Requirements for a Government Owned DIME/PMESII Model Suite

Office of the Secretary of Defense Modeling & Simulation Steering Committee

July 2009

Requirements for a Government Owned DIME/PMESII Model Suite

Authorship

Principle Investigator	Roger Hilson, Ph.D	Naval Research Laboratory
Chief Social Scientist	William C. Young, Ph.D	OPNAV N81 (SAIC)
Chief Integrator	Jerry R. Smith, Ph.D	OPNAV N81

Systems Analysis	Doug Clark	Gard Associates
Descriptive Requirements	Ivar Oswalt, Ph.D	Visitech
Descriptive Requirements	Robert Tyler, Ph.D	Visitech
Measures of Effectiveness	Staff	OPNAV N81 & NRL
Framework Requirements	Steven Kasputis, Ph.D	Reallaer
Framework Requirements	Troy Hendricks	OPNAV N81
Sample Scenario	Trena Lilly	OPNAV N81 (JHU/APL)
Model Analysis	Myriam Abramson, Ph.D	Naval Research Laboratory
Model Comparisons (Analytic	:) Steve Kasputis, Ph.D	Reallaer
Model Comparisons (Framew	ork) Roger Hilson, Ph.D	Naval Research Laboratory

Technical Advisory Committee

COL Walter "Shep" Barge USA	JCS J8 WAD
Michael Baranick, Ph.D.	National Defense University
Pauline Baker, Ph.D.	Fund for Peace
Kathleen Carley, Ph.D.	Carnegie Mellon University
Stephen Downes-Martin, Ph.D.	US Naval War College
Debbie Duong, Ph.D.	OSD PA&E (SAIC)
Dean Hartley, Ph.D.	Hartley Consulting
Andrew G. Loerch, Ph.D.	George Mason University
Charles Macal, Ph.D.	Argonne National Laboratory (JTAC)
Edward MacKerrow	Los Alamos National Laboratory
CAPT Brett M. Pierson USN	JCS J8 WAD
Helen Purkitt, Ph.D.	US Naval Academy
Julie Rosen, Ph.D.	
Robert Rubel, Ph.D.	US Naval War College
John Salerno, Ph.D	Air Force Research Laboratory
Jerry Smith, Ph.D.	
Yuna Wong, Ph.D.	

Executive Summary

Throughout history, governments, groups, and organizations have sought to exert influence over others via a range of policies and actions in order to achieve a range of objectives. In the current discourse, the components associated with power and influence projection are abstracted into Diplomatic, Informational, Military, and Economic (DIME) actions while the resultant impacts are typically characterized as Political, Military, Economic, Social, Informational, and Infrastructural (PMESII) effects.

In pre-modern states, the analysis of such DIME actions and PMESII effects was the exclusive purview of kings, princes, and royal advisors. With the Renaissance, the Age of Enlightenment, and the Scientific Method, philosophers and advisors began to slowly develop methods to analyze the political, economic, military, and social repercussions of statecraft in a manner that allowed it to move beyond the throne room and into the supporting bureaucracies, entrepreneurial organizations, and educated population. With the development of Operations Research and other analytical/organizational methods, military planning and research became separate from foreign policy analysis and both began to move out of the philosophical realm into the domain of science, though the science was often tainted by agendas. Much more recently, efforts based on social, political, and economic theories have attempted to represent, at least in part, limited DIME/PMESII scenarios in a systematic manner suitable for automated computer simulation.

This report documents a recent effort to systematically develop a "Gold Standard" for DIME/PMESII modeling. This standard consists of set of core requirements and frameworks which are necessary to efficiently and effectively support the simulation of full-ranged DIME/PMESII scenarios. Also included is an assessment of the current *state-of-the-art* in automated simulation; a list of specific difficulties associated with current modeling and simulation practices and architecture frameworks; a set of generic analytic measures of effectiveness to facilitate analysis of DIME/PMESII scenarios; and a list identifying analytic coverage gaps and deficiencies to aid in modeling investment strategies. Finally, recommendations on closing the gaps and deficiencies, as well as special studies to start resolving the difficulties are proposed.

Background & Objective

This document presents the results of an effort to identify the core, high-level requirements for modeling DIME actions and PMESII effects. The effort grew out of the recognition by the Office of the Secretary of Defense (OSD) that DIME/PMESII modeling is of increasing importance and needs further development. The OSD also recognized that the proliferation of many proprietary DIME/PMESII modeling tools may impede future development of this technology. To promote and guide the development

of non-proprietary tools whose design elements could be easily accessed and modified as necessary by analysts and stakeholders, the OSD decided that a comprehensive list of modeling requirements was needed.

This effort's original scope included the development of a prototype model. However, given DARPA's significant investments in COMPOEX, the decision was made to not proceed with a prototype but instead focus all efforts on developing a list of high-level requirements that can serve as a "Gold Standard" for evaluating DIME/PMESII models in the following major areas:

- **Descriptive Requirements** which identify the elements that DIME/PMESII models should represent
- Useful **Measures of Effectiveness** that touch on the complex strategic aspects of societal responses, to aid the DIME/PMESII analyst and decision-maker
- Framework and Architectural Requirements which address software design issues such as: integration and interoperability of tools; simultaneous module runs and data exchange concerns; and the synchronization of various time-stepped tools.

Such lists can be used as a roadmap for evaluating the utility of existing DIME/PMESII models or to guide model development. These requirements can support the development of a suite of government-owned, open source DIME/PMESII modeling tools. By comparing the capabilities of existing models against these requirements, stakeholders can identify gaps and deficiencies in the current set of models to aid in making model improvement and investment decisions.

Development Approach

The general approach for identifying DIME/PMESII model requirements was designed to fulfill two crucial prerequisites: (a) that the descriptive requirements and associated metrics be broadly applicable and independent of any particular scenarios, missions, social science theories, or model and tool suites; and (b) that the framework and architecture requirements address a wide range of computational challenges, including operator/analyst functionality needs, and platform/system independence.

The development effort was initiated by holding a multi-agency workshop to solicit input from a wide range of stakeholders and potential users. This yielded a broad collection of specific requirements and needs based on past experiences as well as many excellent insights about past analytic efforts of varying degrees of success.

An Advisory Panel also was assembled whose members had a range of skills and experiences:

- Operators, analysts, and academics
- Social scientists, modeling experts, and other subject matter experts

This panel participated in the workshop, provided technical guidance during the development process, and reviewed drafts of the requirements and other technical products.

Concurrently, a survey of open-source literature about past and on-going DIME/PMESII activities around the globe was conducted. This covered public strategies and doctrines from a range of governments and agencies as well as reports about many past and on-going analysis efforts. Special attention was given to the required representations, assumptions, and identified gaps in existing efforts. Additionally, existing models were examined in an effort to capture as many requirements as possible. These model reviews laid the groundwork for the gaps and deficiencies analysis.

Every effort was made to use open sources to ensure that the final set of requirements could be as widely disseminated as possible. These efforts resulted in a set of descriptive and framework requirements which, though informed by theory and current models and shaped by past experiences or analytic needs, were generic in nature and broad in scope.

Descriptive Requirements

In total, 135 broad descriptive requirements were identified. Unfortunately, not all fit into the standard DIME/PMESII construct of U.S. DIME actions and their resulting PMESII impacts on a host nation. For the "Gold Standard" requirements, it was determined that a generalization of the DIME/PMESII construct was required that:

- Permitted a full range of actors-not just U.S. government actors-to take DIME actions which have impacts on the other actors
- Included representations of each actor's decision-making process
- Included legal actions (DIMEL¹)
- Inclusion of Overarching Factors (in addition to Actions and Effects)

This resulting enhanced "DIMEL"/PMESII dichotomy, though still "host country-centric," is significantly more general.

The greatest change is the inclusion of the Overarching Factors (O) which includes broad contexts such as natural environments, decision-making processes, the institutional frameworks in which actors operate, space/time constraints, and natural or large-scale events.

- States (O-S): All states of the physical environs (weather, geography, infrastructure physical condition, etc.) and the total PMESII states of the scenario.
- Events (O-E): Includes natural events (disasters), planned events (elections), and unplanned events (coups) as they impact the scenario.
- Actors (O-A): The stakeholders in the scenario whose decisions, actions, and resulting effects are being analyzed. Associated with actors are three overarching sub-areas: decision-making, social contexts, and interaction protocols which govern behavior.

¹ The DIME convention, though used throughout this document, always implicitly includes Legal.

- Decision-making (O-D): The process of making a decision for actors based on their objectives, perceptions, abilities, and limitations.
- Social Contexts (O-C): The backdrop and contexts through which actors interpret events, weight options, and make decisions to act.
- Interaction Protocols (O-P): The rules and protocols that govern behavior between actors and within organizations.
- Natural Environs (O-N): The natural, physical environment within the scenario.

The final taxonomy selected for actions includes **Diplomatic**, **Informational**, **Military**, Economic, and Legal (DIMEL). Although some other versions of the DIME/PMESII construct include Intelligence and Financial (DIMEFIL) actions, it was determined that all intelligence activities are a subset of Information actions while financial actions are a complete subset of Economic actions. However, legal activities are sufficiently distinct from diplomatic or military actions to warrant a separate category. Furthermore, "legal" was preferred over "law enforcement" because "legal" encompasses the broader aspects of rule-of-law actions such as the legislative, judicial, and sentence execution aspects of rule-of-law (ex. imprisonment, prison administration, training prison guards, etc.) in addition to all law enforcement activities. Martial law, counter-corruption, counterpiracy, and the identification, interdiction, and disruption of destabilizing actors are also covered under legal. The scopes of diplomatic and economic activities were broadened to include interactions between the full range of actors (e.g. NGOs) and to encompass the full economy (e.g. budgeting, spending, most forms of aid), respectively. Finally, information actions include all activities involving information: collection, creation, and processing; dissemination; and all forms of information operations such as wide dissemination of information, communication activities, or messages (psychological operations, deception, propaganda, and spinning of the message).

The taxonomy of effects used here also required modifications since nearly every **Political**, **Military**, **Economic**, **Societal**, **Informational**, and **Infrastructure** (**PMESII**) category is really a subset of society². To resolve the apparent inconsistency, the "S" in PMESII has been defined as a residual category in the list of descriptive requirements such that "*societal" effects are the full universe of impacts minus the political, military, information, and infrastructure effect areas*. Thus societal includes areas such as effects of socio-political discrimination, impacts on social institutions such as the family and friendship networks, and perceptions of population groups. Other modifications to the PMESII taxonomy include:

² In reality, almost every part of PMESII is "social." The political system, military personnel, military organization, and the economy are all aspects of human society, while "information"—an abstract, ethereal thing which shapes the perceptions of societal groups—is created and transmitted in social contexts by people. Only the physical dimensions of PMESII (e.g. infrastructure, military assets, buildings, etc.) are not "part of" society. But even those physical entities were created by societies and exist to serve societies. Despite these reservations about the DIME/PMESII construct, it was beyond the scope of this effort to create a completely consistent taxonomy of "effects."

- Broadening of the political area to include all politically related activities
- Inclusion of actors perceptions as shaped by available information which in turn leads to decisions, actions, and ultimately more effects
- Expansion of **Infrastructure** $(N)^3$ to include the natural environment and resources as well as man-made physical assets (transportation networks, industrial base, storage facilities, the facilities used by the educational system, etc)

Thus in the presented construct, each actor (A), wrapped in his perceptions of PMESII environment (Contexts), decides on a course of action based on his objectives, abilities, and limitations. These actions involve interactions (DIME) which are shaped by protocols and expectations. All of these actions, perceptions, and contexts take place under the influence of other overarching factors such as states, the time/sequence of events, and the natural environment (Figure 1).



Figure 1: The Synthetic Space

In general, the descriptions of Action requirements are broadly written to include not only the specific action taken by an actor but also the full range of direct and indirect effects resulting from this action. Similarly, the descriptions of effects are written so as to refer back to the full collection of the DIME actions that impacted them. In addition, the *effects-of-effects* (i.e. secondary and tertiary impacts) are captured through the interdependencies of the descriptive requirements. Furthermore, many of the effects requirements – although expressed in terms of the impacts of lost or restored capabilities (e.g. "Effects of Sanctions") – also include the opposite case (i.e. "*effects of lifting sanctions*"). Finally, many requirements track changes in the model's states such as perception, attitudes, and the environment. In these cases, the requirement includes the full range of the effects associated with both positive changes as well as negative changes in the associated states.

³ Note that "N" is used to denote the infrastructure area to avoid confusion with information.

Measures of Effectiveness

To aid the analytic community in determining the effectiveness of a given course of action, a set of **Measures of Effectiveness** was developed using the subtle but important distinctions between measures, metrics, and indicators [Web-01]:

- A measure "provides an indication of the extent, amount, dimension, or capacity of a process or product."
- A metric "is a quantitative measure of the degree to which a system, component, or process possess a given attribute."
- An indicator "is a metric or combination of metrics that provides insight into the process or product itself."

Therefore, metrics are quantitative values that are characteristics of a system or process while indicators, which are formed from metrics, are often qualitative in nature. Thus, a hierarchy between metrics and indicators naturally forms under the umbrella of measures. Figure 2 presents this hierarchy as a pyramid which is consistent with the NATO hierarchy for C2 best practices [NATO02] and the OSD proposed planning aids for small-scale contingencies [Gan02].

The **Dimensional Parameters** (DPs) form the foundation, include universally accepted, directly measurable quantities (e.g. mass of cargo in kg, load capacity of truck in m3, load time for truck in hrs, etc.), are independent of scenarios, and represent characteristics of the relevant system. The measures at the next level, **Measures of Performance** (MoP), are quantitative values determined directly via universally accepted mathematical processes (e.g. distance traveled for a given rate and time, number of meals a truck can transport in a given time, and so on).



Figure 2: Hierarchy of Measures

Measures at the middle tier—the last fully quantitative, metric-based measures—are the **Measures of Effectiveness** (MoEs) which may include "boundary" or terrain conditions.

For example, to determine the "satisfaction of food needs" requires knowledge of the spatial demand signal which depends on the specific ground conditions and applied assets. However, the satisfaction rate (e.g. percent of immediate demand satisfied) is directly calculable through analytic methods and hence is still a metric. Thus the mid-level metrics are hard or analytically-based quantities which:

- Are mathematical & broadly acceptable (for given assumptions)
- Depend primarily on "Boundary Conditions" associated with a given scenario.

These low- and mid-level metrics are too numerous to catalog, are often self-evident due to their quantitative nature, and are seldom of interest to policy-makers. For these reasons, the present effort focuses on identifying the **Indicators** in the top two layers where insight into the process itself can be gained. These indicators, which often use metrics as inputs, are qualitative in nature and can only be completely defined within the context of a specific scenario. In addition, the indicators are:

- Specific to the broad campaign goals
- Not always broadly acceptable by the analytic community
- Subject to interpretation
- Depend on assumptions, outside theories or indices
- Do not possess a unique form for a given scenario

The first high-level indicator is the **Measure of Force Effectiveness** (MoFE) which is designed to evaluate the impact of a collection of related activities independent of any specific policy question. To illustrate: consider the case of a humanitarian assistance operation. Measures of Force Effectiveness could address the perception of the assisted populations regarding either the sufficiency of effort; the equity or fairness of effort; or the impact/reception of the associated information campaign on the humanitarian assistance operation.

The highest-level indicator is the **Measure of Policy Effectiveness** (MoPE) and is used to evaluate how MoFEs collectively support very high level policies⁴ through scenario-specific value scales. Using the same humanitarian assistance example, the MoPE is utilized to examine the impact of policies such as "Apply humanitarian assistance to increase regional stability" where the MoPE may define "long-term regional stability" in terms of MoFEs such as "Perception of Gov't Sufficiency / Legitimacy," "Ensure Gov't Sovereignty," and "Security of Basic Needs" among others. Like the MoFE, the MoPE scale is generally user-defined and there is no single "correct" method for evaluating a MoPE. Furthermore, the MoPE may require an outside theory or index (e.g. the Eurasia Group's Stability Index or the Economist Intelligence Unit's Quality of Life Index).

In nearly every case, the high-level indicators span multiple DIME/PMESII areas. In the present work, each indicator is linked to multiple descriptive requirements and their

⁴ In the present work, the considered policies were linked to 18 distinct overarching policy areas.

associated metrics. In many cases, a group of other indicators are joined and rolled up into a single Measure of Policy Effectiveness indicator.

DIME/PMESII Data

DIME/PMESII models are all fed by data which initializes the scenario, establishes the static "terrain" and boundary conditions, and defines the forcing factors which drive the model through various states. It is these initial, boundary, and forcing conditions which shape the simulations and determine the outcomes—the artificial observations—which are the source of analytic insights.

In this report, two types of data, quantitative and qualitative, are compared and contrasted. When discussing methods for converting one type to the other, the report makes two important points: 1) qualitative data can be both exact and objective, and 2) much of modeling is actually driven by qualitative data in the form of rules, procedures, command networks, etc. However, it notes that there are many more analytic tools and frameworks available to process and utilize quantitative data than qualitative data. This analytic disparity, which has limited the use of qualitative data and created misconceptions regarding it, needs to be remedied through the focused development of improved and more versatile frameworks which allow qualitative data to reside in its natural, qualitative state.

Framework & Architecture Requirements

The framework and architecture requirements focus on the functionality of an ideal DIME/PMESII model suite. Thus the ideal framework must:

- Maximally assist the analyst through automation
- Provide clear visibility within models regarding both PMESII states as well as cause and effects at any desired granularity
- Permit unlimited control of system data, configuration, and operations
- Allow any combination of models to be integrated together (including legacy or other non-framework compliant models), permit input of available datasets (regardless of format), and allow outputs to be tailored for the analysis at hand.

While the present state of technology may not currently permit all of the objectives, all were used to generate requirements so that all gaps in framework design would be revealed and development efforts could be prioritized. The 600+ identified framework and architecture requirements are organized into five broad categories:

- 1. **Operator Interactions:** includes setup and operation; input/output and metadata management; system utility and *ease-of-use*; and visualization
- 2. **System Control:** includes execution and run control as well as coordination and data exchange between modules
- 3. **Model Interoperability:** covers negotiation of time and data mappings between modules; management of exchange protocols; and maintaining consistency in PMESII state vectors between modules

- 4. **System Integration and Maintenance:** spans topics such as model integration tools and middleware; system maintenance; and documentation (including validation testing)
- 5. **System Architecture:** addresses the system's architecture, specifically its flexibility, scalability, portability, and interoperability; overall performance and efficiency; system availability, reliability, and maintainability; and system security.

The next sections outline general gaps and deficiencies in DIME/PMESII modeling and social theories and also discuss specific modeling challenges.

Gaps and Deficiencies in Models, Data, and Frameworks

Fourteen commonly used models were compared against the "Gold Standard's" descriptive requirements to assess the *state-of-the-art*. The goal was to identify gaps and deficiencies to aid investment decisions which support the development of theories and modeling tools. The models selected for this comparison are listed below:

• ACTOR	 Integrated Gaming 	• MIT State	• PSOM
• Agile	System (IGS)	Stability Model	• Synthetic
• Apollo	• Interim Semi-	• MOOTW	Environments for
• CAST	static Stability Model (ISSM)	• Nexus	Simulation
• Centurion		 Organizational 	(SEAS)
• COMPOEX		Risk Analyzer (ORA)	

These models were selected either because they have enough documentation for evaluating their capacities and characteristics or because they are currently used by many members of the analysis community.

From this comparison, it was determined that few requirements are well covered by the collection of models. Specifically, only 23 of the 135 requirements are addressed by four or more models⁵. Over half of the descriptive requirements are either completely unrepresented (46) or are covered by three or fewer models (60) that touch only some portion of the requirement. Important requirements gaps, for which no models represent any portion, include:

⁵ Note that in this comparison, a model only needs to address some portion of a descriptive requirement to receive "credit" for coverage. Thus if all fourteen models touch a given requirement, this does not mean that existing models completely or adequately addresses the requirement for all possible applications. For example, several models address the effects of E-S-7 "Migration" but no models currently identify the precise conditions that trigger migration or completely represent the manner or pattern of the resulting migration.

- A-E-5 Economic Information Operations
- A-E-15 Economic Development Supporting Disaster Recovery
- A-E-16 Stability Operations (Economic)
- E-P-2 Changes in Political Involvement of Host Nation Citizens
- E-P-3 Changes in Government Structure or Functions
- E-M-2 Effects of Multi-National Exercises on Military
- E-S-9 Effects of Discrimination in Host Nation

Within the descriptive requirements, currently there is limited ability to model important DIME/PMESII interactions, events, and effects. Most notably these PMESII modeling gaps and deficiencies include:

- Limited ability to examine how social networks adapt and respond to the evolving DIME/PMESII environment
- Representation of how the different types of illicit support benefit insurgents
- Ability to model the shift from insurgency support toward criminality
- Effects of training on military and government personnel
- The shift between short-term behavioral change and long-term attitudinal shifts

In conjunction with assessing modeling gaps, a first-cut assessment of data availability and gaps was performed against the descriptive requirements. That assessment, limited to publically available data sources, found that even fewer descriptive requirements were addressed with data to feed into models.

In addition to quantifying the descriptive requirements coverage in the current *state-of-the-art* tools, the architecture of the DARPA released COMPOEX (software backplane plus selected modules) was compared against the identified Architecture and Framework Requirements. COMPOEX's framework contains many desirable features that support essential operational functionality but there are several important deficiencies that were identified (Table 1) including:

- No enforcement of data compatibility (i.e. strong data-typing is lost) when data is passed between models
- No support for meta-modeling
- Differences in simulation time steps must be individually handled within the model components rather than automatically resolved by the backplane (COMPOEX's backplane assumes all models send and receive updates at a constant preset simulation clock interval)
- No capability to negotiate data schemes between models making it difficult to integrate COMPOEX models with non-COMPOEX models
- No method for publishing and subscribing to data produced by external models, as is possible with HLA (High Level Architecture)

COMPOEX Comparison		
1. Operator Interface	4. System Integration and Maintenance	
3/7 1.1 Setup	2/3 4.1 Model Integration	
0/3 1.2 Operation	0/2 4.2 Maintenance	
3/7 1.3 Output	0/2 4.3 Validation Testing	
0/3 1.4 Metadata management	1/7 4.4 Documentation	
1/4 1.5 System utility	5. System Architecture	
2. System control	1/1 5.1 Flexibility	
3/4 2.1 Execution control	N/A 5.2 Performance	
5/6 2.2 Coordination	2/3 5.3 Scalability	
1/2 2.3 Data exchange	0/3 5.4 Availability	
3. Model Interoperability	0/1 5.5 Reliability	
0/1 3.1 Negotiate timing	0/1 5.6 Maintainability	
0/12 3.2 Negotiate data	0/4 5.7 Security	
0/3 3.3 Negotiate protocols	0/2 5.8 Portability	
0/3 3.3 Negotiate data distribution	0/4 5.9 Interoperability	
0/6 3.5 Consistent Descriptions		

Table 1: Comparison of COMPOEX to Framework Requirements

Notes: The comparisons with COMPOEX are made down to rolled-up third tier framework requirements. The coverage of these third tier requirements is denoted as a fraction (e.g. 3/7 requirement under the 1.1 grouping). Note that only a portion of the requirement need be covered to get full credit.

Specific framework and architecture gaps on scenario generation; tool interoperability and sharing of data (inputs, outputs, and states); data reuse (for vignette and excursions); dynamic switching between models or resolutions; and identification data requirements warranted additional attention. The most significant deficiencies included:

- Construction tool for rapid scenario creation from scratch
- Lack of a scenario data wizard which allows single point of entry for all data files to provide consistency in interpretation, reduce setup time, enhance reusability, and reduce errors
- Just-in-time resolution and fidelity which allows dynamic switching between modules/theories based on the changing conditions
- Automated Flagging when a model moves beyond its limits of applicability
- Uncertainty analysis and error tracking throughout an analysis, and
- Ability to identify game changes (e.g. what information would significantly change perceptions and yield a better decision for the actor?)

In addition to modeling and framework gaps, specific deficiencies in social theories were identified including:

- Theories regarding the perception of events for individuals and groups (both retrospective perceptions and perceptions on anticipated or expected outcomes)
- Scalability, decomposition, and moving between resolutions (micro, meso, and macroscopic)
- Theories linking personality, culture, and decision-making

To aid in the development of theories, models, and datasets as well as develop insights, several exploratory studies are recommended and challenge problems are proposed:

- Strategic Communication
- Impact of Social Leaders on Society (e.g. ideological, religious, political)
- Information Operations and Campaigns (in the broadest social context)

Additional gaps, deficiencies, and challenges are provided in greater detail in Chapter 7

Recommendations

Further investments in well-covered descriptive requirements should be deferred until more of Table 4 (Coverage of Descriptive Requirements on page 1) is green. A systematic approach to filling the descriptive requirements gaps is needed based on the most pressing and urgent needs. Such a prioritization will be difficult to firmly establish since it is difficult to predict which future scenarios will be of greatest importance. However, the gaps outlined in this Executive Summary appear to be universal shortfalls and should be addressed first.

Similarly, the most critical COMPOEX framework gaps (listed above) should also be closed and a review initiated to determine which of the other framework gaps can be closed within COMPOEX's current constraints. Where closure is not possible, alternate frameworks and architectures should be examined and considered for the next-generation framework. No attempt was made to identify which framework requirements could be achieved with current technologies and which will require additional research and development. Such a review is highly recommended before any comprehensive effort is initiated on the next generation framework.

Refining and initiating the recommended studies (see page 99) will increase understanding in these areas while aiding in the development of appropriate theories and the identification of additional deficiencies (e.g. data). The most pertinent studies would be those that examine strategic communications, impacts of social leaders, and information operations and campaigns. Finally, the specific gaps in modeling capability, social science theory, and other technical challenges (listed above) need to be addressed in order to achieve the greatest gains and efficiencies in future analyses. Of highest importance are the scenario construction tool and a universal data wizard to convert data into a uniform semantic context.

Table of Contents

E	Executive Summary			
1	Intro 1.1 1.2 1.3	Development Process Use of this document	18 18 19 23	
2	Dese 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9	criptive Requirements List Independence of Theory & Model Coverage of the Descriptive Requirements Basic Format of Each Descriptive Requirement Modifications to DIME/PMESII Spectrum Overarching Requirements (O) Action Requirements (A) Effect Requirements (E) Definitions, Missions, and Other Characterizations of Requirements Complete List of Descriptive Requirements	25 25 27 28 29 30 33 35 38 42	
3	Mea 3.1 3.2 3.3 3.4	Hierarchy of Measures High-Level Indicators Categories of High-Level Policies Measure of Force Effectiveness	48 48 51 52 56	
4	Арр	lying the Descriptive Requirements & Measures of Effectiveness	60	
5	Data 5.1 5.2 5.3 5.4 5.5 5.6 5.7	The Nature of Data Major Lessons Learned in Past Efforts Further Discussions on Qualitative Data Data Use Best Practices Proposed Data Quality Measures Data Availability Assessment Methodology Conclusions	 62 62 66 67 70 70 71 72 	
6	Fran 6.1 6.2 6.3	nework & Architectural Requirements System Overview Requirements Organization - Description of Functional Areas Framework Burden on the Model Builders	73 74 74 83	
7	Curr 7.1 7.2 Requir	rent State-of-the-Art Comparison of Selected Models against Descriptive Requirements Comparison of Data & Modeling Capabilities against Descript rements	85 85 ive 87	

7	.3 Comparison of COMPOEX against Framework Requirements	
7	.4 Gaps & Deficiencies in DIME/PMESII Modeling	
7	.5 Gaps & Deficiencies in Frameworks & Architectures	
7	.6 General Modeling & Simulation Challenges	
7	.7 Social Theory Gaps & Deficiencies	
/ 7	8 Recommended Studies	
/	.9 Summary	
8	Recommendations	
9	Acronyms & Glossary	103
10	Social Theory—Assessment of the Coverage & Consistency	107
1	0.1 Slow Progress in Theoretical Developments	107
1	0.2 Difficulties in Data Collection	109
1	0.3 Limited Scalability and Generalizability	110
1	0.4 Inherent Complexities of Generalized Cognition Modeling	111
1	0.5 Conclusions	
11	Detailed List of Descriptive Requirements	113
12	Detailed List of Measures	
1	2.1 Measures of Policy Effectiveness	
1	2.2 Measures of Force Effectiveness	
13	Selected List of Data Sources	
14	Data Requirements	
1	4.1 Data Collection Best Practices	
1	4.2 Proposed Metadata Tags	
1	4.3 Generic Problems in Maintaining Quality Data	
15	Sample Scenario	
S	tep 1: Identify, Define, and Bound the Scenario	
S	tep 2: Generate Modeling Requirements and Associated Measures	
S	tep 3: Select Model Suite	
S	tep 4: Determine Model & Data Coverage	
S	tep 5: Begin Modeling and Analysis	
16	Detailed List of Framework & Architecture Requirements	
17	Model Synopses	
	CAST	
	CogSim	
	COMPOEX	
	DIAMOND-US	
	Interim Semi-static Stability Model (ISSM)	
	MANA	
	MITSSM	
	Nexus	
	National Operational Environmental Modeling (NOEM)	337
	ORA	

PoFED	
PSOM (UK)	
Pythagoras	
Rebellion	
SEAS-VIS	
Senturion	
SIAM TM	
STRATMAS®	
18 Bibliography	

1 Introduction

This chapter describes the thinking that led to this effort, presents its overall objectives, and details the processes through which the core requirements for a government-owned DIME/PMESII model suite were identified.

1.1 Background & Objective

In the increasingly complex and interconnected world of today, no social actions or events can be considered the results of simple cause-and-effect chains. Rather, they are produced by many causal factors that are intertwined. Moreover, actions and events are not isolated from each other, even though they might occur in different countries or continents. Rather, each action works in concert with others, so that their effects are the culmination of multiple factors. Furthermore, the actual (ground truth) effects are not always as important as the ways in which they are perceived. Because perception is strongly dependent on every person's culture, history, and values – as well as the availability and accuracy of information – it is very difficult for any actor to predict how his or her actions will be perceived by others. This is especially true in today's globalized world, where reports about actions and events can flash across the world in seconds, prompting reactions from people in many different cultures and countries. Thus it is increasingly important to understand how actions interact synergistically to yield effects; how those effects are perceived by stakeholders and observers; and how those stakeholders may respond. In order to best aid decision-makers, it is desirable to have analytic methods and tools which can forecast the effects of decisions and courses of action. This type of capability falls squarely within the DIME/PMESII modeling and analysis regime.

This document presents the results of an effort to identify core, high-level requirements for modeling DIME actions and PMESII effects. The effort grew out of the recognition by the Office of the Secretary of Defense (OSD) that DIME/PMESII modeling is of increasing importance and needs further development. The OSD Modeling and Simulation Steering Committee (M&S SC) also recognized that the proliferation of many proprietary DIME/PMESII modeling tools may impede future development of this technology. As such, the OSD decided that a comprehensive list of modeling requirements was needed to promote and guide the development of non-proprietary tools whose design elements could be easily accessed and modified as necessary by analysts and stakeholders. This report documents the results of such an effort.

1.2 Development Process

The purpose of a DIME/PMESII model or simulation is to aid decision-makers. They need to determine how to apply assets and capabilities when executing various kinds of missions (ranging from irregular warfare to conducting non-kinetic operations that avoid conflict and promote security). Therefore, the process of developing lists of modeling requirements was based in their point of view: mission planning and asset allocation.

The development effort, led by the Naval Research Laboratory, began in July 2007. It started with the recognition that DIME/PMESII models and simulations are used by the DoD to help plan or guide particular missions – that is, either irregular warfare or non-kinetic operations that aim to deter or prevent warfare. That being the case, the first step was to produce an inventory of all of the activities and goals that these DoD missions entail. By examining the scenarios and mission-related activities that are described in DoD documents, doctrine, and instructions, it was possible to produce an activity analysis and provide the operational context for DIME/PMESII modeling. This step also yielded a very preliminary list of requirements.

Concurrently, a survey of open-source literature about past and on-going DIME/PMESII activities around the globe was conducted. This covered public strategies and doctrines from a range of governments and agencies as well as reports about many past and on-going analysis efforts. Special attention was given to the required representations, assumptions, and identified gaps in existing efforts.

In December 2007 a workshop was held where stakeholders and modelers from many US government agencies and services provided input about DIME/PMESII modeling requirements [JHU07]. This yielded a broad collection of specific requirements and needs based on past experiences as well as many excellent insights about past analytic efforts that had varying degrees of success. The requirements elicited from the workshop participants were added to the requirements found in DOD documents.

At the same time, an Advisory Panel was assembled whose members had a range of skills and experiences. They included operators, analysts, and academics from various fields (social scientists, specialists in modeling and simulation, and other subject matter experts). This panel participated in the workshop, provided technical guidance during the development process, and reviewed drafts of the requirements and other technical products.

The next step was to sort the initial batch of requirements into two sub-sets: descriptive requirements (which identify the elements that DIME/PMESII models should represent) and framework or architectural requirements (which address software design issues such as: integration and interoperability of tools; simultaneous module runs and data exchange concerns; and the synchronization of various time-stepped tools).

Extended interviews were conducted in 2008 with experts, operators, analysts, planners, and decision-makers. These interviews sought to capture the "lessons learned" by experts and practitioners of DIME/PMESII modeling ventures (past and on-going). The interviewees included:

• Dr. Pauline Baker (Fund for Peace)

- COL Trey Braun (Army War College, Carlisle PA)
- Dr. Kathleen Carley (CMU)
- Dr. Dean Hartley (Hartley Consulting)
- Dr. Garth Jensen (OSD Science Advisor)
- Dr. Douglas Johnson (Army War College, Carlisle PA)
- Dr. William Lawless (Paine College)
- Dr. Andrew Loerch (George Mason University)
- Dr. Susan Numrich (Institute for Defense Analysis)
- Dr. Robert Rubel (Naval War College)
- Dr. Wilmer "Al" Sweetser (OSD PA&E SAC)
- Dr. Phil Williams (US Army War College, Carlisle PA)

In addition to specific questions regarding past and on-going efforts, descriptive requirements, measures, framework requirements, and gaps, each interviewee was given the opportunity to take the interview along a path that experience has shown to be important. It was these tangential paths that most often lead to critical insights and needs which are captured in the final set of requirements.

1.2.1 Scope changes

Initially, this effort was intended to be only the first phase of a project to develop a government-owned DIME/PMESII model/suite for use in place of existing proprietary model suites. The guiding objective was to construct a model/suite that would be open for government user review and validation without proprietary restrictions. After identifying the requirements for such a model/suite, it was expected that a prototype would be developed. However, this broader objective was overtaken by events. The Defense Advanced Research Projects Agency (DARPA) released portions of its Conflict Modeling, Planning, and Outcomes Experimentation (COMPOEX) suite of modeling tools in 2007. The suite was used by JFCOM for conducting limited experiments in that year and by 2008 it had attracted the interest of many modelers in the DoD. Because COMPOEX appeared to satisfy many of the needs for a non-proprietary modeling suite, it no longer seemed urgent to develop a new suite of DIME/PMESII modeling tools. Given the maturity of the COMPOEX effort and the level of previous investment devoted to it [DARPA-09], it was decided that a new non-proprietary modeling suite should not be developed at this time. Accordingly, the effort was re-scoped, so that instead of a new modeling tool or suite of tools, it would produce a "gold standard" for evaluating all existing tools and for guiding investments in developing new modeling capabilities.

1.2.2 Descriptive Requirements

The list of descriptive requirements derived from the inventory of DoD publications and the input of the workshop participants was not complete. Additional requirements could be identified by other means – for example, by examining existing DIME/PMESII models. To illustrate: one such model – NEXUS – represents the attitudes of each actor in a scenario about historical events and shows how the actor assigns blame for historical wrongs and errors to the other actors in a game. This modeling capability is useful for

some simulations, yet it did not occur to the participants in the workshop to list this capability as a requirement.

Another way to identify new requirements was to carry out systematic, logical reviews of DoD mission activities and goals from various perspectives. For example, one component of a Humanitarian Assistance (HA) operation is to supply and distribute emergency food supplies. From a military perspective these activities have no secondary effects; they serve only to provide food for displaced persons temporarily under military protection. From an economist's perspective, however, provision of emergency food supplies has many secondary effects. It can depress prices for food in local markets and prompt local farmers to try to market their produce far away from the disaster area, where emergency food supplies are not available. The greater the scale and duration of the relief effort, the more pronounced these secondary economic effects will be; thus they should be modeled. This shows how a logical review can generate new modeling requirements.

To prevent the list of descriptive requirements from growing beyond what real users actually need, the list was distributed to the members of the Advisory Panel. They provided judgments about whether each requirement on the list was really needed. The goal was to strike a reasonable balance between listing every conceivable descriptive requirement and listing only the bare minimum. Hence users should regard the list as a useful guide rather than a closed set, especially when it comes to deciding what the descriptive requirements should be for a particular modeling application. New requirements can always be devised to cover the specifics of a particular scenario or application.

1.2.3 Measures of Effectiveness

It was determined that a set of high-level measurements was an important component to the requirements development effort; therefore, another next task was to develop metrics for the descriptive requirements. Initially this was based on the same activity analysis that was used to provide context when requirements were elicited from stake holders and extracted from documents. In this phase, however, the activity analysis provided sets of nouns that were logically and semantically associated with scenario-based activities. For example, a Non-combatant Evacuation Operation (NEO) includes a number of actions (warning, transporting, sheltering, provisioning, providing), and each of these actions entails agents (civil defense personnel, truck drivers, warehouse managers, doctors) and targets or objects of the actions (embassy staff, host nation employees of the embassy, trucks, tents, medication, food, shelter).

These nouns provided a bridge to the next step: providing metrics for each activity. To continue with the same example: if the activity under consideration is a NEO and its component actions include transporting, sheltering, and provisioning, then the metrics of this activity would be: number of embassy staff evacuated, number of tents provided as shelter, number of sick evacuees treated by medical staff, and so on.

In the operations research literature [Gan02] the metrics associated with such activities are called Dimensional Parameters (DPs). Some other examples of Dimensional Parameters include: the weight of a load of cargo in kilograms, the load capacity of a

truck in m^3 , the load time for a truck in hours, and so on. Dimensional Parameters are completely independent of scenarios and represent the characteristics of physical systems. One can also generate a slightly higher level measure from Dimensional Parameters – known as a Measure of Performance (MoP) – by measuring the activity of a physical system over a specified period of time under particular conditions. Thus if a given cargo weighs 400 kilograms and it takes 2 hours for a particular truck to move the material 80 miles while traveling on a steep road with a grade of 15 degrees, one can calculate a Measure of Performance for the truck. Although we cannot obtain a MoP by means of direct observation, we can calculate it from DPs using simple mathematical operations.

Dimensional Parameters differ from Measures of Effectiveness (MoEs) – and, indeed, all other higher-level measures such as Measures of Force Effectiveness (MoFEs) and Measures of Policy Effectiveness (MoPEs) – in that their values can be determined empirically, by direct observation, without taking into account the end-goals of the mission or effort. Unfortunately, determining the values of Dimensional Parameters and Measures of Performance does not allow analysts to answer some of their most important questions, such as: "how effective was a given course of action?" Answering this question in an analytic and self-consistent manner requires Measures of Effectiveness – and perhaps other, higher-level measures – that are appropriate for a particular scenario.

Measures of Effectiveness, however, cannot be mechanically derived from lower-level measure (that is, Dimensional Parameters and Measures of Performance). Instead, they must be derived from the top down, working downward from the most general and most abstract level of Policies to the levels of Measures of Policy Effectiveness (MoPEs), and Measures of Force Effectiveness (MoFEs).

1.2.4 Data Availability and Gaps

Part of the objective of this effort was to make an assessment regarding the availability of DIME/PMESII data to supply models with both scenario input and potentially validation baselines. A through discussion of data, its types, its uses, and its misuse is developed in Chapter 5 followed by an assessment of data availability. The task of assessing all available data sources was insurmountable and, due to the sensitive nature of many data sets, would have limited the availability of this document. As such, the present assessment of data gaps and availability only considered publically available data sources.

Furthermore, the data gaps were identified by comparison against the descriptive requirements along—no assessment regarding the quality, coverage, or usability of any identified data sources were systematically performed.

1.2.5 Framework & Architecture Requirements

The framework and architecture requirements were developed in several steps. First, a survey of past framework and architecture efforts and research was performed to identify the driving needs of the past. Second, discussions with system experts (framework and architecture) and model developers were held. Concurrently, interviews with

DIME/PMESII model users were conducted to understand needs within the user communities, collect known problems and shortfalls, and identify additional requirements. Finally, by drawing on personal experience from within the team, these inputs were consolidated, shaped, and condensed into more than 600 framework and architecture requirements.

In addition the attendees of the December workshop and input provided by the Advisory Panel, the following model experts and users participated in interviews and technical discussions:

- Mr. Tim Bacon (J9 Norfolk)
- Dr. Michael Baranick (National Defense University)
- COL Walter "Shep" Barge (JCS-J8)
- Mr. Jim Blank (J9 Norfolk)
- Mr. Tony Cerri (J9 Norfolk)
- Mr. Jesse Citizen (DMSO)
- Mr. Peter S. Corpac (BAE)
- Mr. Thomas A. Couture (JCS-J8)
- Dr. Paul Davis (RAND)
- Dr. Brian Efird (Sentia Group)
- Mr. Paul Everson (Booz Allen Hamilton)
- Dr. Dean Hartley (Hartley Consulting, Inc)
- Dr. Alexander Kott (DARPA)
- Dr. Craig Lawrence (BAE).
- LT Robin Marling (MCCDC OAD)
- CAPT Brett Pierson (JCS-J8)
- Mr. Wayne Randolph (DRC)
- Dr. Robert S. Sheldon (MCCDC OAD)
- Dr. Dan Snyder (J9 / Norfolk)
- Mr. Cortez "Steve" Stephens (MCCDC OAD)
- Dr. Yuna Wong (RAND)

These interviews aided in developmenting the model synopses, providing context in the use of DIME/PMESII models, and in developing the framework requirements as well as in comparing the current tools to the complete set of descriptive requirements.

1.3 Use of this document

In this chapter, the background, objective, and development process for the Government-Own DIME/PMESII model suite were outlined.

The list of descriptive DIME/PMESII requirements is explained in Chapter 2 Each requirement includes details regarding scope, associated missions, searchable keywords, and relevant measures of effectiveness. This collection of requirements, which cross-reference one another, span a large portion of the DIME/PMESII space permitting a range of complex scenarios to be richly represented in a variety of contexts.

Chapter 3 describes a hierarchy of Measures of Effectiveness useful to DIME/PMESII scenarios with special emphasis on the high-level indicators. A recommended approach to applying the Descriptive Requirements and Measures of Effectiveness follows in Chapter 4. A discussion on DIME/PMESII related data is presented in Chapter 5.

The descriptions associated with the Framework and Architecture Requirements are provided in Chapter 6 followed with a discussion on the current *state-of-the-art* of DIME/PMESII modeling, simulation, analysis, data availability, frameworks, and theory in Chapter 7. Insights and recommendations follow in Chapter 8.

Several appendices support the document including a glossary (Appendix 9) and a brief review of current state of Social Theory is provided in Appendix 10. The complete and detailed lists for the Descriptive Requirements and Measures of Effectiveness are provided in Appendices 11 and 12. The list of selected, publically available data sources is provided in Appendix 13 followed by additional discussion on data requirements in Appendix 14. A sample scenario is provided in Appendix 15 which illustrates the application of the descriptive requirements and measures of effectiveness. The complete list of Framework Requirements is provided in Appendix 16. Synopses of selected models currently in use appear in Appendix 17 followed by the bibliography in Appendix 18.

These requirements efforts are the first step towards the development of a governmentowned, non-proprietary DIME/PMESII modeling suite. Additionally, the requirements list aids modelers, analysts, and war-gamers in the design and development phases of a DIME/PMESII scenario. Finally, the set of descriptive requirement serve as a *Gold Standard* for comparing the utility of models or as a guide for the development of future modeling tools and suites.

2 Descriptive Requirements List

This chapter outlines a list of statements—the Descriptive Requirements—that characterize the representation of DIME actions and PMESII effects needed by U.S. Government users of models and/or simulations. These statements, which represent the needs of the analytic community, describe the essential components of such models with enough specificity to identify and adequately characterize each particular DIME/PMESII element. Furthermore, the descriptive requirements include associated general measures and interdependencies.

In Chapter 7, the list of descriptive requirements is used to assess the *state-of-the-art* by identifying gaps and deficiencies which will aid investment decisions in the development of theories and modeling tools.

2.1 Independence of Theory & Model

A more detailed and thorough review of the current *state-of-the-art* in social science modeling relevant to the DIME/PMESII problem is provided in Appendix 10. Based on the presentation in the appendix, this section outlines justifies the rationale in writing the "Gold Standard" Descriptive Requirements independent of existing theory.

With respect to DIME/PMESII modeling and simulation, the current state of knowledge regarding social processes, dynamics, and interactions, as well as perception and decision-making, is far from complete. In 1998 researchers argued that "the modeling of cognition and action by individuals and groups is quite possibly the most difficult task humans have yet undertaken," noting that "developments in this area are still in their infancy" [RC 1998:8]. A more recent review admitted that the "situation has not changed significantly in the [past] 10 years..." [NRC 2008:20]. In fact, progress in the social sciences generally, and not just in social science modeling, has been slow.

This slow progress is due to the difficulty of combining inductive research about social behavior (which seeks to establish empirical correlations between variables without distinguishing cause from effect) with deductive research (which derives hypotheses about human behavior from grand theories of human nature and then attempts to test these hypotheses against actual data). On the one hand, empirical correlations are difficult to find because social behavior depends on a very large number of variables. To establish a solid statistical correlation, a huge number of variables must be considered and measured. On the other hand, theoretically informed causal hypotheses emerge very slowly and often are not empirically tested for many years after they are formulated. This is because the process of critiquing social theory from a logical and philosophical viewpoint usually precedes empirical testing and often takes decades.

A good illustration is the effort to explain criminal behavior. Theories about the causes of criminality first emerged in the nineteenth century [Dur95, Dur97], were subjected to criticism [Mer38], were tested against empirical data [Agn92, Agn1995a, Agn95b, AW92, Ake06:152, NMN02, Sro56] and were accepted or rejected. Despite this long process of winnowing, two competing theories of crime (a "social strain" approach and an "environmental/biological/neurological" approach) still remain. There is no consensus about which is correct [TVS78]. Moreover, some social theorists think that competing theories may all be correct to some extent, arguing that cause and effect mechanisms in human life are strongly affected by social and cultural context [Max04:4, PawTil97:69]. Put differently, this is an argument that there are multiple causes for each single effect; the central causal mechanism is shaped by contextual factors. Thus it is not surprising that the social sciences have not established the kinds of "law-like regularities" that were characteristic of Newtonian physics [Boh91:18-30; Say92:125-129].

Another problem is the absence of a scalability principle in the social sciences that allows us to generalize up from individual behavior to collective behavior. Few social scientists have asked whether differences in social scale are correlated with differences in social properties. For example, we see little discussion of scale in the sociological literature about riots [Bid75, BvD95, Col82, Col92, Gae94, Mar70, UK87, UCC96, Wan68]. There are no empirical studies that prove that a riot involving 500 people is structurally different from a riot involving 50,000 people. Only a few studies of riots and mobs have started to explore questions of scale [LMA07, MHC09]. In other disciplines – such as anthropology – there has been research about the differences between small, informal groups and larger, hierarchically structured organizations. Dunbar, for instance, has argued that the upper limit on the size of an informal social group or network is about 150. Larger groups find it very difficult to maintain group cohesion and control disruptive behavior without establishing some kind of formal policing organization [Dun93]. Nevertheless, these explorations into the limits of group size are not systematic studies of the entire issue of scalability.

Scale is not the only problem. Some theories have been shown to be valid for only very narrow domains. For example, theories of motivation that apply to consumer behavior may not be applicable to games and sports, combat, or cognitive actions such as reading or problem-solving [HC05:105, MM87]. Also, theories that seem to have been validated for particular research subjects (for example, the shopworn "American freshmen college class," a sample that appears frequently in the sociological and psychological literature) have not been validated for other populations (e.g. Iraqi shepherds or Afghan villagers) whose social and cultural experiences are very different. Researchers in the psychology of consumer behavior, for instance, have pointed out the need to validate their theories cross-culturally [BO'C05, Dor02, PS03].

The existence of competing theories, the absence of scalability principles, and doubts about the general applicability of theories that are valid for narrow domains all make it difficult for the modeler to decide which social theories to use when constructing a model of a particular scenario. Even if the scenario is de-composed into different dimensions and distinct phases, so that a better match between a social theory and a particular aspect or part of a social phenomenon can be made, there will still be debate about the quality of the match between theory and scenario. In light of these problems, this effort does not identify descriptive requirements based on theoretical grounds. Instead, the list of descriptive requirements is based on an assessment of user needs. By means of interviews, surveys, reviews of task descriptions available from U.S. government agencies, and other assessments, the modeling needs of current user community was determined. Furthermore, the requirements assessment team, based on the interview discussions, attempted to project future modeling needs. No attempt has been made to dictate how these representations must be modeled or what theoretical assumptions the models must adopt.

2.2 Coverage of the Descriptive Requirements

This list of descriptive requirements is also not prescriptive in another sense: coverage. It cannot be expected that every modeling tool can satisfy each of the descriptive requirements for all scenarios and at all granularity levels. In some cases a particular model may only represent one or two features of a social system with any fidelity. If such a model can be linked to other tools which cover different, complementary requirements, the result may be quite satisfactory.

In short, the presented list is independent of theoretical underpinnings and includes only the things that a model or simulation must represent to be useful. It describes the range of social phenomena that an entire suite of modeling tools should, ideally, cover.

Until a grand unified social theory emerges from the research that provides valid assumptions and algorithms for modeling all aspects of social life, the analyst's judgment is required in determining which of the incomplete theories best represents the specific interactions at hand. However, as complex scenarios evolve and the social environment changes, the analyst will not know *a priori* which theorem to apply to the particular modeling task. Under these circumstances, the best modeling tool would represent all plausible theories simultaneously, showing the various possible effects of a particular action and generating a large collection of potential outcome threads. To complete the analysis, SMEs could compare the threads and select those that seemed most plausible. Even if such a modeling tool could be built, however, consensus among SMEs might still elude us.

The community cannot wait for the "best" modeling tool to appear. The community's modeling requirements must come first and drive the development of theories and modeling tools. This list of descriptive requirements, as best as possible, represents the community's assessment of its analytical needs. With these requirements in hand, this effort then assessed the state-of-the-art of the modeling community to identify gaps and deficiencies to aid investment decisions in the development of theories and modeling tools (see Chapter 7).

No claim is made regarding the completeness of this list, although every attempt was made to make it as comprehensive as possible. Instead, the list of descriptive requirements should be regarded as an extendable list that is representative of the full range of actions and impacts associated with non-kinetic operations and events.

2.3 Basic Format of Each Descriptive Requirement

Each descriptive requirement is presented with a variety of information categories in an attempt to show the breadth and depth of the full set. Each descriptive requirement includes discussion of the requirement; cross-linkages between requirements and the measures of effectiveness; keywords; and the related DIME/PMESII areas and missions. The categories presented are:

- **Identifier:** The first component makes the descriptive requirement uniquely identifiable.
- **Title:** The Title provides a succinct description of the social phenomenon to be modeled. The title for A-D-01, for example, is "Support to the Ambassador."
- **Description:** The Description provides a more detailed characterization of the requirement, so that its specific features can be identified.
- The Associated Areas: This provides a quick visual indication of which areas in the DIME/PMESII spectrum are touched by a particular requirement. For example, although A-D-01 is primarily a diplomatic action, it has military, economic, and informational components and has political, military, economic, and informational effects. Thus the designator would have the letters D, M, E, I, P, M, E, and I all present. Also included are the related SEADCPN and FRIS areas.
- The Associated Missions: This identifies the various missions (e.g. Humanitarian Assistance/Disaster Relief [HA/DR], Diplomatic Support [DS], etc.) that are supported by, affected by, or have an impact on a descriptive requirement.
- **Relevant Mission Phases**: This identifies which phases of an operation (Phase 0 through Phase V), if any, are relevant to the descriptive requirement.
- **Keywords:** This is a collection of nouns and verbs associated with the descriptive requirement.
- **Interdependencies:** These link the requirement to the other descriptive requirements which it either affects or is affected by. The interdependencies relationships are characterized as either parent-to-child or peer-to-peer.
- **Measures of Effectiveness Linkage:** These relate the measures of effectiveness for a particular action to the measures of effectiveness for other actions, thus indicating how the success of one effort impacts the success of other efforts.

Each identifier consists of two letters followed by an indexing number. The first letter (A, E, or O) connotes that the requirement addresses an Action, Effects, or Overarching requirement. The second letter is chosen from the letters in the DIME/PMESII acronym. Thus A-D-01 identifies an Action (A) that is primarily Diplomatic (D) in nature and that is the first of many such diplomatic actions in the list of requirements. It contrasts with another requirement, E-P-01, which is an Effect (E) that has a primarily Political (P) character. Finally, O-D-01 identifies the first Overarching (O) or general requirement on Decision-making (D).

In general, the descriptions of Action requirements are broadly written to include not only the specific action taken by an actor but also the full range of direct and indirect effects resulting from this action. Thus the description for A-D-1 includes references to the impacts of this diplomatic action on the host nation's political and social system. Similarly, the descriptions of Effects are written to refer back to the full collection of DIME factors that contributed to them. Thus the requirement entitled "Changes in the Availability, Cost, and Distribution of Goods and Services" (E-E-05 or "Economic Effect # 3") includes a reference to the various diplomatic, informational, military, economic, and law enforcement actions that contributed to this effect.

The collection of keyword nouns and verbs allow the user to quickly develop measurable, unit-based metrics associated with the requirement by inserting the nouns and verbs into the following template "there were [number] of [noun] as a result of [verb]." For example, the requirement A-D-04 "Embassy Communications" contains the nouns "message" and "response" along with the verbs "transmit," "receive," and "construct." Thus simple metrics, such as "number of messages transmitted" or "number of responses constructed" can be easily created from these keywords.

It may appear at first glance that the DIME/PMESII Associated Areas are redundant, since each requirement is already marked by the Identifier as belonging to one part of the DIME/PMESII construct. However, few actions or effects can be completely confined to only one part of this spectrum. A primarily diplomatic action, for instance, may be supported by military actors and law enforcement officers. Similarly, one type of effect (ex. the rise or fall in price of a commodity) is often due to a synergistic interaction of many actions and other causal factors. In real life, the different actions and effects overlap because the various aspects of any social system are interconnected.

This led to a hierarchy of interdependencies among requirements. These interdependencies are characterized as "parent-child," "peer-peer," and "child-parent" relationships. "Parent" requirements always proceed, cause, or drive the associated "child" requirement. However, the small number of requirements which have no parent are *starting requirement* and the requirements which have no children are *terminal requirements*.

2.4 Modifications to DIME/PMESII Spectrum

The basic DIME/PMESII construct revolves our actions and their effects. However, this dichotomy between actions and effects is too simple. Other factors, which shape or drive the actions and effects, have an impact on socio-political systems and the contexts in which they are found. Hence these *Overarching Factors* (O) must also be represented.

In this context it is important to note that the typical use of the DIME/PMESII dichotomy divides the social world and its events into "U.S. military DIME actions and their PMESII impacts on the host nation." This U.S. military-centric use severely limits the utility of this dichotomy, because the actions of other actors, in particular host nation's political actions, and their resultant impacts are excluded. It was beyond the scope of this effort to completely develop a new action/impact dichotomy, however, so the version of the DIME/PMESII construct that presented differs only by:

- Generalization to permit the full range of actors-not just U.S. government actorsto take DIME actions which have impacts on any of the other actors
- Expansion to include decision-making for the actors
- Minor generalization in the scope of areas
- Inclusion of law enforcement
- Inclusion of Overarching Factors (in addition to Actions and Effects)

This resulting enhanced DIME/PMESII dichotomy is still not entirely generic because it is still host-country centric. However, it is significantly more general. Thus the descriptive requirements presented are of much greater applicability for the modeling, simulation, and analysis communities.

2.5 Overarching Requirements (O)

The Overarching Factors (O) included in the list transcend the DIME/PMESII dichotomy and make it possible to represent broad contexts such as natural environments, decisionmaking processes, the institutional frameworks in which actors operate, space/time constraints, and natural or large-scale events. Furthermore, each overarching requirement touches every area of DIME/PMESII, is involved with every mission type, and is a parent to every DIME/PMESII requirement. Because of their diversity, we see no value in describing the overarching factors in generic terms. Rather, we prefer to divide them into sub-types, as follows: Conditions and States within the Scenario (O-S); Events, Time, and Space (O-E); Actors (O-A); Decision-making (O-D); Socio-Behavioral Contexts (O-C); Interaction Protocols (O-P); and Natural Environment (O-N).

2.5.1 *Conditions and States within the Scenario (O-S)*

The Complete Model State includes all the physical environs states (weather, geography, infrastructure physical condition, etc.) and the total PMESII state. The total PMESII state is comprised of all the individual states across the PMESII taxonomy for each actor. Examples of individual PMESII states include:

- **Political:** structure, process, policy, laws, diplomatic standings, plans, etc.
- **Economic:** policy, production, norms, behaviors, confidence, etc.
- **Military:** status, ROEs, objectives, physical security status, capability, morale, etc.
- Social: perception, opinions, attitudes, norms, networks, demographics, etc.
- Information: sources, content, coverage, quality, availability, etc.
- **Infrastructure:** condition, networks, capability, demand, loads, etc.

Each individual state consists of its current value and associated the temporal trend (time derivatives). Thus the individual states vary temporally, spatially, and categorically across the groups of actors, the socio-behavioral contexts, interaction protocols, and the physical environment.

2.5.2 Events, Time, and Space (O-E)

Only the events which impact actors (drives decisions, shapes actions, generates PMESII effects) are of interest to the DIME/PMESII modelers. Therefore, the modeling suite shall represent natural and man-made occurrences that cannot be *completely shaped by the actors*, as events that alter contexts (i.e. ultimately impact actors) and to which actors respond. Anticipated and unforeseen natural occurrences are events which cannot be controlled by the actors include weather, earthquakes, floods, and seasons. Manscheduled events such as national holidays, elections, inaugurations, and the Olympics, are also included as events since these dates are typically fixed in time. On the other hand, unscheduled or unanticipated man-made events (e.g. assignations/deaths, resignations, epidemics, economic crashes, "random" terrorist acts, formation of unknown groups) are also included as events. It is important to stress that the model shall, for each actor, represent *the sequential perception of events and associated impacts*—not the ground truth sequence of events—so that the actors respond to their perceptions.

Geography and the spatial relationships between events, actors, and the world's physical states shall be represented in the modeling suite, including the impact that distance and geography has on decision, the decision-making process, an actor's ability to respond, delays in information actions, and in the distortion of each actor's perception.

2.5.3 *Actors (O-A)*

The actors include all entities which (1) are capable of making a decision, (2) can take an action which impacts the PMESII state, and (3) can be impacted by actions, events, or the model state. Thus, the natural environment is not an actor and its impacts are captured as natural events (e.g. weather) which have resulting effects on the actors or PMESII states.

An actor can be an individual, any group of people which behave collectively, an organization, or a nation/trans-national body. While the full range of actors will depend on a specific scenario, the following basic actors must be included:

- Trans-national organizations (UN, NGOs, alliances, cartels)
- HN central and regional government, ministries, military, and agencies
- The United States, the US Military, Dept of State, or other USG Agency
- Other nation states or autonomous entities and associated militaries/agencies
- Insurgents, criminal syndicates, brigand, terrorist, or proxy groups
- Population groups (e.g. local peoples, ethnic or tribal groups, aboriginal/nomadic peoples)
- Social identity groups (e.g. speakers of a common language, members of a religious community, political party members, members of a particular social class or caste, etc.)
- Cooperative local groups (e.g. households, neighborhoods, ethnic or tribal groups, aboriginal/nomadic peoples)
- Economic groups, business, and organizations (e.g. unions, industrialists, media outlets)

• Advocate and ideological groups (e.g. environmentalists)

All relations, structure, organization, command, and control relationships between actors represent important PMESII states between these actors which must be represented.

2.5.4 Decision-Making (O-D)

Actors make decisions based on their individual Objectives, Perceptions, Abilities, Limitations, and Strategies (OPALS).

- **Objectives:** The complete set of prioritized goals which are shaped by the actor's ideology. They may include mutually exclusive or contradictory goals.
- **Perceptions:** Their interpretation of the true PMESII state which is shaded by their experiences, biases, beliefs, and culture.
- **Abilities:** The full range of known/assumed capabilities of the actor to take action which may differ from the true their abilities.
- **Limitations**: The complete set of constraints placed on the actor's potential course of actions due to legal, moral, and authority/latitude to act restrictions.
- **Strategy:** The strategy adopted to achieve the Objectives based on Perceptions and Abilities within the constraints of the Limitations.

Thus the actor's selected course of action balances across all their objectives, is based on their perception of the PMESII state, shaped by their abilities to act, and constrained by their individual rules of engagement.

2.5.5 Overarching Social-Behavioral Contexts (O-C)

Individual actors normally work in social contexts; they belong to groups and organizations. Thus their relationships with other group members constrain their behavior. The context can be any group of people which behaves collectively, such as a local organization or a national/trans-national body. While the full range of organizations or groups will depend on a specific scenario, the model suite must represent these basic behavioral contexts:

- Organizational structures (chains-of-command, administrative hierarchies, etc.)
- Alliance structures
- Social networks
- Role structures (head-of-state/liaison/head-of-state, decision-maker/support staff, patron/client, parent/child, etc.)
- Turn-taking structures (parliaments, court, etc.)

All relations, structure, organization, command, and control relationships between actors represent important relations and constraints on individual behavior which must be represented. Thus, in order to accurately represent human behavior (individually and within groups) group actors may need to be *multi-associated* or dynamically *re-scalable* depending on their current environment or situation. In other words, a multi-religious political group may remain cohesive under normal political contexts (e.g. advocating legislation supporting industrialization). However, in a different context or under

different pressures (e.g. debates regarding sectarian violence), the political cohesion may (temporarily) dissolve and the individuals coalesce or merge into other groups or "actors" when responding until the context changes again.

2.5.6 Overarching Interaction Protocols (O-P)

This area includes all the social-cultural constraints and protocols which manifest as rules, norms, and expectations for behavior. These institutionalized frameworks guide and restrict how actors operate within the scenario and interact with one another. Examples include:

- **Political:** administrative regulations, governance processes, established policies, laws, diplomatic understandings, long-term plans, etc.
- **Economic:** economic policies, markets regulation, monetary standards, norms for contracts, etc.
- Military: rules of engagement, command and communication protocols, etc.
- **Social:** norms, etc.
- **Information:** propaganda review and dissemination processes, writing standards, broadcasting regulations, etc.
- Legal: processes for and interactions within/between legislative, law enforcement, court, and prison systems

For each individual, the overarching interaction protocols and institutional frameworks have both current value and associated the temporal trend (time derivatives). Thus the individual states vary temporally, spatially, and categorically across the groups of actors.

2.5.7 Natural Environmental Factors (O-N)

These include climate, elevation, terrain features (mountains, rivers, and so on), soil conditions, the distribution of natural resources (metal ores, petroleum products, etc.), and other environmental conditions (ocean currents, prevailing winds, natural hazards, etc.). These factors constrain behavior and are taken into consideration before actions are planned or executed.

2.6 Action Requirements (A)

The final taxonomy selected for actions includes Diplomatic, Information, Military, Economic, and Legal ("DIMEL")⁶. Although some constructs include Intelligence and Financial (DIMEFIL) actions, it was determined that all intelligence activities are a subset of information actions while financial actions are a complete subset of economic

⁶ The DIME convention, though used throughout this document, always implicitly includes Legal.

actions. However, legal activities are sufficiently distinct from diplomatic or military actions to warrant a separate category. Furthermore, legal was preferred over law enforcement since it encompasses the broader aspects of rule-of-law actions.

2.6.1 Diplomatic (A-D)

Most state-to-state political activities fall into this area including negotiations, planning, and preparations to provide aid. Also captured here are activities involving deterrence of foreign nations, support to the Ambassador/embassy, and negotiations with regional governments. In some cases, activities can include non-states/trans-nationals if they are *diplomatic-like* (e.g. negotiations between NGOs). In many cases, state-to-state activities that go beyond "talking," although inherently diplomatic, are addressed in the IMEL areas (e.g. providing physical or economic aid, multi-nation military operations, information sharing, trans-national law enforcement).

2.6.2 Information (A-I)

In the presented dichotomy, all actions regarding information collection, analysis, dissemination, sharing, and information operations fall under the A-I category, except decision-making which is specifically covered under O-D. Thus information actions include:

- Intelligence operations include all forms of information collection and analysis (overt, covert, SME judgment)
- Information dissemination includes only the movement and sharing information between organizations
- Information operations includes all types of wide dissemination of information, communications, or messages and includes psychological operations, deception, propaganda, and spinning of the message

Therefore, acts of Intelligence Collection and Analysis (A-I) lead to acts of Decisionmaking (O-D). Decisions by actors lead to new actions which may include Information Dissemination (information sharing or IO) or other DME actions. Each action shall have its own effects and the sequence of actions may have additional non-linear, synergistic effects.

It is worth stressing that the use of "intelligence" here is in the broadest possible sense and includes all forms of information collection or generation such as polling, analysis, open-source research, SME judgments, and overt observation as well as ISR, espionage, and interrogation.

2.6.3 *Military (A-M)*

This action area includes the full range of military-led activities such as response to attacks, military exercises, military-supported non-combat operations (e.g. NEO, logistics), and training. While a DIME/PMESII model suite is not expected to have a full or detailed representation of major combat operations, it should represent the full range of

PMESII impacts for all actors due to the events associated with high-intensity conflict in the region.

2.6.4 *Economic (A-E)*

The full range economy actions, by any actor, and their impacts are collected under A-E. Representative activities by actors include:

- **State Activities:** establishing policies, managing resources, controlling price, government spending, printing money, taxation, customs, and economic stabilization
- **Trans-national Activities:** humanitarian assistance, providing disaster relief, support to refugees, and development of infrastructure
- **Business Activities:** investment of capitol, banking activities, providing credit, production of good, distribution of goods, labor training, trade, and providing services
- Group Activities: consumption, saving

In the presented DIME taxonomy, all financial actions are a subset of economic actions.

2.6.5 Legal (A-L)

In the present list of requirements, the area of legal actions was expanded to include the legislative, judicial, and sentence execution aspects of rule-of-law in addition to all law enforcement activities. This area also includes:

- Acts of martial law
- Actions against crime syndicates, gangs, and pirates (non-military actions)
- Counter-corruption initiatives
- Identification, interdiction, and disruption of all support for destabilizing actors

However, spending in support of law enforcement (training, facilities, budgets, equipping, sentence execution, etc.) is categorized as an economic action.

2.7 Effect Requirements (E)

One fundamental problem with the DIME/PMESII dichotomy is in categorizing the effects of actions. Societal is normally just one area of PMESII. However, the political system, military personnel, military organization, and the economy are subsets of human society while information, an ethereal concept which shapes the perception of societal groups, is created by people. Only the physical portions of PMESII (e.g. infrastructure, military assets, buildings, etc.) are not "part of" society but those physical entities were created and exist to serve society. However, it was beyond the scope of this effort to create a self-consistent effects taxonomy so this apparent contradiction is resolved by limiting the societal area to everything not PMEII. That is, in the presented list *societal effects are the full universe of impacts minus the political, military, information, and infrastructure effect areas*.

Another problem is that the DIME/PMESII dichotomy does not explicitly permit internal political actions. To circumvent this, host nation political actions are captured as causes of PMESII effects. Finally, the infrastructure area was expanded to include the supporting natural environment (e.g. natural resources).

Many of the requirements that appear below address the effects of restored capabilities (e.g. Effects of Sanctions, Effects of Restored Infrastructure on Host Nation). In these cases, the requirement applies to both the positive case (i.e. Effects of Sanctions) and in the negative case (i.e. *effects of lifting sanctions*). Similarly, the Effects of Restored Infrastructure on Host Nation must also include the *effects of impaired or destroyed infrastructure*.

Many requirements stipulate that models must track changes in states such as perception, attitudes, and the environment. In these cases, the requirement entails capturing the full range of the effects associated with both positive changes as well as negative changes in the associated states. For example, the Changes in Host Nation Environment requirement stipulates that models must track changes in a variety of states including water pollution levels and land fertility. The model must simultaneously address reductions increases in water pollution (a negative change) and its impacts as well as improvements in land fertility (a positive change) and its impacts. Thus the model must fuse these opposing changes, and associated impacts, to provide a proper representation of the combined effects across the PMESII spectrum.

The different PMESII areas are described below:

2.7.1 Political (E-P)

The effects associated with host nation political actions are captured in this area because the DIME categorization does not explicitly include internal politics.

2.7.2 *Military (E-M)*

This effect area captures the impacts to military, paramilitary, and national security forces including their readiness (manpower and material), morale, organizational structure, loyalty, capabilities, and capacities.

2.7.3 *Economic (E-E)*

This broad area includes all the economic impacts due to any number of events or actions. In addition to accounting for the initial effects, all the resultant secondary and tertiary effects are also included. For example, a Humanitarian Assistance/Disaster Relief Operation A-E-12 increases the availability of food (Changes in the Availability, Cost, and Distribution of Goods and Services E-E-05) thus reducing food prices. This in turn reduces the economic viability of agriculture causing farmers to seek work elsewhere (economic Migration E-S-07). The farmland – which used to be planted – is now bare and, without plant cover, starts to erode. This eventually reduces soil fertility and HN sustainability (Changes in Host Nation Environment E-N-03). In this example, food aid
causes reduced food prices, the secondary effect is economic migration, and the tertiary effect is changes in HN soil fertility.

2.7.4 Societal (E-S)

As stated before, the societal effects area is a catch-all. Most notably, though, it includes effects regarding movement of people, population perceptions, discrimination, and social institutions such as law enforcement and government regulations.

2.7.5 Information (E-I)

The information effects area covers:

- The perceptions of actors
- The availability of information (limited to widely available open sources)
- How the available information shapes the perceptions of actors which in turn leads to decisions, actions, and ultimately effects.

This said, the second two items are subsets of the first. Thus the information area is ultimately limited to the perception of the actors and the development of those perceptions.

2.7.6 Infrastructure (E-N)

In the requirements list, the infrastructure includes the capabilities, capacities, condition, interconnectivities, and location of physical assets such as transportation networks, the industrial base, storage facilities, the education system, essential service facilities, the healthcare system, and the supporting natural infrastructure (e.g. the environment, natural resources, etc.). Essential services include:

- Water purification and distribution
- Waste/sewage collection, transport, and processing
- Power production, distribution, monitoring, and control
- Emergency communication systems (TV, radio, sirens, etc)
- Fuel processing, distribution, and emergency stores (e.g. oil, coal, NG)
- Emergency food stores and emergency medical stores/facilities
- Basic medical capabilities (e.g. physicians, facilities, equipment)
- Basic policing and physical security for life and property
- Basic command and control capabilities for nation, regional, and local government leaders (by basic, we mean sufficient to provide the above services)

In addition to man-made infrastructure, this area includes natural resources such as mineral deposits, energy sources, and arable land. Note that the infrastructure area is denoted by an "N" to avoid confusion with the information (I) area.

2.8 Definitions, Missions, and Other Characterizations of Requirements

Since the list of descriptive requirements draws from a range of source documents and interviews, more than the usual precision regarding meanings, terms of reference, scope, and responsibilities is required.

For these descriptive requirements, attacks involving WMD are limited to only chemical, biological, radiological, and nuclear (CBRN) attacks—all other attacks, regardless of scale, are conventional.

Destabilization operations are defined as actions taken by a nation state that wants to undermine the control of another nation state's government or regime. Although a wide range of destabilizing actions can be taken (economic erosion, propaganda, insurgent support), they all represent some form of state-to-state interaction and are thus categorized under diplomatic actions. Direct military to military actions such as war and invasion are not included here. Also, the actions of insurgents and their destabilizing effects fall under different categories.

2.8.1 The FRIS Construct

Another construct—developed for modeling Asymmetric Warfare—is the Funding, Recruitment, Information, and Support (FRIS) for insurgents or terrorists. The FRIS construct is useful in certain scenarios but cuts across the entire DIME/PMESII dichotomy. Therefore, the presented descriptive requirements list denotes which actions and effects have a strong link to FRIS activities or impacts.

In the spirit of generalization, the use of FRIS with the presented requirements is expanded to include efforts related to any illegal or illegitimate actor (gangs, criminal syndicates, proxy actors, rogue or parallel governments) as well as insurgent or terrorist groups.

2.8.2 Associated Missions

Many descriptive requirements include cross-links to a variety of military, security, and diplomatic missions or operations. The missions include:

- **Conventional Warfare (CW):** Includes warfare using conventional military weapons and battlefield tactics between two or more states in open confrontation.
- **Building Partner Capacity (BPC):** Addresses actions to increase the internal security and law enforcement capability of partner nations through training, equipping, maintenance, and support.
- **Civil-Military Operations (CMO):** Covers activities of a commander that establish, maintain, influence, or exploit relations between forces, governmental and nongovernmental civilian organizations and authorities, and the civilian populace in a friendly, neutral, or hostile operational area in order to facilitate military operations, to consolidate and achieve operational US objectives.

- **Consequence Management (CM) for WMDs:** Are measures taken to protect public health and safety, restore essential government services, and provide emergency relief to governments, businesses, and individuals affected by the consequences of a WMD attack. For the present list, high-yield explosives are not included in the list of WMDs but radiological weapons are explicitly included.
- **Counter-Insurgency** (COIN): Includes military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency.
- **Counter-Terrorism (CT):** Encompasses practices, tactics, techniques, and strategies that governments, militaries, police departments and corporations adopt in response to terrorist threats and/or acts, both real and imputed.
- **Diplomatic Support (DS):** Includes all diplomatic activities between a nation and any other nation, trans-national organization, or regional government/power. Activities include public statements of support or condemnation; overt aid in the form of information, funding, financing, materiel, or manpower (e.g. military); giving signals or signs of support (e.g. attending summits, officiating ceremonies); communication of or clarification on issues of policy, position, or potential response; and providing of advice or guidance.
- Economic Aid (EA): Spans the full range of economic, financial, monetary, materiel, or support that one actor may provide another.
- Foreign Internal Defense (FID): Is the participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization, to free and protect its society from subversion, lawlessness, and insurgency.
- Humanitarian Assistance/Disaster Relief (HA/DR): Includes all aid and actions designed to save lives, alleviate suffering, and maintain and protect human dignity during and in the aftermath of emergencies.
- Law Enforcement (LE): Missions include all activities that ensure compliance with laws, regulations, and resolutions.
- Non-combatant Evacuation Operations (NEO): Assist the in evacuating noncombatants and nonessential military personnel from locations in a foreign nation to an appropriate safe haven.
- Security Institution Building/Reform (SIB/R): The creation of governance capacities. It entails the dismantling and reformation of old organizations and institutions—legal, administrative, economic as well as social—the improvement of security, efficiency and effectiveness of existing institutions, the restoration of destroyed institutions and the enhancement of authorities' professionalism.
- Shaping and Influence Operations (SI): Includes activities by an agency designed to alter, towards a specific ends, the perceptions, actions, opinions, and positions of a nation, people group, or organization.
- Stability, Security, Transition, and Reconstruction (SSTR): U.S. Department of Defense activities that support U.S. Government plans for stabilization, security, reconstruction and transition operations, which lead to sustainable peace while advancing U.S. interests.

- Unconventional Warfare (UW): Encompasses all actions which attempt to achieve military victory through acquiescence, capitulation, or clandestine support for one side of an existing conflict.
- Theater Security Cooperation (TSC): Is all activities conducted with allies and friends, in accordance with U.S. SECDEF Guidance, to build relationships that promote specified U.S. interests; build allied and friendly capabilities for self-defense and coalition operations; and provide U.S. forces with peacetime and contingency access.

2.8.3 *Phases of Operations*

The *Phases of an Operation* construct is often useful in categorizing actions and effects from a military mission's perspective. Although not always applicable for all the scenarios, their inclusion will aid the analyst or war-gamer. The six phases (0 through V) are described below:

- **Phase 0 Shape:** In this phase, operations are designed to "shape" the governmental, economic, civil society, and security components of the operating environment in such a manner that violence and conflict are made less likely or even unnecessary. The emphasis on Phase Zero operations by many in academia, the NGO community, and the military comes from the belief that the destructive costs—in both lives and money—of major combat operations can be lessened if the conditions necessary for peace and stability are engendered ahead of time, and the knowledge that the level of military effort required to be effective in this phase is dramatically lower than in other phases of major theater contingency operations.
- **Phase I Deter:** The objective of this phase is to deter the adversary from undertaking actions that are undesirable to the U.S. mission. Deterrence in this phase is a demonstration of the capability and resolve of the joint force, and differs from the deterrence that occurs in the 'shape' phase in that it is largely characterized by preparatory actions that specifically support or facilitate the execution of subsequent phases of the operation.
- **Phase II Seize the Initiative:** The primary focus of Phase II operations is to deny the enemy its objective. This is done by executing offensive operations at the earliest possible time, with the aim of delaying, impeding, or halting the enemy's aggression, and otherwise creating the conditions for the exploitation, pursuit, and ultimate destruction of enemy forces. During this phase, joint forces strive to gain access to infrastructure and to stabilize all lines of communication.
- **Phase III Dominate:** The dominate phase requires the deployment of a decisive force capable of breaking the enemy's will for organized resistance and gaining unqualified control of the operational environment. Where possible, land, maritime, and aviation assets should be jointly employed at this time, as success is dependent upon overmatching the enemy at the critical time and place. Operations during this phase will vary depending on whether the joint forces are focused on fighting conventional or unconventional enemy forces. If combating conventional forces, the dominate phase normally concludes with decisive operations that unconditionally defeat the enemy and achieve the joint forces command's operational objectives. Against unconventional enemies, decisive

operations are characterized by dominating and controlling the operational environment through a combination of conventional/unconventional, information, and stability operations.

- **Phase IV Stability:** Stability operations have been indoctrinated as a necessary component phase of military operations, meant to ensure that the threat (military and/or political) is reduced to a manageable level capable of being controlled by the newly reorganized civil authority or, in non-combat situations, to ensure that the circumstances leading to the original crisis do not reoccur. The phased transition from dominate to stabilize can occur even if residual combat operations are still underway within the theater of operations, as long as the primary governance centers are firmly under control. During this phase, the joint forces will likely be required to perform limited local governance along with the support of international and non-governmental organizations until legitimate local entities are functioning.
- **Phase V Enable Civil Authority:** This phase is predominantly characterized by multilateral support to legitimate civil governance. The goal at this point is to enable the viability of the civil authority and ensure its ability to provide essential services to the largest number of people as possible in the region. The military end state is achieved during this phase, signaling the end of the joint operation. Recognizing that states emerging from conflict are often some of the more vulnerable in the world, the joint forces should recognize the need to return to Phase Zero operations, and attempt to instill the pillars of stability required to prevent a return to violence.

2.8.4 Scope of National Institutions & Ministries

In order to avoid confusion, the scope of the national institutions and ministries referenced in the list of descriptive requirements must be defined. The generic responsibilities outlined here do not represent any specific nation's governmental structure but rather organize the roles and responsibilities into a small, but distinct, set of agencies. Unless a real agency is named (e.g. U.S. Department of State), assume that the discussion refers to some generic ministry or agency with roles and responsibilities defined below.

The Legislative body is responsible for debate, creation, approval, and oversight of internal and external policy issues; the creation of laws; governmental budgeting; management and oversight of providences/regions; and the management and oversight of the government ministries. The list does not stipulate that the head of the legislature be a chief executive or prime minister. Various offices have been created by the countries that have such legislative bodies.

The Ministry of Foreign Affairs is responsible for all external diplomatic activities short of war and national defense. This includes all negotiations, coordination, and strategic communication activities. The creation and management of agreements (e.g. treaties, pacts, alliances) fall under the Ministry of Foreign Affairs.

The Ministry of Defense is responsible for defending the sovereignty of the nation for all external threats and internal insurgencies as well as for providing the means of

maintaining internal security and control. Thus defending against attacks in breakaway regions and exerting control by the central government falls under the Ministry of Defense. Other responsibilities include the governance, management, support, training, equipping, control, discipline, planning, and use of the military and paramilitary forces as well as building, maintaining, and expanding all supporting infrastructure systems for the defense forces. The military and foreign intelligence organizations fall under this ministry.

Law enforcement (including basic physical security of life and property), investigative services, the judicial apparatus, and sentence execution responsibilities are the domain of the Ministry of Justice. Actions regarding basic border security, customs enforcement, tax enforcement, regulatory compliance, and corruption probes belong to the Ministry of Justice. Actions against state-supported proxy actors, brigands, pirates, and illegitimate parallel government organization are a joint area for the Ministries of Justice and Defense.

In the list of requirements, the Ministry of Interior is responsible for managing natural resources, land use, agriculture, the food supply, the environment, national industrial base, providing essential services, the education system, medical infrastructure, national communication systems, and the transportation infrastructure (roads, railways, ports, airports, waterways). The internal intelligence organizations (e.g. census) fall under this ministry.

2.9 Complete List of Descriptive Requirements

Listed below is the complete list of the 135 descriptive requirements which are also presented graphically in Table 2 (at end of Chapter 2 on page 25). A detailed description of each requirement is provided in Appendix 11.

It is noteworthy to mention that only the Events (O-E) and Decision-making (O-D) categories of the Overarching requirements contain explicit requirements. The remaining categories—States, Actors, Contexts, Protocols, and Natural Environment—all contain requirements as described in Section 2.5. However, since the specifics elements are highly-dependent on the scenario (e.g. protocols between actors, historical contexts, etc), it is impossible to *a priori* represent all the associated descriptive requirements in a finite number. Instead, Table 2 presents representative titles (in gray) while implying the open nature of the set (...).

O-E Events

- O-E-01 Time and Space
- O-E-02 General Events, Trends, and Cycles
- O-E-03 Actions in Preparation for Anticipated and Scheduled Events
- O-E-04 Weather Impacts to Decision-making and Military Operations

O-D Decision-making

- O-D-01 Decision-making in Hierarchical Organizations
- O-D-02 Individual Decision-making
- O-D-03 Social Process of Decision-making
- O-D-04 Perception of Environment, Actions, and Events

O-D-05 Adaptability and Learning

A-D Diplomatic Actions

- A-D-01 Support to the Ambassador
- A-D-02 Negotiations with Host Nation Government
- A-D-03 Negotiations with Local Leaders
- A-D-04 Embassy Communications
- A-D-05 Improvements to Host Nation Diplomatic Capabilities
- A-D-06 Diplomatic Actions to Prepare for Stability Operations
- A-D-07 Support to Host Nation for Compliance with International Conventions and Standards
- A-D-08 Evacuation of Embassy Personnel and Affiliated Host Country Nationals
- A-D-09 Negotiating Refugee Safe Havens
- A-D-10 Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief
- A-D-11 Diplomatic Action to Support Training Host Nation Government Personnel
- A-D-12 Diplomatic-Like Interactions Between Organizations
- A-D-13 Diplomatic Preparation for WMD Consequence Management
- A-D-14 Diplomatic Actions for Multi-National Exercises
- A-D-15 Interactions with Aboriginal/Nomadic Peoples and other Minorities
- A-D-16 Establishing Relations In Absence of State
- A-D-17 Multi-party Diplomatic Negotiations
- A-D-18 Destabilization Operations
- A-D-19 Deterrence
- A-D-20 Advocacy Actions by US Government
- A-D-21 Security and Law Enforcement for US

A-I Information Actions

- A-I-01 Intelligence Operations on Host Nation Conditions
- A-I-02 Intelligence Operations on Host Nation Government
- A-I-03 Collection of Host Nation Citizen Perceptions
- A-I-04 Information Dissemination
- A-I-05 Collection and Use of Refugee Information
- A-I-06 Improvement of Host Nation Government Communication Networks
- A-I-07 Establishment & Support of Information Exchange Program
- A-I-08 Changing Influence/Exposure of Societal Leaders
- A-I-09 Changing/Shaping Message/Position of Societal Leaders
- A-I-10 Intelligence Collection to Support Host Nation
- A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
- A-I-12 Intelligence, Surveillance, Reconnaissance for Embassy
- A-I-13 Host Nation Internal Dissemination of Information
- A-I-14 Needs Assessments Supporting Decision-Making
- A-I-15 Information Operations
- A-I-16 Training of Host Nation Government Personnel

A-M Military Actions

- A-M-01 Response to WMD Attack
- A-M-02 Response to Conventional Attack

- A-M-03 Foreign Non-Combatant Evacuation Operations
- A-M-04 Military Training
- A-M-05 Actions Supporting Host Nation Counter-Insurgency
- A-M-06 Military Exercises
- A-M-07 Logistics
- A-M-08 Improvement of Ministry of Defense
- A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation
- A-M-10 Military and Naval Presence
- A-M-11 War and Military Invasion

A-E Economic Actions

- A-E-01 Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief
- A-E-02 Building and Securing Lines of Communication
- A-E-03 Building and Securing Host Nation Essential Services
- A-E-04 Repatriation / Relocation Efforts
- A-E-05 Economic Information Operations
- A-E-06 Mitigation of Long-term WMD Effects
- A-E-07 Economic Intelligence Operations
- A-E-08 Establishing and Maintaining Logistical Support for Host Nation
- A-E-09 Activities to Improve Infrastructure
- A-E-10 Economic Actions Supporting Joint Military Exercises
- A-E-11 Hiring of Host Country Nationals
- A-E-12 Humanitarian Assistance/Disaster Relief Operations
- A-E-13 Establishing and Maintaining Refugee Camps
- A-E-14 Mitigation of Destabilizing Effects
- A-E-15 Economic Development Supporting Disaster Recovery
- A-E-16 Stability Operations (Economic)
- A-E-17 Improvement of Ministry of Interior
- A-E-18 Spending in Support of Host Nation Ministry of Interior
- A-E-19 Spending in Support of Host Nation Ministry of Defense
- A-E-20 Spending to Support Rule of Law
- A-E-21 Spending for / Development of Other Host Nation Ministries and Agencies

A-L Law Enforcement Actions

- A-L-01 Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors
- A-L-02 Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors
- A-L-03 Identification, Disruption, and Interdiction of Local Support for Destabilizing Actors
- A-L-04 Identification, Disruption, and Interdiction of Recruitment for Destabilizing Actors
- A-L-05 Operations Against Criminal Syndicates
- A-L-06 Martial Law and Law Enforcement Operations
- A-L-07 Enforcement of International Resolutions
- A-L-08 Counter-Corruption Activities

- A-L-09 Improvement of Legal and Law Enforcement Ministries
- A-L-10 Barely Legal, Extra-Legal, and Criminal Activities

E-P Political Effects

- E-P-01 Changes in Population Loyalty to Host Nation Government
- E-P-02 Changes in Political Involvement of Host Nation Citizens
- E-P-03 Changes in Government Structure or Functions
- E-P-04 Effects of External Group Involvement in Host Nation Politics
- E-P-05 Changes in Perception of Government/Authority Legitimacy
- E-P-06 Effects of Changes to Government Leadership
- E-P-07 Destabilizing Effects
- E-P-08 Internal Repercussions of a Trans-National Organization's Actions Regarding Host Nation
- E-P-09 Internal Repercussions of an Outside Nation's Actions Regarding Host Nation
- E-P-10 Effects on Host Nation by Forward Bases
- E-P-11 Effects of Third-Party External Diplomatic Actions
- E-P-12 Effects of Factional Group Activities

E-M Military Effects

- E-M-01 Effects of Foreign Military Support/Operations on Host Nation Military
- E-M-02 Effects of Multi-National Exercises on Military
- E-M-03 Effects on Military due to Operations

E-E Economic Effects

- E-E-01 Changes in the Domestic Production by Economic Sector and Region
- E-E-02 Changes in the Flow of Capital
- E-E-03 Changes in Host Nation Wealth/Income Distributions
- E-E-04 Effects on Markets
- E-E-05 Changes in the Availability, Cost, and Distribution of Goods and Services
- E-E-06 Effects of Human Resources Training on Economy
- E-E-07 Effects of Combat Operations on the Economy
- E-E-08 Effects of Noncombatant Evacuation Operations on the Economy
- E-E-09 Economic Response Rule of Law Enforcement
- E-E-10 Effects of Sanctions (Economic)
- E-E-11 Effects of Industrialization on Host Nation
- E-E-12 Effects of Trade Agreements on Economy
- E-E-13 Effects of Changes in Host Nation Infrastructure

E-S Societal Effects

- E-S-01 Effect of Foreign Presence on Host Nation Norms and Behaviors
- E-S-02 Quality of Life Perception
- E-S-03 Effects of Restriction on Population Movement
- E-S-04 Effects of Societal Leaders
- E-S-05 Impact to Stability and Security due to Events
- E-S-06 Epidemic Breakout
- E-S-07 Migration
- E-S-08 Effects of Legislation, Law Enforcement, and Regulations
- E-S-09 Effects of Discrimination in Host Nation
- E-S-10 Impact of Terrorist/Insurgent Groups on Host Nation Population

E-S-11 Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots

E-I Information Effects

- E-I-01 Effects of Information Gathering on Host Nation Government Actions
- E-I-02 Effects of Information Gathering on Host Nation Citizens
- E-I-03 Effects of Information Dissemination on Host Nation Government
- E-I-04 Effects of Information Dissemination on Host Nation Citizens
- E-I-05 Effects of Independent Media Outlets on Perceptions and Attitudes

E-N Infrastructure Effects

- E-N-01 Effects of Changes in Essential Public Services on Host Nation
- E-N-02 Effects of Restored/Impaired Infrastructure on Host Nation
- E-N-03 Changes in Host Nation Environment

In this chapter, the list of descriptive DIME/PMESII requirements is explained. Each requirement includes details regarding scope, associated missions, searchable keywords, and relevant measures of effectiveness. This collection of requirements, which cross-reference one another, span a large portion of the DIME/PMESII space permitting a range of complex scenarios to be richly represented in a variety of contexts.

These requirements efforts are the first step towards the development of a governmentowned, non-proprietary DIME/PMESII modeling suite. Additionally, the requirements list aids modelers, analysts, and war-gamer in the design and development phases of a DIME/PMESII scenario. Finally, the set of descriptive requirement serves as a *Gold Standard* for comparing the utility of models or as a guide for the development of future modeling tools and suites.

#			Actions (79)					Effect	s (47)		
	Diplomatic	Information	Military	Economic	Legal	Political	Military	Economic	Societal	Information	Infrastructure
-	Support to	Intell Ops on HN	Response to	Est Distro Ctrs	ID/Disrpt/Intrdict	△ in Pop Loyalty	Foreign Sprt /	△ Dom Product	Foreigners on	Info Collect on	Essential Public
	Ambassador	Conditions	WMD Attack	for HA/DR	Funds: Dstbl	to HN Gov't	Ops on HN Mil	(Sector, Region)	Norms & Behav	HN Gov't Actions	Services on HN
2	Negots w/ HN	Intell Ops on HN	Response to	Build/Secure	ID/Distrpt/Intrdict	∆ Political	Multi-Nat'l	△ Flow of Capital	Quality of Life	Info Gathering on	△ Infrastructure
	Gov't	Gov't	Convent'l Attack	Lines of Comm	Inst'l Sprt: Dstbl	Activity of Pop	Exercises on Mil		Perception	HN Pop	on HN
ო	Negots w/ Local	Collect HN	Foreign NEO	Build/Secure	ID/Distrpt/Intrdict	△ Gov't Struct or	Mil due to Ops	∆ HN Wealth /	Restrictions on	Info Dissem on	∆ in HN Envirn
	Leaders	Citizen Percepts		Essent'l Services	Local Sprt: Dstbl	Funct		Income Distro	Pop Movement	HN Gov't	
4	Embassy Comms	Info Dissem	Mil Training	Repatriate /	ID/Distrpt/Intrdict	Outside Involm't		Markets	Societal Leaders	Info Dissem on	
				Relocate Efforts	Recruit: Dstbl	in HN Politics				HN Citizens	
2	Improve HN Diplo	Collect & Use of	Support to HN	Econ Info Ops	Cntr-Criminal	△ Percepts of		△ Avail/Cost of	Events: Stability	3rd Party Media	
	Capability	Refugee Info	COIN Efforts		Syndicates Ops	Gov't Legit		Goods/Services	& Security	Percept/Attitude	_
9	Diplo Acts: Prep	Improve HN Gov't	Mil Exercises	Mitigate WMD	Martial Law & LE	∆ Gov't		HR Training on	Epidemic		
	for Stability Ops	Comms		Effects	Ops	Leadership		Econ	Breakout		
~	Comply w/ Int'l	Info Exchange	Logistics	Econ Intell Ops	Enforce Int'l	Destabilizing		Combat Ops on	Migration		
	Conv'tns & Stds	Program			Resolutions	Events		the Economy			
ω	Evac Embassy &	Alter Influence of	Improve of MoD	Est & Maint Log	Cntr-Corrupt	Trans-Nat'l Org's		NEO on Economy	Legislation, LE, &		
	Support Staff	Ldrs		Support for HN	Activities	Acts (Internal)			Regulations		
თ	Negot Refugee	∆ Message /	Deter Foreign /	Improve	Improve Legal &	Outside Nation's		Econ Response	Discrimination in		
	Safe Havens	Position of Ldrs	Proxy Attackers	Infrastructure	LE Ministries	Acts (Internal)		to Rule of Law	NH		
10	Diplo Acts to	Intell Collect to	Mil & Naval	Econ Actions for	Extra-Legal	HN by Forward	_	Sanctions (Econ)	Terror / Insurat		
2	Sunnort HA/DR	Support HN	Presence	Loint Mil Ever	CriminalActs	Bacec		(Grns on HN Pon		
;	Diplo-Act for UN	Improve HNI Intell	War & Mil			2rd Darty Extral		Inductrialization	Ctrikae Brataete		
-			Wdi & Mil						SUINES, FIUESIS,		
1	Gov't Pers Irain	S IC	Invasion	Citizens		Uiplo Acts		NH UO	Kiots, Gathering		
17	Diplo-Like Acts	ISR for Embassy		HA/DR Ops		Factional Group		Irade			
	Btwn Orgs					Activities		Agreements			
13	Diplo Preps for	HN Internal		Est & Maint				A HN			
	WMD CM	Dissem of Info		Refugee Camps				Infrastructure			
14	Diplo Acts: Multi-	Needs Assess for		Mitigate Destable			Ċ	5/			
	Nat'l Exercises	Decision-Making		Effects			3	erarcning (s	(±		
15	Diplo Aborgn'l,	Info Ops		Econ Dev for		i i i i i i i i i i i i i i i i i i i					
	Nomad, Minority			Disaster Recov	States	Events	Actors	Decisions	Context	Protocols	Environment
16	Est Relatns:	Training of HN		Stability Ops	PMESII Ground	Time and Space	By Power or	Hierarchical DM	History	Social Norms &	Physical Terrains
	Absent a State	Gov't Personnel		(Econ)	Truth		Authority (HN)	in Organizations		Expectations	
17	Multi-party Diplo			Improve Mol	Actor Percepts of	Events, Trends, &	By Region	Individual	Interpretation &	ROEs &	Natural Resouces
	Negots				PMESII	Cycles	(Providence)	Decision-making	Percept Rules	Regulations	
18	Destabilization			Spending for HN	Historical States	Actions in	By Ideology or	Social Process of	Biases,	Policies, Stds,	Weather, Land
	Ops			Mol	of Actors/Entities	Preparation for	Agenda	Decision-making	Prejudices	Processes	Fertility
19	Deterrence			Spending for HN	OPAL States of	Weather Impacts	By Social Identity	Perception of	Org Structs &	Legal Rules &	Natural Physical
				MoD	Actors	to Decision-	(Tribe)	Environment,	Roles	Procedures	Conditions
20	Advocacy Acts			Spending for	Current Rule Sets		By Interest	Adapability &	Limitations of	Limitations of	Physical
	by US Gov't			Rule of Law	for Actors		(Unions)	Learning	Context Rules	Protocol Rules	Contraints
21	Security & LE for US			Spend / Dev HN Other Agencies	:	Implicit Req'ts	:		:	:	:
		•				į,		:		:	1
	Each identifier co	insists of two letter	s followed by an ii	ndexing number. ¹	The first letter (A,	E, or O) connotes	that the requireme	nt addresses an Ac	tion, Effects, or O	verarching require	ment. The
	second letter is ch	nosen from the lette	sts in the DIMEL/I	PMESII acronym.	Thus the first requ	nirement "Support	to Ambassador," i	indicated by A-D-0	is identified as	an Action (A) that	t is primarily
	Diplomatic (D) in	n nature. Similarly,	the requirement f	or "Migration." inc	licated by E-S-7, i	s the 7th social eff	ect requirement. 1	Note the implicit O	verarching require	ements in grey are	always scenario
	enerific and thus t	too niimeroiis to ev	-nlicitly cataloo)	•						•
	specture and mass	NU Immunum	spilling varance.								

Table 2: Descriptive Requirements

3 Measures of Effectiveness

One common question posed to the analytic community is "how effective was a given course of action?" Answering this question in an analytic and self-consistent manner requires measures of effectiveness that are appropriate for the scenario. To use measures of effectiveness consistently, in turn, we must understand the subtle but important distinctions between measures, metrics, and indicators. These terms are defined as follows [Web-01, slightly modified]:

- A measure "provides an indication of the extent, amount, dimension, or capacity of a process or product."
- A metric "is a quantitative measure of the degree to which a system, component, or process possess a given attribute."
- An indicator "is a metric or combination of metrics that provide insight into the process or product itself."

Therefore, metrics are quantitative values that are characteristics of a system or process. However, indicators which are formed from metrics are often qualitative in nature. Thus, there is a hierarchy between metrics and indicators, both of which are a subset of measures. It is from this basis that measures of effectiveness are derived.

3.1 Hierarchy of Measures

Figure 3 presents this hierarchy as a pyramid which is consistent with the NATO hierarchy for C2 best practices [NATO02] and the OSD proposed planning aids for small-scale contingencies [Gan02]. The Dimensional Parameters (DPs) form the foundation and include universally accepted, directly measurable quantities (e.g. mass of cargo in kg, load capacity of truck in m³, load time for truck in hrs, etc.). Dimensional parameters are completely independent of scenarios and represent characteristics of the relevant system.

The next level is the Measures of Performance (MoP). These values are also quantitative and are determined directly via universally accepted mathematical processes (e.g. distance traveled for a given rate and time, number of meals a truck can transport in a given time).

Thus metrics are low-level, hard or analytically-based quantities which:

- Are mathematical & broadly acceptable (for given assumptions)
- Do not address any particular scenario

Measures at the middle tier – the last quantitative, metric-based measures – are the Measures of Effectiveness (MoEs). In order to discern a MoE, the analyst needs fully quantitative measures. For example, determining the degree of degradation (time of

additional delays) to logistical support due to a damaged road system is readily solvable though accepted operational research methods. Note that in addition to being tied to an asset's DPs and MoPs, the MoEs often include "boundary" or terrain conditions which may be scenario-specific. For example, to determine the "satisfaction of food needs" requires knowledge of the spatial demand signal which depends on the specific ground conditions and applied assets. However, the satisfaction rate (e.g. percent of immediate demand sated) is directly calculable though analytic methods. Hence the MoE is a still a metric.

Thus the mid-level metrics, hard or analytically-based quantities which:

- Are mathematical & broadly acceptable (for given assumptions)
- Depend primarily on "Boundary Conditions" associated with a given scenario

Examples of metrics include: What is the rate at which operational teams can restore damaged roads (dimensional parameter)? What is the capacity of the restored road (measure of performance)? What is degradation of transport / logistics network due to damaged roads (measure of effectiveness which requires knowledge of the specific network)?



Low-Level Metrics Alone Fail to Capture the Impact of Activities on the Broader Mission Objectives the "So What?" Impact

Figure 3: Hierarchy of Measures

Above these metrics exist two layers of indicators which, as stated earlier, provide insight into the process or product itself and often use the metrics as inputs. These indicators are qualitative in nature and can only be completely defined within the context of a specific scenario. In addition, they are:

- Specific to the broad campaign goals
- Not always broadly acceptable by analytic community
- Subject to interpretation

- Depend on assumptions, outside theories or indices
- Do not possess a unique form for a given scenario

The first high-level indicator is the Measure of Force Effectiveness (MoFE) which is designed to evaluate the impact of a collection of related activities independent of any specific policy question. To illustrate: consider the case of a humanitarian assistance operation. Measures of force effectiveness could address the perception of the assisted populations regarding either the sufficiency of effort; the equity or fairness of effort; or the impact/reception of the associated information campaign on the humanitarian assistance operation.

Alternatively, another set of MoFEs could address the attitudes of the assisted people towards (a) the local and national government or (b) the assistance efforts and assisting forces. In both cases, the MoFE will require polling-like data which can only provide the population's current perceptions and attitudes (i.e. they may not be prediction data). The MoFE will be a user-defined mathematical/logical expression that is not universally accepted.

Other indicators that could be applied to this scenario might represent answers to questions such as: "How effectively are restored roads meeting the needs of our forces with respect to the mission?" "How effectively are restored roads meeting the needs of the population with respect to the successful distribution of goods?"

The highest-level indicator is the Measure of Policy Effectiveness (MoPE) and seeks to evaluate how MoFEs collectively support very high level policies through scenario-specific value scales. Using the same humanitarian assistance example, the MoPE examines the validity of policies such as "Apply humanitarian assistance to increase regional stability." For example, a MoPE could be defined as "long-term regional stability" in terms of the following MoFEs:

- Perception of Gov't Sufficiency / Legitimacy
- Ensure Gov't Sovereignty
- Security of Basic Needs
- Security of Life / Property
- Positive Outlook for Conditions

Note that this example requires an outside theory or index (e.g. the Eurasia Group's Stability Index or the Economist Intelligence Unit's Quality of Life Index). Note also that the MoPE scale is generally user-defined. Furthermore, there is no single "correct" method for evaluating the measure of policy effectiveness. Regardless, the analyst should exercise great care to fully justify the process and must obtain buy-in from the decision-maker.

The metric-based measures, although critical for all analyses, are often straightforward, generally supported through operational research methodologies, and widely accepted. By comparison, much more effort is needed to develop higher-level measures (indicators). For this reason, the present effort focused on developing a set of generic indicators (measures of force effectiveness and measures of policy effectiveness) suitable for a wide range of problems. Over fifty generic, high-level indicators were identified, covering a wide range of areas such as conflict, stability, security, basic needs, rule-of-

law, and perceptions as well as the DIME/PMESII areas. Examples of representative indicators include:

- To what degree has the perceived level of government corruption changed as a result of monitoring and reporting by oversight officials?
- To what degree has the perceived legitimacy of officials/leaders changed as a consequence of external support e.g. security, aid, oversight?
- How effective are intelligence activities in supporting counter-insurgent operations?
- How effective are targeted communications at (a) advancing the mission goals and (b) refuting misinformation attributable to deception or rumor? What is the perceived credible of these communications to the target audience?
- How has the perceived legitimacy of the government changed since commencing counter-insurgency operations?

Note that for each example the indicator spans multiple DIME/PMESII areas. Each indicator is linked to multiple descriptive requirements and their associated metrics. In many cases, a group of other indicators are joined and rolled up into a Measure of Policy Effectiveness indicator. For example, the last sample indicator (perceived government legitimacy after counter-insurgency operations) will depend on the preceding indicator (effectiveness of any information campaigns).

3.2 High-Level Indicators

Unlike the effort to compile a list of descriptive requirements, the attempt to identify relevant measures cannot, in principle, result in a closed list. This is because the higher-level indicators are all second- and third-order abstractions of dimensional parameters which are in turn grounded in descriptive requirements. In theory, it is possible to develop a closed set of descriptive requirements since the DIME/PMESII problem space that they cover is bounded. Moreover, it is theoretically possible to identify a limited number of dimensional parameters and measures of performance since they correspond to a limited number of descriptive requirements. However, the mid-level metrics (measures of effectiveness) are scenario dependent. Since there are an unlimited number of potential scenarios, there are an unlimited number of MoFEs and MoPEs increases without limit.

Thus it is not possible to have a closed set of measures of effectiveness or even a construct a universal taxonomy. Instead, presented below are suggested topical schemas for categorizing measures within both the Measures of Policy Effectiveness (MoPE) and the Measures of Force Effectiveness (MoFE).

3.3 Categories of High-Level Policies

The high level policies – and their associated Measures of Policy Effectiveness – that are presented here are characteristic of an idealized "well-governed country." By adopting these policy goals, this "well-governed country" enjoys generally good relations with its neighbors and creates a stable and secure environment for its citizens. In the real world, many countries fail to adopt these goals. Modelers may represent some countries by ascribing policy goals to them that are just the opposite of the goals listed below. For example, rather than promoting human rights by criticizing the inhumane punishments of lawbreakers, a "badly-governed country" may ignore or even seek to conceal inhumane punishments, both on its own soil and in other countries.

In many cases these policy goals closely approximate the actual policies of the United States during much of its history. However, situational considerations may have led the United States to modify some of these ideal policies at various times. Given the general consensus that the United States should strive to adopt and apply these goals, however, it is reasonable to ascribe them to the United States when modeling its dealings with foreign countries and agents.

Note that these policies only concern the "well-governed country's" relations with other states. Some of the policies that apply to the country's internal governance (for example: "promote national economic diversity by granting immature industries tax breaks and incentives") are not included because they are not directly relevant to DIME/PMESII modeling.

Nineteen (19) high-level policies are presented below. Most of them – and, hence, their associated Measures of Policy Effectiveness – fall into one of five distinct categories:

- Trans-National Issues (TN)
- Foreign Affairs (FA)
- Ideological Advancement (IA)
- Responsibility Issues (RI)
- Internal Issues (II)

There are numerous examples, however, where a single policy can support two or more of these over-arching categories. For example, the promotion of international commercial standards supports Trans-National Issues (international treaties, conventions, and standards), Foreign Affairs (enhance trade and access to resources), and Responsibility Issues (promote sustainable economic growth). An overview of the most prominent 19 high-level policies follows below with full details provided in Appendix 12

3.3.1 Trans-National Issues (TN)

Policies concerning trans-national issues are always multi-lateral in nature, involve a universally or widely internationally recognized organization, and is a special case of foreign affairs. The two major trans-national policy issue categories are described below:

• **Promote International Peace and Security** – The objectives of this policy are the multilateral promotion of international peace and security through arms

control measures; arms limitation agreements (e.g. no armed satellites); recognition of zones of control or influence; treaty organizations; the non-proliferation of WMD; and the verification and enforcement of compliance with international resolutions, or treaties.

• International Treaties, Conventions and Standards – Policies of this type include compliance with international conventions and standards such as financial definitions, rules of war, law enforcement, sovereignty rights, use of non-territorial space (international waters), safe passage rights for diplomats, ownership/liability laws, weights, measures, and passport standards, among other things.

3.3.2 Foreign Affairs (FA)

Foreign Affairs policies usually aim to create bilateral or trilateral international agreements, although there are a limited number of exceptions to this generalization that are well-known (e.g. NATO is a multi-lateral agreement regarding the enhancement of mutual military preparedness). The policy goals of Foreign Affairs include:

- Expand or Consolidate Territory, Dominion, Control, or Influence This includes policies that pursue through force, coherence, and threats as well as less aggressive methods (e.g. bilateral treaty or agreement).
- Enhance Trade and Access to Resources The objectives of this policy are to open or develop markets for the nation's raw materials or finished goods and secure sources for any raw materials or finished goods that the nation needs. Intellectual products and resources are included (e.g. technology, professional services, etc.).
- Enhance Allies' Military Preparedness or Security These enhancements could be achieved by means of arms sales, sharing of technical information and intelligence, joint training, and cooperative exercises.
- Enhance Allies' Stability This policy addresses the political, economic, and social aspects of stability. Actions that support this policy could include recognizing a new governing party after an electoral transition or granting an ally "Favored Nation" status; providing or guaranteeing loans; supplying material, technical, or intelligence support; and statements of support and friendship to the ally.
- Shape Perspectives, Attitudes, Norms, or Processes of Other Nations: This policy stands in between the "Increase Adversaries' Instability" and "Expand ... Control or Influence" policies and is typically applied to nations *in between* ally and adversary. While stopping short of destabilizing the other nation or threatening attack or economic hardship (e.g. withdrawal of economic support), this policy instead attempts to "use the carrot" to influence the nation through a variety of means (e.g. special status, liberal visa policies, no interest loans, etc.). The shaping efforts can be applied to all levels of the nation—from the political elite down to the general population.
- **Increase Adversaries' Instability** This policy seeks to destabilize the adversary's political, economic, and social institutions (e.g. through sanctions, embargos, information campaigns, or support for rebels).

3.3.3 Ideological Advancement (IA)

The policies classified here as Ideological Advancement concern how the national government presents itself to its citizens and to the world. Such policies are not narrowly confined to diplomatic relations between specific countries but inform the general messages about national identity and about how the nation prefers to be viewed and dealt with. They consist of four policies:

- **Promote Human Development** Human Development policy includes supporting disease prevention and control at international and national levels; improving and extending access to medical care; supporting education about health and nutrition; and promoting access to education by supporting literacy campaigns and improving and extending language education.
- **Promote Democracy as a Method of National/Collective Decision-Making** This can be done by supporting groups that monitor host nation elections and by sending diplomatic complaints about irregular elections practices.
- **Promote an Ideology or Political Perspective** Countries that wish to promote an ideology often do so by means of strategic communications and public diplomacy. They also may monitor the international media and publish rebuttals or critiques of whatever propaganda that they wish to counter. Examples include separation of church and state; any social caste system; or socialism.
- **Promote Human Rights/Human Dignity** Human rights policies seek to impact issues such as anti-slavery and anti-trafficking efforts; promoting the humane treatment prisoners and the infirmed (e.g. mentally ill); opposing eugenics; defending prisoners of conscience and assisting refugees; ending discrimination; and promoting personal security (freedom from fear and violent attack).
- **Promote Knowledge Discovery and Technological Advancement** The pursuit of science, technology, and the fine arts all fall under this category. Since this policy seeks to expand knowledge, technology, and the arts, it is distinct from educational and human development policies which seek to propagate existing knowledge and capabilities.

3.3.4 Responsibility Issues (RI)

Responsibility Issue policies involve anticipating future problems at the international and national levels and taking steps to mitigate them. There are three core high-level policies responsibility policies:

- **Prepare for Disasters, Mitigate their Effects, and Provide Relief for Survivors** – This can be done, for example, by establishing and maintaining early warning systems for drought, famine, etc.; by enhancing the readiness of particular host nations (increasing food storage capacity, improving emergency communications networks, etc.); and by establishing capabilities for disaster relief. Disasters could be both natural and man-made (e.g. war, terrorist attack, etc.).
- Support Policies that Promote Sustainable Economic Growth at National and Regional Levels This policy includes support of the World Bank and the

International Monetary Fund; membership in World Trade Organization; and signing bilateral trade agreements, among others. Additionally, control over aspects of the internal economic policies to promote sustainable markets and growth through regulation and monetary / fiscal policy are also included.

• **Support Environmental Stewardship** – Environmental policy might involve signing conventions about the sustainable use/harvesting of natural resources (fishing, forestry, etc.); signing conventions about environmental pollution (acid rain, lead, asbestos, etc.); and preventing the spread of animal and plant diseases.

3.3.5 Internal Issues (II)

Internal policies are important because, they directly impact a nation's ability to function internally as well as its ability to operate on an international level. Often, internal policies restrict or drive foreign policy through legislated restrictions, bureaucratic complications (e.g. multiple foreign affairs departments), consistent message (internal), credible message (e.g. promoting international human rights while internally an abuser), and procedural requirements (e.g. long process of ratifying agreements). They consist of four high-level policies:

- **Promote the Rule of Law** –These are unilateral policies to combat theft; eliminate corruption; enforce compliance with established processes, procedures, regulations, and protocols; maintain transparent and oversight as authorized; maintain agencies within their defined jurisdictions; control authorities of force (military, police, etc) within legal framework and maintain loyalty to leadership; and prevent illegitimate coercion and threat of physical safety. There are specific cases where this policy expands beyond national borders (e.g. international agreements on money laundering, looted artifacts, human and drug trafficking).
- Enhance Internal Stability: In addition to financial, social, political, and security stability, these policies also include the establishment of national identities, norms, values, and morals. These policies can be both explicit (codified) and implicit (generally accepted norms espoused by the regime). This policy is related to both Consolidating Power and Control and potentially Promote the Rule of Law.
- **Consolidate Power and Control:** These policies, executed by factions within governments, seek to consolidate their power, establish their control, mitigate or limit opposition (even eliminate), and gain consent of the population (including acquiescence). The means for achieving these goals may be persuasion, negotiation, coercion, or combinations of all three.
- **Promote Internal Development:** In addition to preparing the nation for dealing with allies and adversaries by enhancing its financial and human resources, these policies also include: developing the commercial and financial; promoting educational and training programs; expanding the scientific and technological base; improving the manufacturing and production (agriculture and natural resources) sectors; and expanding infrastructure.

Additional details to the above Measures of Policy Effectiveness are provided in Appendix 12. In the following section, the next lower level indicators—the Measures of Force Effectiveness—are outlined.

3.4 Measure of Force Effectiveness

This section presents the Measures of Force Effectiveness which draw from the MoEs and feed into the MoPEs. As stated above, these Measures of Force Effectiveness are not organized into a taxonomy but rather a topical schema designed to allow the user examine the effectiveness of activities and policies from various perspectives (e.g. "effectiveness of law enforcement agencies and policies" *vice* "crime prevention activities and policies").

Each of the MoFEs presented below is posed in terms of multiple, specific questions. Each of these suggested questions provides, to varying extent, insight into the state or indicator being examined. For the most part, each individual question represents a Measure of Effectiveness (MoE). The compilation of answers to all these questions then coalesces into force-level insights regarding effectiveness.

Many measures are stated in terms of the current conditions. However, most measures can be restated in terms of changes due to new policies and actions or in terms of expected shortfalls in capability, capacity, or function. Bearing this in mind, some 62 Measures of Effectiveness have been identified. They can be grouped into 9 categories, as follows:

- Relationships between Actors
- Government Institutions
- Social Institutions
- Force-on-Force Conflict
- Economy & Investment
- Sufficiency & Utility
- Decision-making and Implementation
- Enforcement
- Information

For each MoE presented below, there are actually three MoE⁷s:

- The *Actual* or *Ground Truth* MoE for the condition
- The *Perceived* MoE for the condition held by an actor (includes credibility)

⁷ Note that both the perception and attitude related MoEs include inter-subjective secondary effects and relationships. Examples include: actor A's perception of actor B's attitude regarding an event; furthermore, B's perception of A's perception of B's attitude; *ad naseum*. While the full infinite regress is not required for most scenarios, there are cases where at least several inter-subjective cycles are important to the MoEs.

• The *Attitude* of each actor regarding the condition (this includes both the attitude of legitimacy and the expectations of the actor)

No attempt has been made to make this list of MoEs non-overlapping. In fact, as with the MoPEs, there is overlap between groups of MoFEs. This should be expected since the measure is composed of answers to multiple underlying questions some of which apply to other MoFEs or MoPEs. Additionally, there are cases where a MoFE draws from other MoFEs. For example, the effectiveness of promoting the Rule of Law (see the Rule of Law MoFE under Government Institutions) depends on the effectiveness of information disseminating of laws and regulations to the population (see Information Operation MoFE under Information). The list of MoFEs is briefly presented below organized by the nine categories. The complete details, including links to the Descriptive Requirements, are provided in Appendix 12.

- **Relationships Between Actors:** This category involves the bilateral and multilateral relationships between actors. Note that an actor's real attitude can differ from a third party's perception or interpretation of what that attitude is. Specific MoFEs include:
 - Bilateral/Multilateral Relationship
 - Deterrence
 - Hierarchical Relationship
 - Culture Brokerage Skills
- **Government Institutions:** This category involves processes associated with how the government operates as well as the effectiveness in achieving the government's set goals (governance).
 - Elections and Political Process
 - Legislative Process
 - Legislative Support
 - Governance
 - Civil Service Standards
 - Proportionality of Response Process
 - Rule-of-Law
 - Laws, Rulings, and Regulations
 - Preparedness
 - Government Officials and Leaders
 - Evacuation and Resettling Efforts After Disasters
 - Urban Planning
 - Freedoms & Rights
- **Social Institutions:** This category involves all the non-governmental institutions, networks, and norms which influence or shape social behavior and interactions (e.g. kinship, ethnic, religious, ideological, business, professional, criminal, insurgent, or other people group).
 - Institutional Effectiveness
 - Governmental Policy Impact
- Force-on-Force Conflict: This category focuses entirely on measures associated with active military conflict. These are simple, representative and belong to a well-defined field.

- Warfighting and Mission Execution
- Military Readiness
- Military Force Sufficiency
- Occupation and Control of Hostile Territory
- Intelligence, Surveillance, and Reconnaissance
- Militia Demobilization
- Transition from Martial Law to Civilian Control
- Border security, piracy, interdiction, counter-FRIS
- **Economy & Investment:** This covers how well actions support, enhance, or expand economic activity, production, and investment.
 - Human Capital
 - Economic Infrastructure
 - Resource Development
 - Targeted Did
 - Capital Improvements
 - Business Support by Government
 - Monetary and Financial
- **Sufficiency & Utility:** This category presents indicators that measure how well specific needs are met and whether they are met in a sufficient and timely manner.
 - Infrastructure
 - Security of Life
 - Security of Private Property
 - Security of Government Facilities
 - Counter-terrorism
 - Counter-insurgency
 - Basic Needs (e.g. food, water, clothing, shelter, fuel, medicine)
 - Humanitarian Assistance / Disaster Relief
- **Decision-making & Implementation:** Decision-making, at all levels of government, is critical to good governance. This often requires anticipation of problems, rapid response to issues, and the development of information in order to permit good decisions. Additionally, the execution of good decisions is just as critical to the final outcome.
 - Anticipation of Decision
 - Information Collection
 - Decision-making Process
 - Quality of Decision
 - Implementation Plan for Decision
 - Execution of Decision
 - Impact of Decision
- **Enforcement:** The enforcement of policy, regulation, and law—critical to effective governance—is covered in this category.
 - Rule of Law Policies
 - Law Enforcement
 - Judicial Process
 - Penal Process
 - Oversight Agencies

- Common Crime Prevention
- High Crime Prevention
- Blockade and Sanction Compliance
- Environmental Stewardship
- Corruption, Crime
- **Information:** This category covers a wide range of information-related measures including the collection, processing, storage, and dissemination of data.
 - Information Operations
 - Public Records
 - Freedom of Media
 - Information (Collect, Process, Disseminate)

This chapter has described the hierarchy of the higher-level measures (indicators) and has provided several illustrative examples. The next chapter compares several common models against the "Gold Standard" descriptive requirements in order to identify current modeling gaps and deficiencies.

4 Applying the Descriptive Requirements & Measures of Effectiveness

When applying the descriptive requirements to particular scenarios and problems, it is important to recognize that no single tool can address all analytical complexities at all levels of fidelity. Also, not every analysis of a problem has to fully address each requirement. Every scenario has its own set of descriptive requirements and associated measures of effectiveness which the analyst must divine beforehand. Therefore, for the best use the descriptive requirements, the following process is recommended:

- 1. Identify, define, and bound the scenario
 - Background, region, human terrain, starting conditions, assumptions, objectives, potential actions, ...
 - Establish "criteria for success" for the measures of policy effectiveness
- 2. Use SMEs to generate modeling requirements and associated measures from the "Gold Standard's" descriptive requirements
 - Develop scenario indicators
 - Remove requirements that are non-critical for analysis
 - Link requirements and measures
 - Prioritize remaining requirements and measures based on impact
 - Identify any additional scenario-specific requirements or measures
- 3. Select model suite that best fill requirements and measures
 - Review existing models and select those that fill requirements and link to measures
 - Assess data needs for each model
 - Determine model linkage approach
- 4. Determine "model and data coverage" against identified requirements
 - Assemble available data
 - Tweak/improve models and datasets where required
 - Develop appropriate workarounds
 - Review with SMEs and document
- 5. Begin modeling and analysis

Step 1, though critical in properly defining and bounding the problem, is often defined by the decision-maker or the scenario. Special care must be taken in selecting the "criteria for success" which will drive the selected course of actions and the evaluation of potential policies.

The next step revolves around the descriptive requirements and associated measures. In Step 2, subject matter experts compare the scenario and its goals against each requirement, throwing out the unnecessary or weakly-coupled requirements and prioritizing the remaining requirements, thus thinning out the modeling space. Also, the development of the high-level measures (indicators) that point to the "criteria for success" are defined and linked to the descriptive requirements. Note that it may be necessary to establish specialized, scenario-specific requirements not well addressed by the current set.

Step 3 involves comparing the required representations from step 2 against the collection of existing tools to determine which tools can address some portion of the requirements space. During this step, collections of tools may be examined. The linkages between tools and model suites should also be considered. It is also imperative that the data requirements of each model be considered in this phase. At this point, it is possible to narrow down the range of tools considered and select the model suite—the tool suite, data sets, and linkage architecture—which will be used to support the analysis.

Once the model suite is chosen, it is possible to determine the model and data coverage of the scenario (step 4). This is accomplished by identifying which descriptive requirements from Step 3 are not fully covered (with regard to either representation or data) by the modeling tool suite. Several options exist for mitigating poor coverage of requirements. First, the tools or data themselves may be improved (although this often takes more time than is desirable). Alternately, suitable workarounds or surrogates may be devised. Lastly, poor coverage can be mitigated by making the appropriate assumptions (i.e. assume the political situation remains within the boundaries of the model acceptability). After all of the coverage issues have been addressed, it is best to have the subject matter experts to revisit the problem and make a final assessment regarding the validity of the representation and associated indicators. The criticality of the data's quality—in terms of what the data represents; inherit sampling or reporting biases; collection methods; coverage; and the inter-reliability of the various data sources—and its proper integration with the models cannot be overstressed.

Then, once steps 1 through 4 are completed, analysis may commence with step 5 generation of output data through modeling and analysis by means of the developed indicators. By following the steps described in this section, the descriptive requirements and measures can be used to aid the analyst in properly framing a problem. From the above, it is clear that the descriptive requirements and high-level measures (indicators) play a strong role in steps 2 and 4 before any modeling and analysis is initiated.

5 Data

As is clear from the discussion in Chapter 4, data is a critical component of any DIME/PMESII analysis. Data is the fuel that drives the engine of analysis. Low quality fuel will give the analyst poor analytic performance, calling into question the credibility and viability of any associated analytic products.

Thus any effort to identify the best DIME/PMESII modeling methodologies would be incomplete if it did not address the issue of DIME/PMESII data quality. Solving the data quality problem, however, depends on the recognition that DIME/PMESII data is different from the kinds of data traditionally used in Operations Research and in models of kinetic warfare and attrition. DIME/PMESII data inevitably combines qualitative observations with quantified measures. For this reason, producing high-quality DIME/PMESII data is not just a matter of resolving the general data processing issues (i.e. collection, analysis, archiving, maintenance, use, interpretation, application, and interoperability within the framework of a modeling suite) that DIME/PMESII data has in common with other kinds of data. To produce high-quality DIME/PMESII data and use it appropriately, modelers and analysts must also devise methods for recording and accommodating qualitative inputs.

5.1 The Nature of Data

The meaning of the term "data" is varied but, for the purposes of the present discussion, data is defined as "raw observations or findings" including facts, statistics, descriptions, or other items of empirical observation. Data can be further broken down into the subcategories (Figure 4):

- Quantitative Data which consists of measured data
 - **Topological** data includes geographic maps and spatial distributions
 - **Numerical** data includes numerical streams, processed statistics, and equations
- Qualitative Data, in contrast, consists of non-measured data.
 - **Binned** data includes categorical information
 - Rules include procedures, decision-trees, protocols, and rules-ofengagement
 - Hierarchical data include ranked or prioritized lists

- **Relational** data includes network maps, affinities between entities, and chains of command
- **Transitional Data** typical is qualitative data that has undergone a quantification process⁸. Examples include scaled qualitative (Likert) data and scores resulting from an Analytical Hierarchy Processes.



Figure 4: Types of Data

It is the qualitative data that is often the most difficult to handle in DIME/PMESII modeling and it is often the most critical part⁹. People fall into demographic groups and have social identities (categorical bins); social interactions are dictated by protocols and norms (rules); decisions are made by processes (rules); objectives are often prioritized (hierarchical) or given situational preference (relational affinity); and social networks shape interactions between entities (relationship). To further complicate matters, real people present contradictions and conflicting objectives/allegiances that often are difficult to identify in any data collection process.

⁸ It is possible to transform quantitative data into qualitative data though this is rarely done since it results in a loss of resolution.

 $^{^{9}}$ "Not everything that can be counted counts and not everything that counts can be counted." – Albert Einstein

5.1.1 The Place of Data in Analysis

All analysis is focused on answering questions. Often these questions cannot be answered through direct experimentation or observation so insight into the problem must be developed before the questions can be answered. This is especially true of DIME/PMESII questions. So what is the relationship between data and insight? How do they work together to help support answering the questions? The Hierarchy of Knowledge (Figure 5) illustrates that Data, the most basic unit of observation, resides at the bottom of an inverted pyramid with Insight and Understanding, the highest form of knowledge, residing at the top. All the layers, including the middle categories of Information and Learning, are defined as:

- **Data**: the raw basic unit of observations consisting of the minimal listing of observed facts and can include definitions of the data fields (metadata). Examples include historical GDP numbers, budget tables, and social network mappings.
- **Information**: the explanatory narratives associated with data (observations) and can contain results of processed data (e.g. statistics, empirical relationship, etc.). Examples include after action reports, journal papers, and data analysis reports.
- **Learning**: the accumulation of information across various topics and collected historical insights. Learning is often presented in the form of comprehensive theories, books, or state-of-the-art digest papers.
- **Insight and Intuition**: includes all causal reasoning and extrapolate beyond Learning or past observation (Data). It is here where understanding is developed and here where understanding is applied to new, hypothetical situations.

As can be inferred from this inverted structure, typically, more is known than has been observed. This is not surprising since people often rely on intuition and past experience to predict what may occur in new situations. Unlike the Information and Learning categories—which are reflective—the Insight and Intuition category is creative and able to look beyond "past experience" or observed data to predict or extrapolate new outcomes.

Figure 6 shows how Data interacts with Insight and Intuition. It is interesting to note that Insight and Intuition draws directly from Data, bypassing Information and Learning. This is because Insight and Intuition is the *source* of all Information and Learning. Insight is gained by careful consideration of observation (Data); hypotheses are proposed (potential future Intuition) and experiments developed; the performed experiments yield new Data which support/reject the hypotheses, serve as a source for more Insight, and expand the observation base. From the developed Insights and analysis of Data, narratives can be composed that explain observations (Information) and theories proposed that link related topics (Learning). Thus students review Information and Learning in the hope of ultimately developing Insights and Intuition.



Figure 5: The Hierarchy of Knowledge

However, not all observations can be performed. Furthermore, many systems (e.g. societies) are too complex and have too many interdependencies to permit straightforward application of this Data \rightarrow Insight and Intuition process. So analysts resort to using computational models—which are built on a combination of assumptions and past observational experience—to mimic the experimental process. Models are driven by three types of input conditions to generate output Data or Observations. The input categories are as follows:

- **Initial Conditions**: a scenario's starting state of dynamic variables. Examples typically include population size and distributions, economic conditions, and internal security factors.
- **Static "Terrain" or Boundary Conditions**: are conditions which remain fixed throughout a simulation. Examples include geographic terrain, natural resources, or alliance fixed through the scenario.
- **Exogenous Driving or Forcing Factors**: the outside entities and conditions which push variables from one state to another. Examples include natural disasters, pre-planned events, and scripted actions.

It is these types of input conditions, commonly referred to as input data, that are used in conjunction with models to generate artificial observations (output Data). These are then analyzed to develop Insights and Intuition and then Information and Learning. Moreover, these analyses often identify the need for additional observations (e.g. Data) related to other input conditions. The remainder of this report is focused on input conditions/input data rather than the outputs.



Figure 6: Models & Data Yield New Data for Analysis & Insight

5.2 Major Lessons Learned in Past Efforts

Though interviews, discussions, and reviews several important "lessons learned" regarding data were identified. They are listed below. While the list is incomplete, it does represent a partial "map through the minefield" of data misuse:

- **Misunderstanding the Assumptions:** Every dataset contains both explicit and implicit assumptions rooted in the underlying theory associated with the problem statement and/or in the collection and analysis methodologies.
- Semantic Ontology: Also important are the definitions associated with the data points and data categories. Such definitions must be explicit, consistent, and unambiguous; without such specificity, a data set cannot be validated and comparisons cannot be made against other contexts. This difficulty is increased when multiple data sets are used simultaneously.
- **Data Freshness:** Social data sets lose their usefulness if not maintained and refreshed periodically. The freshness of the data depends strongly on the social stability of the data source population, the evolving social dynamics, and the collected data. Most data sets lack any metadata or conditions which would indicate that the dataset has "expired."
- **Incompleteness in Information Coverage:** Few data sets are sufficiently thorough to address multiple questions. For example, a data set that lists criminal acts (location, date, type) but lacks information about the perpetrator or the *modus operandi* can provide crime rate statistics but will not allow correlations between criminal activities, demographics of the perpetrators, and political unrest. The incompleteness can be topical, geographical, or temporal.

- Extrapolation and Interpolation: These methods of "filling in data" do not always work for most data sets and there is rarely consensus about both the methods used and the credibility of the results. On a positive note, it has been learned that in some cases the analytic concerns associated with a data set's gaps are either unfounded or easily overcome through simple data interpolation. Thus, the incompleteness of a data set does not necessarily invalidate its use.
- **Data Granularity:** It is also common for a model to require data at a different granularity level than the data set presents. Moving between levels of granularity, through either aggregation or disaggregation, is a significant challenge.
- **Data to Model Linking:** When a data set was not explicitly developed for a given DIME/PMESII model, difficulties arise in adjudicating, interpreting, or recoding the source data. These difficulties potentially arise from granularity, differing definitions, or modeler's subjective interpretation during recoding.
- **Inconsistencies in Data Collection & Analysis:** The limited adherence to best practices regarding data collection or processing can damage the data's quality and reduce its credibility. It was found that these concerns can be partially mitigated through documenting the data's collection and processing methodologies.

Despite the fact that the lessons learned described above are commonly acknowledged by modelers, they might not always be in a position to apply them. When modelers have to deal with tight schedules or constraints on resources, they might have to use data sets or data input methods that have all of the above flaws. This can lead to either the use of poor data sets or the misuse of data beyond its area of applicability. In some cases— when reliable data is completely absent—they may even manufacture "data" by means of the "Bunch of Guys Sitting Around Talking" (BOGSAT) method or by eliciting approximations from SMEs. Such "data" is actually generated from the SMEs' knowledge of phenomena. However, knowledge is not the same as data since knowledge is inherently an aggregation of data and information. Thus it is possible to aggregate data into knowledge but it is not always possible to disaggregate knowledge into specific, precise data sets or data proxies. By using such proxies for data, of course, the modelers may reduce the validity and credibility of their analyses.

The above issues cannot be resolved simply by establishing a priori standards for data quality and data organization. The variety of relevant data and data collection methods is too great to be covered by standards at this stage in the development of DIME/PMESII modeling. However, there are best practices that mitigate some of these concerns.

5.3 Further Discussions on Qualitative Data

A common misconception regarding qualitative data is that qualitative data is imprecise, inexact, and ultimately subjective while quantitative data is objective with inherent measures of precision and accuracy. However, this is not always true.

A subjective, quantitative example is "how many good days did your organization have this month?" While the final answer is clearly quantitative, the definition of "good" is subjective to the respondent. Conversely, the answer to the question "Who shot JR?" is

completely objective, exact, and qualitative. The difference is that objective data require consensus in the underlying definitions associated with the data while, with subjective data, the definitions vary between respondents.

5.3.1 Direct Use of Qualitative Data in Modeling

Qualitative data has been in use much longer than most analysts realize. For example, normative statements such as rules of engagement, protocols, and standard operating procedures are often represented as procedural rule sets. While some may argue that these procedural rule sets are models, they are in fact qualitative input data¹⁰.

Similarly, behavioral outcomes after the application of such rules are frequently represented as "decision-trees" for analyzing such rule-governed behavior. Such decision-trees can be constructed normatively—by manually examining a set of rules and deciding what the sequence is for applying these rules—or empirically by analyzing observed behavior.

Also, the categorization or "binning" of objects and observations is a classic example of using qualitative data in modeling and simulation. For example, the tagging of hostile intent to a track is the assignment of a qualitative characteristic. Similarly, the assignment of a group as supporting an agenda is both qualitative and exact.

5.3.2 Quantification of Qualitative Data

One of the most common means of handling qualitative data is conversion to quantitative data. One method is to use a Likert scale for interviews and questionnaires which allows individuals to select from a range. An example question on a Likert scale is:

"How important is government transparency to the anti-corruption initiative?"

- 1) Very Important
- 2) Important
- 3) Moderately Important
- *4) Of Little Importance*
- 5) Unimportant

In this manner, Likert scales convert qualitative perception or attitudinal sentiments into quantitative data.

More times than not, data are not directly available but often implicitly embedded within Information as descriptive narratives (e.g. "the country imposes harsh penalties for corruption"), qualitative distinctions (e.g. "the country forbids labor unions in the public

¹⁰ I could be said that one analyst's model is another analyst's input data. Consider a command and control structure. If the objective is to analyze the flow of information, the C2 structure is the model. However, if the objective is to analyze an entire force's combat effectiveness, then the C2 structure acts more as input data into a larger-scoped combat model.

sector but permits them in the private sector"), or qualitative comparisons (e.g. "country X provides more ready access to defense counsel than country Y"). These types of Information can be converted into quantitative data via manual coding methods [MJ09]. Unfortunately coding involves interpretation of the Information source which can introduce inconsistencies and subjectivity errors into the coding process which can be mitigated through a detailed list of instructions or a coding manual. A coding manual, which is essentially metadata on variable definitions, disciplines the process of identifying the variables to be entered in the dataset, their possible values, and the rules by which numerical values should be assigned to those variables. Thus good coding manuals should:

- Delineate which variables are coded
- Be clear, complete, and explicit on all rules and procedures
- Have variables and values that are theoretically useful for maximum reusability
- Ensure values and variables are mutually exclusive and collectively exhaustive
- Have orthogonal variables as much as possible.

Two common concerns arise from coded datasets [MR06]:

- **Construction Validity**: the end user may reject the creator's definitions inherent with the variables and values (e.g. definition of what constitutes an open and fair election)
- **Mapping Accuracy**: despite the coding manual, the coders can execute inaccurate mappings of empirical evidence due to coder subjectivity, coder misinterpretation, or incorrect assessment inherent the source material

Automated searches of very large sets of narrative corpora can also be used to process qualitative data to yield the quantitative data needed by many modeling tools. One advantage of such methods is that they are less subjective than manual coding methods [CR09;MEC07].

It is important to note that not all kinds of qualitative data can be converted to quantitative data, including certain precise qualitative data types (e.g. rules, protocols, relational maps). This non-convertibility can be due to limited processes which allow movement between the data types, though this could be resolved with future developments of methods. Other data types may be permanently bound within the qualitative domain due to their inherent qualitative characteristics. For example, language is inherently qualitative with the meaning entirely dependent on the context and interpreter. Similarly, abstract concepts (democracy, justices, legitimacy) and psychological states (devotion, loyalty, trust, etc.) cannot be made quantitative, though many have attempted to Likert scale these values.

5.3.3 The Intertwining of Quantitative and Qualitative Data

Unlike the analysis of physical systems, DIME/PMESII systems inevitably intertwine both quantitative and qualitative data and representations which are illustrated by way of two examples:

Consider a case where a change of societal rules are significantly altered behavior: prohibition. This qualitative change was simply the recategorization of widely available products as illegal. This qualitative act led to qualitative changes in social behavior— establishment of illegal bars, bootlegging, etc. Similarly, quantitative changes resulted from this qualitative act—tax revenues were lost, law enforcement resources where redirected, criminal activities increased in volume and severity, etc.

Conversely, quantitative changes can yield both quantitative and qualitative results. Consider a value increase in the local currency. This increase of local purchasing power is clearly quantitative and has quantitative effects (e.g. increase in imports, decrease in exports, economic immigration, etc.). At the same time, there are associated qualitative impacts such as an increase in local standard of living, stratification within society, and changes in purchasing behavior and decision-making.

From these examples, it is evident that DIME/PMESII modeling and analysis must simultaneously consider both quantitative and qualitative aspects in both data and model representation.

5.4 Data Use Best Practices

This section presents a method for determining whether a data set is applicable to the current scenario and driving questions. This determination is made by answering specific questions regarding the data set features and purpose. The following list of questions is a starting point for determining the applicability of a data set to a given scenario. The ideal practice would be to have a definitive "yes" answer to each of the following questions:

- Is the data representative of the region and time period of interest?
- Is the data fresh? Have the ground conditions or underlying assumption changed?
- Were the collection methods sufficiently rigorous for the current scenario?
- Is this application in congruence with the originator's caveats and intended use?
- Is this the proper interpretation of the data as intended by the creators? If not, is the required interpretation within the range of validity?
- Are the explicit assumptions inherent in the data set acceptable?
- Have the implicit assumptions inherent in the data set (e.g. underlying social theory, scale, coverage, etc.) been identified and determined to be acceptable?
- Are the data set's deficiencies outside the area of application?

The presence of a "no" to one or more of these best practices does not necessarily invalidate the use of the data set for the analysis. However, it does indicate that additional due diligence in the form of SME reviews and accreditation be obtained in order to minimize the impact to the analysis' credibility.

5.5 **Proposed Data Quality Measures**

Measures of data quality compare characteristics of the data sets with the analytical goals of a modeling effort to determine how well-suited the data sets are for these goals.

Ideally, data quality measures should be created for every type of analysis or application (ex. war gaming, forecasting PMESII effects for COA adjudication, sensitivity testing of DIME actions, etc.) Such measures would include:

- **Compatibility:** How well the assumptions in the data set match the assumptions inherent in the models being used.
- **Reusability:** The degree to which a data set can be reused outside its original context or purpose.
- **Timelessness:** The longevity of the data set.
- **Breadth:** The fullest range of issues to which the data could apply (i.e. its entire applicability).
- **Incompleteness:** The size and distribution of the gaps within a data set that are significant from the perspective of the modeling effort.

In some cases it may be useful to create measures of data quality for a specific application, if that application is sufficiently unusual or unrepresentative of its type to justify the extra effort. For example, if the modeling goal is to forecast the PMESII effects of "whole of government" courses of action in two or three adjacent countries simultaneously – thus involving many different government actors and agencies, in addition to war fighters and their supporters – then some special measure of data quality may be needed.

5.6 Data Availability Assessment Methodology

Part of the objective of this effort was to make an assessment regarding the availability of DIME/PMESII data to supply models with both scenario input and potentially validation baselines. The task of assessing all available data sources was insurmountable and, due to the sensitive nature of many data sets, would have limited the availability of this document. As such, the present assessment of data availability only considered publically available data sources.

Data availability was assessed against each of the descriptive requirements. However, several difficulties were encountered in the data availability assessment. First, DIME/PMESII data sets are often of limited or spotty coverage and can be of questionable quality.

Another concern about data availability is that, even in data rich environments, most data sets cannot be validated because all data sets are derivatives of a single data source. For example, economic data within the United States abounds but in many cases, these data sets can all be traced to a single data collection activity within the Department of Commerce. Thus, there are few truly independent data sets to compare and validate against.

For these reasons, data availability for each descriptive requirement was assessed as one of four categories:

- No available data was found
- One data source was found but was of poor quality or with spotty coverage

- Multiple data sources were found which were "independent"
- One data source was found that was of high quality and good coverage

During the survey, no assessment of data quality, consistency, or coverage was made other than the claims provided by the data source. Note that the data availability assessment did not consider data sources focused on the United States. The results of the data availability assessment are presented in detail in Chapter 7 and the complete list of data sources reviewed are presented in Appendix 13.

5.7 Conclusions

Model input data is critical to computational models to generate artificial observations (output Data) which are used by analysts to gain insights into the scenario. Thus the importance of input data to analysis efforts cannot be overstressed. Often it is the data that represents the chink in the armor of any DIME/PMESII analytic product. Proper development of data, quality assurance for data, and the proper use of data are all equally important. Failure in any of these areas will result in a potentially poor data set which could impact the credibility and viability of all resulting analysis.

Chapter 7 presents an assessment of the current state-of-the-art for DIME/PMESII data availability based on the list of open source DIME/PMESII databases provided in Chapter 13. Additional discussions on data use, collection, and concerns are presented in Chapter 14.
6 Framework & Architectural Requirements

The descriptive requirements provided in Chapter 2 and Appendix 11 cover the representations that that a DIME/PMESII model solution should strive to meet. In this chapter, the functional framework and architecture requirements, that represent a flexible and efficient computational environment, are presented.

This set of framework requirements is not meant to be a complete but does provide an indication of the breadth and extent of specifications that must be considered in a comprehensive set of infrastructure requirements.

It is understood that the current state of technology may not fully support meeting all the stated requirements. Any system that could be produced, within reasonable time and cost limits, would most likely implement only a select subset of the requirements to implement. The selection of that subset depends on the priorities of the program. Therefore, no such prioritization was developed as part of this effort.

There are five overarching assumptions that drive many of the system's requirements:

- The framework should assist the analyst to the maximum extent possible, including automation of procedures.
- The analysts will want maximum visibility into what is happening within the models, including indication of cause and effect.
- The analyst should be able to control all aspects of system data, configuration, and operations.
- The system should allow for the tailoring of model suites used and the generated output to best address the question at hand. This is the equivalent of composing the system with the optimal selection of models each time the system is run.¹¹
- The system should have the capability to incorporate models not specifically created for use with the system. This includes legacy models and models created for different applications, possibly even by non-DoD agencies.

¹¹ This led to requirements that address the selection of the models (e.g. the transparency of the models) to ensure compatibility. This in turn impacts the manner in which the analyst frames the scenario.

6.1 System Overview

A DIME/PMESII model suite uses several complementary models to represent the potential conditions in the region of interest and assess the effectiveness of possible DIME actions. As different models represent different aspects and time periods of the region of interest, successful application typically requires concurrent execution and means for sending regular data or model state updates from each model to the others. Therefore, it is imperative to integrate the models into a common operational infrastructure.

The infrastructure must provide all of the required system functionality that is not provided by the models. It must provide, at the very least, the following functionality:

- Means for the analyst to select, initiate, and control the models that must be executed in order for the conditions in the region of interest to evolve
- Visibility into the evolving representation of the region of interest
- Cause and effect linkages for the models
- Ability to tailor and manipulate the outputs of the system
- Ability to control and coordinate the models
- Ability to ensure the interoperability of the models
- Connectivity to external data sources to facilitate simulation initialization
- Documentation, instructions, and techniques to ensure that the ideal model suite is maintainable throughout its lifecycle
- System architecture that provides for the hardware performance requirements and accommodates expansion that will become necessary during the system lifecycle

The difficulty of providing this functionality is compounded by the complexity of the DIME/PMESII problem. This problem space requires the use of many models; typically, they are more than needed for other simulation applications. In addition to the sheer numbers of models needed, the problem also requires the application of every modeling paradigm including finite state, Bayesian networks, agents, system dynamics, etc. Additionally, the approach involved in modeling the different aspects provides considerable temporal diversity in the representations. For example, some models use regular time steps while others do not address quantitative time at all. Successful integration of the numbers and diversity of models required to address DIME/PMESII problems may thus be the most complex problem in DoD modeling and simulation.

6.2 Requirements Organization - Description of Functional Areas

The following sections provide a summary of the requirements. The requirements are broken into five general areas:

- Operator Interactions
- System Control
- Model Interoperability

- System Integration and Maintenance
- System Architecture

The more than 600 framework and architectural requirements are further organized into multiple layers or tiers—up to seven deep—within these five broad categories (see Table 3).

Architecture & Fram	nework Requirements						
1. Operator Interface	4. System Integration and Maintenance						
1.1 Setup	4.1 Model Integration						
1.2 Operation	4.2 Maintenance						
1.3 Output	4.3 Validation Testing						
1.4 Metadata management	4.4 Documentation						
1.5 System utility	5. System Architecture						
2. System control	5.1 Flexibility						
2.1 Execution control	5.2 Performance						
2.2 Coordination	5.3 Scalability						
2.3 Data exchange	5.4 Availability						
3. Model Interoperability	5.5 Reliability						
3.1 Negotiate timing	5.6 Maintainability						
3.2 Negotiate data	5.7 Security						
3.3 Negotiate protocols	5.8 Portability						
3.4 Negotiate data distribution	5.9 Interoperability						
3.5 Consistent Descriptions							

 Table 3: Organization of Framework Requirements

In the following sections, each of the five categories and their associated second tier areas are described. The complete and detailed list of framework requirements is found in Appendix 16.

6.2.1 *Operator Interactions*

The first section deals with operator interactions with the system. This is an expansive section and addresses aspects from problem definition to final analysis and report publication.

Model Setup

Before beginning any analysis, the problem statement or analysis topic needs to be defined. Requirements for assisting the analyst with analysis topic definition are thus included. Analysis topic definition has many parts that need to be addressed. First, the topic must be stated in understandable and unambiguous terms. Second, all but the most trivial topics must be decomposed in easily addressable sub-components. The ideal model suite should then assist in identifying what analytic tools are best suited for each subcomponent. The ideal suite represents just one type of analytic tool in a spectrum that includes manual analysis, game playing, subject matter expert analysis, and modeling and simulation. No one analytic tool is suitable for every analysis topic or for all subcomponents of a given topic. Additionally, it is not always known which analytic tools

will be best at addressing an analysis topic before decomposition begins. The infrastructure should, therefore, recommend which form of analytic tool is best for each subcomponent. The infrastructure should also assist in identifying how the results from the subcomponents can be combined again to address the original analysis topic. Additionally, the infrastructure should assist with identification of alternatives for the recommended analytic tool along with their limitations. The infrastructure thus potentially has a role in supporting any analysis, not just the analysis for which the models were selected. For any subcomponents assigned to the model suite, the system will identify the needed descriptions of the scenario, the factors affecting the scenario conditions, and the required outputs.

There is an additional consideration to analysis topic definition. For the automation support discussed in the System Overview above, the analysis topic definition will need to be expressed in a standard ontology that the model suite can utilitze. This is only one of several ontologies required by the model suite. After the analysis topic is defined, the context for the topic needs to be specified using a standard ontology. This context includes the DIME/PMESII aspects of the world that must be represented to support the analysis, such as the area of the world, specific organizations and actors, infrastructure, interactions, etc. Both of these must be related to the ontology that describes the capabilities of the models available. This relationship is needed to map what is required for the analysis to what is possible within the model suite. This helps not only to select the optimum model set for the analysis topic but also to identify risks associated with modeling limitations, redefine the analysis topic if necessary, and recommend approaches to mitigate risks. All of these ontologies need to be related to a standard ontology used to describe the content of the scenario. This section of the requirements, therefore, addresses the need for multiple ontologies.

The system must be able to support analysis topics that employ both causal reasoning and diagnostic reasoning. Causal reasoning topics are those that analyze PMESII effects as a result of specified DIME actions. Diagnostic reasoning addresses the inverse problem; either actual or desired PMESII effects are specified and the DIME actions that precipitated or could precipitate them are sought. The system must be capable of defining and decomposing either class of analysis topic equally well.

The first section of requirements also addresses selecting and composing the model set to address the desired analysis. Composition functionality allows the system to be configured with just the models needed to address the specific analysis topic of current interest. This allows the system to be executed with the minimum computational and communication resources needed.

Selection of the models to include in support of any specific analysis should be based in part on knowing which models are best able to address the defined analysis topic at the appropriate level of detail. The system needs to ensure, however, that selected models will work well together. Checks for both syntactic and semantic compatibility are therefore required. Semantics addresses the assumptions and abstractions implicit in a model. Semantic compatibility needs to be addressed in the context of the problem definition. As an example of semantic compatibility, consider modeling disaster relief in a developing country. One model addressing the spread of disease may contain an internal model on the distribution of food relief. When run with appropriate data, this model may represent food relief as 90% efficient. However, an economic model of the same country may assume that 70% of the aforementioned relief goes to the black market rather than those who need it. The differences are obvious, but may or may not be important in the context of the defined problem. Therefore, it is necessary to determine if the differences in the model assumptions would invalidate their working together to address the defined problem. In addressing the composability of models, the infrastructure also needs to address the interaction of the models and identify constraints on their operation and bounds on the applicability of the results. Both a model's semantic content and operational constraints may change as models are updated. This could happen very quickly for self-adapting models. It may be a difficult for the framework to accommodate and account for such changes during run time.

It is possible that the system will have multiple models available to address the same aspect of the DIME/PMESII problem space. For example, two different models could both represent the general satisfaction level of a population but use different social models to do so. Such models can be expected to produce different results from the same initial conditions. Another consideration in the model selection provided by the framework is the need to decide which model is more appropriate for the context of the analysis at hand. The framework should also recommend an experimental structure to compare and contrast the different results from the different models in cases where the use of all but one model is not clearly inappropriate.

The requirements in the first section also provide recommendations for a scenario and assist with initialization of the models. The infrastructure must be capable of automatically seeking or generating initialization data based upon the scenario content. Initialization data may come from appropriate default data sets such as one for developing countries and one for developed countries. The infrastructure should also provide for initialization data quality and accuracy checks and track the data pedigree. A much more subtle requirement is to ensure that data for different models come from or represent a consistent characterization of the world. As crude example, the infrastructure should not permit one model to be initialized with the economic state of a country as being in a recession while a different model is initialized with data for that same country showing growth in the Gross Domestic Product over the last two quarters.

In addition to initialization data, many models will require initial tasking. The infrastructure must be capable of generating such tasking. The infrastructure must also be capable of supporting a wide range of execution paradigms. For example, multiple runs may be required to compute Monte Carlo type statistics but only one run may be called if it incorporates frequent analyst evaluation and input.

Operations

The first section of requirements also addresses the operations of the model. It includes requirements to ensure that the analyst has visibility into the world description, the data and metadata, and execution progress. The system should also allow the analyst to intervene in the operation at any point as well as terminate the process. During execution, the analyst should be able to monitor the performance and modify the description of the world and the model suite composition.

Output

The first section of requirements also addresses operational controls, performance monitoring, and visibility into the data being generated. The requirements address the output of data in both textural and graphical format, with the added concept of graphic data being "anything that can be displayed on the screen." Also addressed are the tools to help with the analysis of the data, starting with selection of the data and data mining. This includes the need for post-processing support beyond the typical number crunching. Identification of error bounds and the credibility of the data and simulation results is often more important than the values. The infrastructure must be capable of providing these. Understanding the uncertainty associated with the simulation outputs allows for better quantification of the risk associated with the supported analyses.

There are two types of contributors to the size of the error bars on simulation outputs, and the infrastructure must track and report on both of these separately. First, errors arise in modeling real world situation. There is error introduced by the difference between the theory that is modeled and reality. Second, additional errors are introduced into the simulation process by limitations in the model's representation of the theory in a digital format, its abstractions of some aspects, and interactions between models representing competing theories. Uncertainties enter into the process through limitations in exactly defining all of the initial conditions. This problem is difficult in physical modeling; temperature readings always have some plus or minus value associated with them, for example. The problem becomes greatly compounded when attempting to accurately define variables such as social conditions and attitudes as needed in DIME/PMESII modeling. The errors and uncertainties affect the uncertainty of the simulation output in different ways. The infrastructure needs to take this into account and combine them properly to identify the accumulated uncertainty as the simulation progresses and notify the operator should uncertainty levels rise to unacceptable levels.

Statistical analysis tools are also included as part of the infrastructure requirements. Provision for statistical capability could be provided in either of two ways; as an organic capability of the infrastructure, or as the ability to interface with multiple available statistical packages. Inclusion of an organic capability was selected for two reasons. First, it offers the stressing case and second, it offers statistical support throughout the setup and execution process to assess data quality, error bounds, and credibility of the products. Such calculations will be highly dependent on the specific combinations of models used and the context in which they are used. The statistical functionality needed by the infrastructure to identify the subtle limitations on the interoperability of model sets as well as compute aggregated or accumulated statistics can also provide the functionality for any statistical analysis of the simulation system outputs.

The infrastructure also must provide tools to help the operator evaluate the effect of the uncertainties of modeling the analysis scenario, uncertainty of data or initial conditions, and the variability of competing modeled theories to indicate the level of risk associated with an given analysis or robustness of a given concept of operations.

Metadata Management

Section 1 of the requirements also discusses the capability to conduct distributed collaborative analyses so additional expertise can be brought to bear. Requirements that

address the generation and maintenance of metadata and report generation support are also included.

System Utility

Finally, this section also addresses analyst assistance through on-line guidance (i.e., "wizards"), help screens, training, and documentation.

6.2.2 System Control

The second section of the requirements addresses the internal control of the DIME/PMESII models. These requirements deal with the issues of starting and stopping the models, keeping them synchronized, and making sure the right data gets to the right place within the system.

Execution Control

Execution control requirements allow the analyst to have central control of all models, to include start, pausing, resuming, suspending, and terminating the execution. These requirements also address synchronization of the time step among the models.

Coordination

As part of internal control, the requirements in this section also address the need to ensure that the complete description of the simulated world is properly updated and that any data conflicts are resolved. The concept of assembling a unique set of models for each analysis to be run makes it highly probable that multiple models may be producing data for a single world state description variable. The model suite must allow for this possibility and provide an adjudication scheme for determining what value will be used for that variable's update. One possible adjudication schemes would be to simply select the output of one model over the others. Alternatively, a weighted average of the values produced by the models could be used. Regardless of the adjudication scheme, that the analyst must have visibility into what it is and the ability to modify it if desired.

Data Exchange

Data exchange requirements ensure that the data input to the models initially or produced during execution is properly exchanged among the models.

6.2.3 *Model Interoperability*

It is well understood that simulating the whole range of possible DIME actions and PMESII responses will require the coordinated use of many different models. In addition to ensuring model compatibility with respect to the semantic considerations discussed earlier, the infrastructure must also ensure that the mechanics of model interoperability are satisfied. Interoperability essentially ensures that models can exchange data and that the right data is provided to each model at the right time. Ensuring interoperability can be quite complex. Some aspects of the simulation space may be best addressed though the use of one modeling paradigm while another aspect may require modeling in a different paradigm. Thus, the infrastructure must not only provide for interoperability of models, but for the interoperability of modeling paradigms as diverse as fuzzy logic,

Bayesian belief networks, expert systems, causal graphs, concept graphs, concept maps, semantic networks, social networks, system dynamics models, neural networks, and situation theory. Additionally, different models represent the world at different levels of resolution and with different fidelity. Each model requires a description of part of the world as data inputs and provides a unique status as outputs. Thus, it shall be necessary for the system to negotiate timing schemes, data format and content, and communication protocols.

To fully cover the required DIME/PMESII simulation space, it is probable that the system would use some models that were developed specifically for the system. There would probably be even more models used by the system that were pre-existing or in development for other purposes. Integration of these models, therefore, should reasonably be expected to take some level of effort. The most stressing case from the perspective of infrastructure requirements is to place the entire burden for this effort on the ideal model suite. This is equivalent to stating that the extant models need not make any modifications and that the infrastructure will supply any middleware or wrapper software required for the integration. This includes integration of software for which the source code is not available. It should be noted that this approach also offers the lowest programmatic risk to the ideal model suite as many existing models are likely to not have sufficient funding to pay for any needed modifications to support integration.

Because of the complexity and broad scope of the problem and the variability in the pedigrees of the models that will be employed, no one timing scheme, data definition, format or level of resolution, or protocol standard could be defined as a system standard. Instead, the infrastructure must provide the capability to reconcile different schemes to the extent that they can work together. Thus, it shall be necessary for the system to negotiate timing schemes, data format and content, and communication protocols.

Negotiate Timing

The infrastructure must be able to recognize situations in which the timing synchronizations of several models is different and accommodate them. A potential example of a timing negotiation is the synchronization of an event-based model with several time-based models. Another example might be if one model has a basic cycle of one month in simulated time but requires inputs from another model with a basic cycle time of every two months. The second model would produce outputs only half as often as the first model required them. Evaluation of whether or not the accommodation scheme used was adequate is addressed during the semantic compatibility evaluation.

Negotiate Data

There are many possible types of data format and content mappings that are required. Format changes can be as simple as changing the ordering of variables in a data packet. Next in complexity are data filtering (selecting the data that needs to be forwarded) and static data filling. Examples of static data filling are: providing a unit call sign or the area in square miles of a specific region. The infrastructure must check to ensure that a complete data packet is forwarded to all models. If a data packet requires input from multiple sources and one of these sources does not provide an update on time, the system must account for this and provide a mechanism for completing the data packet. More complex types of data negotiations involve changing or modifying the data to be sent. Examples of the simplest form of this are coordinate conversion or changing units from English to metric. Content changes are potentially more involved and may require the use of complex algorithms or auxiliary models. For example, one model may require population density data while another model may provide number of inhabitants within specified grids along with the gridding information. More complicated are situations where cross resolution conversion is required. Simple examples of this would be down sampling for lower resolution and interpolation for increasing resolution. Perhaps the more difficult data modifications to recognize are those arising at the boundaries of responsibility between models due to mismatches in their assumptions. This would be equivalent to an impedance mismatch in an electrical circuit and would typically manifest itself as a discontinuity of some parameter in either space or time. Again, the infrastructure must recognize the need for and accommodate each of these types of data negotiation to ensure that the models can operate together.

Any data conversion will introduce additional error(s) into the value of the data field. The model suite must be capable of estimating the error introduced by any data negotiation scheme. It should track the accumulation of error as the simulation executes. It must also be capable of determining, from the problem definition, a tolerable limit to such accumulated error such that the results continue to be meaningful or remain within acceptable limits of confidence.

Negotiate Protocols

Negotiating communication protocols addresses the problem of getting models with different operational backgrounds to talk to each other. This even includes communications between small clusters of models within the system. For example, if it is efficient to run some of the models as part of an HLA federation while others are not being run, the framework will need to act as a surrogate for the non-HLA models and represent them to the models that are part of the HLA federation. The framework must also accommodate models with different data distribution schemes. For instance, negotiation between multicast and broadcast schemes may be required.

Provide Consistent Description of Critical State Parameters

In addition to the negotiations discussed above, the framework shall be responsible for ensuring a consistent representation of pervasive conditions that are important to multiple models. Multiple models will likely require as input a representation of some aspect of conditions such as fractionalization or state boundaries. While the models will require different aspects or parameters of the condition, it is critical that they all be derived from a consistent and realistic representation of that condition. For instance, if two models are to operate together and one requires an input of wind speed and another an input sea state, having simultaneous inputs of 2 knots and sea state 5 would likely provide questionable results. The framework must, therefore, understand which models require what data on pervasive conditions and provide that data in the format required based on consistent representations of the conditions.

6.2.4 System Integration and Maintenance

The fourth section of the requirements deals with ensuring that new models can be integrated into the system and that the system is reasonably maintained during its lifecycle. To facilitate integration of new models into the model suite, the system must provide a definition of the information required about the model for successful integration. To assist in producing some of the information that might not exist for extant models, the infrastructure should also provide some reverse engineering capability. To provide guidance for new models that are being developed, the system should also provide development principles and best practices that will facilitate integration into the system.

Model Integration

For the integration of models into the model suite, the objective is not to change the models being integrated. Rather, the infrastructure needs to provide the tools to develop any middleware required for the integration. The middleware needs to address all the negotiation schemes discussed under Model Interoperability. It should also include middleware to integrate a model's initialization and control as well as help menus into the model suite control interfaces. Model compliance testing is also addressed as part of the requirements that facilitate integration.

Maintenance

This section of the requirements also addresses issues associated with system maintenance. The infrastructure must support performance testing, health checks, and de-bugging. General requirements that will assist in these areas are presented.

Validation Testing

Requirements associated with validation testing are also presented in this section. The system must be capable not only of comparing simulation results against real world or ground truth data but also of identifying why differences might exist between them and when those differences are significant. This includes whether the simulation from a collection of models could be considered valid and any conditions on that validity.

Documentation

Finally, this section of the requirements addresses the documentation required to maintain the system. This includes documentation of the software code and the interfaces.

6.2.5 System Architecture

The final section of the requirements addresses the system architecture.

Flexibility

The first system architectural requirement is the need for flexibility in execution modes. Execution modes include network mode (distributed or non-distributed), processor mode, and computation mode.

Performance

Next come performance requirements including processing power, storage, bandwidth, and database performance.

The *ilities*

Additional system architecture requirements consist of system *ilities*: scalability, availability, reliability, maintainability, portability and interoperability. These must be included in a system requirements document but need not specify many of the hard limits that would be application specific. In a sense, many of the requirements in these areas are indicative or exemplary of requirements that could be provided to a system developer.

Security

Security considerations must also be addressed architecturally by requirements. In particular, the system should be capable of operating at multiple levels of security. When in the distributed mode, the system should be able to accommodate different sites operating at different classification levels without the risk of a compromise of classified information. Security requirements also address the area of information assurance and tamper resistance.

6.3 Framework Burden on the Model Builders

While the software development burden for integrating a model into the framework is assumed to lie with the framework, some requirements are incumbent upon the model developer or supplier to make the integration possible. The information needed from the model developers for the models to be successfully integrated into the full functionality of the system includes:

- **Syntactic Model Description:** this shows what the model represents. It includes inputs and outputs, and an assessment of the resolution and fidelity of the model. It also includes sources of input data, such as interfaces to command and control or database systems.
- Semantic Model Description: this does not describe what the model does, but how and how well it does it. This description lists the assumptions and abstractions—both explicit and implicit—in the models. For self adapting models, this needs to include what the semantics might change as the model adapts. Semantic descriptions must be stated using the standard taxonomy.
- **Model Control Interface:** this includes the interface and commands required for model initialization and execution controls
- **Timing:** this is how the model moves from one time step to the next. The description must include the flexibility possible in that progression. For example, is the model capable of reporting updates at selectable time steps (such as weeks vs. months) in the simulated environment?
- **Communications Protocols:** This describes the protocols the model can use for receiving inputs and distributing outputs.
- Security Level: this provides the classification level at which the model operates. It also includes information on whether the model is approved for

operation with any automated information downgrading systems or other systems that permit the connection of systems at different classification levels.

This chapter outlined more than 600 framework and architecture requirements. The next chapter provides an assessment of the current *state-of-the-art* for DIME/PMESII models including a comparison of COMPOEX to the framework requirements and the identification of specific gaps and deficiencies in architectures.

7 Current State-of-the-Art

This chapter provides an assessment for the current *state-of-the-art* in DIME/PMESII modeling capability in within the context of the presented descriptive requirements and framework requirements. Also presented are technical and theoretical gaps associated with DIME/PMESII modeling as well as specific challenges regarding usability, interoperability, and scale. A brief list of recommended studies that will help advance the *state-of-the-art* are also provided.

7.1 Comparison of Selected Models against Descriptive Requirements

This section uses the above descriptive requirements as a "Gold Standard" to assess the current *state-of-the-art* by identifying gaps and deficiencies. This will aid investment decisions to support development of theories and modeling tools. The models selected for this comparison are listed below:

• ACTOR	 Integrated Gaming 	• MIT State	• PSOM
• Agile	System (IGS)	Stability Model	• Synthetic
• Apollo	• Interim Semi-	• MOOTW	Environments for
• CAST	static Stability	• Nexus	Simulation
 Centurion 		 Organizational 	(SEAS)
• COMPORY		Risk Analyzer	
		(ORA)	

These models were selected either because they have enough documentation for evaluating their capacities and characteristics or because they are currently used by many members of the analysis community. In the comparison, the extent to which a requirement is covered by existing models is indicated by means of colors. Four colors, corresponding to four levels of coverage, are indicated:

- Red: No models touch any portion of the descriptive requirement
- Yellow: One to three models touch some portion of the descriptive requirement
- Green: Between four and five models touch the descriptive requirement
- Blue: Six or more models touch the descriptive requirement

ŧ			Actions (79)					Effect	:s (47)		
	Diplomatic	Information	Military	Economic	Legal	Political	Military	Economic	Societal	Information	Infrastructure
ς	Support to	Intell Ops on HN	Response to	Est Distro Ctrs	ID/Disrpt/Intrdict	△ in Pop Loyalty	Foreign Sprt /	△ Dom Product	Foreigners on	Info Collect on	Essential Public
	Ambassador	Conditions	WMD Attack	for HA/DR	Funds: Dstbl	to HN Gov't	Ops on HN Mil	(Sector, Region)	Norms & Behav	HN Gov't Actions	Services on HN
2	Negots w/ HN	Intell Ops on HN	Response to	Build/Secure	ID/Distrpt/Intrdict	△ Political	Multi-Nat'l	△ Flow of Capital	Quality of Life	Info Gathering on	△ Infrastructure
	Gov't	Gov't	Convent'l Attack	Lines of Comm	Inst'l Sprt: Dstbl	Activity of Pop	Exercises on Mil		Perception	HN Pop	on HN
ო	Negots w/ Local	Collect HN	Foreign NEO	Build/Secure	ID/Distrpt/Intrdict	△ Gov't Struct or	Mil due to Ops	∆ HN Wealth /	Restrictions on	Info Dissem on	∆ in HN Envirn
	Leaders	Citizen Percepts		Essent'l Services	Local Sprt: Dstbl	Funct		Income Distro	Pop Movement	HN Gov't	
4	Embassy Comms	s Info Dissem	Mil Training	Repatriate /	ID/Distrpt/Intrdict	Outside Involm't		Markets	Societal Leaders	Info Dissem on	
4	Internet IN Dials	Collect 6 Hard	Constant to 111	Relocate Errorts	Recruit: Ustol	IN HN POLITICS			Presses Califian	HN CITIZENS	
0			Support to HN	Econ Into Ops		△ Percepts of			Events: stability	Sra Party Media	
6	Capability	Rerugee Info	Mil Eveneration	Alisimoto Minal	Syndicates Ops	GOVT LEGIT		Goods/Services	& Security		
U	for Stability One		MIII EXERCISES	MITIGATE WIND Efforte	Martial Law & LE			HK ITAINING ON	Epidemic		
1	Comply w/ Int'l	Info Evchande	1 onietice	Econ Intell One	Cp3 Enforce Int'l	Detabilizing		Combat One on	Microtion		
-	Convitne & Stde	Program	Logistica		Recolutions	Events		the Economy			
¢	Fvar Embassy &	Alter Influence of	Improve of MoD	Est & Maint Log	Cutr-Corrint	Trans-Nat'l Ord's		NEO on Economy	l acielation F &		
ر	Support Staff			Support for HN	Activities	Acts (Internal)			regisianoni, cr., a Reciritations		
0	Norat Definato	A Massaud	Dotor Eoroion /		Improve ocol 9	Outcide Nation's		Feen Demoneo	Discrimination in		
	Sofo Louge		Brown Attachare		IIIIprove Legal &	Outside Nation's		ECUII RESPUISE			Gap Key:
1		POSITION OT LOTS	Froxy Attackers			Acts (Internal)					March 1944 - Tanada
ĩ	U Diplo Acts to	Intell Collect to	Mil & Naval	Econ Actions for	Extra-Legal	HN by Forward		Sanctions (Econ)	Terror / Insurgt		No Models Touch
	Support HA/DR	Support HN	Presence	Joint Mil Exer	CriminalActs	Bases			Grps on HN Pop		DR
÷	1 Diplo-Act for HN	Improve HN Intell	War & Mil	Hiring HN		3rd-Party Extrnl		Industrialization	Strikes, Protests,		1-3 Models Touch
	Gov't Pers Train	& IO	Invasion	Citizens		Diplo Acts		on HN	Riots, Gathering		DR
7	2 Diplo-Like Acts	ISR for Embassy		HA/DR Ops		Factional Group		Trade			4-5 Models Touch
	Btwn Orgs					Activities		Agreements			DR
÷	3 Diplo Preps for	HN Internal		Est & Maint				A HN			6+ Models Touch
	WMD CM	Dissem of Info		Refugee Camps				Infrastructure			DR
÷	4 Diplo Acts: Multi-	Needs Assess for		Mitigate Destable			Č)/ maidanana			
	Nat'l Exercises	Decision-Making		Effects			3	erarcning (%	(+)		
ĩ	5 Diplo Aborgn'l,	Info Ops		Econ Dev for	States	Fvents	Actors	Decisions	Context	Protocole	Environment
	Nomad, Minority			DISASTER RECOV							
÷,	6 Est Relatins:	Training of HN		Stability Ops	PMESII Ground	Time and Space	By Power or	Hierarchical DM	History	Social Norms &	Physical Terrains
	Absent a State	Gov't Personnel		(Econ)	Truth		Authority (HN)	in Organizations		Expectations	
-	7 Multi-party Diplo			Improve Mol	Actor Percepts of	Events, Trends, &	By Region	Individual	Interpretation &	ROEs &	Natural Resouces
	Negots				PMESI	Cycles	(Providence)	Decision-making	Percept Rules	Regulations	
ř	8 Destabilization			Spending for HN	HISTORICAL STATES	Actions in	By Ideology or	Social Process of	Blases,	Policies, Stds,	Weather, Land
	Ops			Mol	of Actors/Entities	Preparation for	Agenda	Ma	Prejudices	Processes	Fertility
÷	9 Deterrence			Spending for HN	OPAL States of	Weather Impacts	By Social Identity	Percept of Acts,	Org Structs &	Legal Rules &	Natural Physical
				MoD	Actors	to Decision-	(Tribe)	Events, Environ	Roles	Procedures	Conditions
й	0 Advocacy Acts			Spending for	Current Rule Sets		By Interest	Adapability &	Limitations of	Limitations of	Physical
	by US Gov't			Rule of Law	for Actors		(Unions)	Learning	Context Rules	Protocol Rules	Contraints
Ż	1 Security & LE for			Spend / Dev HN			:			:	-
	NS			Other Agencies		Implicit Req'ts					
	* Note: A model	only need to addre	ss some portion of	a Descriptive Req	luirement to receiv	e "credit' for cove	rage. Thus a Blue	or Green requirem	nent should not be	interpreted as com	pletely or
	adequately addrea	ss for all applicatic	ons. For example, s	several models add	lress the effects of	E-S-7 "Migration	" but no models cu	urrently can identif	y the precise condi	itions that initiate r	nigration or the
	manner or pattern	1 of the resulting m	nigration.								

 Table 4: Coverage of Descriptive Requirements

The comparisons, by descriptive requirement, are presented in Table 4. Note that in this $\frac{86}{86}$

comparison, a model only needs to address some portion of a descriptive requirement to receive "credit" for coverage. Thus if a given requirement is colored Blue or Green, this does not mean that existing models completely or adequately addresses the requirement for all possible applications. For example, several models address the effects of E-S-7 "Migration" but no models currently identify the precise conditions that trigger migration or completely represent the manner or pattern of the resulting migration.

From this comparison, we can see that few requirements are well covered by the collection of models. Specifically, only 23 requirements are addressed by four or more models. Over half of the descriptive requirements are either completely unrepresented (46) or are covered by three or fewer models (60) that only touch some portion of the requirement.

Important requirements gaps, for which no models represent any portion, include:

other
and
ar

The following section outlines the recommended methodology for applying the descriptive requirements and associated measures of effectiveness including an approach to mitigate the above deficiencies when critical to a scenario.

7.2 Comparison of Data & Modeling Capabilities against Descriptive Requirements

A good many data bases that can provide input for DIME/PMESII modeling have been created. However, they do not cover the entire span of DIME/PMESII elements evenly. Generally, it appears that political and economic data bases may be more plentiful and more varied than data bases about other DIME/PMESII elements (see Appendix 13). The comparatively large number of data bases devoted to politics could be the result of greater interest in comparative statistical research among political scientists than among other researchers such as anthropologists or linguists. Economists, also, seem to be more active in creating quantitative data bases than other social scientists. This is probably due to the fact that economic data is more easily quantified than data about the political, social, military, and informational dimensions of international relations.

Table 5 presents the results of the data availability assessment. During the survey, no assessment of data quality, consistency, or coverage was made other than the claims

provided by the data source. Note that the data availability assessment did not consider data sources focused on the United States.

As with the modeling assessment, four colors indicate the level of data availability:

- **Red:** No available data was found that touches any portion of the descriptive requirement
- **Yellow:** One data source was found but was of poor quality or with spotty coverage touches some portion of the descriptive requirement
- **Green:** One quality data source was found that was that touches the descriptive requirement
- **Blue:** Multiple data sources, which touch the descriptive requirement, were found which were "independent"

Several caveats are included in the effort to identify data soruces:

- A data set merely needed to appear to touch some portion of a descriptive requirement in order to be counted,
- The survey was limited to publicly available datasets classified or FOUO data was not considered,
- As it is impossible to consider every publicly available dataset, the survey was not comprehensive,
- Since datasets often evolve over time, the presented gaps represents the current assessment,
- Regions of consideration excluded the United States

It is apparent from Table 5 that many data gaps currently exist despite the generous evaluation of coverage in this assessment. Table 6 presents a State of Analytic Capability assessment¹² based on both the modeling gaps (Table 4) and the data gaps (Table 5).

- **Red:** Poor capability meaning either data or model representations are lacking, or both
- **Yellow:** Poor capability as defined as limited availability of models and/or poor data coverage
- **Green:** Fair capability meaning there are several models available with at least one available data set of reasonable quality
- **Blue:** Substantial analytic capability with many available models and multiple data sets to chose from

Based on the assessment in Table 6, it is clear that the overall DIME/PMESII analytic capability is greatly in need of focused improvement.

¹² The precise value assigned to each descriptive requirement in the State of Analytic Capability Assessment of Table 6 is the minimum value of both the modeling gap and the data availability assessments.

# Actions (7) Explore Filters (47) Explore Filters (47) Explore Filters (47) Formation Filters (47) Formation Formation <t< th=""><th></th><th>Infrastructure</th><th>Essential Publi</th><th>Services on HN</th><th>△ Infrastructure</th><th>on HN</th><th>△ in HN Envirn</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Environment</th><th>Physical Terrain</th><th></th><th>Natural Resouce</th><th></th><th>Weather, Land</th><th>Fertility</th><th>Natural Physics</th><th>Conditions</th><th>Physical</th><th>Contraints</th><th>:</th></t<>		Infrastructure	Essential Publi	Services on HN	△ Infrastructure	on HN	△ in HN Envirn																								Environment	Physical Terrain		Natural Resouce		Weather, Land	Fertility	Natural Physics	Conditions	Physical	Contraints	:
# Final Sector Economic Societal 1 Supports Military Economic Societal 2 Supports Military Economic Societal 3 Supports Military Economic Societal 4 Rupports Military Economic Societal 5 Mores Caleeri Military Economic Societal 6 Mores Caleeri Military Economic Societal Secondision Military Economic Societal 6 Mores Caleeri Military Economic Societal Military Economic Societal 7 Comparitarie Military Economic Societal Military Military </th <th></th> <th>Information</th> <th>Info Collect on</th> <th>HN Gov't Actions</th> <th>Info Gathering or</th> <th>HN Pop</th> <th>Info Dissem on</th> <th>HN Gov't</th> <th>Info Dissem on</th> <th>HN Citizens</th> <th>3rd Party Media</th> <th>Percept/Attitude</th> <th></th> <th>Protocols</th> <th>Social Norms &</th> <th>Expectations</th> <th>ROEs &</th> <th>Regulations</th> <th>Policies, Stds,</th> <th>Processes</th> <th>Legal Rules &</th> <th>Procedures</th> <th>Limitations of</th> <th>Protocol Rules</th> <th>:</th>		Information	Info Collect on	HN Gov't Actions	Info Gathering or	HN Pop	Info Dissem on	HN Gov't	Info Dissem on	HN Citizens	3rd Party Media	Percept/Attitude																			Protocols	Social Norms &	Expectations	ROEs &	Regulations	Policies, Stds,	Processes	Legal Rules &	Procedures	Limitations of	Protocol Rules	:
# Actions Acti	ts (47)	Societal	Foreigners on	Norms & Behav	Quality of Life	Perception	Restrictions on	Pop Movement	Societal Leaders		Events: Stability	& Security	Epidemic	Breakout	Migration		Legislation, LE, &	Regulations	Discrimination in	NH	Terror / Insurgt	Grps on HN Pop	Strikes, Protests,	Riots, Gathering					(+6		Context	History		Interpretation &	Percept Rules	Biases,	Prejudices	Org Structs &	Roles	Limitations of	Context Rules	:
# Information Actions (T3) Exemution Legal Political Military 1 Support on meet system Information Military Economic Legal Political Military 2 Napport on meet system Information Military Economic Legal Political Military 2 Negots with Goot Constant Foreign NET Economic Economic Distribution Military 3 Bester Constant Constant Economic Economic Action of Page Military 4 Entrasy Comme Military Economic Economic <th>Effect</th> <th>Economic</th> <th>A Dom Product</th> <th>(Sector, Region)</th> <th>△ Flow of Capital</th> <th></th> <th>△ HN Wealth /</th> <th>Income Distro</th> <th>Markets</th> <th></th> <th>∆ Avail/Cost of</th> <th>Goods/Services</th> <th>HR Training on</th> <th>Econ</th> <th>Combat Ops on</th> <th>the Economy</th> <th>NEO on Economy</th> <th></th> <th>Econ Response</th> <th>to Rule of Law</th> <th>Sanctions (Econ)</th> <th></th> <th>Industrialization</th> <th>on HN</th> <th>Trade</th> <th>Agreements</th> <th>A HN</th> <th>Infrastructure</th> <th>erarching (</th> <th></th> <th>Decisions</th> <th>Hierarchical DM</th> <th>in Organizations</th> <th>Individual</th> <th>Decision-making</th> <th>Social Process of</th> <th>Decision-making</th> <th>Perception of</th> <th>Environment,</th> <th>Adapability &</th> <th>Learning</th> <th></th>	Effect	Economic	A Dom Product	(Sector, Region)	△ Flow of Capital		△ HN Wealth /	Income Distro	Markets		∆ Avail/Cost of	Goods/Services	HR Training on	Econ	Combat Ops on	the Economy	NEO on Economy		Econ Response	to Rule of Law	Sanctions (Econ)		Industrialization	on HN	Trade	Agreements	A HN	Infrastructure	erarching (Decisions	Hierarchical DM	in Organizations	Individual	Decision-making	Social Process of	Decision-making	Perception of	Environment,	Adapability &	Learning	
# Actions (3) Economic multiary control multiary contrelated (multiary control multiary control multiary contrelated (Military	Foreign Sprt /	Ops on HN Mil	Multi-Nat'l	Exercises on Mil	Mil due to Ops																						ç	5	Actors	By Power or	Authority (HN)	By Region	(Providence)	By Ideology or	Agenda	By Social Identity	(Tribe)	By Interest	(Unions)	:
# Actions (79) Endimatic Information Military Economic Legal 2 Nuppertic Information Military Economic Legal 3 Suppertic Information Military Economic Legal 3 Negots w/HN Information Military Economic Legal 3 Negots w/Local Conditions Number of the Dissum DiDistryIntractic Legal 3 Negots w/Local Conserin' Attack Eliders DiDistryIntractic DiDistryIntractic 5 Negots w/Local Conserin' Attack Eliders DiDistryIntractic 6 Dipolacital Lindo Dissum Military Endore Bind DiDistryIntractic 6 Dipolacital Lindo Dissum Military Endore Bind Contractinal 6 Dipolacital Lindo Dissum Military Endore Bind Contractinal 7 Complix w/Lind Info Dissum Construction Contractinal Controctinal Controctinal		Political	∆ in Pop Loyalty	to HN Gov't	∆ Political	Activity of Pop	△ Gov't Struct or	Funct	Outside Involm't	in HN Politics	△ Percepts of	Gov't Legit	∆ Gov't	Leadership	Destabilizing	Events	Trans-Nat'l Org's	Acts (Internal)	Outside Nation's	Acts (Internal)	HN by Forward	Bases	3rd-Party Extrnl	Diplo Acts	Factional Group	Activities					Events	Time and Space		Events, Trends, &	Cycles	Actions in	Preparation for	Weather Impacts	to Decision-			international de la contraction de la contractio
# Actions (79) 1 Diplomatic Information Military Economic 2 Support to Conditions WMD Attack Build/Secure 3 Negots w/HN Intel Ops on HN Response to Build/Secure 4 Ambassador Convent/ Attack Build/Secure Build/Secure 3 Negots w/Local CitizenlectHN Foreign NEO Build/Secure 4 Embassy Comms Info Dissen Mil Training Repartiate / Loca 6 Diplo Acts Prep morve HN Gov/ Convent/ Attack Build/Secure 6 Diplo Acts Prep Mil Training Repartiate / Loca 7 Comply w/IN Info Dissen Locase Efforts 8 Exercises Mil Training Repartiate / Loca 6 Diplo Acts Prep Morve HN Gov/ Mil Evercises 7 Comply w/IN Info Dissen Locase Efforts 8 Economic Atter Influence Mil Training Repartiate / Info 9 Negots W/L <th></th> <td>Legal</td> <td>ID/Disrpt/Intrdict</td> <td>Funds: Dstbl</td> <td>ID/Distrpt/Intrdict</td> <td>Inst'l Sprt: Dstbl</td> <td>ID/Distrpt/Intrdict</td> <td>Local Sprt: Dstbl</td> <td>ID/Distrpt/Intrdict</td> <td>Recruit: Dstbl</td> <td>Cntr-Criminal</td> <td>Syndicates Ops</td> <td>Martial Law & LE</td> <td>Ops</td> <td>Enforce Int'l</td> <td>Resolutions</td> <td>Cntr-Corrupt</td> <td>Activities</td> <td>Improve Legal &</td> <td>LE Ministries</td> <td>Extra-Legal</td> <td>CriminalActs</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>States</td> <td>PMESII Ground</td> <td>Truth</td> <td>Actor Percepts of</td> <td>PMESII</td> <td>Historical States</td> <td>of Actors/Entities</td> <td>OPAL States of</td> <td>Actors</td> <td>Current Rule Sets</td> <td>for Actors</td> <td>:</td>		Legal	ID/Disrpt/Intrdict	Funds: Dstbl	ID/Distrpt/Intrdict	Inst'l Sprt: Dstbl	ID/Distrpt/Intrdict	Local Sprt: Dstbl	ID/Distrpt/Intrdict	Recruit: Dstbl	Cntr-Criminal	Syndicates Ops	Martial Law & LE	Ops	Enforce Int'l	Resolutions	Cntr-Corrupt	Activities	Improve Legal &	LE Ministries	Extra-Legal	CriminalActs									States	PMESII Ground	Truth	Actor Percepts of	PMESII	Historical States	of Actors/Entities	OPAL States of	Actors	Current Rule Sets	for Actors	:
# Actions (79) 1 Diplomatic Information Military 2 Napport to Ambasador Intel Ops on HN Response to Military 3 Nepots w/HN Intel Ops on HN Response to Conditions Military 4 Habsador Intel Ops on HN Response to Govt Military 3 Negots w/HN Intel Ops on HN Response to Convent I Attack 4 Embasy Comms Collect & Use of Collect & Use of MD Collect & MIL Exercises Collect & Use of MD Collect & Diplo Acts of Collect & Use of MD Collect & Diplo Acts of Collect & Use of MD Collect & Use of MD Collec		Economic	Est Distro Ctrs	for HA/DR	Build/Secure	Lines of Comm	Build/Secure	Essent'l Services	Repatriate /	Relocate Efforts	Econ Info Ops		Mitigate WMD	Effects	Econ Intell Ops		Est & Maint Log	Support for HN	Improve	Infrastructure	Econ Actions for	Joint Mil Exer	Hiring HN	Citizens	HA/DR Ops		Est & Maint	Retugee Camps	Mitigate Destable	Econ Dev for	Disaster Recov	Stability Ops	(Econ)	Improve Mol		Spending for HN	Mol	Spending for HN	MoD	Spending for	Rule of Law	Spend / Dev HN
# Diplomatic Information 1 Support to Ambassador Information 2 Support to Ambassador Infel Ops on HN Conditions N Gov't 3 Negots w/HN Tornation 4 Embassy Comms Gov't 5 Inprove HN Diplo Collect HN Control 6 Diplo Acts: Prep Info Dissem 7 Compaty with Info Dissem 8 Exatalers Info Dissem 9 Negots within Info Dissem 10 Diplo Acts: Prep Impove HN Gov't 11 Info Dissem Info Dissem 12 Compaty with Info Dissem 13 Support HADR Support HN 14 Diplo Acts to Support HN Info Dissem of Info 13 Diplo Acts to Support HN Info Ops 14 Diplo Acts tor Info Ops 15 Diplo Acts tor Info Ops 16 Diplo Acts tor Info Ops 17 Muth PartStretices Decstion-making <tr< td=""><th>Actions (79)</th><td>Military</td><td>Response to</td><td>WMD Attack</td><td>Response to</td><td>Convent'l Attack</td><td>Foreign NEO</td><td></td><td>Mil Training</td><td></td><td>Support to HN</td><td>COIN Efforts</td><td>Mil Exercises</td><td></td><td>Logistics</td><td></td><td>Improve of MoD</td><td></td><td>Deter Foreign /</td><td>Proxy Attackers</td><td>Mil & Naval</td><td>Presence</td><td>War & Mil</td><td>Invasion</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>	Actions (79)	Military	Response to	WMD Attack	Response to	Convent'l Attack	Foreign NEO		Mil Training		Support to HN	COIN Efforts	Mil Exercises		Logistics		Improve of MoD		Deter Foreign /	Proxy Attackers	Mil & Naval	Presence	War & Mil	Invasion																		
# Diplomatic 2 Support to Ambassador 2 Negots w/ HN 3 Negots w/ Local 4 Embassy Commas 5 Inprove HN Diplo 6 Diplo Acts: Prep 7 Capability Ops 8 Evaders: Prep 9 Diplo Acts: Prep 10 Diplo Acts: Prep 11 Diplo Acts: Prep 12 Diplo Acts: Prep 13 Buybort HADR 14 Diplo Acts: Prep 15 Diplo Acts: Prep 16 Diplo Acts: Prep 17 Diplo Acts: Prep 18 Diplo Acts: Prep 19 Diplo Acts: Prep 11 Diplo Acts: Prep 11 Diplo Acts: Prep 12 Diplo Acts: Prep 13 Diplo Acts: Prep 14 Diplo Acts: Prep 15 Diplo Acts: Prep 16 Diplo Acts: Prep 17 Multi-party Diplo <tr< td=""><th></th><td>Information</td><td>Intell Ops on HN</td><td>Conditions</td><td>Intell Ops on HN</td><td>Gov't</td><td>Collect HN</td><td>Citizen Percepts</td><td>Info Dissem</td><td></td><td>Collect & Use of</td><td>Refugee Info</td><td>Improve HN Gov't</td><td>Comms</td><td>Info Exchange</td><td>Program</td><td>Alter Influence of</td><td>Ldrs</td><td>∆ Message /</td><td>Position of Ldrs</td><td>Intell Collect to</td><td>Support HN</td><td>Improve HN Intell</td><td>& IO</td><td>ISR for Embassy</td><td></td><td>HN Internal</td><td>Dissem of Into</td><td>Needs Assess for</td><td></td><td>2</td><td>Training of HN</td><td>Gov't Personnel</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>		Information	Intell Ops on HN	Conditions	Intell Ops on HN	Gov't	Collect HN	Citizen Percepts	Info Dissem		Collect & Use of	Refugee Info	Improve HN Gov't	Comms	Info Exchange	Program	Alter Influence of	Ldrs	∆ Message /	Position of Ldrs	Intell Collect to	Support HN	Improve HN Intell	& IO	ISR for Embassy		HN Internal	Dissem of Into	Needs Assess for		2	Training of HN	Gov't Personnel									
#		Diplomatic	Support to	Ambassador	Negots w/ HN	Gov't	Negots w/ Local	Leaders	Embassy Comms		Improve HN Diplo	Capability	Diplo Acts: Prep	for Stability Ops	Comply w/ Int'l	Conv'tns & Stds	Evac Embassy &	Support Staff	Negot Refugee	Safe Havens	Diplo Acts to	Support HA/DR	Diplo-Act for HN	Gov't Pers Train	Diplo-Like Acts	Btwn Orgs	Diplo Preps for	WMD CM	Diplo Acts: Multi-	Dinlo Aboran'l	Nomad. Minority	Est Relatus:	Absent a State	Multi-party Diplo	Negots	Destabilization	Ops	Deterrence		Advocacy Acts	by US Gov't	Security & LE for
	#		-		2		ო		4		ŝ		9		~	-	ω		თ		10		1		12		13	;	4	17	2	16		17		18		19		20		21

 Table 5: Data Availability Assessment

receive "credit" for coverage. The Blue category requires 2+ independent sources touch one or more aspects of the descriptive requirement though no judgement is made regarding the quality. Preliminary survey was not exhaustive and limited to open sources databases. Sources that did not compile information (e.g. incident reports, news articles, etc) were not considered databases. * Nc

#		4	Actions (79)					Effect	ts (47)		
	Diplomatic	Information	Military	Economic	Legal	Political	Military	Economic	Societal	Information	Infrastructure
-	Support to	Intell Ops on HN	Response to	Est Distro Ctrs	ID/Disrpt/Intrdict	∆ in Pop Loyalty	Foreign Sprt /	△ Dom Product	Foreigners on	Info Collect on	Essential Public
	Ambassador	Conditions	WMD Attack	for HA/DR	Funds: Dstbl	to HN Gov't	Ops on HN Mil	(Sector, Region)	Norms & Behav	HN Gov't Actions	Services on HN
2	Negots w/ HN	Intell Ops on HN	Response to	Build/Secure	ID/Distrpt/Intrdict	△ Political	Multi-Nat'l	△ Flow of Capital	Quality of Life	Info Gathering on	△ Infrastructure
	Gov't	Gov't	Convent'l Attack	Lines of Comm	Inst'l Sprt: Dstbl	Activity of Pop	Exercises on Mil		Perception	HN Pop	on HN
с	Negots w/ Local	Collect HN	Foreign NEO	Build/Secure	ID/Distrpt/Intrdict	△ Gov't Struct or	Mil due to Ops	∆ HN Wealth /	Restrictions on	Info Dissem on	∆ in HN Envirn
	Leaders	Citizen Percepts		Essent'l Services	Local Sprt: Dstbl	Funct		Income Distro	Pop Movement	HN Gov't	
4	Embassy Comms	s Info Dissem	Mil Training	Repatriate /	ID/Distrpt/Intrdict	Outside Involm't		Markets	Societal Leaders	Info Dissem on	
				Relocate Efforts	Recruit: Dstbl	in HN Politics				HN Citizens	
2	Improve HN Diplo	Collect & Use of	Support to HN	Econ Info Ops	Cntr-Criminal	△ Percepts of		△ Avail/Cost of	Events: Stability	3rd Party Media	
	Capability	Refugee Info	COIN Efforts		Syndicates Ops	Gov't Legit		Goods/Services	& Security	Percept/Attitude	
9	Diplo Acts: Prep	Improve HN Gov't	Mil Exercises	Mitigate WMD	Martial Law & LE	∆ Gov't		HR Training on	Epidemic		
	for Stability Ops	Comms		Effects	Ops	Leadership		Econ	Breakout		
7	Comply w/ Int'l	Info Exchange	Logistics	Econ Intell Ops	Enforce Int'l	Destabilizing		Combat Ops on	Migration		
	Conv'tns & Stds	Program			Resolutions	Events		the Economy			
ω	Evac Embassy &	Alter Influence of	Improve of MoD	Est & Maint Log	Cntr-Corrupt	Trans-Nat'l Org's		NEO on Economy	Legislation, LE, &		
(Support Staff	Ldrs		Support for HN	Activities	Acts (Internal)			Regulations		
თ	Negot Refugee	△ Message /	Deter Foreign /	Improve	Improve Legal &	Outside Nation's		Econ Response	Discrimination in		
	Safe Havens	Position of Ldrs	Proxy Attackers	Infrastructure	LE Ministries	Acts (Internal)		to Rule of Law	¥		
10	Diplo Acts to	Intell Collect to	Mil & Naval	Econ Actions for	Extra-Legal	HN by Forward		Sanctions (Econ)	Terror / Insurgt		
	Support HA/DR	Support HN	Presence	Joint Mil Exer	CriminalActs	Bases			Grps on HN Pop		
1	Diplo-Act for HN	Improve HN Intell	War & Mil	Hiring HN		3rd-Party Extrnl		Industrialization	Strikes, Protests,		
	Gov't Pers Train	& IO	Invasion	Citizens		Diplo Acts		on HN	Riots, Gathering		
12	Diplo-Like Acts	ISR for Embassy		HA/DR Ops		Factional Group		Trade			
	Btwn Orgs					Activities		Agreements			
13	Diplo Preps for	HN Internal		Est & Maint				NH △			
	WMD CM	Dissem of Info		Refugee Camps				Infrastructure			
14	Diplo Acts: Multi-	- Needs Assess for		Mitigate Destable			Č)	1.6		
	Nat'l Exercises	Decision-Making		Effects			3	erarching (%	(+)		
15	Diplo Aborgn'l,	Info Ops		Econ Dev for	Ctatoc	Evente	Actore	Darielone	Contaxt	Drotocle	Environment
	Nomad, Minority			Disaster Recov	Oldico	L VGI ILS	2017		CONCEVE		
16	Est Relatus:	Training of HN		Stability Ops	PMESII Ground	Time and Space	By Power or	Hierarchical DM	History	Social Norms &	Physical Terrains
	Absent a State	Gov't Personnel		(Econ)	Truth		Authority (HN)	in Organizations		Expectations	
17	Multi-party Diplo			Improve Mol	Actor Percepts of	Events, Trends, &	By Region	Individual	Interpretation &	ROES &	Natural Resouces
	Negots				PMESII	Cycles	(Providence)	Decision-making	Percept Rules	Regulations	
18	Destabilization			Spending for HN	Historical States	Actions in	By Ideology or	Social Process of	Biases,	Policies, Stds,	Weather, Land
	Ops			Mol	of Actors/Entities	Preparation for	Agenda	Decision-making	Prejudices	Processes	Fertility
19	Deterrence			Spending for HN	OPAL States of	Weather Impacts	By Social Identity	Perception of	Org Structs &	Legal Rules &	Natural Physical
				MoD	Actors	to Decision-	(Tribe)	Environment,	Roles	Procedures	Conditions
20	Advocacy Acts			Spending for	Current Rule Sets		By Interest	Adapability &	Limitations of	Limitations of	Physical
	by US Gov't			Rule of Law	for Actors		(Unions)	Learning	Context Rules	Protocol Rules	Contraints
21	Security & LE for			Spend / Dev HN		0	:			:	-
	SU			Other Agencies		Implicit Ked ts					

 Table 6: State of Analytic Capability Assessment

7.3 Comparison of COMPOEX against Framework Requirements

This section provides a rough mapping of the COMPOEX framework features onto the idealized frameworks requirements. Rather than compare COMPOEX to each of the 600+ requirements, the idealized framework requirements are collapsed to the topic three-levels. This assessment is based on COMPOEX's documented capabilities. Finally, as with the descriptive requirements, COMPOEX need to simply address some portion of the idealized frame requirement to receive credit.

For the purposes of this comparison, COMPOEX is the DARPA released version and includes the software backplane plus selected COMPOEX modules which support scenario specification and execution. For the present comparison, the COMPOEX backplane consists of the:

- Software Backplane which interconnects the models, stores PMESII states, displays model-specific output, and integrates the models in time
- Campaign Planning Tool which is the pre-execution application
- Option Exploration Tool (OET) output services which traces causality
- The OET Baseline Editor Tool which edits the PMESII states and controls the Multi-Resolution Model (MRM) module

Specifically excluded in this evaluation are the underlying models (e.g. for rule of law, corruption, economy, effects of targeted communication, etc.), model-specific development tools, and model-specific input or output features (e.g. model-specific graphics support). The comparison of COMPOEX to the idealized framework requirements is presented in Table 7.

The COMPOEX framework, as defined herein, contains many desirable features that support essential operational functionality:

- An extensible backplane supports "plug-and-play" model integration, provided that the model APIs are described in an XML file.
- A common PMESII state vector is maintained by the software backplane, which also enforces a simulation clock rate with which the individual models must comply.
- Useful tools are provided to support variable initiation and MRM scenario specification.
- Data can be passed between models, typically as Java objects.
- Graphics are model specific, but the backplane supports a graphics handler function that can serve the models' graphical outputs to a common display.
- The developers assert that the system is scalable.

However, the more sophisticated features in the idealized framework requirements are absent. For example:

• There is no enforcement of data compatibility (i.e. strong data-typing is lost) when data is passed between models.

• Meta-modeling is not supported.

•

- Differences in simulation time steps must be individually handled within the model components rather than automatically resolved by the backplane (COMPOEX's backplane assumes all models send and receive updates at a constant preset simulation clock interval).
- No capability exists to negotiate data schemes between models making it difficult to integrate COMPOEX models with non-COMPOEX models.
- The COMPOEX framework does not provide a method for publishing and subscribing to data produced by external models, as is possible with HLA (High Level Architecture).

The next sections outline general gaps and deficiencies in DIME/PMESII modeling and social theories as well as discuss specific modeling challenges.

COMPOEX	Comparison
1. Operator Interface	4. System Integration and Maintenance
3/7 1.1 Setup	2/3 4.1 Model Integration
0/3 1.2 Operation	0/2 4.2 Maintenance
3/7 1.3 Output	0/2 4.3 Validation Testing
0/3 1.4 Metadata management	1/7 4.4 Documentation
1/4 1.5 System utility	5. System Architecture
2. System control	1/1 5.1 Flexibility
3/4 2.1 Execution control	N/A 5.2 Performance
5/6 2.2 Coordination	2/3 5.3 Scalability
1/2 2.3 Data exchange	0/3 5.4 Availability
3. Model Interoperability	0/1 5.5 Reliability
0/1 3.1 Negotiate timing	0/1 5.6 Maintainability
0/12 3.2 Negotiate data	0/4 5.7 Security
0/3 3.3 Negotiate protocols	0/2 5.8 Portability
0/3 3.3 Negotiate data distribution	0/4 5.9 Interoperability
0/6 3.5 Consistent Descriptions	

Table 7: Comparison of COMPOEX to Framework Requirements

Notes: The comparisons with COMPOEX are made down to rolled-up third tier framework requirements. The coverage of these third tier requirements is denoted as a fraction (e.g. 3/7 requirement under the 1.1 grouping). Note that only a portion of the requirement need be covered to get full credit.

7.4 Gaps & Deficiencies in DIME/PMESII Modeling

Specific DIME/PMESII modeling gaps and deficiencies are discussed below. In many cases, these modeling gaps are due to social theory gaps or deficiencies.

• **Collective Belief and Group Identity:** More models of collective beliefs and group identity that explain spontaneous violence and mob behavior [ESP01] [EPS02] are needed. The rational actor model, where leaders as single individuals speak for others, is prevalent [ABEK06; Efi], but with the rise of information dissemination through globalization and technology, public opinion is expected

have a greater influence on leaders. More understanding is needed of how public opinion evolves and of the impact of misinformation. Some efforts have explored change through information dissemination [Mac03; SSC04].

- Adaptable Social Network Models: Current social network models do not adequately represent the adaptability and responsiveness of social networks to an evolving DIME/PMESII environment. While some existing social network models permit changes in allegiances between individuals or groups (Senturian [Efi; ABEK06], Nexus [DMM+07], SCIPR [GSL+08], DynNet [SSC04], all lack the sophistication necessary to automatically model the dynamic adaptation of criminal groups, insurgents, or terrorist cells to DIME actions or their responses to an evolving PMESII environment. For example, if the HN infiltrates an insurgent network, how will that social network deform and how will the interactions within that network change?
- **Illicit Support Models:** No models adequately represent all types of support (financial, material, recruitment, information, institutional, and local) given to non-state actors such as insurgent organizations or rebels. The developed models must represent more than just support levels or the flow of support (funds) and show how changes in the types and quantities of support lead to changes in the group's actions, tactics, and strategies. For example, a model might determine how the tactics and strategies of insurgents evolve as funding and information ebbs and flows. Such tools would aid in the selection of COIN strategic objectives.
- Synergistic Effects of Multiple Actors: The amalgamation of many simultaneous actions and responses by multiple diverse actors is difficult to model. Consider the simultaneous interactions between military, non-military, NGO, and civilian government actors in response to a natural disaster. During HA operations, it is often necessary for foreign militaries to support NGOs, already familiar with region and its culture, with materiel and equipment. These advantages must be weighed against the implications involved in such collaborative efforts. NGOs may fear being discredited by associating with a military. Modeling and Simulation techniques need to be developed to assist as (a) aids to decision-makers by projecting mission outcomes based on NGO support and (b) training tools to improve interagency cooperation and improve interactions with NGO counterparts [DHL96].
- **Criminality verse Insurgency Support:** Shifts between violence as a political insurgent's tactic and simple criminality by armed groups are not well represented in current models. Criminality models must differentiate between criminal activity in support of a growing insurgency and crime as an indicator of the weakening of an insurgency (i.e. transformation of politically motivated activists into criminals) [NPA07]. Tools that model the financial aspects of an insurgency must represent crime and foreign funding as elements of economic support.
- **Integration of Sophisticated Combat Models:** Few of the models evaluated address the full range of military operations. The operations that are addressed are typically in the realm of conflict with conventional or unconventional forces. Moreover, most tools address these conflict operations only at the level of Lancaster models. Combat modeling (at the engagement to campaign level) is

one of the few well developed analytic areas and appropriate links should be made to the DIME/PMESII domain.

- Effects of Training: Modeling the effects of other types of operations such as training host nation security forces by military personnel or operations to provide for infrastructure security are currently not modeled. Several models address the effect of other types of operations but represent them as conducted by organizations other than the U.S. military. Equating the effects of non-conflict operations is not prudent, for many reasons (ex. U.S. actions are perceived differently than actions by other countries; the political factors that shape U.S. actions are not the same as those which constrain other countries; etc.). Therefore, representation of the entire spectrum of military operations as conducted by the U.S. military, needs to be addressed.
- **Time Scales:** The relationship between short-term behavioral change and longterm attitudinal shifts is not robustly represented in current models. While it is important to know how culture, personality, and environmental conditions affect short-term societal responses to interventions, it is also important to know in the long term how a society adapts to changed conditions and how its culture evolves.
- The Natural Environment: None of the models evaluated represent the natural environment and the effects it has on DIME/PMESII elements. For example, how does the monsoon season affect the movement of traffic on unpaved roads and the distribution of humanitarian aid? Environmental phenomena can have short term or long term effects on operations, infrastructure, and economies, and both the phenomena and their effects need to be modeled.
- Intelligence Collection, Processing, and Dissemination: The process of collecting, processing, disseminating, and exploiting intelligence is not well represented. While some models represented sharing of information between different units or organizations, there was no explicit representation of the effects of collecting information by one actor that other actors wish to conceal. Likewise, there is no representation of other intelligence activities such as efforts to intentionally deceive others by providing erroneous information. Nor are there representations of the dissemination of information among actors. The filtering and sanitization of intelligence information often means that different organizations have different levels of perception of the state of affairs or intentions of others and needs to be represented as well as its impact on decisions or operations. This effort did not examine classified models and thus it is unclear if any classified model addresses these needs.
- Quantification of Results Validation: Ultimately validation of models is done through some comparison of simulation results against observed real world results. For all but the simplest cases, however, a direct one-to-one comparison of simulated to real world results is not possible. Identification of all the conditions and interconnection of the real world situation is only possible to within some (error) limit. As a result, the simulation results are typically different than those observed in the real world. The model is declared valid if the results are "close enough," in the opinion of an SME, to the real world observed values. Techniques are required to both quantify the differences and to identify their

probable cause. This is required to make more definitive determinations of whether a model's outputs are appropriate for a given problem and under what circumstances or conditions the model is appropriate (the limitations of its valid use). Limitations need to be expressed in the ontology used for analysis topic definition.

7.5 Gaps & Deficiencies in Frameworks & Architectures

Common themes permeates the gaps and deficiencies outlined below: scenario generation; tool interoperability and sharing of data (inputs, outputs, and states); reuse of data (for vignette and excursions); dynamic switching between models or resolutions; and identification data requirements. In actuality, these gaps could easily be consolidated into a single, broad statement of need but such a compilation would do little to aid investment decisions. Thus these gaps are written as individual focused statements of specific needs regardless of any overlap and redundancy:

- Scenario Construction Tool: A tool that matches scenario requirements with appropriate models is needed. Furthermore, a tool that also built the scenario skeleton of an appropriate scenario would be very useful. Such a tool would also construct variations in the scenario to help the analyst explore options as required by the topic. Finally, the ideal tool would identify the scenario's data requirements for the recommend tool set.
- **Composition of Models Analyzer:** In concert with the Scenario Construction Tool, a method is required that compares a scenario against a proposed model suite and corresponding data (including assumptions) to evaluate the its suitability (coverage, gaps, deficiencies, etc) and assess the risks or errors associated with its use in analyzing the scenario.
- Scenario Data Wizard: Most models currently require the manual translation of complex human analysis into a format that can be inputted into the DIME/PMESII models. This repetitive and tedious process introduces the opportunity for both typographic and semantic interpretation errors. Ideally, a data wizard would quickly create the required model inputs from a single data source. This single data source, in conjunction with a well-defined lexicon, would reduce input errors.
- **Model Gurus:** Related to the Scenario Data Wizard deficiency is the difficulty associated with the model guru's interpretation of the user's input. In many instantiations, multiple DIME/PMESII models are run concurrently, which means that great care must be taken to ensure that different models use the same input or produce the same output variables simultaneously in order to avoid interpretation or translation errors introduced by the different model gurus.
- Just-in-Time Resolution and Fidelity: As a scenario evolves, the importance of different aspects in scenario change depending on the conditions thus the resolution and fidelity requirements evolve. A technique is required to identify when changes in resolution or fidelity are needed and to implement these changes.

This effort needs to leverage off the analysis topic decomposition and semantic description efforts and ontologies. Note that the theoretical foundation to determine which resolution is needed at a given point in a scenario is also lacking.

- Automated Determination of Operation beyond Model Limitations: Every model has built-in limitations based on its architecture or its representations (assumptions, etc). A method is required that can assess the current applicability of a model given the scenario's current state. More desirable is a method that could estimate if/when a model may fail and both alert the operator and make preparations to switch to a better model (if possible) at the appropriate time (see also Just-in-Time Resolution and Fidelity).
- Universal Interoperability Bridge: Bringing together several models to address the analysis topic of the day requires that they be able to talk to each other. Traditionally, interoperability capability required months of discussion by model builders of data, timing, and protocol standards for each new combination. Flexible middleware is required that brings together many applications by accepting the each applications native outputs and provide that data in any required format. The bridge must also negotiate different timing schemes, time scales, and communication protocols. COMPOEX and NOEM have made strides towards this end but more work is required.
- **Simultaneous Post-Branch Point Simulation:** Often within a simulation, a decision point or branch point is reach constitutes a defining moment in the scenario. Often, it is uncertain which branch the scenario will actually follow though the choice radically alters the simulated future. The ability to simultaneously model multiple threads after key branch points is highly desirable.
- **Reduction in Preparation Time:** Larger models and model suites have thousand of variables and inputs many of which require alternation to analyze vignettes and excursions. Techniques that streamline the process of maintaining data and variable consistency between models is required while maintaining adequate fidelity for simulation (see also Universal Interoperability Bridge). More desirable is a method that allows a new scenario to be quickly generated without a baseline.
- Uncertainty Analysis and Error Tracking: The ideal tool suite would track uncertainties throughout the analysis. Uncertainties result from either the model representations or input data (numerical error, misuse, and bugs are ignored here). Model uncertainty results from (a) the differences between reality and theory and (b) errors or assumptions introduced in translating the theory into a quantitative computer representation. Methods need to be developed that estimate, track, or control model uncertainty errors. All input data sets contain inherent errors. Methods and standards that quantify these errors are required. Furthermore, techniques that track these errors throughout an analysis (and update when combined with other error sources) are needed. Finally, techniques that trace these errors to their sources would greatly aid scenario analysis and in developing future input data sets.
- Metamodel and Metadata Standards: An overall deficiency in metamodel and metadata was observed in most of the models reviewed. Transparent metamodels permit rapid comparison of diverse DIME/PMESII models for specific

applications. Similarly, metadata standards would greatly improve data usability and reuse while improving traceability (and hence credibility) to originating data sources.

7.6 General Modeling & Simulation Challenges

The following issues, though affecting DIME/PMESII modeling, lay more in the domain of mathematics and computer science.

- **Course of Action Optimization:** Although a set of Measures of Effectiveness are proposed in this report, there is no general approach for assessing the value or Return on Investment (ROI) for a specific course of action. With the proposed method, an ROI schema would be scenario-specific or, at best, region-specific. While useful in making trades between COAs within a specific scenario, a general ROI framework is not available to aid a decision-making in comparing COAs between competing scenarios when resources are limited. For example, if the objective is to deploy the USS COMFORT to provide medical assistance, promote regional stability, and improve goodwill, which regions and ports should be visited during the deployment to achieve maximum benefit?
- Semantic Description of Models: Semantic descriptions for models and datasets are required that capture the assumptions, both explicit and implicit, and the abstractions embodied in a model or dataset. These do not tell explain what a model or dataset represents but rather explain how and how well it the represents it. A standard ontology describing semantic content and application techniques to produce a description are required. The final description must provide an indication of the risks and limitations of a model or dataset.
- Semantic Compatibility of Models: Semantic similarities and differences between models always need to be identified so that the limits on valid application of the any combinations of these models can be determined. The bounds of applicability should be expressed in an ontology for the description of the analysis problem. This implies a mapping of the problem description ontology to the semantic content ontology.
- Semantic Interoperability: Semantic Interoperability, "the ability of two or more computer systems to exchange information and have the meaning of that information automatically interpreted by the receiving system accurately enough to produce useful results, as defined by the end users of both systems" [Wiki02] still has not been achieved. See also [SEDRIS].
- **Data Visualization:** Highly detailed visualizations of model outputs are not always useful for portraying complex situations or predicting long-term consequences. What is desired is the visualization of only the most relevant and greatest impacting information. However, these outputs cannot be determined *a priori* given the nearly limitless scenarios. Therefore, flexible visualization methods are needed that can simultaneously present various granularities while limiting the information to only the most pertinent components.
- Game Changer Identifier: The ability to identify game changers for actors is extremely useful. For example, what information would significantly change

perceptions and yield a better decision for the actor? Also, what alliance or agreement would impact the scenario the most? Access or denial to which resource or capability (material, technology, etc) would yield the greatest impact on the actor and when? Which message would most influence the group of interest? When should that message be send and how?

7.7 Social Theory Gaps & Deficiencies

This section identifies specific gaps and deficiencies in social theories which must be filled before any model can make the necessary representations.

- **Perception of Events:** Currently, there are no theories which predict how groups perceive or interpret the impact of events. This is a double-edge gap. First is the retrospective perception of real past events and the associated (or assumed) effects. Second is the perception (or anticipation) of the *yet-to-occur* effects associated with recent or on-going events. For example, if USAID provides food and medical aid to a distressed region, there is no generally accepted method of estimating how the local citizens (a) will perceive or interpret the actual impact of the aid, or (b) will anticipate the future impact of the aid. Similarly, theories that illuminate how on group perceives the motivation of another group are needed.
- Moving Between Resolutions: The decomposition and composition methods that allow users to move between microscopic, mesoscopic, and macroscopic models and theories is poorly developed for social phenomena. For example, although some have argued that macroscopic behavior emerges from individual microscopic actions, there are no accepted methods to link microscopic phenomena (e.g. individual behavior and cognition), large scale phenomena (e.g. mob violence [KS05] at the mesoscopic level), and national political stability at the macroscopic level.
- Linking Personality, Culture, and Decision-Making: The link between personality and culture, and how those factors affect the decision making of rational actors, is still not resolved. If culture favors certain personality patterns, then to what degree and when are they favored? In [Sti08] it was shown that the time-frame of certain decisions is also a factor (e.g. personality-bound decisions are more prevalent in the 3-week time-frame). More understanding is needed on context-based decision-making.
- Effects of Operations on Trust: Trust, the flip-side of deterrence, can be eroded through both kinetic and non-kinetic operations. There is very limited data, and virtually no theories, that accurately link levels of trust between state-level actors with the actions they each take. Similarly at the multi- or *transcopic* level (i.e. state-level to individuals or small people group), theories of trust are poorly developed. Additional research of historical cases would begin closing this gap.
- Scalability and Decomposition: Currently, most social theories lack scalability and decomposability (see Appendix 10.2). Development of a standard way to break down an analysis problem into constituent parts is highly desirable and must include descriptions of how results from piece parts can be recombined to address the original topic.

7.8 Recommended Studies

Listed below are recommended analytic studies and exploratory problems that will provide insight into key areas of interest to help aid the development of future models. This list is far from complete but serves as a starting point for proposing studies. Most of the suggested studies involve the development or refinement of the underpinning social science rather than development of computational models.

- **Strategic Communication:** A study examining the nature and impact of the full range of Strategic Communications (e.g. diplomatic, economic, military) in all phases of operations (Phase 0 through Phase V). The study should include the complications of multilateral (e.g. UN, NATO) and multi-party (e.g. country X acts on country Y to send country Z a message) scenarios.
- **Impact of Cyber Warfare on Society:** The examination of Cyber Warfare and its impact on critical infrastructure and other entities is of interest. In addition to the potential military insights, the study would identify critical nodes and infrastructure components and aid in analytically prioritizing defenses. The study should not be limited to U.S. Home Land Defense aspects but should examine the whole of government (social services, information dissemination) and civilian (commercial, banking, social) for a wide range of nations. The study should also include the social impact (perceptions, morale, etc.) associated widespread cyber warfare.
- Information Operations and Campaigns: Contrary to the standard military definition, every real observable, imagined event (fictitious), or distorted statement (propaganda) is an information operation (including kinetic actions). For example, the innate preference of a shooter to target a specific asset or leadership position, even if not an official policy of the attacking force, culminates into an information campaign. Similarly, the absence of any observable action can also send a message (e.g. the failure of authority to act against insurgents can be interpreted as either weakness or implicit support). Furthermore, message credibility is critical to its interpretation. A wide variety of historical information campaigns can be mined to aid in the development and refinement of theories and models for the full range of semiotic information operations.
- **Impact of Social Leaders on Society:** The mechanisms, effectiveness, and efficiencies of how leaders influence social behavior, perceptions, interpretations of events, and attitudes. Of particular interest is how religious, political, and ideological leaders influence social perceptions, motivate participation, and shape social behavior or norms. The study should consider the means of influence (moral, etc.), message content, message credibility, message medium (print, radio, etc.), and distortion (by lesser leaders). The study should seek to develop new theories and constructs in addition to refining the current collection of theories.
- Long-Range Energy Security: A study examining how the international demand for energy will impact the global political and economic climate as well as regional security. This study should also seek to identify any potentially destabilizing situations (e.g. alliances, blockades, and conflict).

- Effects of Changes in Food Supply: A study that examines changes in the water and food supply chains (due to droughts, food shortages, scarcity of water, disruptions in distribution, etc) and the resulting consequences could identify key tipping factors for displacement, mass migration, instability, and potentially conflict. The study should examine both natural (faultless) and man-made changes to examine the differences when blame can be credibly assigned.
- **Demographic Trends:** A study examining how long-term international demographic trends impact national political systems and international resource needs to identify regional instability. The study should also examine how nationalism or other social identities evolve as a result of demographic changes and internal socio-political pressures evolve.
- **Balancing Independence with Assistance:** The trade-off between minimizing the threat of foreign military presence and maximizing security including economic security by forming partnerships and alliances with foreign powers has not been fully explored. How host nation populations perceive security, stability, transition, and relief efforts by foreign allies makes a difference for the execution of such missions. Only a few studies of how host nation populations perceive foreign interventions have been conducted [BMSY08]. Additional studies are needed for both a wider variety of cultures and circumstances.

7.9 Summary

The above discussion identifies gaps in the coverage of individual requirements. Additionally, theoretical deficiencies and technical challenges have also been presented. However, the DIME/PMESII problem space is a complex one with numerous potential interdependencies. Therefore, addressing most real world issues requires a model that represents most, if not all, requirements areas to some extent. Currently, none of the models addressed come close to doing this. Some models are actually better described as modeling systems. Such systems have the potential to address most or all of the requirements, but none of them have yet realized their full potential to address a majority of the requirement areas. Additionally, these systems typically do not lend themselves to easy integration with other models or modeling systems. Therefore, while there may be reasonably good coverage of the descriptive requirements by the whole set of models evaluated, there is currently little realistic hope for developing a single modeling tool that could cover most of the descriptive requirements. Rather than strive for a single, all-purpose model, it would be best to improve the interoperability of existing tools and pursue improvements of these tools with this in mind.

8 Recommendations

Further investments in well-covered descriptive requirements should be deferred until more of Table 4 (Coverage of Descriptive Requirements on page 1) is green. A systematic approach to filling the descriptive requirements gaps is needed based on the most pressing and urgent needs. Such a prioritization will be difficult to firmly establish since it is difficult to predict which future scenarios will be of greatest importance. However, the gaps outlined in the Executive Summary (see page 14) appear to be universal shortfalls and should be addressed first.

Similarly, the most critical COMPOEX framework gaps (listed above) should also be closed and a review initiated to determine which of the other framework gaps can be closed within COMPOEX's current constraints. Where closure is not possible, alternate frameworks and architectures should be examined and considered for the next-generation framework. No attempt was made to identify which framework requirements could be achieved with current technologies and which will require additional research and development. Such a review is highly recommended before any comprehensive effort is initiated on the next generation framework.

Refining and initiating the recommended studies (see page 99) will increase understanding in these areas while aiding in the development of appropriate theories and the identification of additional deficiencies (e.g. data). The most pertinent studies would be those that examine strategic communications, impacts of social leaders, and information operations and campaigns. Finally, the specific gaps in modeling capability, social science theory, and other technical challenges (listed above) need to be addressed in order to achieve the greatest gains and efficiencies in future analyses. Of highest importance are the scenario construction tool and a universal data wizard to convert data into a uniform semantic context.

The rigorous modeling of the *whole of human society*—the interactions between individuals, groups, institutions, and nations—is one of the most difficult intellectual challenges. While recently advancements in organizational science, operations research, analysis, and information technology have made great strides in recent decades, it is clear that these technological advancements quickly outdistanced our knowledge of human This disparity between technical capabilities and sociological theoretical society. development means that much more effort is required to advance social knowledge (data and theory) into a new framework that permits harmony between the technology and the social science's theories to permit improved analysis of social phenomena. While currently the best framework for examining today's problems, the DIME/PMESII construct is neither optimal nor all-encompassing and must eventually be replaced. While these endeavors are inherently academic, they cannot reside wholly within the academic community. It is imperative that follow-on efforts be focused on the goal of generating better insights to promote better decision-making.

Appendices

9 Acronyms & Glossary

Actor	Any agent or entity within the model that responds to the PMESI
	environment or makes decisions that may impact the PMESII
	environment
ALOCS	Air Lines of Communications
AMC	Air Mobility Command
ANSI	American National Standards Institute
AOR	Area of Responsibility
Architecture	The organizational structure of a system or component, their
	relationships, and the principles and guidelines governing their
	design and evolution over time
Availability	The measure of the degree to which a system is in an operable and
-	committable state at the start of its tasking, given a random point in
	time
C2	Command and Control
C4ISR	Command, Control, Communications, Computers, Intelligence,
	Surveillance, and Reconnaissance
CBRN	Chemical, Biological, Radiological, and Nuclear
СМ	Configuration Management
COIN	Counter-Insurgency
Composability	The capability to select and assemble simulation components in
	various combinations into simulation systems that satisfy specific
	user requirements
Confidence	The level of trust or assurance in initialization data or intermediate
	or final processing results from the system
Consistency	Degree of repeatability in simulation runs expressed in standard
	statistical terms
CONUS	Continental United States
CRG	Contingency Response Group
CSSB	Combat Sustainment Support Battalion
Declarative Model.	A model that utilizes a semantic encoding (e.g., XML) of objects
	wherein declarations are used to describe the relationships between
	source and target models instead of the steps necessary to
D 111	transform a source model into a target model
Decomposability	The ability to break a topic or problem into smaller, inter-related
	but easier to understand components
DIME	Diplomatic, Information, Military, and Economic
DIMEFIL	Diplomatic, Information, Military, Economic, Financial,
	Intelligence and Law Enforcement
DIMEL	Diplomatic, Information, Military, Economic, and Legal is the
	spectrum of actions within the DIME/PMESII dichotomy

DISA	Defense Information Systems Agency
DITSCAP	DoD Information Technology Security Certification and
	Accreditation Process
DoD	Department of Defense (U.S.)
DoN	Department of Navy
DoS	Department of State (U.S.)
DP	DIME/PMESII
DPMS	DIME/PMESII Model Suite
DR	Disaster Relief
DS	Diplomatic Support
EMEDS	Expeditionar Medical Support
Factorial Experiment.	An experiment that is designed with two or more factors, and the
-	factors take on all possible combinations of their values
FID	Foreign Internal Defense
FOB	Forward Operating Base
FRIS	Funding, Recruitment, Information, and Support typically refers to
	destabilizing actors, groups, and institutions
GPS	Global Positioning System
НА	Humanitarian Assistance
HA/DR	Humanitarian Assistance/Disaster Relief
HITL	Human-in-the-Loop
HN	Host Nation
IA	Information Assurance
IAW	In Accordance With
ICD	Interface Control Document
IEDs	Improvised Explosive Devices
IMF	International Monetary Fund
Interface Standard	A standard that specifies the physical or functional interface
	characteristics of systems, subsystems, equipment, assemblies,
	components, items or parts to permit interchangeability,
	interconnection, interoperability, compatibility, or communications
Interoperability	The ability of two or more systems or components to exchange
	data and use information
IO	Information Operations
IP	Internet Protocol
JHSV	Joint High Speed Vessel
JTA	Joint Technical Architecture
JTF	Joint Task Force
LAN	Local Area Network
LCS	Littoral Combat Ship
LoO	Level of Openness is the lowest level (e.g., system, subsystem or
	component) at and above which the buyer defines critical
	interfaces and requires conformance of these interfaces to open
	standards
LoC	Line of Communication

Maintainability............The ability of an item to be retained in, or restored to, specified conditions when maintenance is performed by personnel with the required skill levels to perform the prescribed procedures and use the required resources necessary for the prescribed level of maintenance MAMMuzawwar and Associated Movement Metadata......Data about the data used or generated by the system and data on the system and process status including information on origins and relevant processes used to transform it to its current state MHEMaterial Handling Equipment MoD......Ministry of Defense Modular.....Pertaining to the design concept in which interchangeable units are employed to create a functional end product MOEsMeasures of Effectiveness MOGMobility Operations Group MoI.....Ministry of Interior MOPsMeasures of Performance MoS......Ministry of State MOSA The DoD implementation of Open Systems is known as a Modular Open Systems Approach (MOSA) MSRs......Main Supply Routes MTBF......Mean Time Between Failure MTBMMean Time Between Maintenance MTTRMean Time To Repair NEONon-Combatant Evacuation Operation NGNatural Gas NGO......Non-Governmental Organization (e.g. Red Cross International) OntologyA defined set of representational primitives, such as classes, attributes, and relationships, which are used to provide a semantic description of a domain of knowledge or discourse OPALObjective, Perceptions, Abilities, and Limitations are the full range of drivers and constraints governing an actor's decision-making Open Specifications ... Public specifications that are maintained by an open, public consensus process to accommodate new technologies over time and that are consistent with international standards Open Standards..........Widely accepted and supported standards set by a recognized standards organization or the commercial market place that are equally available to the general public at no cost or with a moderate licensing fee and support interoperability, portability, and scalability Open SystemA system that implements sufficient open standards for interfaces, services, and supporting formats to enable properly engineered components to be utilized across a wide range of systems with minimal changes, to interoperate with other components on local and remote systems, and to interact with users in a style that facilitates portability

OPNAV.....Office of the Chief of Naval Operations

Parameter Sweep......A simulation technique in which the same code is executed multiple times using unique sets of input parameter values

- PMESIIPolitical, Military, Economic, Social, Infrastructure, and Information
- PMESIIPolitical, Military, Economic, Societal. Information, and Infrastructure
- PMESIN.....Political, Societal, Military, Economic, Information, and iNfrastructure is the spectrum of effects within the DIME/PMESII dichotomy (note this document uses PMESIN vice the traditional PMESII acronym)
- Portability......The ease with which a system, component, data, or user can be transferred from one hardware or software environment to another POSIXPortable Operating System Interface
- a specified period of time
- ROE.....Rules of Engagement
- RPGsRocket-Propelled Grenade
- SEADStates/Events/Actors/Decision-making
- SemanticsA description of what a model does and how it does it. It includes the assumptions and abstractions either explicit or implicit in a model
- SLOCSSea Lines of Communications
- SMESubject Matter Expert
- SpecificationA document that prescribes, in a complete, precise, verifiable manner, the requirements, design, behavior, or characteristics of a system or system component
- Standalone System.....A computer that is not actively connected through a network to other computer systems, regardless of whether the computer has the potential to be connected through its existing hardware or not
- StandardA document that establishes uniform engineering and technical requirements for processes, procedures, practices, and methods. Standards may also establish requirements for selection, application, and design criteria of material
- SysML.....Systems Modeling Language
- System......Any organized assembly of resources and procedures united and regulated by interaction or interdependence to accomplish a set of specific functions
- TAFIMTechnical Architectural Framework for Information Management
- Theory Triangulation. The application and combination of more than a single research methodology to study a particular phenomenon
- UOBUnit Order of Battle
- USG.....United States Government
- WMDWeapons of Mass Destruction
- WTOWorld Trade Organization
- XML.....EXtensible Markup Language

10 Social Theory—Assessment of the Coverage & Consistency

This appendix briefly outlines the current *state-of-the-art* in the social sciences in order to justify the decision to make the Descriptive Requirements independent of any particular social theory. The social sciences certainly have not produced a dominant theoretical paradigm that explains or even describes all aspects of human social and cultural behavior. Thus social science theory does not yet provide a solid foundation on which the Descriptive Requirements could be grounded. There are many reasons for this lack of dominant theoretical paradigm:

- Slow progress in theoretical developments
- Difficulties in social observation & data collection
- Limited scalability and generalizability of theories
- Inherent complexities of generalized cognition modeling and validation

Each of these reasons is discussed below in greater detail from a historical perspective.

10.1 Slow Progress in Theoretical Developments

Progress in the social science theory – and not just in social science modeling – has been slow. This is due to the difficulty of combining inductive research about social behavior (which mainly seeks to establish empirical correlations between variables without distinguishing cause from effect) with deductive research (which derives theorems about human behavior from grand theories of human nature and then attempts to test these theorems against actual data). On the one hand, empirical correlations are difficult to find because social behavior depends on a very large number of variables. To establish a solid statistical correlation, a huge number of variables must be considered and measured. On the other hand, theoretically informed causal hypotheses emerge very slowly and often are not rigorously tested for many years after they are formulated. This is because the process of critiquing social theory from a logical and philosophical viewpoint usually precedes empirical testing and often takes decades.

The slow and difficult process of uncovering the true causes of human social behavior can be illustrated by the effort to explain crime. Probably no other kind of human behavior has been so thoroughly and carefully documented; the data about crime and criminals are abundant. Despite this, progress in identifying the causes of crime has been slow.

Sociologists have been proposing explanations of criminal behavior ever since 1895, when Durkheim published his seminal work, The Rules of the Sociological Method [Dur95] and established sociology as a scientific discipline. From the beginning,

sociologists' theoretical efforts have been guided as much by philosophical and ethical preferences as by actual data. Thus, in 1897 Emile Durkheim proposed that crime is sometimes caused by anomie or "normlessness." He argued that during periods of rapid social change (economic booms and busts, civil disorder, etc.), established social norms are weakened or eliminated, making it difficult for people to determine how to maintain or improve their social status in legitimate ways. This supposedly leads to conflict, crime, and other forms of deviance such as suicide [Dur95, Dur97]. Empirical testing of this thesis, however, was difficult, due to problems in operationalizing and measuring anomie [cf. Srole56].

Later thinkers such as Robert Merton modified Durkheim's theory, proposing that "social strain" causes crime. In Merton's approach, there is a mismatch between the cultural values of a society and the legitimate means that individuals are given for realizing those values. For example, one of the central values of "the American way of life" is home ownership in a "nice neighborhood," yet the means needed for realizing this value (good credit, relatively high annual income, secondary school education, etc.) are not equally distributed, leading to a strain between values and means among economically deprived people. This strain causes some of the poor to resort to crime [Mer38]. Merton's thesis, however, proved difficult to verify empirically, and for most of the 1970s it was dismissed. [cf. TVS78].

During the 1980s, the only factors that appeared to be solidly correlated with criminality were sex and age. It was recognized that, universally, young men are much more likely to commit crimes than other members of society. As a leading sociologist put it, "Gender is a stronger correlate than either race or class for a wide range of deviant and criminal behavior throughout history, across all societies, and within all societies" [Ake06:152]. Because this finding pointed to the importance of biological factors for determining gender-associated behavior, however, it did not appeal to those sociologists who were philosophically committed to the position that gender roles are entirely constructed by social convention and have no grounds in genetics or biology. Thus these theorists have been slow to incorporate the empirical correlation between male gender and crime into their theories.

At the present both the "social strain" theories and biological theories are accepted to varying degrees as possible explanations of crime. The "social strain" approach has been revived by new empirical testing, which has shown that social strain is both measurable and correlated with criminality. [Agn92; Agn95a; Ag95b; AW92] At the same time, the correlation between male gender and crime remains strong and is not contested. But new causal factors for high rates of crime in working-class and/or poor neighborhoods are also being assessed. Recent studies, for example, indicate that early exposure to environmental poisons, such as lead, disturbs the neural mechanisms responsible for impulse control. [NMN02] This finding may help explain why crime rates among the urban poor are higher than crime rates in affluent suburbs.

There are probably many other factors that help explain the difference in crime rates between poor urbanites and middle-class residents of suburbia. Determining the respective weights of these many contributory factors, however, is difficult. Although statistical methods for estimating the explanatory power of each of many causal factors have been available to social scientists since the 1920s – when techniques for the analysis
of variance were first invented [cf. Wiki01] – they cannot be applied unless the measurements of the contributory causal factors are accurate.

This brief review of the history of sociological research on crime illustrates many of the problems that have slowed progress in the social sciences generally: (1) the difficulty of establishing empirical correlations among variables, due to the multiplicity of possible causal variables associated with every kind of socio-cultural behavior, all of which must be identified and measured; (2) the multiplicity of competing theories of social behavior, which are often critiqued on philosophical and logical grounds before they are tested against empirical cases. Thus testing of theories against data may be delayed by philosophical or ideological resistance to them. In the meantime, empirically weaker theories may prevail, at least temporarily; (3) the difficulty of determining which of many factors may be the most important determinant of a social phenomenon when many independent causes are involved. Multiple explanations of criminality, for instance, are plausible; the physical developmental process in males, lead poisoning, and social strain may all contribute to criminality.

10.2 Difficulties in Data Collection

Second, collecting experimental data about some social phenomena can be very difficult. Ethical and practical considerations prohibit the application of classical laboratory methods to social science research. We cannot isolate a human population, hold some of its characteristics constant, and manipulate various causal factors (food supply, crowding, climate, etc.) to see what effects these manipulations may have. Human beings cannot be treated like laboratory rats. For some research questions, however, laboratory methods can be replaced by the comparative method. For example, in order to determine the effect of crowding on human populations, we need not introduce a human population into a confined space, gradually increase its numbers and observe the results. Instead, we can compare human groups whose population density is naturally low with other human groups who live in densely-populated locations. Methods have been developed to ensure that such naturally-occurring test cases are comparable. Some branches of the social sciences, such as anthropology and political science, rely almost entirely on the comparative method for their data.

Not all social phenomena can be studied by means of the comparative method, however. Students of mass collective behavior – such as riots, social movements, and protest marches – have found it difficult to predict when and where these mass collective behaviors will occur. For this reason, they cannot normally position themselves and their data-collecting instruments in time to capture the data that they need for analysis. To some extent this difficulty has been mitigated by studying controlled spaces where mass collective behaviors such as riots occur more predictably: prisons and sports arenas. There are now numerous comparative studies of prison riots [ex. UCC96] that describe this kind of collective behavior with some precision and even identify the factors that trigger riots and make them more or less prolonged or violent. It remains questionable, however, whether the data about these special kinds of riots are comparable to data about riots that occur in uncontrolled public spaces or, indeed, about any other kinds of collective behavior.

10.3 Limited Scalability and Generalizability

Two other problems in social science research are scalability and generalizability. Roughly speaking, scalability refers to the possibility of applying explanations about small-scale phenomena to larger-scale phenomena, or *vice versa*. In the social sciences, debates about scalability initially turned on the issue of whether the individual or the group is the locus of behavior and motivation. Are the actions of a group best understood as nothing more than the aggregation of actions performed by the group's members? Or does collective action have properties of its own that cannot be described as individual action writ large?

Over a century of debate has led many social scientists to accept the principle of "methodological individualism." This view, summarized by Elster in 1989 [Els89:13], assumes that "to explain social institutions and social change is to show how they arise as the result of the actions and interaction of individuals." This does not mean that structural explanations – i.e. explanations that ignore individual motivations and actions – are necessarily wrong. Such explanations simply identify causes without getting to the actual mechanisms through which the causes work. They are "half-way" explanations rather than "rock-bottom" explanations.

For example, when sociologists noticed a sharp drop in the crime rate in the United States during the 1990s, some suggested that a shift in America's demographic structure (i.e. a decline in the percentage of young men in the general population) might be responsible. Since fewer young men were present, fewer crimes were committed. This explanation, although not refuted, presented no necessary connection between the drop in the percentage of young men in the population and the crime rate. After all, the crime rate could have stayed the same if the remaining young men had become more violent or if other cohorts in the population had adopted criminal behaviors. To completely understand the change in the crime rate we would have to know why other elements in society remained unchanged. What prevented the remaining young men from exploring criminal options? Why did older men and women decide to continue to stay on the right side of the law [Hea05]?

Social scientists' preoccupation with debate about the individual/collective dichotomy left them with little energy to devote to secondary issues of scalability. Few have asked whether differences in social scale are correlated with differences in social properties. For example, we see little discussion of scale in the literature about riots [Bid75; BvD95; Col82; Col92; Ellis 1984; Gae94; Mar70; UCC96; Wan68]. There are no empirical studies that prove that a riot involving 500 people is structurally different from a riot involving 50,000 people. Only a few studies of riots and mobs have started to explore questions of scale [ex. LMA07; MHC09].

Thus there is no scalability principle in the social sciences that allows researchers to generalize from individual behavior up to small groups, large groups, and organizations. In general, there are no analytical guidelines for moving up from one level of granularity to the next. Practically the only social scientists who have shown much interest in the question of scalability are specialists in social science modeling [ex. FFM08]. Their work has arguably been more influenced by engineering paradigms than by the general theoretical concerns of the social sciences.

Scale is not the only problem. Some theories have been shown to be valid for only very narrow domains. For example, theories of motivation that apply to consumer behavior may not be applicable to games and sports, combat, or cognitive actions such as reading or problem-solving. Consumer motivation, of course, involves reduction of economic risk, since to buy a product the consumer must expend capital [MM97]. Such considerations do not apply to sports motivation, which has been shown to be most strongly affected by a set of psychological states and perceptions known as "self-efficacy" [HC05:105]. So there is no general theory of motivation in psychology that applies to every possible scenario.

Also, theories that seem to have been validated for particular research subjects (e.g. for example, the shopworn "American freshmen college class," a sample that appears frequently in the sociological and psychological literature) have not been validated for other populations (e.g. Iraqi shepherds or Afghan villagers) whose social and cultural experiences are very different. Researchers in the psychology of consumer behavior, for instance, have been pointing out the need to validate their theories cross-culturally for the past decade [BO'C05; Dor02; PS03].

10.4 Inherent Complexities of Generalized Cognition Modeling

In addition to the obstacles to progress in the social sciences generally, there are special difficulties involved in developing models of social behavior. As the National Research Council noted in 1998, "the modeling of cognition and action by individuals and groups is quite possibly the most difficult task humans have yet undertaken. Developments in this area are still in their infancy" [NRC98:8]. Their most recent review of the state of the art in social science modeling admitted that the "situation has not changed significantly in the [past] 10 years..." [NRC08:20]. There are many reasons why progress in social science modeling has been so slow.

Some of the difficulties are technical. For example, no model can cover every aspect of social behavior and its social and physical contexts. To optimize the utility of a model, it must be designed to cover a clearly delimited range of behaviors and contexts. It follows that models must also be designed to work in tandem with each other, so that their differing capabilities can be combined. In short, they must be interoperable. Many technical steps must be taken to make this possible [NRC08:271-284].

Another problem is the verification, validation, and accreditation (VV&A) of social behavioral models. Verification involves making sure that the model actually operates as intended. This task is no more complicated for social science models than it is for models of kinetic phenomena and no additional discussion is required here. Validation, however, is more difficult [NRC08:301-324].

10.5 Conclusions

The overall difficulty of developing empirically confirmed explanations of socio-cultural variation and social behavior provides a daunting context for the more specific effort to develop valid models of human behavior.

As a result, modeling social phenomena has also been slow to develop. The analyst who seeks to construct a model of a particular scenario will find it difficult to decide which theory is the most applicable to that scenario. Even if the scenario is de-composed into different dimensions and distinct phases, so that a better match between a social theory and a particular aspect or part of a social phenomenon can be made, there will still be debate about how good that match may be.

Perhaps one day a grand unified social theory will emerge that will provide valid assumptions and algorithms for modeling every feature of social life. Until that time, the analyst will not know a priori which theorem to apply to a particular modeling task. Under these circumstances, the best modeling tool would represent all plausible theories simultaneously, showing the various possible effects of a particular action and generating a large collection of potential outcome threads. To complete the analysis, SMEs could compare the threads and select those that seemed most plausible. Clearly such a modeling tool would be complex and difficult to design. And even if it could be built, it could not guarantee that social science SMEs could reach a complete consensus about the tool's outputs.

11 Detailed List of Descriptive Requirements

This appendix contains the details for the descriptive requirements including interdependencies, keywords, relevant missions, and phases. Detailed definitions for the different categories and descriptors are provided in Chapter 2 including Table 2 which presents a graphical organization for all the requirements.

O-E Events

O-E-01 Time and Space

The DIME/PMESII model suite will represent Time and Space for pertinent actions and effects across the DIME/PMESII elements. This requirement includes the proper temporal sequencing of events, actions, and states as well as their relevant spatial relationships.

Areas:E--Phases:0, I, II, III, IV, VMissions:Nouns:time, distanceVerbs:pass, move

O-E-02 General Events, Trends, and Cycles

The DIME/PMESII model suite will represent General Events, Trends, and Cycles for pertinent actions and effects across the DIME/PMESII elements. The requirement includes the effects associated with anticipated, scheduled, and unscheduled events. Anticipated events include seasonal cycles and scheduled events include holidays, elections, and political events. Unscheduled events include storms, military coups, sudden market shifts, epidemics, and natural disasters. Note that some events are sudden (earthquakes) while others may be gradual (market shifts or seasonal cycles). The proper sequencing of events and the actor's awareness of the events must be included when modeling the impacts.

Areas: E-- Phases: 0, I, II, III, IV, V Missions: Nouns: Verbs:

O-E-03 Actions in Preparation for Anticipated and Scheduled Events

The DIME/PMESII model suite will represent Actions in Preparation for Anticipated and Scheduled Events for pertinent actions and effects across the DIME/PMESII elements. The requirement includes elections, celebration of holidays, changes in leaders, major events (the Olympics, dignitary visits), and seasonal cycles. Preparations regarding disasters are not included.

Areas:	E-IE-PESIN Phases: 0, I, II, III, IV, V
Missions:	
Nouns:	HN population, elections, special events, Olympics, dignitary visits
Verbs:	secure, demonstrate, celebrate
Parent of:	
A-D-17	Multi-party Diplomatic Negotiations
A-L-06	Martial Law and Law Enforcement Operations
A-D-12	Diplomatic-Like Interactions Between Organizations
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-E-09	Activities to Improve Infrastructure
E-M-02	Effects of Multi-National Exercises on Military
A-I-15	Information Operations

O-E-04 Weather Impacts to Decision-making and Military Operations

The DIME/PMESII model suite will represent Weather Impacts to Decision-making and Military Operations for pertinent actions and effects across the DIME/PMESII elements. The requirement includes the impact of weather to decision-making and military operations such as the reduction in military or logistics capabilities due to weather events or weather-caused damage; uncertainty in storm forecasting; and uncertainty in ground conditions due to on-going or recent weather events. Preemptive actions taken to mitigate potential dangers must be included (e.g. preparations for hurricane movements, WMD plume movements).

Areas:	ED-DIM-PMS Phases: II, III, IV
Missions:	CW, CM, HA/DR, NEO
Nouns:	HN population, infrastructure, military, logistics, fore-casting
Verbs:	damage, repair, secure, restore, plan, prepare
Parent of:	
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-L-06	Martial Law and Law Enforcement Operations
A-M-10	Military and Naval Presence
A-M-11	War and Military Invasion
E-M-02	Effects of Multi-National Exercises on Military

O-D Decision-making

O-D-01 Decision-making in Hierarchical Organizations

The DIME/PMESII model suite will represent Decision-making in Hierarchical Organizations for pertinent actions and effects across the DIME/PMESII elements. The requirement includes the processes of decision-making in hierarchies. The interactions between the military and other agencies/organizations must be included. Any biases between actors must be included in the decision-making interactions (e.g. two organization with opposing policies and values). This requirement includes most military decision making processes.

Areas:	D	Phases:	0, I, II, III, IV, V
Missions:			
Nouns:	military, organiz	ations, OODA	
Verbs:	decide, influence, deter, communicate, act		
Child of:			
A-I-12	Intelligence, Sur	veillance, Reco	nnaissance for Embassy

O-D-02 Individual Decision-making

The DIME/PMESII model suite will represent Individual Decision-making for pertinent actions and effects across the DIME/PMESII elements. The requirement includes the psychology and cognition of decision-maker as influenced by experience / knowledge / personality / perception / culture based responses to the measured PMESII elements. The goals, perceptions, abilities, and limitations of the decision-maker must be accounted for in the process.

Areas:D--Phases:0, I, II, III, IV, VMissions:Nouns:decision maker, perceptions, biases, goals, abilities, personalityVerbs:decide, respond, consider

O-D-03 Social Process of Decision-making

The DIME/PMESII model suite will represent Social Process of Decision-making for pertinent actions and effects across the DIME/PMESII elements. The requirement includes the processes of decision making by groups, group leaders, or corporate bodies. The aspects of political compromise and seeking group consensus must be included as well as the different roles/influences of key group members.

Areas:	D	Phases:	0, I, II, III, IV, V
Missions:			
Nouns:	groups, group lea	ders, corporate	e bodies, members
Verbs:	decide, comprom	ise, influence	

O-D-04 Perception of Environment, Actions, and Events

The DIME/PMESII model suite will represent Perception of Environment, Actions, and Events for pertinent actions and effects across the DIME/PMESII elements. This requirement includes the development of perception for actors based on their information awareness. This evolution of perception must take into account the psychology, cognition, preferences, biases, prejudices, value system, belief set, and fundamental axioms of the actor.

Areas:	D	Phases:	0, I, II, III, IV, V
Missions:			
Nouns:	environment, be	eliefs, values, op	inions
Verbs:	aware, perception	on, prefer	
Parent of:			
A-I-03	Collection of He	ost Nation Citize	en Perceptions
E-S-01	Effect of Foreig	n Presence on H	lost Nation Norms and Behaviors
A-I-10	Intelligence Col	lection to Suppo	ort Host Nation
E-S-07	Migration		
Child of:			
E-I-02	Effects of Inform	mation Gathering	g on Host Nation Citizens
A-D-20	Advocacy Actio	ons by US Gover	rnment

O-D-05 Adaptability and Learning

The DIME/PMESII model suite will represent Adaptability and Learning for pertinent actions and effects across the DIME/PMESII elements. This requirement include the adaptibility and learning process associated with experience and observation; adaptation of new objectives or strategies; creation, elimination, and alteration of processes, standards, rules, policies, and plans; and alteration of old relationships and the forging of new relationships. Application must include the full range of actor types (e.g. individuals, small group up to large social populations)

Areas:D--Phases:0, I, II, III, IV, VMissions:Nouns:process, goal, rulesVerbs:adapt, change, improve, learn

A-D Diplomatic Actions

A-D-01 Support to the Ambassador

The DIME/PMESII model suite will represent Support to the Ambassador and associated effects across the PMESII elements. The requirement includes the various types and levels of support that military forces and civilian government agencies provide to the Ambassador in response to Embassy directions. The effects include any changes in Embassy activity that these support actions enable and the effects of changed/enhanced Embassy activity on the HN and related countries.

Areas: AD-DIM-P Phases: 0, I, IV, V

Missions:	NEO, SSTR, BPC, TSC, DS, SI				
noulls.	security forces, HN Businesses, HN citizens, embassy				
Verbs:	operations, communication, military actions, security, employed.				
	reporting, meeting, information exchange				
Parent of:					
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy				
A-D-13	Diplomatic Preparation for WMD Consequence Management				
A-D-14	Diplomatic Actions for Multi-National Exercises				
A-D-04	Embassy Communications				
A-D-06	Diplomatic Actions to Prepare for Stability Operations				
A-M-03	Foreign Non-Combatant Evacuation Operations				
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country				
	Nationals				
A-E-01	Establishing Distribution Centers for Humanitarian				
	Assistance/Disaster Relief				
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy				
A-E-13	Establishing and Maintaining Refugee Camps				
A-E-06	Mitigation of Long-term WMD Effects				
A-I-01	Intelligence Operations on Host Nation Conditions				
A-I-02	Intelligence Operations on Host Nation Government				
A-I-04	Information Dissemination				
A-I-05	Collection and Use of Refugee Information				
A-I-07	Establishment & Support of Information Exchange Program				
A-E-17	Improvement of Ministry of Interior				
A-M-05	Actions Supporting Host Nation Counter-Insurgency				
A-M-07	Logistics				
A-M-06	Military Exercises				
E-I-01	Effects of Information Gathering on Host Nation Government				
	Actions				
A-E-12	Humanitarian Assistance/Disaster Relief Operations				
A-D-18	Destabilization Operations				
A-I-10	Intelligence Collection to Support Host Nation				
A-D-19	Deterrence				
A-E-15	Economic Development Supporting Disaster Recovery				
A-D-21	Security and Law Enforcement for US				

A-D-02 Negotiations with Host Nation Government

The DIME/PMESII model suite will represent Negotiations with Host Nation Government and associated effects across the PMESII elements. The requirement includes negotiations between military and civilian personnel and corresponding HN officials at the local, regional, and national levels to clarify policies, identify interests and potential conflicts, and mitigate conflict. Also includes the effects of diplomatic successes and failures on relations with HN and on HN relations with other countries.

Areas:	-D-PE Phases: 0, I, IV, V
Missions:	FID, HA/DR, NEO, SSTR, BPC, TSC, DS
Nouns:	HN government, local markets, HN businesses, HN populace
Verbs:	requests, perception, operations, security, reports
Parent of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-03	Negotiations with Local Leaders
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country
	Nationals
A-D-09	Negotiating Refugee Safe Havens
A-E-11	Hiring of Host Country Nationals
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-02	Intelligence Operations on Host Nation Government
A-I-04	Information Dissemination
A-I-07	Establishment & Support of Information Exchange Program
A-M-08	Improvement of Ministry of Defense
A-E-17	Improvement of Ministry of Interior
A-M-04	Military Training
A-M-06	Military Exercises
E-I-02	Effects of Information Gathering on Host Nation Citizens
E-I-01	Effects of Information Gathering on Host Nation Government
	Actions
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
A-E-14	Mitigation of Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
A-E-16	Stability Operations (Economic)
A-I-13	Host Nation Internal Dissemination of Information
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
Peer of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-17	Multi-party Diplomatic Negotiations

A-D-03 Negotiations with Local Leaders

The DIME/PMESII model suite will represent Negotiations with Local Leaders and associated effects across the PMESII elements. The requirement includes negotiations/interactions with leaders of important families, businesses, political parties, interest groups, and other organizations outside of the context of the HN

government.	Also	represents	the	effects	of	these	negotiations	on	the	HN	and	on
international	relati	ons with the	HN	·								

international rete	
Areas:	-D-PES Phases: 0, I, IV, V
Missions:	FID, HA/DR, NEO, DS
Nouns:	HN government, local markets, HN businesses, HN populace
Verbs:	requests, negotiate, perception, hostile actions, military actions,
	reports
Parent of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-13	Diplomatic Preparation for WMD Consequence Management
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
Child of:	
A-D-02	Negotiations with Host Nation Government
Peer of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-17	Multi-party Diplomatic Negotiations
A-D-12	Diplomatic-Like Interactions Between Organizations

A-D-04 Embassy Communications

The DIME/PMESII model suite will represent Embassy Communications and associated effects across the PMESII elements. The requirement includes regular dialogs between Ambassador, embassy staff, military leaders/liaisons, and other supporting entities. Resulting decisions to act or set policy and the dissemination of decisions is included. The effects of these communications on diplomatic relations and support for HN are also included.

Areas:	D-D-P Phases: 0, I, IV, V
Missions:	CM, COIN, FID, NEO, DS
Nouns:	memos, briefing sessions, embassy staff/personnel, HN market
	place, HN job programs, embassy functions, radio
Verbs:	attend, produce, communicate, collaborate, share, meet,
	military/embassy actions
Parent of:	
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-E-05	Economic Information Operations
A-I-04	Information Dissemination
A-I-07	Establishment & Support of Information Exchange Program
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
Child of:	
A-D-01	Support to the Ambassador

A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
Peer of:	
A-E-02	Building and Securing Lines of Communication
A-I-06	Improvement of Host Nation Government Communication
	Networks
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities

A-D-05 Improvements to Host Nation Diplomatic Capabilities

The DIME/PMESII model suite will represent Improvements to Host Nation Diplomatic Capabilities and associated effects across the PMESII elements. The requirement includes all capabilities that impact diplomatic efforts such as diplomatic and legal training; information collection, analysis, and decisionmaking; communications, language, and translation capabilities; build negotiating skills; security of operations (personnel, facilities, and information); and enhance the diplomatic advisory roles in foreign policy shaping.

ine aipiomatic a	avisory roles in joreign policy snaping.				
Areas:	-DE-PEN Phases: 0, I, IV, V				
Missions:	CM, HA/DR, BPC, TSC, CMO, DS				
Nouns:	HN government, embassy staff/personnel				
Verbs:	information collection, analysis, training, communication, advise, negotiate				
Parent of:					
A-I-04	Information Dissemination				
A-I-06	Improvement of Host Nation Government Communication				
	Networks				
A-I-07	Establishment & Support of Information Exchange Program				
E-P-04	Effects of External Group Involvement in Host Nation Politics				
E-P-05	Changes in Perception of Government/Authority Legitimacy				
A-D-17	Multi-party Diplomatic Negotiations				
A-I-10	Intelligence Collection to Support Host Nation				

Diplomatic-Like Interactions Between Organizations

A-D-06 Diplomatic Actions to Prepare for Stability Operations

A-D-12

The DIME/PMESII model suite will represent Diplomatic Actions to Prepare for Stability Operations and associated effects across the PMESII elements. The requirement includes negotiations with HN about the timing, economic benefits, and scope of stability operations and indicates their effect on relations with the HN.

1 0	2 I	00
Areas:	-D-PS	Phases: IV, V
Missions:	COIN, FID, HA/I	/DR, SIB/R, SSTR, BPC, TSC, CMO
Nouns:	embassy activitie	es, embassy personnel, HN businesses, financial
	institutions, stock	k market, HN populace, HN
Verbs:	access, operations	ns, military engagements, secure, receive, conduc
	coordinate	

Parent of:

A-E-20	Spending to Support Rule of Law
E-E-09	Economic Response Rule of Law Enforcement
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-07	Economic Intelligence Operations
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-E-07	Effects of Combat Operations on the Economy
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-02	Intelligence Operations on Host Nation Government
A-I-04	Information Dissemination
A-I-06	Improvement of Host Nation Government Communication Networks
A-I-07	Establishment & Support of Information Exchange Program
A-L-01	Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
A_M_08	Improvement of Ministry of Defense
$A_{-}E_{-}17$	Improvement of Ministry of Interior
A - M - 05	Actions Supporting Host Nation Counter-Insurgency
A-M-03	Military Training
A-M-06	Military Exercises
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
F-P-01	Changes in Population Loyalty to Host Nation Government
E-P-02	Changes in Political Involvement of Host Nation Citizens
E P 02	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-08	Effects of Legislation Law Enforcement and Regulations
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
E-P-07	Destabilizing Effects
A-D-17	Multi-party Diplomatic Negotiations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-10	Intelligence Collection to Support Host Nation
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities

A-D-21	Security and Law Enforcement for US
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other
	Minorities
A-L-08	Counter-Corruption Activities
Child of:	
A-D-01	Support to the Ambassador
A-D-02	Negotiations with Host Nation Government
E-S-05	Impact to Stability and Security due to Events
Peer of:	
A-D-16	Establishing Relations In Absence of State
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population

A-D-07 Support to Host Nation for Compliance with International Conventions and Standards

The DIME/PMESII model suite will represent Support to Host Nation for Compliance with International Conventions and Standards and associated effects across the PMESII elements. This requirement includes all actions taken to assist the HN with compliance with the many international conventions and standards. This includes conventions and standards regarding communication systems, protocols, and broadcasting; air, land, and sea travel; airports, border checkpoints, and sea ports; transportation systems; operator certification and training; transportation assets; disease control; narcotics, smuggling, and human trafficking; nuclear energy and non-proliferation; ordinance and mine disposal; and transnational law enforcement conventions. This requirement also includes conventions and standards related to actions on the high seas/international regions; operations/enforcement within territorial waters and exclusive economic zones; and de-escalating protocols for military-to-military contact. The full range of impacts associated with the improve compliance (improved international relations and cooperation, reduced tensions, improved trade, etc) must be included.

<i>cooperation</i> , <i>re</i>	aucea tensions, improved in due, etc) must be included.
Areas:	-DEL-PMESIN Phases: 0, V
Missions:	DS, EA, LE, SI
Nouns:	comms systems, travel, broadcasting, air and sea ports,
	transportation systems, conventions and standards
Verbs:	assist, train comply, enforce
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
A-I-10	Intelligence Collection to Support Host Nation
E-E-10	Effects of Sanctions (Economic)
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
E-N-03	Changes in Host Nation Environment
A-E-09	Activities to Improve Infrastructure
Child of:	

- O-E-03 Actions in Preparation for Anticipated and Scheduled Events
- A-L-07 Enforcement of International Resolutions
- E-E-12 Effects of Trade Agreements on Economy

A-D-08 Evacuation of Embassy Personnel and Affiliated Host Country Nationals

The DIME/PMESII model suite will represent Evacuation of Embassy Personnel and Affiliated Host Country Nationals and associated effects across the PMESII elements. The requirement includes actions taken to protect and evacuate embassy personnel and host country nationals who also work for the embassy. Should indicate the effects these actions have on continuity of diplomatic activities and on host nation perceptions of embassy staff during and after the evacuation.

Areas:	-DM-P Phases: II, III
Missions:	NEO
Nouns:	embassy personnel/staff, host country nationals, diplomatic activities
Verbs:	protect, evacuate, perception, operations
Parent of:	
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-02	Negotiations with Host Nation Government
Peer of:	
A-M-03	Foreign Non-Combatant Evacuation Operations

A-D-09 Negotiating Refugee Safe Havens

The DIME/PMESII model suite will represent Negotiating Refugee Safe Havens and associated effects across the PMESII elements. The requirement includes diplomatic and military actions taken to create refugee safe havens either in the portions of the HN where normal conditions still prevail or in neighboring countries. Should indicate the effects those actions have on diplomatic relations with the refugees' home country and with neighboring countries.

Areas:	-DM-P	Phases:	III. IV		
Missions:	HA/DR, NEO	, SI	,		
Nouns:	refugees, shelt	er, HN populace,	essential se	rvices	
Verbs:	provide, const	ruct, repair, secur	e, perceptio	n, infori	mation
	dissemination,	comply			
Parent of:					
A-M-03	Foreign Non-O	Combatant Evacu	ation Operat	tions	
A-E-01	Establishing	Distribution	Centers	for	Humanitarian
	Assistance/Dis	saster Relief			

A-E-13	Establishing and Maintaining Refugee Camps
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-04	Information Dissemination
A-I-05	Collection and Use of Refugee Information
A-I-07	Establishment & Support of Information Exchange Program
A-M-07	Logistics
E-I-02	Effects of Information Gathering on Host Nation Citizens
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-06	Epidemic Breakout
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
E-P-07	Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
E-S-07	Migration
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-02	Negotiations with Host Nation Government
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-S-05	Impact to Stability and Security due to Events

A-D-10 Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief

The DIME/PMESII model suite will represent Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief and associated effects across the PMESII elements. The requirement includes actions taken by military forces and/or civilian government agencies to negotiate an understanding with the HN government in preparation for humanitarian assistance operations. Also indicates the effect of these diplomatic actions on relations with the HN and related countries.

Areas:	-D-P	Phases:	0, I, IV, V	
Missions:	HA/DR, NEO, S	SI		
Nouns:	military forces,	civilian governn	nent agencies, HN gove	ernment, HN
	Population, esse	ntial services		
Verbs:	operations,, nego	otiate, decide, p	epare, provide, secure,	, receive,
	perception			
Parent of:				
A-D-04	Embassy Comm	unications		

A-M-03	Foreign Non-Combatant Evacuation Operations
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country
	Nationals
A-D-09	Negotiating Refugee Safe Havens
A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
A-E-11	Hiring of Host Country Nationals
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-E-13	Establishing and Maintaining Refugee Camps
A-E-03	Building and Securing Host Nation Essential Services
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-05	Collection and Use of Refugee Information
A-M-01	Response to WMD Attack
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
E-S-02	Quality of Life Perception
E-S-03	Effects of Restriction on Population Movement
E-S-06	Epidemic Breakout
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-I-10	Intelligence Collection to Support Host Nation
A-E-15	Economic Development Supporting Disaster Recovery
E-S-07	Migration
Peer of:	
A-D-02	Negotiations with Host Nation Government
A-D-03	Negotiations with Local Leaders

A-D-11 Diplomatic Action to Support Training Host Nation Government Personnel

The DIME/PMESII model suite will represent Diplomatic Action to Support Training Host Nation Government Personnel and associated effects across the PMESII elements. This requirement includes all diplomatic actions associated with training government personnelsuch as first responders, military, police, law enforcement, judicial, and oversight agents. The requirement includes diplomatic actions to obtain Host Nation agreement for joint first responder training and civilian and military actions associated with providing first responder training to Host Nation personnel and NGOs. Also indicates the effects those diplomatic and training actions have on relevant multi-national efforts and on Host Nation public perceptions. Diplomatic efforts associated with equipping and maintaining the personnel also fall under this requirement.

Areas:	-DI-PN Phases: 0, IV, V
Missions:	CM, FID, HA/DR, NEO
Nouns:	HN government, HN populace, facilities, funding/dollars,
	international community, HN 1st responders Verbs: negotiate,
	train, respond, perception, prepare, conduct, deploy, information
	dissemination
Parent of:	
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-L-09	Improvement of Legal and Law Enforcement Ministries
A-I-16	Training of Host Nation Government Personnel
Child of:	
A-D-02	Negotiations with Host Nation Government
A-D-03	Negotiations with Local Leaders
A-E-10	Economic Actions Supporting Joint Military Exercises
A-E-18	Spending in Support of Host Nation Ministry of Interior
Peer of:	
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-14	Diplomatic Actions for Multi-National Exercises
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-06	Improvement of Host Nation Government Communication
	Networks
A-M-06	Military Exercises
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities

A-D-12 Diplomatic-Like Interactions Between Organizations

The DIME/PMESII model suite will represent Diplomatic-Like Interactions Between Organizations and associated effects across the PMESII elements. The requirement includes all actions between actors/parties, which are diplomatic in nature, to address issues of common concern and take joint action. The actions must include talks, negotiations, agreements and resulting actions on issues of crisis preparation and management; advocacy; consultation; policy and agenda setting; negotiations and agreements/contracts; and security; on the full range of issues such as political; social; information and education; economics, trade, and infrastructure; and law enforcement and legislation. This action is not restricted to nation states but can be performed by any set of actors (e.g. unions and companies, NGO groups, economic cartels, political coalitions). Specific issues must include trans-national and multinational efforts on peace, security, and law enforcement; international cooperation, agreements, and partnerships; and trade and monetary cooperation. Advocacy issues for NGOs, nation states, and other key actors must include human rights and dignity; poverty relief, education, and medical aid; and environmental issues.

Areas:	-D-PMESIN Phases:
Missions:	
Nouns:	NGOs, nation states, unions, businesses, economic cartels, political coalitions
Verbs:	negotiate, agree, actions, security, enforce
Parent of:	
A-E-04	Repatriation / Relocation Efforts
E-P-12	Effects of Factional Group Activities
Child of:	
A-D-05	Improvements to Host Nation Diplomatic Capabilities
O-E-03	Actions in Preparation for Anticipated and Scheduled Events
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-L-06	Martial Law and Law Enforcement Operations
Peer of:	
A-D-03	Negotiations with Local Leaders
E-P-02	Changes in Political Involvement of Host Nation Citizens
A-D-16	Establishing Relations In Absence of State
A-D-17	Multi-party Diplomatic Negotiations
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
E-E-12	Effects of Trade Agreements on Economy
E-P-11	Effects of Third-Party External Diplomatic Actions

A-D-13 Diplomatic Preparation for WMD Consequence Management

The DIME/PMESII model suite will represent Diplomatic Preparation for WMD Consequence Management and associated effects across the PMESII elements. The requirement includes diplomatic actions that facilitate Consequence Management such as agreements with HN and preparations (training, pre-planning, prepositioning). Also indicates the effects those agreements and preparations have on diplomatic efforts and relations with the HN and the region.

uipiomune ejjo	is and relations with the 111 and the region.
Areas:	-DM-PMN Phases: 0, V
Missions:	CM, NEO
Nouns:	HN,WMD, CBRN, 1st responders
Verbs:	agree, negotiate, prepare, conduct, identify, train, respond,
	mitigate, decontaminate
Parent of:	
A-E-06	Mitigation of Long-term WMD Effects
A-I-07	Establishment & Support of Information Exchange Program
A-M-01	Response to WMD Attack
A-M-04	Military Training
A-M-06	Military Exercises

E-P-01 Changes in Population Loyalty to Host Nation Government

E-P-05	Changes in Perception of Government/Authority Legitimacy
A-E-15	Economic Development Supporting Disaster Recovery
A-D-21	Security and Law Enforcement for US
Child of:	
A-D-01	Support to the Ambassador
A-D-02	Negotiations with Host Nation Government
A-D-03	Negotiations with Local Leaders
Peer of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-14	Diplomatic Actions for Multi-National Exercises

A-D-14 Diplomatic Actions for Multi-National Exercises

The DIME/PMESII model suite will represent Diplomatic Actions for Multi-National Exercises and associated effects across the PMESII elements. The requirement includes actions associated with participation in multi-national exercises and theater security cooperation as well as the effects of those actions on diplomatic relations with HN and perceived international stature of HN. Effects must include the global and regional security effects such exercises have between HN and neighbors/agents.

Areas:	-D-PM Phases: 0. I. V
Missions:	CM, FID, HA/DR, SIB/R, BPC, TSC
Nouns:	HN, international community, exercises, multi-nation
Verbs:	participate, cooperate, coordinate, conduct, train
Parent of:	
A-E-10	Economic Actions Supporting Joint Military Exercises
A-E-11	Hiring of Host Country Nationals
A-E-13	Establishing and Maintaining Refugee Camps
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-06	Improvement of Host Nation Government Communication
	Networks
A-I-07	Establishment & Support of Information Exchange Program
A-M-08	Improvement of Ministry of Defense
A-M-04	Military Training
A-M-06	Military Exercises
E-E-02	Changes in the Flow of Capital
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
E-E-13	Effects of Changes in Host Nation Infrastructure
A-I-13	Host Nation Internal Dissemination of Information
Child of:	
A-D-01	Support to the Ambassador
A-D-02	Negotiations with Host Nation Government
Peer of:	

A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-D-19	Deterrence
A-D-02	Negotiations with Host Nation Government
A-D-03	Negotiations with Local Leaders

A-D-15 Interactions with Aboriginal/Nomadic Peoples and other Minorities

The DIME/PMESII model suite will represent Interactions with Aboriginal/Nomadic Peoples and other Minorities and associated effects across the PMESII elements. This requirements includes all types of interactions and the resulting impacts between aboriginal/nomadic peoples or other distinct minority groups in HN/surrounding areas and other actors. The resulting actions and impacts to all parties must be included such as economic aid, support, trade, and taxation; law enforcement and security agreements/cooperation; military and paramilitary support, training, equipping, planning, and intelligence; diplomatic agreements or legislation regarding sovereignty, freedom of movement, treaties, and rights; information exchanges; and forced resettlement, assimilation, and re-identification of peoples. Military and paramilitary actions and the resulting effects must also be represented including both actions against aboriginals/nomads (attacks, genocide) and the use of aboriginals by others as a destabilizing faction. Secondary interactions and impacts such as cultural exchanges, societal changes, and assimilation/merging on both the HN population and aboriginal/nomadic peoples *must be included.*

Areas:	-DIMEL-PMESIN Phases: 0, I, IV, V
Missions:	FID, SSTR
Nouns:	HN populace, minorities, aborginal/nomaadic peoples, military and paramilitary
Verbs:	train, equip, aid, trade, assimilate, attack
Parent of:	
E-P-05	Changes in Perception of Government/Authority Legitimacy
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-12	Humanitarian Assistance/Disaster Relief Operations
Peer of:	-
E-P-02	Changes in Political Involvement of Host Nation Citizens
A-D-16	Establishing Relations In Absence of State
E-S-09	Effects of Discrimination in Host Nation

A-D-16 Establishing Relations In Absence of State

The DIME/PMESII model suite will represent Establishing Relations In Absence of State and associated effects across the PMESII elements. The requirement includes all decision-making associated with and initiating diplomatic-like actions in the case

of failed states when no host nation or government exists. This includes selection of which internal factions will be contacted or recognized; efforts to have other states recognize chosen faction; planning with "recognized" faction to support establishment of HN government; types of support may be provided; and preconditions or restrictions may go with support or recognition. This collection of actions and associated effects ends once a HN government is initiated.

actions and ass	octated effects chas once a first government is initiated.
Areas:	-D-PE Phases: IV, V
Missions:	SSTR
Nouns:	faction, HN government
Verbs:	initiate, decide, select, establish
Parent of:	
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-10	Intelligence Collection to Support Host Nation
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-E-16	Stability Operations (Economic)
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-14	Needs Assessments Supporting Decision-Making
Child of:	
E-S-07	Migration
A-M-11	War and Military Invasion
Peer of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-12	Diplomatic-Like Interactions Between Organizations
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other
	Minorities
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
A-L-07	Enforcement of International Resolutions
E-P-11	Effects of Third-Party External Diplomatic Actions
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

A-D-17 Multi-party Diplomatic Negotiations

The DIME/PMESII model suite will represent Multi-party Diplomatic Negotiations and associated effects across the PMESII elements. The requirement includes all diplomatic aspects to prepare for and hold multi-party negotiations. Preparations could include other DIME actions such as economic incentives, promises, preconditions, establishment/dissolution of other agreements (treaties, pacts), and information campaigns as well as military actions or threats.

Areas:	-D-P	Phases:	0, I, II, IV, V
Missions:	SSTR, DS		
Nouns:	economic incentives,	agreements	, HN government, militar

Verbs:	negotiate, prepare, actions, threats	
Parent of:		
A-D-18	Destabilization Operations	
A-D-19	Deterrence	
E-E-10	Effects of Sanctions (Economic)	
A-E-15	Economic Development Supporting Disaster Recovery	
A-E-16	Stability Operations (Economic)	
E-P-08	Internal Repercussions of a Trans-National Organization's Actions	
	Regarding Host Nation	
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding	
	Host Nation	
A-L-07	Enforcement of International Resolutions	
A-M-10	Military and Naval Presence	
E-E-12	Effects of Trade Agreements on Economy	
E-M-02	Effects of Multi-National Exercises on Military	
A-I-15	Information Operations	
Child of:		
A-D-05	Improvements to Host Nation Diplomatic Capabilities	
A-D-06	Diplomatic Actions to Prepare for Stability Operations	
O-E-03	Actions in Preparation for Anticipated and Scheduled Events	
Peer of:		
A-D-02	Negotiations with Host Nation Government	
A-D-03	Negotiations with Local Leaders	
E-P-12	Effects of Factional Group Activities	
A-D-12	Diplomatic-Like Interactions Between Organizations	
A-M-11	War and Military Invasion	
E-P-11	Effects of Third-Party External Diplomatic Actions	

A-D-18 Destabilization Operations

The DIME/PMESII model suite will represent Destabilization Operations and associated effects across the PMESII elements. The requirement includes the full range of DIME actions which can destabilize a regime, region, group, or other entity. Actions must include information operations, currency devaluation, sanctions, freezing of assets, refusal to honor debts, dissolution of agreements, changes in policies, support (all forms) for internal dissidents, and overt threats. Minor law enforcement or military actions are included but not major military actions.

Areas:	-DIE-PMESI	Phases:	0, I
Missions:	UW		
Nouns:	regime, region, gro	up, entity, cu	rrency, debts, agreements
Verbs:	enforce, devalue, re	fuse, change	e, dissolve
Parent of:			
A-I-03	Collection of Host	Nation Citize	en Perceptions
A-L-01	Identification, Disr	uption, and I	nterdiction of Financial Support for
	Destabilizing Actor	·s	

A-L-02 Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors Identification, Disruption, and Interdiction of Local Support for A-L-03 **Destabilizing Actors** Effects of Factional Group Activities E-P-12 Effects of Restored/Impaired Infrastructure on Host Nation E-N-02 E-P-01 Changes in Population Loyalty to Host Nation Government E-P-04 Effects of External Group Involvement in Host Nation Politics Changes in Perception of Government/Authority Legitimacy E-P-05 E-S-02 Quality of Life Perception Effects of Restriction on Population Movement E-S-03 E-S-04 Effects of Societal Leaders Impact to Stability and Security due to Events E-S-05 A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation Identification, Disruption, and Interdiction of Recruitment for A-L-04 **Destabilizing Actors** Mitigation of Destabilizing Effects A-E-14 **Destabilizing Effects** E-P-07 Changing Influence/Exposure of Societal Leaders A-I-08 Changing/Shaping Message/Position of Societal Leaders A-I-09 Effects of Sanctions (Economic) E-E-10 A-E-16 Stability Operations (Economic) Internal Repercussions of an Outside Nation's Actions Regarding E-P-09 Host Nation **Enforcement of International Resolutions** A-L-07 A-M-10 Military and Naval Presence E-P-10 Effects on Host Nation by Forward Bases Information Operations A-I-15 E-S-11 Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots Child of: Support to the Ambassador A-D-01 Multi-party Diplomatic Negotiations A-D-17 Impact of Terrorist/Insurgent Groups on Host Nation Population E-S-10 A-I-14 Needs Assessments Supporting Decision-Making Peer of: E-E-01 Changes in the Domestic Production by Economic Sector and Region E-E-02 Changes in the Flow of Capital Changes in Host Nation Wealth/Income Distributions E-E-03 E-E-04 Effects on Markets Changes in the Availability, Cost, and Distribution of Goods and E-E-05 Services Effects of Changes to Government Leadership E-P-06 A-D-19 Deterrence Advocacy Actions by US Government A-D-20

A-D-21	Security and Law Enforcement for US
--------	-------------------------------------

- E-I-05 Effects of Independent Media Outlets on Perceptions and Attitudes
- A-M-11 War and Military Invasion
- E-M-02 Effects of Multi-National Exercises on Military
- A-E-21 Spending for / Development of Other Host Nation Ministries and Agencies

A-D-19 Deterrence

The DIME/PMESII model suite will represent Deterrence and associated effects across the PMESII elements. The requirement includes the full range of deterrent actions including nation defense policy statements and information operations; treaties and international agreements/memberships; and military training, equipping, planning, exercises, and demonstrations of capabilities. The full range of deterrence must be covered: assuring allies and constituents; dissuading potential adversaries; deterring aggressors through policy statements and demonstrated strength; defending sovereignty; and any historical examples of defeating enemies (assure, dissuade, deter, defend, defeat).

Areas:	-DIML-PMS Phases: 0, I
Missions:	CW, TSC
Nouns:	allies, adversaries, aggressors, enemies, military, HN government
Verbs:	assure, dissuade, deter, defend, defeat, train, equip, plan, exercise,
	demonstrate
Parent of:	
E-S-05	Impact to Stability and Security due to Events
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
E-P-10	Effects on Host Nation by Forward Bases
A-M-11	War and Military Invasion
E-M-02	Effects of Multi-National Exercises on Military
E-M-03	Effects on Military due to Operations
Child of:	
A-D-01	Support to the Ambassador
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-M-01	Response to WMD Attack
A-M-08	Improvement of Ministry of Defense
A-M-02	Response to Conventional Attack
A-D-17	Multi-party Diplomatic Negotiations
Peer of:	
A-M-04	Military Training
A-M-06	Military Exercises
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
A-D-18	Destabilization Operations

A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-D-14	Diplomatic Actions for Multi-National Exercises
A-L-07	Enforcement of International Resolutions
A-M-10	Military and Naval Presence
A-I-15	Information Operations

A-D-20 Advocacy Actions by US Government

The DIME/PMESII model suite will represent Advocacy Actions by US Government and associated effects across the PMESII elements. The requirement includes all US advocate activities (military, DoS, other USG agency) to shape attitudes and behaviors of actors to bring closer to either US or international values. This includes advocacy of values such as human rights, human dignity, individual freedom, economic access, and rule of law.

Areas:	-D-PMESIN Phases: 0
Missions:	СТ
Nouns:	military, DOS, USG agencies
Verbs:	shape, influence, persuade
Parent of:	
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
E-S-05	Impact to Stability and Security due to Events
E-P-07	Destabilizing Effects
E-E-10	Effects of Sanctions (Economic)
E-P-10	Effects on Host Nation by Forward Bases
E-E-12	Effects of Trade Agreements on Economy
E-N-03	Changes in Host Nation Environment
O-D-04	Perception of Environment, Actions, and Events
A-E-09	Activities to Improve Infrastructure
Child of:	-
A-D-02	Negotiations with Host Nation Government
E-S-09	Effects of Discrimination in Host Nation
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-L-07	Enforcement of International Resolutions
Peer of:	
A-E-11	Hiring of Host Country Nationals
E-P-12	Effects of Factional Group Activities
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-06	Effects of Changes to Government Leadership
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders

A-D-21 Security and Law Enforcement for US

The DIME/PMESII model suite will represent Security and Law Enforcement for US and associated effects across the PMESII elements. This requirement includes efforts to enforce the law and defend the interests of the United States; prevent and disrupt attacks; protect the American people, our critical infrastructure, and key resources; and respond to and recover from incidents that do occur.

<i>csources</i> , <i>una</i>	
Areas:	-DIML-PS Phases: 0, I, II, IV, V
Missions:	CT, SI
Nouns:	US government, infrastructure, US interests, incidents, resources
Verbs:	enforce, defend, prevent, disrupt, respond and recover
Parent of:	
A-E-18	Spending in Support of Host Nation Ministry of Interior
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
E-S-05	Impact to Stability and Security due to Events
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-E-14	Mitigation of Destabilizing Effects
E-P-07	Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
E-E-10	Effects of Sanctions (Economic)
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-M-10	Military and Naval Presence
E-P-10	Effects on Host Nation by Forward Bases
E-M-02	Effects of Multi-National Exercises on Military
A-I-15	Information Operations
E-M-03	Effects on Military due to Operations
Child of:	
A-D-01	Support to the Ambassador
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
Peer of:	
A-E-20	Spending to Support Rule of Law
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
A-D-18	Destabilization Operations
A-L-07	Enforcement of International Resolutions

A-I Information Actions

A-I-01 Intelligence Operations on Host Nation Conditions

The DIME/PMESII model suite will represent Intelligence Operations on Host Nation Conditions and associated effects across the PMESII elements. The requirement includes the gathering and analysis of information relevant to HN conditions (infrastructure, internal security, politics, social, health, etc) and resulting decisions based on the intelligence. Economic intelligence actions are covered in A-E-7.

Areas:	D-I-PEN Phases: 0, IV, V
Missions:	CM, FID, HA/DR, BPC, CMO, DS
Nouns:	infrastructure, internal security, politics, HN society, HN
	government, facilities, information
Verbs:	gather, analysis
Parent of:	
A-E-03	Building and Securing Host Nation Essential Services
A-E-05	Economic Information Operations
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-I-01	Effects of Information Gathering on Host Nation Government
	Actions
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
A-E-14	Mitigation of Destabilizing Effects
A-E-16	Stability Operations (Economic)
Child of:	• • •
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-E-11	Effects of Industrialization on Host Nation
Peer of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-1-06	Improvement of Host Nation Government Communication Networks
A-E-17	Improvement of Ministry of Interior
E-N-01	Effects of Changes in Essential Public Services on Host Nation

E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-14	Needs Assessments Supporting Decision-Making
E-E-12	Effects of Trade Agreements on Economy
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

A-I-02 Intelligence Operations on Host Nation Government

The DIME/PMESII model suite will represent Intelligence Operations on Host Nation Government and associated effects across the PMESII elements. The requirement includes the gathering of information relevant to HN governmental operations and effectiveness.

Areas:	D-I- Phases: 0, IV, V
Missions:	CM, FID, HA/DR, NEO
Nouns:	HN government
Verbs:	gather, analysis, influence, conduct, exploit
Parent of:	
A-E-05	Economic Information Operations
A-I-06	Improvement of Host Nation Government Communication
	Networks
E-I-01	Effects of Information Gathering on Host Nation Government Actions
E-I-03	Effects of Information Dissemination on Host Nation Government
E-P-03	Changes in Government Structure or Functions
E-P-06	Effects of Changes to Government Leadership
A-I-13	Host Nation Internal Dissemination of Information
Child of:	
A-D-01	Support to the Ambassador
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-I-10	Intelligence Collection to Support Host Nation
A-I-14	Needs Assessments Supporting Decision-Making
Peer of:	
A-L-08	Counter-Corruption Activities
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies

A-I-03 Collection of Host Nation Citizen Perceptions

The DIME/PMESII model suite will represent Collection of Host Nation Citizen Perceptions and associated effects across the PMESII elements. The requirement includes intelligence collection and polling of citizen perceptions of HN governmental effectiveness and the impact this intelligence has on decision making as well as resulting effects of these collection activities on popular perceptions, attitudes, and actions.

annacs, ana a		
Areas:	D-I-PSI Phases:	0, IV, V
Missions:	CM, COIN, FID, HA/DR	
Nouns:	HN populace, HN citizens	
Verbs:	Intel collection, polling, percepti	on
Parent of:		
A-I-03	Collection of Host Nation Citizer	n Perceptions
E-I-03	Effects of Information Dissemina	ation on Host Nation Government
E-I-04	Effects of Information Dissemina	ation on Host Nation Citizens
Child of:		
A-I-12	Intelligence, Surveillance, Recor	naissance for Embassy
A-I-03	Collection of Host Nation Citizer	n Perceptions
A-E-14	Mitigation of Destabilizing Effect	cts
A-D-18	Destabilization Operations	
A-E-16	Stability Operations (Economic)	
O-D-04	Perception of Environment, Acti	ons, and Events
Peer of:	-	
A-E-04	Repatriation / Relocation Efforts	
E-I-02	Effects of Information Gathering	on Host Nation Citizens
E-I-01	Effects of Information Gatheri	ng on Host Nation Government
	Actions	
A-I-08	Changing Influence/Exposure of	Societal Leaders
A-I-09	Changing/Shaping Message/Posi	tion of Societal Leaders
E-I-05	Effects of Independent Media Ou	utlets on Perceptions and Attitudes
A-L-08	Counter-Corruption Activities	
A-E-21	Spending for / Development of	Other Host Nation Ministries and
	Agencies	

A-I-04 Information Dissemination

The DIME/PMESII model suite will represent Information Dissemination and associated effects across the PMESII elements. The requirement includes dissemination and consumption of information on any pertinent topic (infrastructure, economic, social, political, etc.) and the resulting effects such information has the audience's perceptions and actions. The coverage, accuracy, and timeliness of the message must be considered in the calculation of final impact.

Areas:	D-I-PSI	Phases:	0, I, II, III, IV, V	
Missions:	DS			
Nouns:	HN government,	HN citizens, in	nformation Verbs:	consumption
	and disseminatio	n, deliver, perc	eption	

Establishment & Support of Information Exchange Program
Improvement of Host Nation Intelligence, Use of Intelligence, and
IO Capabilities
Support to the Ambassador
Intelligence, Surveillance, Reconnaissance for Embassy
Negotiations with Host Nation Government
Embassy Communications
Improvements to Host Nation Diplomatic Capabilities
Diplomatic Actions to Prepare for Stability Operations
Negotiating Refugee Safe Havens
Information Operations
Economic Information Operations
Mitigation of Long-term WMD Effects
Establishment & Support of Information Exchange Program
Effects of Information Dissemination on Host Nation Government
Effects of Information Dissemination on Host Nation Citizens
Host Nation Internal Dissemination of Information
Effects of Independent Media Outlets on Perceptions and Attitudes
Counter-Corruption Activities

A-I-05 Collection and Use of Refugee Information

The DIME/PMESII model suite will represent Collection and Use of Refugee Information and associated effects across the PMESII elements. The requirement includes collection of refugee information relevant to NEO and HA/DR operations and the use of information to support decision-making. The dissemination of information to alleviate displaced persons anxiety must also be included.

v	
Areas:	D-I-ESI Phases: 0, IV, V
Missions:	CM, HA/DR, NEO, DS, SI
Nouns:	refugees, information, HN Verbs:collect, provide, disseminate
Parent of:	
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-09	Negotiating Refugee Safe Havens
A-E-12	Humanitarian Assistance/Disaster Relief Operations
Peer of:	
A-E-04	Repatriation / Relocation Efforts
E-I-02	Effects of Information Gathering on Host Nation Citizens

E-I-01	Effects of Information Gathering on Host Nation Government
	Actions
A-I-10	Intelligence Collection to Support Host Nation
A-I-13	Host Nation Internal Dissemination of Information

A-I-06 Improvement of Host Nation Government Communication Networks

The DIME/PMESII model suite will represent Improvement of Host Nation Government Communication Networks and associated effects across the PMESII elements. The requirement includes improvement of government and emergency communication networks to support HN governmental operations. The effects must include gained capabilities and efficiencies of HN government operations, especially in emergencies, and the population response and perception to the enhance systems.

Areas:	D-IE-I Phases: 0, V
Missions:	CM, FID, HA/DR, NEO, SIB/R, BPC, DS, EA
Nouns:	HN government, Communication Networks, HN government
	Verbs: enhance, secure, provide
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
Child of:	
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-05	Improvements to Host Nation Diplomatic Capabilities
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-I-02	Intelligence Operations on Host Nation Government
A-E-17	Improvement of Ministry of Interior
A-I-14	Needs Assessments Supporting Decision-Making
A-I-16	Training of Host Nation Government Personnel
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies
Peer of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government Personnel
A-D-04	Embassy Communications
A-I-01	Intelligence Operations on Host Nation Conditions
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-13	Host Nation Internal Dissemination of Information
A-M-11	War and Military Invasion

A-I-07 Establishment & Support of Information Exchange Program

The DIME/PMESII model suite will represent Establishment & Support of Information Exchange Program and associated effects across the PMESII elements. The requirement includes the establishment of exchange / liaison programs with the HN government (or other actors). The effects must include how the program impacts diplomatic, economic, political, and social relations with outside parties. Information exchanges may be in a variety of areas (social, economic, military, intelligence, etc).

Areas:	D-I-PMESI Phases: 0, I, V
Missions:	CM, FID, HA/DR, SIB/R, DS, SI
Nouns:	HN government, HN personnel, HN populace, HN facilities, HN
	media, military, international community
Verbs: estab	lish, perception, identify, fill, information exchange Child of:
A-D-01	Support to the Ambassador
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-02	Negotiations with Host Nation Government
A-D-04	Embassy Communications
A-D-05	Improvements to Host Nation Diplomatic Capabilities
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
A-I-04	Information Dissemination
E-P-10	Effects on Host Nation by Forward Bases
Peer of:	
A-I-04	Information Dissemination
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
A-M-04	Military Training
A-M-06	Military Exercises
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors

A-I-08 Changing Influence/Exposure of Societal Leaders

The DIME/PMESII model suite will represent Changing Influence/Exposure of Societal Leaders and associated effects across the PMESII elements. The requirement includes all actions taken to either increase or decrease the influence societal leaders have on the population, HN government, business sectors, or other important groups/entities. Societal leaders include leaders, policy makers, agenda setters, and pundits with influence from religious, social, union, political, governmental, and economic groups. How the population's perceptions of the

as the population's response to these changes in influence.	
D-DI-PSI Phases: 0, IV, V	
SI	
leaders, policy makers, pundits, HN government, HN Populace	
Verbs: influence, change. Perceive	
Changes in Population Loyalty to Host Nation Government	
Changes in Political Involvement of Host Nation Citizens	
Changes in Perception of Government/Authority Legitimacy	
Quality of Life Perception	
Effects of Societal Leaders	
Deterrence of Foreign/Proxy Attackers on Host Nation	
Diplomatic Actions to Prepare for Stability Operations	
Impact to Stability and Security due to Events	
Destabilizing Effects	
Establishing Relations In Absence of State	
Destabilization Operations	
Information Operations	
Collection of Host Nation Citizen Perceptions	
Effects of Factional Group Activities	
Effects of External Group Involvement in Host Nation Politics	
Effects of Changes to Government Leadership	
Mitigation of Destabilizing Effects	
Intelligence Collection to Support Host Nation	
Changing/Shaping Message/Position of Societal Leaders	
Improvement of Host Nation Intelligence, Use of Intelligence, and	
IO Capabilities	
Advocacy Actions by US Government	
Effects of Independent Media Outlets on Perceptions and Attitudes	
Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,	
& Riots	
Spending for / Development of Other Host Nation Ministries and	
Agencies	

leader, the HN government, and those impacting the leader's influence must be included as well as the population's response to these changes in influence.

A-I-09 Changing/Shaping Message/Position of Societal Leaders

The DIME/PMESII model suite will represent Changing/Shaping Message/Position of Societal Leaders and associated effects across the PMESII elements. The requirement includes all methods of shaping the leader's message or position including compromise, cooperation, quid pro quo, payoff, and coercion. The changes in the public's perceptions of the message and the resulting impacts must be modeled as well as the public's opinion of the "shaped" leader, HN

government, and the apparent/assumed shaper of the leader.

Areas:	D-DI-PSI Phases: 0, IV, V
Missions:	SI
Nouns:	leader, HN government, HN populace
Verbs:	compromise, cooperation, coercion, perception
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-02	Quality of Life Perception
E-S-04	Effects of Societal Leaders
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
E-S-05	Impact to Stability and Security due to Events
E-P-07	Destabilizing Effects
A-D-16	Establishing Relations In Absence of State
A-D-18	Destabilization Operations
A-M-10	Military and Naval Presence
A-I-15	Information Operations
Peer of:	
A-I-03	Collection of Host Nation Citizen Perceptions
E-P-12	Effects of Factional Group Activities
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-06	Effects of Changes to Government Leadership
A-E-14	Mitigation of Destabilizing Effects
A-I-08	Changing Influence/Exposure of Societal Leaders
A-D-19	Deterrence
A-E-16	Stability Operations (Economic)
A-D-20	Advocacy Actions by US Government
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies

A-I-10 Intelligence Collection to Support Host Nation

The DIME/PMESII model suite will represent Intelligence Collection to Support Host Nation and associated effects across the PMESII elements. The requirement includes all aspect of intelligence collection and analysis at the request of the HN government as well as the information sharing with relevant HN agencies. Collection activities could focus on infrastructure, social, military, political, security, law enforcement, and diplomatic among others. Request may include assets that HN otherwise has no access to (satellites, aircraft, analysis experts).

Areas:D-DI-PMSIPhases:0, VMissions:TSC, DS

Nouns:	HN government, infrastructure, military, law enforcement,
	satellites, aircraft, analysis experts
Verbs:	Intel collection, analysis, information sharing
Parent of:	
A-E-03	Building and Securing Host Nation Essential Services
A-E-04	Repatriation / Relocation Efforts
A-E-05	Economic Information Operations
A-I-02	Intelligence Operations on Host Nation Government
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
Child of:	-
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief
A-D-02	Negotiations with Host Nation Government
A-D-05	Improvements to Host Nation Diplomatic Capabilities
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
E-S-06	Epidemic Breakout
A-D-16	Establishing Relations In Absence of State
A-D-21	Security and Law Enforcement for US
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-L-07	Enforcement of International Resolutions
A-M-11	War and Military Invasion
O-D-04	Perception of Environment, Actions, and Events
A-I-15	Information Operations
Peer of:	
A-I-05	Collection and Use of Refugee Information
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-14	Mitigation of Destabilizing Effects
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-13	Host Nation Internal Dissemination of Information
A-I-14	Needs Assessments Supporting Decision-Making
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies

A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities

The DIME/PMESII model suite will represent Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities and associated effects across the PMESII elements. This requirement includes training in collection, analysis, and
development of	the message and communication capabilities/facilities.
Areas:	D-DIM-PI Phases: 0, I, V
Missions:	BPC, DS
Nouns:	HN government; organizational structure and process;
	communication capabilities/facilities
Verbs:	training, analysis, security, develop
Parent of:	
A-E-05	Economic Information Operations
E-P-01	Changes in Population Loyalty to Host Nation Government
A-I-13	Host Nation Internal Dissemination of Information
E-M-02	Effects of Multi-National Exercises on Military
E-M-03	Effects on Military due to Operations
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-20	Spending to Support Rule of Law
A-I-04	Information Dissemination
E-S-06	Epidemic Breakout
A-E-14	Mitigation of Destabilizing Effects
A-D-16	Establishing Relations In Absence of State
A-L-06	Martial Law and Law Enforcement Operations
A-I-16	Training of Host Nation Government Personnel
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies
Peer of:	C C C C C C C C C C C C C C C C C C C
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-04	Embassy Communications
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-06	Improvement of Host Nation Government Communication
	Networks
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
A-M-08	Improvement of Ministry of Defense
A-E-17	Improvement of Ministry of Interior
E-I-02	Effects of Information Gathering on Host Nation Citizens
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-10	Intelligence Collection to Support Host Nation
A-I-14	Needs Assessments Supporting Decision-Making
A-I-15	Information Operations

security; support for development of organizational structure and processes; and development of the message and communication capabilities/facilities.

A-I-12 Intelligence, Surveillance, Reconnaissance for Embassy

The DIME/PMESII model suite will represent Intelligence, Surveillance, Reconnaissance for Embassy and associated effects across the PMESII elements. The requirement includes actions associated with the preparation of ISR reports for the Embassy staff and indicates the effect those actions have on diplomatic efforts and on diplomatic relations with the HN. Includes internal distribution and decision-making associated with ISR data.

D-DI-PMI Phases: 0, I, II, IV
CM, COIN, FID, HA/DR, NEO, SIB/R, DS
embassy staff, ambassador, intelligence, reconnaissance
surveillance, interpret, gather, collect, report
Intelligence Operations on Host Nation Conditions
Intelligence Operations on Host Nation Government
Collection of Host Nation Citizen Perceptions
Information Dissemination
Establishment & Support of Information Exchange Program
Effects of Information Gathering on Host Nation Citizens
Effects of Information Gathering on Host Nation Government
Actions
Decision-making in Hierarchical Organizations
Support to the Ambassador
Embassy Communications

A-I-13 Host Nation Internal Dissemination of Information

The DIME/PMESII model suite will represent Host Nation Internal Dissemination of Information and associated effects across the PMESII elements. This requirement includes internal movement of intelligences/information/info and must take into account any internal communication barriers (bureaucracy, in-fighting, stovepipes, divergent leadership interests/agendas).

0	1 0 /		
Areas:	D-I-PI	Phases:	0, I, II, III, IV, V
Missions:			
Nouns:	HN, information, intel	ligence, int	ternal comms barriers
Verbs: mover	nent, deliver, Child of:	:	
A-D-14	Diplomatic Actions for	r Multi-Na	tional Exercises
A-D-02	Negotiations with Hos	t Nation G	overnment
A-E-20	Spending to Support R	ule of Law	1
A-I-02	Intelligence Operation	s on Host N	Nation Government
A-E-12	Humanitarian Assistan	ce/Disaste	r Relief Operations
A-I-11	Improvement of Host	Nation Inte	elligence, Use of Intelligence, and
	IO Capabilities		
A-I-14	Needs Assessments Su	pporting D	Decision-Making
Peer of:			
A-I-04	Information Dissemina	ation	

A-I-05 Collection and Use of Refugee	Information
--------------------------------------	-------------

- A-I-06 Improvement of Host Nation Government Communication Networks
- A-I-10 Intelligence Collection to Support Host Nation
- A-I-15 Information Operations

A-I-14 Needs Assessments Supporting Decision-Making

The DIME/PMESII model suite will represent Needs Assessments Supporting Decision-Making and associated effects across the PMESII elements. This requirements includes analysis of intelligence data and the situation to determine which sequence of possible actions are beneficial in advancing the actor's agenda. The needs assessment must consider the political, military, social, and infrastructural environment and the range of possible DIMEL actions all weighed against the anticipated impacts. One objective of the needs assessment is to avoid wasted efforts (e.g. avoid development of infrastructure without supporting skilled labor) and unintended consequence (e.g. market destabilization due to economic aid). The model must account for the use and allocation of limited information and decision-making resources as it relates to their impact of other concurrent actions, the quality of the actor's decision, and the actor's overall timeline.

Areas:	D-DIMEL-PMESN Phases: 0, I, II, III, IV, V
Missions:	CW, UW, CM, COIN, FID, HA/DR, NEO, SIB/R, SSTR, CT, DS,
	EA
Nouns:	needs, information, analysis
Verbs:	assess, analyze, process, support
Parent of:	
A-E-05	Economic Information Operations
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-02	Intelligence Operations on Host Nation Government
A-I-06	Improvement of Host Nation Government Communication
	Networks
A-M-05	Actions Supporting Host Nation Counter-Insurgency
A-D-18	Destabilization Operations
A-L-05	Operations Against Criminal Syndicates
A-I-13	Host Nation Internal Dissemination of Information
A-E-09	Activities to Improve Infrastructure
Child of:	-
A-D-16	Establishing Relations In Absence of State
E-S-07	Migration
A-I-16	Training of Host Nation Government Personnel
Peer of:	
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-I-01	Intelligence Operations on Host Nation Conditions
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack

- E-P-06 Effects of Changes to Government Leadership
- A-I-10 Intelligence Collection to Support Host Nation
- A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities

A-I-15 Information Operations

The DIME/PMESII model suite will represent Information Operations and associated effects across the PMESII elements. This requirement includes general information operations, not associated with military-on-military applications, which can be taken by any actor. This includes propaganda, disinformation campaign, education/re-education efforts (including internment camps and other standard education methods), psychological operations, and deception. Development, vetting, production, and dissemination of the messages must all be captured in the model representation.

Areas:	Phases:
Missions:	
Nouns:	propaganda, disinformation, psychological operations
Verbs:	deception, develop, produce dissemination
Parent of:	
A-I-04	Information Dissemination
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-02	Quality of Life Perception
E-S-04	Effects of Societal Leaders
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-10	Intelligence Collection to Support Host Nation
A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-S-09	Effects of Discrimination in Host Nation
Child of:	
O-E-03	Actions in Preparation for Anticipated and Scheduled Events
A-E-14	Mitigation of Destabilizing Effects
A-D-17	Multi-party Diplomatic Negotiations
A-D-18	Destabilization Operations
A-L-05	Operations Against Criminal Syndicates
A-D-21	Security and Law Enforcement for US
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
Peer of:	
E-I-02	Effects of Information Gathering on Host Nation Citizens
E-P-07	Destabilizing Effects
A-D-19	Deterrence
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
A-I-13	Host Nation Internal Dissemination of Information

A-M-11	War and Military Invasion
E-P-11	Effects of Third-Party External Diplomatic Actions

A-I-16 Training of Host Nation Government Personnel

The DIME/PMESII model suite will represent Training of Host Nation Government Personnel and associated effects across the PMESII elements. This requirement includes training of the Host Nation's first responders, police forces, court personnel, oversight agents, security forces, customs agents, and bureacrats. Events must cover prepartory training for counter-WMD, WMD consequence management, emergency response, command and control, and inter-agency cooperation. The training of military personnel for combat and traditional military actions is covered elsewhere.

Areas:	-DIEL-PES Phases: 0, IV, V		
Missions:	SIB/R, SSTR, BPC, DS, EA, LE, SI		
Nouns:	HN government, HN populace, facilities, funding/dollars, training		
Verbs:	train, respond, perception, conduct, deploy, information dissemination		
Parent of:			
A-I-06	Improvement of Host Nation Government Communication		
	Networks		
A-L-05	Operations Against Criminal Syndicates		
A-L-06	Martial Law and Law Enforcement Operations		
E-E-06	Effects of Human Resources Training on Economy		
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and		
	IO Capabilities		
A-I-14	Needs Assessments Supporting Decision-Making		
Child of:			
A-D-11	Diplomatic Action to Support Training Host Nation Government		
	Personnel		
A-E-17	Improvement of Ministry of Interior		
A-L-09	Improvement of Legal and Law Enforcement Ministries		
Peer of:	-		
A-L-08	Counter-Corruption Activities		

A-M Military Actions

A-M-01 Response to WMD Attack

The DIME/PMESII model suite will represent Response to WMD Attack and associated effects across the PMESII elements. The requirement includes all actions associated with responding to a chemical, biological, radiological, or nuclear attack and the mitigating effects those actions have. These efforts end once the attacked region is declared "safe."

Areas: -DM-PMSI Phases: II, III, IV

Missions:	CM, BPC, CMO		
Nouns:	HN government, HN populace, military forces, international		
	community, civilians, personnel, HN media		
Verbs:	respond, mitigate, decontaminate protect		
Parent of:			
A-D-09	Negotiating Refugee Safe Havens		
A-E-01	Establishing Distribution Centers for Humanitarian		
	Assistance/Disaster Relief		
A-E-04	Repatriation / Relocation Efforts		
A-E-06	Mitigation of Long-term WMD Effects		
E-E-07	Effects of Combat Operations on the Economy		
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and		
	Services		
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation		
E-S-02	Ouality of Life Perception		
E-S-05	Impact to Stability and Security due to Events		
A-E-12	Humanitarian Assistance/Disaster Relief Operations		
A-E-14	Mitigation of Destabilizing Effects		
E-P-07	Destabilizing Effects		
E-E-13	Effects of Changes in Host Nation Infrastructure		
A-D-19	Deterrence		
A-E-15	Economic Development Supporting Disaster Recovery		
A-E-16	Stability Operations (Economic)		
E-S-07	Migration		
A-L-06	Martial Law and Law Enforcement Operations		
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding		
	Host Nation		
E-N-03	Changes in Host Nation Environment		
E-P-11	Effects of Third-Party External Diplomatic Actions		
Child of:			
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster		
	Relief		
A-D-11	Diplomatic Action to Support Training Host Nation Government		
	Personnel		
A-D-13	Diplomatic Preparation for WMD Consequence Management		
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country		
	Nationals		
A-I-01	Intelligence Operations on Host Nation Conditions		
Peer of:			
A-I-14	Needs Assessments Supporting Decision-Making		
A-M-11	War and Military Invasion		

A-M-02 Response to Conventional Attack

The DIME/PMESII model suite will represent Response to Conventional Attack and associated effects across the PMESII elements. The requirement includes all actions

associated with responding to any conventional attack and the mitigating effects those actions have. Actions must include securing the area and other potential targets; supporting first responders; increasing alert and mobilization status of forces; and supporting forensics of the attack. These efforts end once the attacked region is declared "safe." Follow-on counter attacks are not included.

region is acciui	eu suje. I onow on counter unacks are not included.		
Areas:	-M-PMSI Phases: II, III, IV		
Missions:	COIN, FID, NEO, TSC, CMO		
Nouns:	potential targets, 1st responders, forces Verbs: respond,		
	mitigate, protect		
Parent of:			
A-D-09	Negotiating Refugee Safe Havens		
A-E-01	Establishing Distribution Centers for Humanitarian		
	Assistance/Disaster Relief		
E-E-07	Effects of Combat Operations on the Economy		
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services		
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation		
E-S-02	Quality of Life Perception		
E-S-05	Impact to Stability and Security due to Events		
A-E-12	Humanitarian Assistance/Disaster Relief Operations		
A-E-14	Mitigation of Destabilizing Effects		
E-P-07	Destabilizing Effects		
E-E-13	Effects of Changes in Host Nation Infrastructure		
A-D-19	Deterrence		
A-E-15	Economic Development Supporting Disaster Recovery		
A-E-16	Stability Operations (Economic)		
E-S-07	Migration		
A-L-06	Martial Law and Law Enforcement Operations		
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding		
	Host Nation		
E-N-03	Changes in Host Nation Environment		
E-P-11	Effects of Third-Party External Diplomatic Actions		
Child of:			
A-D-11	Diplomatic Action to Support Training Host Nation Government Personnel		
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country Nationals		
A-I-01	Intelligence Operations on Host Nation Conditions		
Peer of:			
A-I-14	Needs Assessments Supporting Decision-Making		
A-M-11	War and Military Invasion		

A-M-03 Foreign Non-Combatant Evacuation Operations

The DIME/PMESII model suite will represent Foreign Non-Combatant Evacuation Operations and associated effects across the PMESII elements. The requirement includes military actions taken to evacuate non-combatants from a war zone and indicates the effects those actions have on diplomatic relations with the countries at war, the countries whose citizens were evacuated, and other

Areas:	-M-PES Phases: 0, V
Missions:	NEO, CMO, DS
Nouns:	non-combatants, citizens, military forces Verbs: evacuate, secure, protect
Parent of:	
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief
A-D-09	Negotiating Refugee Safe Havens
Peer of:	
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country Nationals

A-M-04 Military Training

The DIME/PMESII model suite will represent Military Training and associated effects across the PMESII elements. This requirement includes military actions associated with providing HN military training support and the resulting HN military effectiveness.

Areas:	-M-PMN Phases: I, IV, V
Missions:	CM, FID, SIB/R, BPC, TSC, SI
Nouns:	military forces, HN military forces, capabilities
Verbs:	train, conduct
Parent of:	
A-E-10	Economic Actions Supporting Joint Military Exercises
E-E-07	Effects of Combat Operations on the Economy
E-M-03	Effects on Military due to Operations
A-L-09	Improvement of Legal and Law Enforcement Ministries
Child of:	
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-M-08	Improvement of Ministry of Defense
A-M-05	Actions Supporting Host Nation Counter-Insurgency
Peer of:	
A-I-07	Establishment & Support of Information Exchange Program
A-M-06	Military Exercises
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military

A-M-09 Deterrence of Foreign/Proxy Attackers	on Host Nation
--	----------------

- A-D-19 Deterrence
- E-M-02 Effects of Multi-National Exercises on Military

A-M-05 Actions Supporting Host Nation Counter-Insurgency

The DIME/PMESII model suite will represent Actions Supporting Host Nation Counter-Insurgency and associated effects across the PMESII elements. The requirement includes all actions associated with providing HN COIN support including military actions and joint operations; training and equipping; coordination of activities; providing intelligence and communications; interdiction, law enforcement, and security operations; and information operations. Actions also include mediation with insurgent leaders in support of negotiations up until organized insurgency has ceased. Actions can be directed to a variety of HN organizations including law enforcement, military, and MoI.

Areas:	-M-PMESI Phases: 0, IV, V
Missions:	COIN, FID, BPC, TSC, SI
Nouns:	COIN, raids, patrols, insurgents, HN government, HN civilians, international community, HN populace, HN Verbs: conduct, military actions, attack
Parent of:	
A-M-04	Military Training
A-M-06	Military Exercises
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-03	Effects of Restriction on Population Movement
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
E-S-07	Migration
Child of:	
A-D-01	Support to the Ambassador
A-D-06	Diplomatic Actions to Prepare for Stability Operations
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
A-I-14	Needs Assessments Supporting Decision-Making
A-L-09	Improvement of Legal and Law Enforcement Ministries
Peer of:	
A-E-02	Building and Securing Lines of Communication
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-E-14	Mitigation of Destabilizing Effects
E-P-07	Destabilizing Effects
A-D-21	Security and Law Enforcement for US
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation

A-M-06 Military Exercises

The DIME/PMESII model suite will represent Military Exercises and associated effects across the PMESII elements. This requirement includes multi-nation and joint military exercises and the effectiveness of those actions relevant to HN military effectiveness and HN international status.

Δreas.	-M-PMS Phases: 0 I V
Missions:	CM FID NEO SIB/R BPC TSC SI
Nouns:	multingtion everyises
Norha:	anduat train
Velus.	conduct, train
	Essential Astista Commenting Lind Military Essential
A-E-10	Economic Actions Supporting Joint Military Exercises
E-E-07	Effects of Combat Operations on the Economy
E-M-03	Effects on Military due to Operations
Child of:	
A-D-01	Support to the Ambassador
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-M-08	Improvement of Ministry of Defense
A-M-05	Actions Supporting Host Nation Counter-Insurgency
Peer of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-I-07	Establishment & Support of Information Exchange Program
A-M-04	Military Training
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-D-19	Deterrence
E-M-02	Effects of Multi-National Exercises on Military

A-M-07 Logistics

The DIME/PMESII model suite will represent Logistics and associated effects across the PMESII elements. The requirement includes military actions associated with providing logistical support and the effectiveness of those actions as measured across the PMESII elements relevant to lines of communication and distribution systems.

Areas:	-M-MESN	Phases:	II, III, IV,	V
Missions:	COIN, FID, HA/	DR, NEO		
Nouns:	HN military, HN supplies, HN esse	citizens, HN g ential services	overnment, Verbs:	military community, acquire, transport,
	distribute, store, move, perception			

Parent of:

E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-S-02	Quality of Life Perception
E-S-03	Effects of Restriction on Population Movement
E-E-13	Effects of Changes in Host Nation Infrastructure
Child of:	
A-D-01	Support to the Ambassador
A-D-09	Negotiating Refugee Safe Havens
A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
A-E-13	Establishing and Maintaining Refugee Camps
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-M-08	Improvement of Ministry of Defense
E-P-07	Destabilizing Effects
A-M-10	Military and Naval Presence
A-M-11	War and Military Invasion
Peer of:	
A-E-02	Building and Securing Lines of Communication
A-E-08	Establishing and Maintaining Logistical Support for Host Nation

A-M-08 Improvement of Ministry of Defense

The DIME/PMESII model suite will represent Improvement of Ministry of Defense and associated effects across the PMESII elements. The requirement includes all actions associated with improving the HN Ministry of Defense and the effectiveness of those actions relevant to HN military effectiveness and HN regional and global impact. This includes the establishment of the MoD bureaucracy and supporting legal framework; funding, recruiting, training, equipping, and maintaining the armed forces; command and control of forces; contracting, oversight, intergovernmental liaison, and other associated functions.

Areas:	-IME-PMESIN Phases: 0, I, IV, V
Missions:	FID, SIB/R, BPC
Nouns:	MOD, regional and national states
Verbs:	provide, support, develop
Parent of:	
A-M-07	Logistics
A-M-04	Military Training
A-M-06	Military Exercises
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-D-19	Deterrence
Child of:	
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-19	Spending in Support of Host Nation Ministry of Defense
Peer of:	

E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
E-M-02	Effects of Multi-National Exercises on Military
E-M-03	Effects on Military due to Operations

A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation

The DIME/PMESII model suite will represent Deterrence of Foreign/Proxy Attackers on Host Nation and associated effects across the PMESII elements. The requirement includes all DIME actions that induce foreign attackers to refrain from military action (when agents have been mobilized) or de-escalate their levels of mobilization. It should also identify the points at which DIME actions fail to deter or probably cause an escalation of hostilities. Enforcement of international laws, agreements, rulings, and resolutions is included.

Areas:	-DIML-PI Phases: 0, I, IV, V
Missions:	COIN, FID, TSC, LE, SI
Nouns:	HN military, military forces, foreign attackers
Verbs:	enforce
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-M-03	Effects on Military due to Operations
Child of:	
A-E-19	Spending in Support of Host Nation Ministry of Defense
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
E-P-06	Effects of Changes to Government Leadership
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-D-21	Security and Law Enforcement for US
E-S-09	Effects of Discrimination in Host Nation
A-L-07	Enforcement of International Resolutions
A-M-10	Military and Naval Presence
E-P-10	Effects on Host Nation by Forward Bases
E-M-02	Effects of Multi-National Exercises on Military
A-I-15	Information Operations
Peer of:	
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors

Identification, Disruption, and Interdiction of Local Support for
Destabilizing Actors
Actions Supporting Host Nation Counter-Insurgency
Military Training
Military Exercises
Diplomatic Actions for Multi-National Exercises
Identification, Disruption, and Interdiction of Recruitment for
Destabilizing Actors
Mitigation of Destabilizing Effects
Destabilizing Effects

A-M-10 Military and Naval Presence

The DIME/PMESII model suite will represent Military and Naval Presence and associated effects across the PMESII elements. This requirement includes the associated impacts on smuggling, bunkering, and piracy as well as the full range of secondary consequences including law enforcement activities, the economy, the political situation of the HN, regional security, and the social perceptions of the HN and the military / naval presence. This requirement also includes the presences of maritime law enforcement entities as well as amphibious assault forces. Note that the military or naval presence could be associated with any actor including the host nation, rogue actors, insurgents, or proxy actors.

Areas:	-DML-PMES Phases: 0, I, IV, V
Missions:	CW, BPC, TSC, DS, SI
Nouns:	military, HN military, law enforcement, regional security, HN
	population, presence
Verbs:	smuggling, piracy, perception, support, attitudes, respond, deter
Parent of:	
E-E-07	Effects of Combat Operations on the Economy
A-M-07	Logistics
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-E-14	Mitigation of Destabilizing Effects
A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
E-P-10	Effects on Host Nation by Forward Bases
A-M-11	War and Military Invasion
A-E-09	Activities to Improve Infrastructure
Child of:	
E-S-05	Impact to Stability and Security due to Events
O-E-04	Weather Impacts to Decision-making and Military Operations

E-P-07	Destabilizing Effects
A-D-17	Multi-party Diplomatic Negotiations
A-D-18	Destabilization Operations
A-D-21	Security and Law Enforcement for US
A-L-07	Enforcement of International Resolutions
Peer of:	
E-P-04	Effects of External Group Involvement in Host Nation Politics
A-D-19	Deterrence
E-M-02	Effects of Multi-National Exercises on Military
E-M-03	Effects on Military due to Operations

A-M-11 War and Military Invasion

The DIME/PMESII model suite will represent War and Military Invasion and associated effects across the PMESII elements. This requirement includes all forms of high-intensity conventional conflict between nation states which require treaties, armistices, or cease fires to resolve. Actions between militaries and insurgents or other proxies are not included here.

1	
Areas:	-M-PMESIN Phases: II, III
Missions:	CW, UW, CM
Nouns:	nation states, military, border
Verbs:	attack, invade, defend
Parent of:	
A-E-04	Repatriation / Relocation Efforts
E-E-07	Effects of Combat Operations on the Economy
A-M-07	Logistics
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
E-S-03	Effects of Restriction on Population Movement
E-S-05	Impact to Stability and Security due to Events
E-E-13	Effects of Changes in Host Nation Infrastructure
A-D-16	Establishing Relations In Absence of State
A-I-10	Intelligence Collection to Support Host Nation
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
E-N-03	Changes in Host Nation Environment
Child of:	
O-E-04	Weather Impacts to Decision-making and Military Operations
A-D-19	Deterrence
A-L-07	Enforcement of International Resolutions
A-M-10	Military and Naval Presence
E-P-10	Effects on Host Nation by Forward Bases

Effects of Multi-National Exercises on Military
Effects on Military due to Operations
Improvement of Host Nation Government Communication
Networks
Response to WMD Attack
Response to Conventional Attack
Effects of Changes to Government Leadership
Multi-party Diplomatic Negotiations
Destabilization Operations
Information Operations
Effects of Third-Party External Diplomatic Actions

A-E Economic Actions

A-E-01 Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief

The DIME/PMESII model suite will represent Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief and associated effects across the PMESII elements. The requirement includes actions associated with HA/DR tasks of gathering supplies, creating distribution centers, and dispensing those supplies. Should indicate the effects those actions have on the HN economy and other PMESII elements.

Areas:	-E-E Phases: 0, IV, V
Missions:	CM, HA/DR, DS, EA, SI
Nouns:	supplies, distribution centers, goods, consumption, markets
Verbs:	inventory, distribute, operate, monitor
Parent of:	
A-E-11	Hiring of Host Country Nationals
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-M-07	Logistics
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-09	Negotiating Refugee Safe Havens
A-E-06	Mitigation of Long-term WMD Effects

A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
Peer of:	
A-E-13	Establishing and Maintaining Refugee Camps
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-L-08	Counter-Corruption Activities

A-E-02 Building and Securing Lines of Communication

The DIME/PMESII model suite will represent Building and Securing Lines of Communication and associated effects across the PMESII elements. The requirement includes actions associated with HA and FID tasks of building, repairing, restoring, and securing HN LoCs (land, air, sea) as related customs enforcement. The effects these actions and resulting capabilities/infrastructure have on HN are also included.

Areas:	-E-ESN Phases: 0, I, V
Missions:	SIB/R, SSTR, BPC, EA, SI
Nouns:	LOCs, goods, markets
Verbs:	construct, secure, improve, repair, monitor
Parent of:	
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-S-02	Quality of Life Perception
Child of:	
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
Peer of:	
A-D-04	Embassy Communications
A-M-05	Actions Supporting Host Nation Counter-Insurgency
A-M-07	Logistics
E-S-03	Effects of Restriction on Population Movement
E-S-07	Migration
A-L-06	Martial Law and Law Enforcement Operations

A-E-03 Building and Securing Host Nation Essential Services

The DIME/PMESII model suite will represent Building and Securing Host Nation Essential Services and associated effects across the PMESII elements. The requirement includes actions associated with HA and FID tasks of repairing/restoring HN essential services and providing security for them. Essential services include water purification and distribution; trash/sewage collection, transport, and processing; power production, distribution, and control; emergency broadcast systems (TV, radio, sirens, etc); all fuel processing and distribution (oil,

coal, NG)	; and	emergency	food	and	medical	stores/facilities.	Should	indicate	the
effects the	se act	ions have on	the I	HN.					

ejjeets these de					
Areas:	-E-PESN Phases: 0, IV, V				
Missions:	FID, HA/DR, SSTR, BPC, EA, SI				
Nouns:	services, sanitation, goods, markets				
Verbs:	secure, improve, repair, construct.				
Parent of:					
E-E-01	Changes in the Domestic Production by Economic Sector and				
	Region				
E-E-03	Changes in Host Nation Wealth/Income Distributions				
E-E-04	Effects on Markets				
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and				
	Services				
E-N-01	Effects of Changes in Essential Public Services on Host Nation				
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation				
E-P-01	Changes in Population Loyalty to Host Nation Government				
E-P-05	Changes in Perception of Government/Authority Legitimacy				
E-S-02	Quality of Life Perception				
E-E-13	Effects of Changes in Host Nation Infrastructure				
Child of:					
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster				
	Relief				
A-I-01	Intelligence Operations on Host Nation Conditions				
A-E-17	Improvement of Ministry of Interior				
A-E-14	Mitigation of Destabilizing Effects				
A-I-10	Intelligence Collection to Support Host Nation				
A-E-15	Economic Development Supporting Disaster Recovery				
Peer of:					
E-P-02	Changes in Political Involvement of Host Nation Citizens				
A-E-16	Stability Operations (Economic)				
E-E-11	Effects of Industrialization on Host Nation				

A-E-04 Repatriation / Relocation Efforts

The DIME/PMESII model suite will represent Repatriation / Relocation Efforts and associated effects across the PMESII elements. The requirement includes actions associated with HA task of repatriation of HN refugee populace or relocating displaced persons including information collection, temporary housing, transportation, preparation of permanent home, and efforts to reunite families. Should include the effects of these actions on the HN including regional and national economics.

Areas:	-DME-ES	Phases:	0, IV, V
Missions:	FID, HA/DR, EA	A, SI	
Nouns:	population, refug	gee, displaced p	person
Verbs:	monitor, reunite,	assist	
Parent of:			

E-E-03	Changes in Host Nation Wealth/Income Distributions
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-S-02	Quality of Life Perception
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-09	Negotiating Refugee Safe Havens
A-M-01	Response to WMD Attack
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-I-10	Intelligence Collection to Support Host Nation
A-D-12	Diplomatic-Like Interactions Between Organizations
A-M-11	War and Military Invasion
Peer of:	
A-I-03	Collection of Host Nation Citizen Perceptions
A-I-05	Collection and Use of Refugee Information
E-I-02	Effects of Information Gathering on Host Nation Citizens
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-S-06	Epidemic Breakout
A-E-15	Economic Development Supporting Disaster Recovery
E-S-07	Migration
E-S-09	Effects of Discrimination in Host Nation
A-I-14	Needs Assessments Supporting Decision-Making

A-E-05 Economic Information Operations

The DIME/PMESII model suite will represent Economic Information Operations and associated effects across the PMESII elements. The requirement includes efforts to track short-term changes in the value of HN currency and publicize findings; dissemination of news reports about HN budget, economic policies, and contracting opportunities; efforts to improve or establish comprehensive and objective economic data bases for the HN and increase public access to them; and disseminate information about international markets for HN goods. This requirement should include the effects of these actions on the HN.

Areas:	-IE- Phases: 0, IV, V
Missions:	EA, SI
Nouns:	IO, population, information, production, goods, markets
Verbs:	conduct, inform, negotiate, operate, monitor
Parent of:	
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-S-02	Quality of Life Perception
E-N-03	Changes in Host Nation Environment
Child of:	
A-D-04	Embassy Communications
A-E-07	Economic Intelligence Operations

A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-02	Intelligence Operations on Host Nation Government
A-E-14	Mitigation of Destabilizing Effects
E-P-07	Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
E-E-10	Effects of Sanctions (Economic)
A-E-15	Economic Development Supporting Disaster Recovery
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-14	Needs Assessments Supporting Decision-Making
Peer of:	
A-E-20	Spending to Support Rule of Law
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
Peer of:	
A-I-04	Information Dissemination
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-E-13	Effects of Changes in Host Nation Infrastructure
E-S-09	Effects of Discrimination in Host Nation
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-E-11	Effects of Industrialization on Host Nation
E-E-12	Effects of Trade Agreements on Economy
A-L-08	Counter-Corruption Activities

A-E-06 Mitigation of Long-term WMD Effects

The DIME/PMESII model suite will represent Mitigation of Long-term WMD Effects and associated effects across the PMESII elements. The requirement includes actions taken to mitigate the long-term negative effects of Consequence Management operations after WMD attacks on HN or responses to other types of disasters. For example, after first responders work long hours during an emergency, they request compensatory leave and overtime pay, causing labor shortages and shortfalls in local government budgets. Should indicate the effects of mitigation on the HN.

Areas:	-EL-PES	Phases:	0, V
Missions:	CM, CMO, EA		
Nouns:	CM-CBRN, proc	luctions, good	consumption, market, sanctions
Verbs:	mitigate, restore,	repair, operate	, monitor
Parent of:			

A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-E-14	Mitigation of Destabilizing Effects
E-E-13	Effects of Changes in Host Nation Infrastructure
A-E-15	Economic Development Supporting Disaster Recovery
E-E-11	Effects of Industrialization on Host Nation
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-09	Negotiating Refugee Safe Havens
A-I-01	Intelligence Operations on Host Nation Conditions
A-M-01	Response to WMD Attack
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-16	Stability Operations (Economic)
Peer of:	
A-I-04	Information Dissemination
E-P-07	Destabilizing Effects
E-S-07	Migration
A-I-14	Needs Assessments Supporting Decision-Making
E-N-03	Changes in Host Nation Environment

A-E-07 Economic Intelligence Operations

The DIME/PMESII model suite will represent Economic Intelligence Operations and associated effects across the PMESII elements. The requirement includes actions taken to collect HN economic data, analyze it, and disseminate it internally as ISR reports. This should also indicate impact of ISR monitoring on military asset allocation, capacity, and decision-making and on actions taken to support the rule of law in the HN. Economic data includes production capabilities; consumption and demand; transportation and distribution networks with capacities; financial and banking systems; and associated analysis.

Areas:-E-PPhases:0, IV, VMissions:COIN, HA/DR, EA, SI

Nouns:	HN economic data, ISR, production, goods, trade, sanctions, markets
Verbs:	collect, analyze, disseminate, observe, operate, monitor
Parent of:	
A-E-05	Economic Information Operations
Child of:	•
A-D-06	Diplomatic Actions to Prepare for Stability Operations
E-E-07	Effects of Combat Operations on the Economy
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
A-E-16	Stability Operations (Economic)
E-S-07	Migration
E-E-12	Effects of Trade Agreements on Economy
A-E-09	Activities to Improve Infrastructure
Peer of:	•
A-E-13	Establishing and Maintaining Refugee Camps
Peer of:	
E-E-01	Changes in the Domestic Production by Economic Sector and Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services
A-E-14	Mitigation of Destabilizing Effects
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies

A-E-08 Establishing and Maintaining Logistical Support for Host Nation

The DIME/PMESII model suite will represent Establishing and Maintaining Logistical Support for Host Nation and associated effects across the PMESII elements. The requirement includes the maintenance and operation of logistical assets (trucks, planes, trains, warehouses, distribution centers), supporting communication systems, and associated personnel. The effects must include all economic and social impacts on HN, especially any retardation of HN logistical capabilities and create work force imbalances. Infrastructure is covered in A-E-9.

Areas:	-E-EIN	Phases:	0, IV, V
Missions:	HA/DR, SIB/R,	EA, SI	
Nouns:	logistical assets sanctions, emplo	, production, goo	ods, consumption, markets, trade,
Verbs:	maintenance, op	perate, negotiate,	hire, distribute, monitor
Parent of:			

A-E-05	Economic Information Operations			
E-E-01	Changes in the Domestic Production by Economic Sector and			
	Region			
E-E-02	Changes in the Flow of Capital			
E-E-03	Changes in Host Nation Wealth/Income Distributions			
E-E-04	Effects on Markets			
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and			
	Services			
E-N-01	Effects of Changes in Essential Public Services on Host Nation			
E-P-01	Changes in Population Loyalty to Host Nation Government			
E-P-05	Changes in Perception of Government/Authority Legitimacy			
E-S-02	Quality of Life Perception			
E-E-13	Effects of Changes in Host Nation Infrastructure			
Child of:				
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster			
	Relief			
A-D-14	Diplomatic Actions for Multi-National Exercises			
A-D-06	Diplomatic Actions to Prepare for Stability Operations			
A-D-09	Negotiating Refugee Safe Havens			
A-E-01	Establishing Distribution Centers for Humanitarian			
	Assistance/Disaster Relief			
A-I-01	Intelligence Operations on Host Nation Conditions			
A-E-17	Improvement of Ministry of Interior			
A-E-12	Humanitarian Assistance/Disaster Relief Operations			
A-E-14	Mitigation of Destabilizing Effects			
A-E-15	Economic Development Supporting Disaster Recovery			
A-E-16	Stability Operations (Economic)			
A-I-14	Needs Assessments Supporting Decision-Making			
Peer of:				
A-L-02	Identification, Disruption, and Interdiction of Institutional Support			
	for Destabilizing Actors			
A-M-05	Actions Supporting Host Nation Counter-Insurgency			
A-M-07	Logistics			
E-S-03	Effects of Restriction on Population Movement			
E-S-07	Migration			
A-L-08	Counter-Corruption Activities			

A-E-09 Activities to Improve Infrastructure

The DIME/PMESII model suite will represent Activities to Improve Infrastructure and associated effects across the PMESII elements. This requirement includes all activities which improve the HN's infrastructure and the impacts of improvement activities (e.g. impact to bridge traffic during improvements). The impact of improvement activities must include such as changes in demand for labor, temporary reductions in capacity/output, time delays for service, business impacts to near activities, and any associated secondary impacts with improvement activities. The

full	set	of	impacts	associated	with	the	improved	infrastructure	capabilities	are
capt	tured	l in	the Effec	ets of Improv	ved H	N Inj	frastructur	e (E-E-13) requ	uirement.	

Effects of Improved HN Infrastructure (E-E-13) requirement.			
-DE-PESN Phases: 0, V			
BPC, EA, SI			
HN infrastructure, labor, services			
build, repair, construct, establish, maintain			
Economic Intelligence Operations			
Effects of Changes in Essential Public Services on Host Nation			
Effects of Restored/Impaired Infrastructure on Host Nation			
Changes in Population Loyalty to Host Nation Government			
Changes in Perception of Government/Authority Legitimacy			
Effect of Foreign Presence on Host Nation Norms and Behaviors			
Quality of Life Perception			
Effects of Changes in Host Nation Infrastructure			
Effects of Human Resources Training on Economy			
Effects of Industrialization on Host Nation			
Changes in Host Nation Environment			
Epidemic Breakout			
Actions in Preparation for Anticipated and Scheduled Events			
Humanitarian Assistance/Disaster Relief Operations			
Economic Development Supporting Disaster Recovery			
Advocacy Actions by US Government			
Support to Host Nation for Compliance with International			
Conventions and Standards			
Needs Assessments Supporting Decision-Making			
Military and Naval Presence			
Effects on Host Nation by Forward Bases			
Effects of Trade Agreements on Economy			
Improvement of Ministry of Interior			
Effects of Changes to Government Leadership			
Counter-Corruption Activities			

A-E-10 Economic Actions Supporting Joint Military Exercises

The DIME/PMESII model suite will represent Economic Actions Supporting Joint Military Exercises and associated effects across the PMESII elements. The requirement includes actions in support of joint military exercises with HN forces. Should indicate the effects those actions have on the HN economy and HN military.

Areas:	-E-PME Phases: 0, I	
Missions:	FID, BPC, TSC, CMO, EA, SI	
Nouns:	exercises, HN forces, HN military, goods, consumption, markets	s,
	trade, sanctions	
Verbs:	repatriate, operate, negotiate, monitor, produce	

Parent of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-E-19	Spending in Support of Host Nation Ministry of Defense
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-E-13	Effects of Changes in Host Nation Infrastructure
Child of:	
A-D-14	Diplomatic Actions for Multi-National Exercises
A-M-04	Military Training
A-M-06	Military Exercises
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

A-E-11 Hiring of Host Country Nationals

The DIME/PMESII model suite will represent Hiring of Host Country Nationals and associated effects across the PMESII elements. The requirement includes employment of host country nationals to support military and civil operations and the effect that this employment has on the HN, particularly the regional economies and distribution of labor.

Areas:	-E-ES Phases: 0, IV, V			
Missions:	EA, SI			
Nouns:	HN citizens, military, employment, housing, wages, education,			
	policies, markets, trade			
Verbs:	hire, operate, establish, negotiate, monitor			
Parent of:				
E-E-07	Effects of Combat Operations on the Economy			
A-E-17	Improvement of Ministry of Interior			
E-E-02	Changes in the Flow of Capital			
E-E-03	Changes in Host Nation Wealth/Income Distributions			
E-P-01	Changes in Population Loyalty to Host Nation Government			
E-P-02	Changes in Political Involvement of Host Nation Citizens			
E-P-05	Changes in Perception of Government/Authority Legitimacy			
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors			
E-E-06	Effects of Human Resources Training on Economy			
Child of:				
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster			
	Relief			
A-D-14	Diplomatic Actions for Multi-National Exercises			
A-D-02	Negotiations with Host Nation Government			
A-E-01	Establishing Distribution Centers for Humanitarian			
	Assistance/Disaster Relief			
A-E-20	Spending to Support Rule of Law			

A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
Peer of:	
E-S-05	Impact to Stability and Security due to Events
A-D-20	Advocacy Actions by US Government
A-L-08	Counter-Corruption Activities

A-E-12 Humanitarian Assistance/Disaster Relief Operations

The DIME/PMESII model suite will represent Humanitarian Assistance/Disaster Relief Operations and associated effects across the PMESII elements. The requirement includes efforts to provide food, water, medical, and fuel supplies; personnel support (doctors, technicians, rescue workers); critical equipment; and logistical support for humanitarian assistance operations and efforts to disseminate information about the HA to the HN population. It also represents the effects of these actions on the HN economy and socio-political system. Note that these efforts may transition to long-term Economic Development Supporting Disaster Recovery once the immediate crises has been alleviated.

Areas:	-IE-PES Phases: 0, I, II, IV, V			
Missions:	HA/DR, EA, SI			
Nouns:	food, water, medical supplies, HN citizens, HN populace, HN			
	government, NGOs, personnel support, equipment			
Verbs:	provide, distribute, transport, disseminate, restore, establish			
Parent of:				
A-E-13	Establishing and Maintaining Refugee Camps			
A-E-04	Repatriation / Relocation Efforts			
A-E-06	Mitigation of Long-term WMD Effects			
A-E-08	Establishing and Maintaining Logistical Support for Host Nation			
A-I-05	Collection and Use of Refugee Information			
E-P-01	Changes in Population Loyalty to Host Nation Government			
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors			
E-S-02	Quality of Life Perception			
A-E-14	Mitigation of Destabilizing Effects			
E-P-07	Destabilizing Effects			
A-E-15	Economic Development Supporting Disaster Recovery			
A-E-16	Stability Operations (Economic)			
A-I-13	Host Nation Internal Dissemination of Information			
A-D-12	Diplomatic-Like Interactions Between Organizations			
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other			
	Minorities			
A-E-09	Activities to Improve Infrastructure			
Child of:				
A-D-01	Support to the Ambassador			
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster			
	Relief			
A-M-01	Response to WMD Attack			

A-M-02	Response to Cor	nventional Attac	k		
E-S-06	Epidemic Break	out			
O-E-04	Weather Impacts	s to Decision-ma	aking and M	lilitary (Operations
Peer of:					
A-E-01	Establishing	Distribution	Centers	for	Humanitarian
	Assistance/Disas	ster Relief			
A-I-10	Intelligence Coll	lection to Suppo	rt Host Nati	on	
A-L-06	Martial Law and	l Law Enforcem	ent Operatio	ons	

A-E-13 Establishing and Maintaining Refugee Camps

The DIME/PMESII model suite will represent Establishing and Maintaining Refugee Camps and associated effects across the PMESII elements. The requirement includes actions taken to construct refugee camps, distribute food, provide medical treatment, and otherwise care for refugees displaced from their homes by emergencies. This requirement should indicate the effects of these actions on the refugee population, on their home countries, and on the countries who are hosting the refugees.

Areas:	-E-E Phases: 0, I, IV, V				
Missions:	CM, FID, HA/DR, NEO, EA, SI				
Nouns:	refugees, HN, population, repatriation, shelter				
Verbs:	construct, establish, operate monitor, distribute, provide				
Parent of:					
A-M-07	Logistics				
E-E-04	Effects on Markets				
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services				
E-E-13	Effects of Changes in Host Nation Infrastructure				
Child of:					
A-D-01	Support to the Ambassador				
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief				
A-D-14	Diplomatic Actions for Multi-National Exercises				
A-D-09	Negotiating Refugee Safe Havens				
A-E-12	Humanitarian Assistance/Disaster Relief Operations				
A-E-15	Economic Development Supporting Disaster Recovery				
Peer of:					
A-E-01	Establishing Distribution Centers for Humanitarian				
	Assistance/Disaster Relief				
A-E-07	Economic Intelligence Operations				
A-E-14	Mitigation of Destabilizing Effects				

A-E-14 Mitigation of Destabilizing Effects

The DIME/PMESII model suite will represent Mitigation of Destabilizing Effects and associated effects across the PMESII elements. The requirement includes actions in

response to destabilizing actors (insurgents, terrorists, coup leaders, etc). The destabilizing effects due to natural causes, (e.g. loss of control in distant providences after natural disasters) must also be included.

Areas:	-DIMEL-PES Phases: 0, IV, V			
Missions:	SSTR, EA, SI			
Nouns:	insurgents, terrorists, leaders, natural causes			
Verbs:	neutralize, prepare, respond, provide, negotiate			
Parent of:				
A-E-03	Building and Securing Host Nation Essential Services			
A-E-05	Economic Information Operations			
A-E-08	Establishing and Maintaining Logistical Support for Host Nation			
A-I-03	Collection of Host Nation Citizen Perceptions			
A-L-01	Identification, Disruption, and Interdiction of Financial Support for			
	Destabilizing Actors			
A-L-02	Identification, Disruption, and Interdiction of Institutional Support			
A T 02	for Destabilizing Actors			
A-L-03	Destabilizing Actors			
E-N-01	Effects of Changes in Essential Public Services on Host Nation			
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation			
E-P-01	Changes in Population Loyalty to Host Nation Government			
E-P-05	Changes in Perception of Government/Authority Legitimacy			
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors			
E-S-02	Quality of Life Perception			
A-L-04	Identification, Disruption, and Interdiction of Recruitment for			
A T 11	Improvement of Host Nation Intelligence, Use of Intelligence, and			
A-1-11	In Copabilities			
A T 15	Information Operations			
Child of	mormation Operations			
	Negotiations with Host Nation Government			
A-D-02 A E 06	Mitigation of Long term WMD Effects			
A-L-00 A_L-01	Intelligence Operations on Host Nation Conditions			
A - M - 01	Response to WMD Attack			
A-M-01 A-M-02	Response to Conventional Attack			
F-S-06	Enidemic Breakout			
E 5 00 E-S-05	Impact to Stability and Security due to Events			
A-E-12	Humanitarian Assistance/Disaster Relief Operations			
F-P-07	Destabilizing Effects			
A-D-18	Destabilization Operations			
A-D-21	Security and Law Enforcement for US			
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Dopulation			
A-M-10	Military and Naval Presence			
Peer of:				
A-E-13	Establishing and Maintaining Refugee Camps			
A-E-07	Economic Intelligence Operations			

A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-P-06	Effects of Changes to Government Leadership
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-I-08	Changing Influence/Exposure of Societal Leaders
	A-I-10 Intelligence Collection to Support Host Nation
A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-E-10	Effects of Sanctions (Economic)
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
E-M-02	Effects of Multi-National Exercises on Military
A-L-08	Counter-Corruption Activities

A-E-15 Economic Development Supporting Disaster Recovery

The DIME/PMESII model suite will represent Economic Development Supporting Disaster Recovery and associated effects across the PMESII elements. The requirement includes all forms of financial or material support resulting from a disaster. Examples include food, medical, and fuel supplies; non-military logistical support (e.g. purchase/rental of vehicles); providing of support equipment (water purification, refrigeration systems, medical equipment); providing of support personnel (doctors, engineers, construction workers, rescuers); hiring of local population to support HA/DR efforts; construction of housing, hospitals, and other facilities; all types of grants and loans; promises of business or contracts; and longterm aid to rebuild infrastructure or retrain population.

ierm ala lo reb	ulla infrastructure or retrain population.		
Areas:	-DE-PESN Phases: 0, IV, V		
Missions:	EA, SI		
Nouns:	food, water, medical supplies, HN citizens, HN populace, HN government, NGOs, personnel support, equipment		
Verbs:	construct, hire, aid, provide, distribute, transport, disseminate, restore, establish		
Parent of:			
A-E-13	Establishing and Maintaining Refugee Camps		
A-E-03	Building and Securing Host Nation Essential Services		
A-E-05	Economic Information Operations		
A-E-08	Establishing and Maintaining Logistical Support for Host Nation		
E-N-01	Effects of Changes in Essential Public Services on Host Nation		
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation		

Changes in Population Loyalty to Host Nation Government		
Quality of Life Perception		
Effects of Changes in Host Nation Infrastructure		
Migration		
Activities to Improve Infrastructure		
-		
Support to the Ambassador		
Diplomatic Actions to Support Humanitarian Assistance/Disaster		
Relief		
Diplomatic Preparation for WMD Consequence Management		
Mitigation of Long-term WMD Effects		
Response to WMD Attack		
Response to Conventional Attack		
Humanitarian Assistance/Disaster Relief Operations		
Destabilizing Effects		
Multi-party Diplomatic Negotiations		
Stability Operations (Economic)		
Repatriation / Relocation Efforts		
Economic Intelligence Operations		
Changes in the Domestic Production by Economic Sector and		
Region		
Mitigation of Destabilizing Effects		
Counter-Corruption Activities		

A-E-16 Stability Operations (Economic)

The DIME/PMESII model suite will represent Stability Operations (Economic) and associated effects across the PMESII elements. The requirement includes economic efforts to increase stability such as job creation, increasing availability of investment capitol, job training programs, policy efforts to stabilize demand for goods/services, creation of government support contracts, and other government policies which seek to stabilize local security situation. The impacts these actions have on insurgent recruitment, public opinion of HN government, and long-term quality-of-life perspective must be included.

Areas:	-MEL-P Phases: 0, IV, V
Missions:	SIB/R, SSTR, BPC, TSC, EA, SI
Nouns:	employment, goods/services, contracts, programs, HN
	government, HN populace, HN citizens
Verbs:	train, distribute, produce, secure
Parent of:	
A-E-06	Mitigation of Long-term WMD Effects
A-E-07	Economic Intelligence Operations
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-I-03	Collection of Host Nation Citizen Perceptions

A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-01	Changes in Population Loyalty to Host Nation Government
E-S-02	Quality of Life Perception
E-E-13	Effects of Changes in Host Nation Infrastructure
A-E-15	Economic Development Supporting Disaster Recovery
E-E-06	Effects of Human Resources Training on Economy
E-E-12	Effects of Trade Agreements on Economy
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies
Child of:	
A-D-02	Negotiations with Host Nation Government
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-I-01	Intelligence Operations on Host Nation Conditions
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
A-E-12	Humanitarian Assistance/Disaster Relief Operations
E-P-07	Destabilizing Effects
A-D-16	Establishing Relations In Absence of State
A-D-17	Multi-party Diplomatic Negotiations
A-D-18	Destabilization Operations
Peer of:	
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-03	Building and Securing Host Nation Essential Services
A-E-07	Economic Intelligence Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-P-06	Effects of Changes to Government Leadership
A-E-14	Mitigation of Destabilizing Effects
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-L-08	Counter-Corruption Activities
	A-E-21Spending for / Development of Other Host Nation
	Ministries and Agencies

A-E-17 Improvement of Ministry of Interior

The DIME/PMESII model suite will represent Improvement of Ministry of Interior and associated effects across the PMESII elements. The requirement includes all actions associated with improving the HN Ministry of Interior and the effectiveness of those actions relevant to HN government and economic effectiveness. This includes the establishment of the MoI bureaucracy and supporting legal framework; staffing and maintaining the facilities; contracting, oversight, inter-governmental liaison, and other associated functions.

Areas:	-DIEL-PESN Phases: 0, V		
Missions:	SIB/R, BPC, EA		
Nouns:	facilities, HN government, staff		
Verbs:	establish, provide, maintain		
Parent of:			
A-E-03	Building and Securing Host Nation Essential Services		
A-E-08	Establishing and Maintaining Logistical Support for Host Nation		
A-I-06	Improvement of Host Nation Government Communication Networks		
E-E-01	Changes in the Domestic Production by Economic Sector and Region		
E-E-04	Effects on Markets		
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services		
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation		
E-P-01	Changes in Population Loyalty to Host Nation Government		
E-P-03	Changes in Government Structure or Functions		
E-P-05	Changes in Perception of Government/Authority Legitimacy		
E-S-02	Quality of Life Perception		
E-E-13	Effects of Changes in Host Nation Infrastructure		
E-E-11	Effects of Industrialization on Host Nation		
A-I-16	Training of Host Nation Government Personnel		
Child of:			
A-D-01	Support to the Ambassador		
A-D-02	Negotiations with Host Nation Government		
A-D-06	Diplomatic Actions to Prepare for Stability Operations		
A-E-11	Hiring of Host Country Nationals		
Peer of:			
A-E-20	Spending to Support Rule of Law		
A-I-01	Intelligence Operations on Host Nation Conditions		
E-S-08	Effects of Legislation, Law Enforcement, and Regulations		
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and		
	IO Capabilities		
A-E-09	Activities to Improve Infrastructure		
A-L-08	Counter-Corruption Activities		

A-E-18 Spending in Support of Host Nation Ministry of Interior

The DIME/PMESII model suite will represent Spending in Support of Host Nation Ministry of Interior and associated effects across the PMESII elements. The requirement includes spending to improve or establish the HN MoI and related ministries (natural resources, land-use, environment, etc). Should indicate the effects of this spending on the HN.

ejjeeis oj inis s _f			
Areas:	-E-PEN Phases: IV, V		
Missions:	SIB/R, BPC, EA		
Nouns:	MoI, resources, HN economy, HN government, services		
Verbs:	improve, establish, support		
Parent of:			
A-D-11	Diplomatic Action to Support Training Host Nation Government Personnel		
A-E-11	Hiring of Host Country Nationals		
E-E-09	Economic Response Rule of Law Enforcement		
E-E-02	Changes in the Flow of Capital		
E-E-04	Effects on Markets		
E-N-01	Effects of Changes in Essential Public Services on Host Nation		
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation		
E-P-01	Changes in Population Loyalty to Host Nation Government		
E-P-05	Changes in Perception of Government/Authority Legitimacy		
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors		
E-S-02	Quality of Life Perception		
Child of:			
A-D-06	Diplomatic Actions to Prepare for Stability Operations		
E-P-03	Changes in Government Structure or Functions		
E-S-05	Impact to Stability and Security due to Events		
A-D-21	Security and Law Enforcement for US		
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population		
Peer of:			
A-E-05	Economic Information Operations		
A-E-16	Stability Operations (Economic)		
E-S-09	Effects of Discrimination in Host Nation		

A-E-19 Spending in Support of Host Nation Ministry of Defense

The DIME/PMESII model suite will represent Spending in Support of Host Nation Ministry of Defense and associated effects across the PMESII elements. The requirement includes spending to improve or establish the HN MOD, their military (training, assets procurement and maintenance), and related supporting personnel and infrastructure. Should indicate the effects of this spending on the HN and its ministries including improved processes, internal oversight, and gained efficiencies.

Areas:	-EL-PMEN	Phases:	0, I, IV, V	
Missions:	FID, SIB/R, BPC	C, EA		
Nouns:	MOD, HN milita	ry, personnel, i	infrastructure, en	nployment,
	security			

Verbs:	improve, establish, support, operate, maintain	
Parent of:		
A-E-11	Hiring of Host Country Nationals	
A-M-08	Improvement of Ministry of Defense	
A-M-07	Logistics	
A-M-04	Military Training	
A-M-06	Military Exercises	
E-E-01	Changes in the Domestic Production by Economic Sector and	
	Region	
E-E-02	Changes in the Flow of Capital	
E-P-12	Effects of Factional Group Activities	
E-P-01	Changes in Population Loyalty to Host Nation Government	
E-P-05	Changes in Perception of Government/Authority Legitimacy	
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation	
E-E-13	Effects of Changes in Host Nation Infrastructure	
A-D-19	Deterrence	
Child of:		
A-D-14	Diplomatic Actions for Multi-National Exercises	
A-D-06	Diplomatic Actions to Prepare for Stability Operations	
A-E-10	Economic Actions Supporting Joint Military Exercises	
E-S-05	Impact to Stability and Security due to Events	
E-E-10	Effects of Sanctions (Economic)	
Peer of:		
A-E-05	Economic Information Operations	
E-E-11	Effects of Industrialization on Host Nation	

A-E-20 Spending to Support Rule of Law

The DIME/PMESII model suite will represent Spending to Support Rule of Law and associated effects across the PMESII elements. The requirement includes spending to support institutions -- such as police department and academies; military police; law schools, the civil, legal, and criminal courts; judicial and prison systems; and government accounting officers and inspectors -- that strengthen the Rule of Law in the HN. Should indicate the effects that spending has on the HN.

Areas:	-EL-ES Phases: 0, IV, V
Missions:	SIB/R, BPC, EA, LE
Nouns:	rule of law, population, courts, prison, police, lawyers, laws, monetary policies
Verbs:	enforce, hire, operate, maintain, monitor
Parent of:	
A-E-11	Hiring of Host Country Nationals
E-E-09	Economic Response Rule of Law Enforcement
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors

A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
E-I-02	Effects of Information Gathering on Host Nation Citizens
E-E-04	Effects on Markets
E-I-01	Effects of Information Gathering on Host Nation Government Actions
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
E-P-07	Destabilizing Effects
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-13	Host Nation Internal Dissemination of Information
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
Peer of:	
A-E-05	Economic Information Operations
A-E-17	Improvement of Ministry of Interior
E-S-05	Impact to Stability and Security due to Events
A-D-21	Security and Law Enforcement for US
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population

A-E-21 Spending for / Development of Other Host Nation Ministries and Agencies

The DIME/PMESII model suite will represent Spending for / Development of Other Host Nation Ministries and Agencies and associated effects across the PMESII elements.

ciententis.			
Areas:	-E-PESN Phases: 0, IV, V		
Missions:	SIB/R, SSTR, BPC, EA, LE		
Nouns:	spending		
Verbs:	spend		
Parent of:			
A-E-10	Economic Actions Supporting Joint Military Exercises		
A-I-06	Improvement of Host Nation Government Communication		
	Networks		
E-S-06	Epidemic Breakout		
E-S-08	Effects of Legislation, Law Enforcement, and Regulations		
E-S-07	Migration		
E-E-06	Effects of Human Resources Training on Economy		
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, ar		
	IO Capabilities		
E-E-11	Effects of Industrialization on Host Nation		
E-E-11	Effects of Industrialization on Host Nation		

A-L-08	Counter-Corruption Activities		
Child of:	-		
A-E-16	Stability Operations (Economic)		
Peer of:			
A-E-07	Economic Intelligence Operations		
A-I-01	Intelligence Operations on Host Nation Conditions		
A-I-02	Intelligence Operations on Host Nation Government		
A-I-03	Collection of Host Nation Citizen Perceptions		
A-L-01	Identification, Disruption, and Interdiction of Financial Support for		
	Destabilizing Actors		
A-L-02	Identification, Disruption, and Interdiction of Institutional Support		
	for Destabilizing Actors		
A-L-03	Identification, Disruption, and Interdiction of Local Support for		
	Destabilizing Actors		
E-P-12	Effects of Factional Group Activities		
E-P-03	Changes in Government Structure or Functions		
A-L-04	Identification, Disruption, and Interdiction of Recruitment for		
	Destabilizing Actors		
A-D-16	Establishing Relations In Absence of State		
A-D-18	Destabilization Operations		
A-I-08	Changing Influence/Exposure of Societal Leaders		
A-I-10	Intelligence Collection to Support Host Nation		
A-I-09	Changing/Shaping Message/Position of Societal Leaders		
A-E-16	Stability Operations (Economic)		
A-L-05	Operations Against Criminal Syndicates		
A-L-06	Martial Law and Law Enforcement Operations		
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes		
E-P-11	Effects of Third-Party External Diplomatic Actions		

A-L Law Enforcement Actions

A-L-01 Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors

The DIME/PMESII model suite will represent Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors and associated effects across the PMESII elements. Identification includes intelligence collection and analysis while disruption and interdiction include financial actions, policy changes, law enforcement, military actions, and information operations. The requirement must also include diplomatic and economic actions and effects for state or statesupported actors. Note that disruption may only be temporary interruption or reduction of support.

Areas:	-DIMEL-PMESI-FRIS	Phases:	0, IV, V
Missions:	COIN, FID, DS, LE		

Nouns:	intelligence, law enforcement, military, information, funding, non- nations state actor		
Verbs:	collection, analysis, interdict, operate, disrupt		
Parent of:			
E-P-01	Changes in Population Loyalty to Host Nation Government		
E-P-05	Changes in Perception of Government/Authority Legitimacy		
Child of:			
A-D-06	Diplomatic Actions to Prepare for Stability Operations		
A-E-20	Spending to Support Rule of Law		
A-E-14	Mitigation of Destabilizing Effects		
A-D-18	Destabilization Operations		
A-E-16	Stability Operations (Economic)		
A-L-09	Improvement of Legal and Law Enforcement Ministries		
Peer of:			
A-I-07	Establishment & Support of Information Exchange Program		
A-L-02	Identification, Disruption, and Interdiction of Institutional Support		
	for Destabilizing Actors		
A-L-03	Identification, Disruption, and Interdiction of Local Support for		
	Destabilizing Actors		
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation		
E-P-07	Destabilizing Effects		
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and		
	IO Capabilities		
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population		
A-L-08	Counter-Corruption Activities		
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies		

A-L-02 Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors

The DIME/PMESII model suite will represent Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors and associated effects across the PMESII elements. Identification includes intelligence collection and analysis while disruption and interdiction include financial actions, policy changes, law enforcement, military actions, and information operations. The requirement must also include diplomatic and economic actions and effects for state or statesupported actors. Note that disruption may only be temporary interruption or reduction of support.

0	11			
Areas:	-DIMEL-PMESI-FRIS	Phases:	0, IV, V	
Missions:	COIN, FID, LE			
Nouns:	intelligence, law enforcement, military, information, fin			
	support, non-nations state ac	tor		
Verbs:	collection, analysis, interdict, operate, disrupt			
Parent of:	· · · ·	· •	•	
E-P-01	Changes in Population Loyal	lty to Host Nat	ion Government	
		~		
E-P-05	Changes in Perception of Government/Authority Legitimacy			
-----------	---			
Child of:				
A-D-06	Diplomatic Actions to Prepare for Stability Operations			
A-E-20	Spending to Support Rule of Law			
A-E-14	Mitigation of Destabilizing Effects			
A-D-18	Destabilization Operations			
A-E-16	Stability Operations (Economic)			
A-L-09	Improvement of Legal and Law Enforcement Ministries			
Peer of:				
A-E-08	Establishing and Maintaining Logistical Support for Host Nation			
A-I-07	Establishment & Support of Information Exchange Program			
A-L-01	Identification, Disruption, and Interdiction of Financial Support for			
	Destabilizing Actors			
A-L-03	Identification, Disruption, and Interdiction of Local Support for			
	Destabilizing Actors			
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation			
A-L-04	Identification, Disruption, and Interdiction of Recruitment for			
	Destabilizing Actors			
E-P-07	Destabilizing Effects			
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and			
	IO Capabilities			
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population			
A-L-08	Counter-Corruption Activities			
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies			

A-L-03 Identification, Disruption, and Interdiction of Local Support for Destabilizing Actors

The DIME/PMESII model suite will represent Identification, Disruption, and Interdiction of Local Support for Destabilizing Actors and associated effects across the PMESII elements. Identification includes intelligence collection and analysis while disruption and interdiction include financial actions, policy changes, law enforcement, military actions, and information operations. The requirement must also include diplomatic and economic actions and effects for state-supported actors. Note that disruption may only be temporary interruption or reduction of support.

Areas:	-DIMEL-PMESI-FRIS Phases: 0. IV. V
Missions:	COIN. FID. LE
Nouns:	political stability
Verbs:	collection, analysis, interdict, operate, disrupt, mitigate, reestablish
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-20	Spending to Support Rule of Law

A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-16	Stability Operations (Economic)
A-L-09	Improvement of Legal and Law Enforcement Ministries
Peer of:	
A-I-07	Establishment & Support of Information Exchange Program
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
E-P-07	Destabilizing Effects
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies

A-L-04 Identification, Disruption, and Interdiction of Recruitment for Destabilizing Actors

The DIME/PMESII model suite will represent Identification, Disruption, and Interdiction of Recruitment for Destabilizing Actors and associated effects across the PMESII elements. Identification includes intelligence collection and analysis while disruption and interdiction include financial actions, policy changes, law enforcement, military actions, and information operations. The requirement must also include diplomatic and economic actions and effects for state or state-supported actors. Note that disruption may only be temporary interruption or reduction of support.

11			
Areas:	-DIMEL-PMESI-FRIS	Phases:	0, IV, V
Missions:	COIN, FID, LE		
Nouns:	intelligence, law enforcemer	nt, military, inf	ormation, financial
	support, non-nations state ac	tor	
Verbs:	collection, analysis, interdict	t, operate, disr	upt
Parent of:	-	-	-
E-P-01	Changes in Population Loya	lty to Host Na	tion Government
E-P-05	Changes in Perception of Go	overnment/Aut	hority Legitimacy
Child of:			
A-D-06	Diplomatic Actions to Prepa	re for Stability	^v Operations
A-D-09	Negotiating Refugee Safe H	avens	-
A-E-20	Spending to Support Rule of	Law	
A-E-14	Mitigation of Destabilizing I	Effects	
A-D-18	Destabilization Operations		
	-		

Improvement of Legal and Law Enforcement Ministries
Establishment & Support of Information Exchange Program
Identification, Disruption, and Interdiction of Institutional Support
for Destabilizing Actors
Identification, Disruption, and Interdiction of Local Support for
Destabilizing Actors
Deterrence of Foreign/Proxy Attackers on Host Nation
Destabilizing Effects
Improvement of Host Nation Intelligence, Use of Intelligence, and
IO Capabilities
Impact of Terrorist/Insurgent Groups on Host Nation Population
Spending for / Development of Other Host Nation Ministries and
Agencies

A-L-05 Operations Against Criminal Syndicates

The DIME/PMESII model suite will represent Operations Against Criminal Syndicates and associated effects across the PMESII elements. The requirement includes actions to mitigate or eliminate organized criminal groups such as gangs and large crime syndicates to reduce their criminal activities such as smuggling; piracy; kidnapping, ransom, and human trafficking; drug production, distribution, and sale; racketeering; counterfeiting, money laundering, and fencing of stolen goods; and corruption of local law enforcement and political leaders.

Areas:	-IL-PES	Phases:	0, IV, V
Missions:	LE		
Nouns:	organized crime, gang	gs, corrupti	on, law enforcement and political
	leaders, criminal activ	vities Verbs	mitigate, eliminate, reduce
Parent of:			
E-P-01	Changes in Population	n Loyalty to	o Host Nation Government
E-S-02	Quality of Life Percep	otion	
A-M-09	Deterrence of Foreign	/Proxy Att	ackers on Host Nation
E-S-07	Migration		
A-L-06	Martial Law and Law	Enforceme	ent Operations
A-I-15	Information Operation	ns	
Child of:			
A-D-06	Diplomatic Actions to	Prepare fo	or Stability Operations
A-E-20	Spending to Support I	Rule of Lav	V
E-P-06	Effects of Changes to	Governme	nt Leadership
E-P-07	Destabilizing Effects		
A-I-10	Intelligence Collection	n to Suppor	rt Host Nation
A-L-06	Martial Law and Law	Enforceme	ent Operations
A-D-21	Security and Law Enf	forcement f	or US
E-S-10	Impact of Terrorist/In	surgent Gr	oups on Host Nation Population
A-I-14	Needs Assessments S	upporting I	Decision-Making
A-L-09	Improvement of Lega	l and Law	Enforcement Ministries

A-I-16	Training of Host Nation Government Personnel
Peer of:	
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
A-E-14	Mitigation of Destabilizing Effects
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

A-L-06 Martial Law and Law Enforcement Operations

The DIME/PMESII model suite will represent Martial Law and Law Enforcement Operations and associated effects across the PMESII elements. The requirement includes all actions relating to martial law and law enforcement actions such as establishment of rules and procedures; intelligence collection and information operations; patrols and criminal deterrence; and execution of punishments. The effects of martial law declaration and enforcement must include impact on population perception, economic impact (security of safety and property), security, and mitigation of destabilizing factors. The negative effect of long-term martial law (economic slow down, population sentiment, erosion of public trust) must also be included. The effects of rule-of-law and law enforcement operations are addressed in other requirements.

Areas:	-IML-PMESI Phases: 0, IV, V
Missions:	CMO, LE
Nouns:	rules and procedures, intelligence, information, punishment, HN
	population, HN citizens Verbs: establish, collect, deter, execute
Parent of:	
E-E-07	Effects of Combat Operations on the Economy
E-P-01	Changes in Population Loyalty to Host Nation Government
E-S-02	Quality of Life Perception
E-S-03	Effects of Restriction on Population Movement
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-L-05	Operations Against Criminal Syndicates
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-D-12	Diplomatic-Like Interactions Between Organizations
E-M-03	Effects on Military due to Operations
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-20	Spending to Support Rule of Law
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack

O-E-03	Actions in Preparation for Anticipated and Scheduled Events
O-E-04	Weather Impacts to Decision-making and Military Operations
E-P-07	Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
A-L-05	Operations Against Criminal Syndicates
A-D-21	Security and Law Enforcement for US
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
A-L-09	Improvement of Legal and Law Enforcement Ministries
A-I-16	Training of Host Nation Government Personnel
Peer of:	
A-E-02	Building and Securing Lines of Communication
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-14	Mitigation of Destabilizing Effects
A-L-08	Counter-Corruption Activities
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

A-L-07 Enforcement of International Resolutions

The DIME/PMESII model suite will represent Enforcement of International Resolutions and associated effects across the PMESII elements. This requirement includes all actions of enforcement for multi-party, international resolutions such as economic and technological sanctions; security resolutions; UN or WTO resolutions; disciplinary resolutions (e.g. sanctioning a pact/cartel member); inspections; arrests and trials of leaders; and dismantling of capabilities.

-DML-PMESI Phases: 0, I, II, IV, V
COIN, FID, HA/DR, CMO, DS, EA, LE, SI
multi-party, international resolutions, sanctions, resolutions
enforce, negotiate
Changes in Population Loyalty to Host Nation Government
Changes in Government Structure or Functions
Effect of Foreign Presence on Host Nation Norms and Behaviors
Quality of Life Perception
Effects of Restriction on Population Movement
Deterrence of Foreign/Proxy Attackers on Host Nation
Intelligence Collection to Support Host Nation
Effects of Sanctions (Economic)
Advocacy Actions by US Government
Internal Repercussions of a Trans-National Organization's Actions
Regarding Host Nation
Internal Repercussions of an Outside Nation's Actions Regarding
Host Nation

A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-M-10	Military and Naval Presence
E-E-12	Effects of Trade Agreements on Economy
A-M-11	War and Military Invasion
E-N-03	Changes in Host Nation Environment
Child of:	
E-P-07	Destabilizing Effects
A-D-17	Multi-party Diplomatic Negotiations
A-D-18	Destabilization Operations
E-S-09	Effects of Discrimination in Host Nation
E-P-11	Effects of Third-Party External Diplomatic Actions
Peer of:	
E-P-03	Changes in Government Structure or Functions
A-D-16	Establishing Relations In Absence of State
A-D-19	Deterrence
A-D-21	Security and Law Enforcement for US

A-L-08 Counter-Corruption Activities

The DIME/PMESII model suite will represent Counter-Corruption Activities and associated effects across the PMESII elements. This requirements includes activities designed to reduce, investigate, catch, prosecute, punish, deter, and dissuade corruption. The mode representation of corrupt activities cannot be limited to HN government but must include regional government/leaders, law enforcement entities, businesses, the general population's social norms (e.g. accepted quid pro quo sexual harrassment), NGOs, and other trans-national organization. Corruption activities must include bribery, kickbacks, quid pro quo activities, nepotism, special favors/deals, pay-for-access, and illegitimate pay-for-service (e.g. payment to police to arrest adversaries/competetors). Activities and policies designed to provide acountability and transparency to other legitimate activities (especially government functions) must also be included in the counter-corruption representation. In addition to representing the counter-corruption activities (and their effects), the full range of corruption activities by actors and their respective impacts on actors (especially society) must be represented.

Areas:	-IL-PESI Phases: 0, V
Missions:	LE
Nouns:	bribe, graft, extort
Verbs:	investigate, educate, deter, prevent
Parent of:	
E-E-09	Economic Response Rule of Law Enforcement
E-E-02	Changes in the Flow of Capital
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-I-01	Effects of Information Gathering on Host Nation Government
	Actions

E-I-03	Effects of Information Dissemination on Host Nation Government	
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation	
E-P-05	Changes in Perception of Government/Authority Legitimacy	
E-P-06	Effects of Changes to Government Leadership	
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes	
E-E-11	Effects of Industrialization on Host Nation	
E-E-12	Effects of Trade Agreements on Economy	
Child of:		
A-D-06	Diplomatic Actions to Prepare for Stability Operations	
E-P-07	Destabilizing Effects	
A-E-21	Spending for / Development of Other Host Nation Ministries and	
	Agencies	
Peer of:		
A-E-01	Establishing Distribution Centers for Humanitarian	
	Assistance/Disaster Relief	
A-E-11	Hiring of Host Country Nationals	
A-E-05	Economic Information Operations	
A-E-07	Economic Intelligence Operations	
A-E-08	Establishing and Maintaining Logistical Support for Host Nation	
A-I-02	Intelligence Operations on Host Nation Government	
A-I-03	Collection of Host Nation Citizen Perceptions	
A-I-04	Information Dissemination	
A-L-01	Identification, Disruption, and Interdiction of Financial Support for	
	Destabilizing Actors	
A-L-02	Identification, Disruption, and Interdiction of Institutional Support	
	for Destabilizing Actors	
A-L-03	Identification, Disruption, and Interdiction of Local Support for	
	Destabilizing Actors	
A-E-17	Improvement of Ministry of Interior	
E-P-01	Changes in Population Loyalty to Host Nation Government	
E-P-03	Changes in Government Structure or Functions	
A-E-14	Mitigation of Destabilizing Effects	
A-I-10	Intelligence Collection to Support Host Nation	
A-E-15	Economic Development Supporting Disaster Recovery	
A-E-16	Stability Operations (Economic)	
A-L-05	Operations Against Criminal Syndicates	
A-L-06	Martial Law and Law Enforcement Operations	
A-E-09	Activities to Improve Infrastructure	
A-L-09	Improvement of Legal and Law Enforcement Ministries	
A-I-16	Training of Host Nation Government Personnel	

A-L-09 Improvement of Legal and Law Enforcement Ministries

The DIME/PMESII model suite will represent Improvement of Legal and LawEnforcement Ministries and associated effects across the PMESII elements.Areas:-L-PESPhases:

Missions:	SIB/R, EA, LE
Nouns:	training, aid, advice
Verbs:	spend, train, equip, plan
Parent of:	
E-E-09	Economic Response Rule of Law Enforcement
A-L-01	Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for Destabilizing Actors
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-I-16	Training of Host Nation Government Personnel
A-L-10	Barely Legal, Extra-Legal, and Criminal Activities
Child of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government Personnel
A-M-04	Military Training
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots
Peer of:	
A-L-08	Counter-Corruption Activities

A-L-10 Barely Legal, Extra-Legal, and Criminal Activities

The DIME/PMESII model suite will represent Barely Legal, Extra-Legal, and Criminal Activities and associated effects across the PMESII elements. For governmental agencies, this includes operating outside jurisdictional boundaries; purposeful obstruction; exceeding legal authority or deriliction of duty; violating regulations, chain of command, or policies; and abuse of power as well as illegal or criminal behavior (e.g. corruption, graft, political arrests, political assassinations, etc). For non-government actors, this includes "shady" behavior or dealings as well as illegal or criminal actors. Barely legal acts include acts of government that, while technically permissible, violate the spirit or intent of the law/policy or some other ethical standard (e.g. excessive backroom dealing, legislating special fees or leving taxes against political opponents, frequency searches or other police harrassment within legal

Areas:	AD-IEL-PESI	Phases:	0, IV, V
Missions:	EA, LE		
Nouns:	crime, violation		
Verbs:	violations, obstruction	ı	

Parent of:	
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-S-02	Quality of Life Perception
E-S-04	Effects of Societal Leaders
E-S-05	Impact to Stability and Security due to Events
Child of:	
A-L-09	Improvement of Legal and Law Enforcement Ministries

E-P Political Effects

E-P-01 Changes in Population Loyalty to Host Nation Government

The DIME/PMESII model suite will represent Changes in Population Loyalty to Host Nation Government due to DIME actions. The requirement includes loyalty resulting from DIME actions by all actors and links strongly to perception of government legitimacy. The resulting effects by population associated with loyalty to HN government must also be included (allegiance, tax stewardship, lawfulness, feeling of greater community/selflessness, greater patience with government, etc) as well as impacts to decisions by other actors (foreign governments insurgent groups)

well us impucis	to decisions by other dctors (foreign governments, insurgent groups).
Areas:	-IEL-PESI Phases: 0, I, II, III, IV, V
Missions:	CM, COIN, FID, HA/DR, SIB/R, SI
Nouns:	HN population, HN citizens, HN government, loyalty, allegiance
Verbs:	perception, support
Parent of:	
E-P-06	Effects of Changes to Government Leadership
Child of:	
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-13	Diplomatic Preparation for WMD Consequence Management
A-D-03	Negotiations with Local Leaders
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
A-E-10	Economic Actions Supporting Joint Military Exercises
A-E-11	Hiring of Host Country Nationals
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-E-20	Spending to Support Rule of Law
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-03	Building and Securing Host Nation Essential Services
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-E-07	Effects of Combat Operations on the Economy
A-I-06	Improvement of Host Nation Government Communication
	Networks

A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
A-M-08	Improvement of Ministry of Defense
A-E-17	Improvement of Ministry of Interior
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-I-03	Effects of Information Dissemination on Host Nation Government
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
E-P-12	Effects of Factional Group Activities
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-S-03	Effects of Restriction on Population Movement
E-S-04	Effects of Societal Leaders
E-S-05	Impact to Stability and Security due to Events
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-L-04	Identification, Disruption, and Interdiction of Recruitment for
	Destabilizing Actors
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-E-10	Effects of Sanctions (Economic)
A-E-15	Economic Development Supporting Disaster Recovery
	A-E-16Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-L-07	Enforcement of International Resolutions
E-E-12	Effects of Trade Agreements on Economy
A-M-11	War and Military Invasion
A-E-09	Activities to Improve Infrastructure
A-I-15	Information Operations
Peer of:	
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-03	Changes in Government Structure or Functions

E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-07	Migration
A-L-08	Counter-Corruption Activities

E-P-02 Changes in Political Involvement of Host Nation Citizens

The DIME/PMESII model suite will represent Changes in Political Involvement of Host Nation Citizens due to DIME actions. This requirement includes changes due to constitutional modifications, new government policies, participation initiatives (voter registration drives, citizenship training), deterioration of security, threats, disenfranchisement, discrimination, perception of legitimacy, and education. The source of change can be due to either focused (group specific) or broad-scoped (all citizens) DIME actions. The secondary impacts associated with changes in political (formation political involvement of parties, increase participation, disenfranchisement, demand for representation, shows of support, etc) must be included. The model representation must differentiate between the involvement of different demographic or ideological citizens/groups as well as resolve the respective associated impacts.

Areas: -IEL-P Phases: 0, IV, V Missions:

Nouns: HN population, HN citizens, HN government, government policies Verbs: voting, support, involvement Child of:

- A-D-06 Diplomatic Actions to Prepare for Stability Operations
- A-E-11 Hiring of Host Country Nationals
- A-E-04 Repatriation / Relocation Efforts
- A-E-05 Economic Information Operations
- A-I-08 Changing Influence/Exposure of Societal Leaders
- A-I-09 Changing/Shaping Message/Position of Societal Leaders
- E-S-11 Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots
- A-L-10 Barely Legal, Extra-Legal, and Criminal Activities

Peer of:

- A-E-03 Building and Securing Host Nation Essential Services
- E-P-01 Changes in Population Loyalty to Host Nation Government
- E-P-03 Changes in Government Structure or Functions
- E-P-04 Effects of External Group Involvement in Host Nation Politics
- E-P-05 Changes in Perception of Government/Authority Legitimacy
- E-P-06 Effects of Changes to Government Leadership
- E-S-01 Effect of Foreign Presence on Host Nation Norms and Behaviors
- E-S-03 Effects of Restriction on Population Movement
- E-S-04 Effects of Societal Leaders
- E-S-08 Effects of Legislation, Law Enforcement, and Regulations
- E-E-13 Effects of Changes in Host Nation Infrastructure
- E-E-10 Effects of Sanctions (Economic)
- A-D-20 Advocacy Actions by US Government

A-D-12	Diplomatic-Like Interactions Between Organizations
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other
	Minorities
E-S-09	Effects of Discrimination in Host Nation
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-E-11	Effects of Industrialization on Host Nation
E-P-10	Effects on Host Nation by Forward Bases
E-E-12	Effects of Trade Agreements on Economy

E-P-03 Changes in Government Structure or Functions

The DIME/PMESII model suite will represent Changes in Government Structure or Functions due to DIME actions. The requirement must link to the secondary effects associated with these changes (e.g. creation of Ministry of Education allows organized initiative to increase literacy).

Areas:	PESI Phases: 0, V
Missions:	
Nouns:	HN government, organization, style of government
Verbs:	support, respond
Parent of:	
A-E-18	Spending in Support of Host Nation Ministry of Interior
Child of:	
A-I-02	Intelligence Operations on Host Nation Government
A-E-17	Improvement of Ministry of Interior
E-I-01	Effects of Information Gathering on Host Nation Government
	Actions
E-I-03	Effects of Information Dissemination on Host Nation Government
A-L-07	Enforcement of International Resolutions
Peer of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-02	Changes in Political Involvement of Host Nation Citizens
Peer of:	
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-P-07	Destabilizing Effects
E-E-13	Effects of Changes in Host Nation Infrastructure
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
A-L-07	Enforcement of International Resolutions
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

E-P-04 Effects of External Group Involvement in Host Nation Politics

The DIME/PMESII model suite will represent Effects of External Group Involvement in Host Nation Politics due to DIME actions. External groups include interested parties outside the HN constituency including trans-nation entities (UN, World Court, NGOs), businesses, foreign insurgences, and other nation states. Transnational groups such as religions, unions, and other societal organizations involved in politics or political influence must be included. The requirement includes all the effects DIME actions have on these external groups and the resulting actions and influence of the external groups on HN political processes and legitimacy.

Areas:	-DIEL-PESI Phases: 0, I, V
Missions:	DS, SI
Nouns:	external groups, political process, allegiance, HN government, HN
	stability; religion; unions
Verbs:	operate, attend, support involvement
Child of:	
A-D-03	Negotiations with Local Leaders
A-D-05	Improvements to Host Nation Diplomatic Capabilities
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
E-P-07	Destabilizing Effects
A-D-18	Destabilization Operations
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
A-M-10	Military and Naval Presence
E-P-10	Effects on Host Nation by Forward Bases
A-M-11	War and Military Invasion
A-I-15	Information Operations
Peer of:	-
A-E-04	Repatriation / Relocation Efforts
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-03	Changes in Government Structure or Functions
Peer of:	
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-P-06	Effects of Changes to Government Leadership
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
E-E-11	Effects of Industrialization on Host Nation
A-M-10	Military and Naval Presence
E-E-12	Effects of Trade Agreements on Economy

E-P-05 Changes in Perception of Government/Authority Legitimacy

The DIME/PMESII model suite will represent Changes in Perception of Government/Authority Legitimacy due to DIME actions. The requirement includes the perceptions and attitudes of all types of actors and their corresponding actions taken in response on these perceptions/attitudes. Actors can include other nation

states, trans-national organizations, and population groups. For example, one subgroup may denying the legitimacy of the HN government and boycott elections while another sub-group accepts the legitimacy and participates. The perceptions are not limited to just the legitimacy of the HN central government but must include regional government, legislative bodies, law enforcement agencies, HN military, and even societal leaders (unions, religious leaders, etc).

Areas:	D-DIL-PSI Phases: 0, I, II, III, IV, V	
Missions:	SI	
Nouns:	HN government, populace, legitimacy, authority	
Verbs:	perceptions, attitudes, respond, support, trust	
Child of:		
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief	
A-D-11	Diplomatic Action to Support Training Host Nation Government Personnel	
A-D-13	Diplomatic Preparation for WMD Consequence Management	
A-D-03	Negotiations with Local Leaders	
A-D-05	Improvements to Host Nation Diplomatic Capabilities	
A-D-06	Diplomatic Actions to Prepare for Stability Operations	
A-D-09	Negotiating Refugee Safe Havens	
A-E-10	Economic Actions Supporting Joint Military Exercises	
A-E-11	Hiring of Host Country Nationals	
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy	
A-E-20	Spending to Support Rule of Law	
A-E-19	Spending in Support of Host Nation Ministry of Defense	
A-E-18	Spending in Support of Host Nation Ministry of Interior	
A-E-03	Building and Securing Host Nation Essential Services	
A-E-06	Mitigation of Long-term WMD Effects	
A-E-08	Establishing and Maintaining Logistical Support for Host Nation	
E-E-07	Effects of Combat Operations on the Economy	
A-I-06	Improvement of Host Nation Government Communication Networks	
A-L-01	Identification, Disruption, and Interdiction of Financial Support for Destabilizing Actors	
A-L-02	Identification, Disruption, and Interdiction of Institutional Support for Destabilizing Actors	
A-L-03	Identification, Disruption, and Interdiction of Local Support for Destabilizing Actors	
A-M-08	Improvement of Ministry of Defense	
A-E-17	Improvement of Ministry of Interior	
A-M-05	Actions Supporting Host Nation Counter-Insurgency	
E-I-03	Effects of Information Dissemination on Host Nation Government	
E-I-04	Effects of Information Dissemination on Host Nation Citizens	
E-M-01	Effects of Foreign Military Support/Operations on Host Nation Military	
E-P-12	Effects of Factional Group Activities	

E-N-01	Effects of Changes in Essential Public Services on Host Nation	
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation	
E-S-03	Effects of Restriction on Population Movement	
E-S-04	Effects of Societal Leaders	
A-L-04	Identification, Disruption, and Interdiction of Recruitment for	
	Destabilizing Actors	
A-E-14	Mitigation of Destabilizing Effects	
E-P-07	Destabilizing Effects	
A-D-18	Destabilization Operations	
A-I-08	Changing Influence/Exposure of Societal Leaders	
A-I-09	Changing/Shaping Message/Position of Societal Leaders	
E-E-10	Effects of Sanctions (Economic)	
A-D-20	Advocacy Actions by US Government	
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other	
	Minorities	
E-S-09	Effects of Discrimination in Host Nation	
	E-I-05 Effects of Independent Media Outlets on Perceptions and	
	Attitudes	
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population	
A-D-07	Support to Host Nation for Compliance with International	
	Conventions and Standards	
A-M-10	Military and Naval Presence	
E-P-10	Effects on Host Nation by Forward Bases	
A-M-11	War and Military Invasion	
A-E-09	Activities to Improve Infrastructure	
A-I-15	Information Operations	
A-L-08	Counter-Corruption Activities	
Peer of:		
E-P-01	Changes in Population Loyalty to Host Nation Government	
E-P-02	Changes in Political Involvement of Host Nation Citizens	
E-P-03	Changes in Government Structure or Functions	
E-P-04	Effects of External Group Involvement in Host Nation Politics	

E-P-06 Effects of Changes to Government Leadership

The DIME/PMESII model suite will represent Effects of Changes to Government Leadership due to DIME actions. The requirement includes changes in all types of leadership such as HN central government, regional government, political parties, and societal groups (religious, union, etc). The effects must include how power is redistributed; changes in interactions between actors taking account of past relationships; potential for destabilization due to uncertainty; changes in trust between actors; changes in power structure and influence networks; and any changes in diplomatic status (e.g. relations may be renewed or dissolved). The perception of legitimacy, history, and charisma/style/known ideologies of the new leader must also be included in the model and resulting effects.

Areas: --PESI Phases: 0, I, II, III, IV, V

HN government, leadership, regional government, political parties,
societal groups
change, interact, respond, perception, trust
Quality of Life Perception
Deterrence of Foreign/Proxy Attackers on Host Nation
Destabilizing Effects
Operations Against Criminal Syndicates
Changes in Host Nation Environment
Intelligence Operations on Host Nation Government
Changes in Population Loyalty to Host Nation Government
Counter-Corruption Activities
Changes in Political Involvement of Host Nation Citizens
Effects of External Group Involvement in Host Nation Politics
Mitigation of Destabilizing Effects
Destabilization Operations
Changing Influence/Exposure of Societal Leaders
Changing/Shaping Message/Position of Societal Leaders
Effects of Sanctions (Economic)
Stability Operations (Economic)
Advocacy Actions by US Government
Effects of Discrimination in Host Nation
Impact of Terrorist/Insurgent Groups on Host Nation Population
Needs Assessments Supporting Decision-Making
Effects of Trade Agreements on Economy
War and Military Invasion
Activities to Improve Infrastructure

E-P-07 Destabilizing Effects

The DIME/PMESII model suite will represent Destabilizing Effects due to DIME actions. The requirement includes the effects from a variety of destabilizing actions taken by various actors including diplomatic actions (establishment of negotiation pre-conditions; refusal to negotiate or communicate; and sending low-ranking emissaries; recognition of alternate governments), information campaign (propaganda dissemination; alternate view media outlets; disruption of media outlets), military and paramilitary support (training and material support for insurgents or reform groups; planning and intelligence support), economic actions (trade blockades; sanctions; freezing of assets; counterfeiting campaigns; tariffs), and legal actions (charges in world court; UN resolutions; internal political maneuverings between parties). The model must account for the full range of destabilizing effects across the full PMESII

Areas: -DIME-PMESIN Phases: 0, I, IV, V

Missions:	UW, DS, SI
Nouns:	diplomatic actions, media outlets, military and paramilitary,
	sanctions, tariffs, legal actions
Verbs:	establish, negotiate, communicate, training, disseminate, disrupt
Parent of:	
A-E-05	Economic Information Operations
A-M-07	Logistics
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-E-14	Mitigation of Destabilizing Effects
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
E-S-07	Migration
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
A-L-07	Enforcement of International Resolutions
A-M-10	Military and Naval Presence
A-L-08	Counter-Corruption Activities
Child of:	-
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-E-20	Spending to Support Rule of Law
E-E-07	Effects of Combat Operations on the Economy
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-P-06	Effects of Changes to Government Leadership
E-S-04	Effects of Societal Leaders
E-S-06	Epidemic Breakout
E-S-05	Impact to Stability and Security due to Events
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-D-18	Destabilization Operations
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
Peer of:	
A-E-06	Mitigation of Long-term WMD Effects
A-L-01	Identification, Disruption, and Interdiction of Financial Support for
	Destabilizing Actors
A-L-02	Identification, Disruption, and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption, and Interdiction of Local Support for
	Destabilizing Actors
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-P-12	Effects of Factional Group Activities

Effects of Changes in Essential Public Services on Host Nation
Changes in Government Structure or Functions
spectrum. E-S-02 Quality of Life Perception
Effects of Legislation, Law Enforcement, and Regulations
Deterrence of Foreign/Proxy Attackers on Host Nation
Identification, Disruption, and Interdiction of Recruitment for
Destabilizing Actors
Effects of Discrimination in Host Nation
Information Operations

E-P-08 Internal Repercussions of a Trans-National Organization's Actions Regarding Host Nation

The DIME/PMESII model suite will represent Internal Repercussions of a Trans-National Organization's Actions Regarding Host Nation due to DIME actions. This requirement includes the full range of PMESII internal effects for a trans-national organization due to the evolving scenario. This represents a type of internal response within the organization due to its actions (or inactions) regarding the HN. The trans-national organization could be the UN, WTO, an NGO, ideologically connected group, or a business.

Areas:	-I-P	Phases:	0, I, II, III, IV, V
Missions:	SI		
Nouns:	transnational organiza	tion, NGO	s, Un, WTO, business
Verbs:	respond, ignore, suppo	ort, provide	;
Child of:			
A-D-17	Multi-party Diplomati	ic Negotiati	ions
A-D-19	Deterrence		
E-E-10	Effects of Sanctions (I	Economic)	
A-L-07	Enforcement of Intern	ational Res	solutions
A-M-10	Military and Naval Pr	esence	
E-E-12	Effects of Trade Agre	ements on I	Economy
A-M-11	War and Military Inva	asion	
E-M-02	Effects of Multi-Natio	onal Exercis	ses on Military
E-M-03	Effects on Military du	e to Operat	tions
Peer of:			
A-M-05	Actions Supporting H	ost Nation	Counter-Insurgency
A-D-16	Establishing Relations	s In Absenc	e of State
A-D-12	Diplomatic-Like Inter	actions Bet	ween Organizations
E-S-09	Effects of Discriminat	tion in Host	t Nation
E-P-10	Effects on Host Nation	n by Forwa	rd Bases
E-P-11	Effects of Third-Party	External E	Diplomatic Actions

E-P-09 Internal Repercussions of an Outside Nation's Actions Regarding Host Nation

The DIME/PMESII model suite will represent Internal Repercussions of an Outside Nation's Actions Regarding Host Nation due to DIME actions. This requirement includes the full range of PMESII internal effects for a third-party nation due to the evolving scenario. This represents a type of internal response within the third-party nation due to its actions (or inactions) regarding the HN.

Areas:	-I-PESI	Phases:	0, I, II, III, IV, V
Missions:	SI		
Nouns:	third-party nation, H	N governm	ent
Verbs:	respond, ignore, supp	oort, provid	e
Child of:			
A-M-01	Response to WMD A	Attack	
A-M-02	Response to Convent	tional Attac	k
A-D-17	Multi-party Diploma	tic Negotiat	tions
A-D-18	Destabilization Oper	ations	
A-D-19	Deterrence		
E-E-10	Effects of Sanctions	(Economic))
A-L-07	Enforcement of Inter	national Re	solutions
A-M-10	Military and Naval P	resence	
E-E-12	Effects of Trade Agr	eements on	Economy
A-M-11	War and Military Inv	vasion	
E-M-02	Effects of Multi-Nati	onal Exerci	ises on Military
E-M-03	Effects on Military d	ue to Opera	ations
Peer of:			
A-M-05	Actions Supporting H	Host Nation	Counter-Insurgency
A-D-16	Establishing Relation	ns In Absen	ce of State
A-D-12	Diplomatic-Like Inte	ractions Be	tween Organizations
E-S-09	Effects of Discrimina	ation in Hos	st Nation
E-P-10	Effects on Host Natio	on by Forwa	ard Bases
E-P-11	Effects of Third-Part	y External 1	Diplomatic Actions

E-P-10 Effects on Host Nation by Forward Bases

The DIME/PMESII model suite will represent Effects on Host Nation by Forward Bases due to DIME actions. This requirement must include the impacts to the regional societies as well as the political, economic, infrastructure, military, and security impacts. The societal impacts include perception of HN and forward-based nation; attitudes regarding regional security and stability; perception of legitimacy of forward-based nation's presence; and perception of favoritism or bias. The impacts to diplomatic relations in the region must also be represented.

Areas:	-DM-PESIN Phases:	0, I, IV, V
Missions:	FID, HA/DR, TSC, DS, SI	
Nouns:	HN government, HN military, H	IN citizens, society, regional
	stability and security, diplomatic	c relations
Verbs:	perception, support, attitudes, re	espond, deter, provoke

Parent of:

A-I-07	Establishment & Support of Information Exchange Program
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-05	Changes in Perception of Government/Authority Legitimacy
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
A-M-11	War and Military Invasion
A-E-09	Activities to Improve Infrastructure
E-M-02	Effects of Multi-National Exercises on Military
E-M-03	Effects on Military due to Operations
Child of:	
E-S-06	Epidemic Breakout
A-D-18	Destabilization Operations
A-D-19	Deterrence
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
A-M-10	Military and Naval Presence
Peer of:	
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation

E-P-11 Effects of Third-Party External Diplomatic Actions

The DIME/PMESII model suite will represent Effects of Third-Party External Diplomatic Actions due to DIME actions. This requirement includes all the impacts on an actor due to diplomatic activities between two or more other actors (e.g. alliances between other nations, multi-nation exercises not including present actor, etc.). Diplomatic activities include agreements (alliances, military, economic, law enforcement, information sharing), demonstrations of force/capabilities, information operations, and any other collection of activities which may impact the actor. This requirement takes into account the impact of the outside world on an actor (especially on the HN). This requirement must include the full political, military, economic, and social impacts associated with these external diplomatic activities. The impacts are not limited to nation-state actors, though they are the most likely, but must include insurgent groups, criminal organizations (including pirates), people groups, and NGOs.

Areas:	-DI-PME	Phases:	0, I, II, III, IV, V
Missions:			
Nouns:	multi-nations, all groups, criminal	iances, military organizations,	v, law enforcement, insurgent NGOs
Verbs:	support, influenc	e, negotiate, de	monstrate
Parent of:			

E-E-10	Effects of Sanctions (Economic)
A-L-07	Enforcement of International Resolutions
E-E-12	Effects of Trade Agreements on Economy
Child of:	
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes
Peer of:	
A-D-16	Establishing Relations In Absence of State
A-D-17	Multi-party Diplomatic Negotiations
A-D-12	Diplomatic-Like Interactions Between Organizations
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
A-M-11	War and Military Invasion
A-I-15	Information Operations
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

E-P-12 Effects of Factional Group Activities

The DIME/PMESII model suite will represent Effects of Factional Group Activities due to DIME actions. This requirement includes all the impacts of a legitimate faction or group. Potential activities must include participation in the political process, information/education campaigns, membership drives, and societal initiatives. Factions must include groups linked by religious, political, or social ideology; unions; ethnic groups; fringe political parties; and groups linked by historical or regional similarities. The potential for illegal actions by legitimate factions and the resulting impacts must be included (e.g. money laundering). Illegal or illegitimate groups such as insurgents and crime syndicates are not included here.

0	
Areas:	-IE-PMESI Phases: 0, IV, V
Missions:	
Nouns:	faction, group, HN government, HN population
Verbs:	respond, influence, participate
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
E-S-09	Effects of Discrimination in Host Nation
Child of:	
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-D-18	Destabilization Operations
A-D-12	Diplomatic-Like Interactions Between Organizations
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots

Peer of:	
E-P-07	Destabilizing Effects
A-D-17	Multi-party Diplomatic Negotiations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-D-20	Advocacy Actions by US Government
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

E-M Military Effects

E-M-01 Effects of Foreign Military Support/Operations on Host Nation Military

The DIME/PMESII model suite will represent Effects of Foreign Military Support/Operations on Host Nation Military due to DIME actions. In addition to the potential benefits of increased operational capability, training, information sharing, infrastructure improvements, and equipment maintenance, the potential negative effects must also be included (demoralization, negative perception by HN citizenship, resentment within HN military, atrophy of capabilities). The effects on governmental paramilitary organizations (customs, police, border security) must also be included. The effects of military-on-military combat actions are not included here.

Aroos	$\mathbf{DMI} \mathbf{DM} \qquad \mathbf{Dhaces} 0 \mathbf{I} \mathbf{II} \mathbf{III} \mathbf{IV} \mathbf{V}$
Aleas.	-DNIL-FIN FILASES. 0, 1, 11, 11, 1V, V
Missions:	COIN, FID, SIB/R, SSTR, BPC, TSC, DS, SI
Nouns:	HN military, foreign military, HN population, paramilitary,
	presence
Verbs:	support, influence, train, information sharing, maintain, respond,
	actions
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
Child of:	
A-D-14	Diplomatic Actions for Multi-National Exercises
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-10	Economic Actions Supporting Joint Military Exercises
A-E-02	Building and Securing Lines of Communication
E-M-02	Effects of Multi-National Exercises on Military
Peer of:	
A-M-08	Improvement of Ministry of Defense
A-M-04	Military Training
A-M-06	Military Exercises
A-D-19	Deterrence
A-D-21	Security and Law Enforcement for US
E-M-03	Effects on Military due to Operations

E-M-02 Effects of Multi-National Exercises on Military

The DIME/PMESII model suite will represent Effects of Multi-National Exercises on Military due to DIME actions. This requirement includes the impacts for each participant, such as improved operational capabilities and morale.

Areas:	-DM-PM Phases: 0, I, V
Missions:	TSC, DS, SI
Nouns:	HN, international community, exercises, multi-nation, morale
Verbs:	participate, cooperate, coordinate, conduct, train, influence
Parent of:	
E-M-01	Effects of Foreign Military Support/Operations on Host Nation Military
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
A-M-11	War and Military Invasion
Child of:	
O-E-03	Actions in Preparation for Anticipated and Scheduled Events
O-E-04	Weather Impacts to Decision-making and Military Operations
A-D-17	Multi-party Diplomatic Negotiations
A-D-19	Deterrence
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-D-21	Security and Law Enforcement for US
E-P-10	Effects on Host Nation by Forward Bases
Peer of:	
A-M-08	Improvement of Ministry of Defense
A-M-04	Military Training
A-M-06	Military Exercises
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-M-10	Military and Naval Presence
E-M-03	Effects on Military due to Operations

E-M-03 Effects on Military due to Operations

The DIME/PMESII model suite will represent Effects on Military due to Operations due to DIME actions. This requirements includes all the effects (including attrition) associated with military operations above the normal peace-time operations tempo. Effects must include wear-and-tear on equipment and personnel retention as well as improved warfighting skills and changes in public perception of military. Long-term impacts include reconstitution of the force.

Areas:	-M-PM	Phases:
Missions:	CW, COIN, FID	

Nouns:	personnel retention, attrition, equipment, warfighting skills, HN
	population, perception
Verbs:	maintain, repair, retain, improve, support
Parent of:	
E-P-08	Internal Repercussions of a Trans-National Organization's Actions Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding Host Nation
A-M-11	War and Military Invasion
Child of:	
A-M-04	Military Training
A-M-06	Military Exercises
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation
A-D-19	Deterrence
A-L-06	Martial Law and Law Enforcement Operations
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
A-D-21	Security and Law Enforcement for US
E-P-10	Effects on Host Nation by Forward Bases
Peer of:	·
A-M-08	Improvement of Ministry of Defense
E-M-01	Effects of Foreign Military Support/Operations on Host Nation Military
A-M-10	Military and Naval Presence
E-M-02	Effects of Multi-National Exercises on Military

E-E Economic Effects

E-E-01 Changes in the Domestic Production by Economic Sector and Region

The DIME/PMESII model suite will represent Changes in the Domestic Production by Economic Sector and Region due to DIME actions. The requirement includes effects for all DIME actions as well as other events (disasters, market crashes, regime changes, war, etc).

Areas:	E-DIMEL-PESN Phases: 0, I, II, III, IV, V
Missions:	CW, CM, FID, HA/DR, SIB/R, EA
Nouns:	HN economy, goods/services, GDP, inflation, war, regime
	changes, disasters, HN market, HN financial
Verbs:	observe, respond, support, exchange, operate
Child of:	
A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
E-E-09	Economic Response Rule of Law Enforcement
A-E-19	Spending in Support of Host Nation Ministry of Defense

A-E-03	Building and Securing Host Nation Essential Services
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-E-17	Improvement of Ministry of Interior
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
Peer of:	
A-E-05	Economic Information Operations
A-E-07	Economic Intelligence Operations
E-E-07	Effects of Combat Operations on the Economy
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)

E-E-02 Changes in the Flow of Capital

The DIME/PMESII model suite will represent Changes in the Flow of Capital due to DIME actions. The requirement includes all forms of capital such as currencies and tradable goods; actionable economic information and professional services; and the availability of credit, investment instruments, and investment activities. Note that changes in the cost of goods and services; consumer spending and saving habits; and investor activities must be included since these impact the flow of capital. All significant redistribution of wealth efforts by government, charities, or social groups/organizations must also be included. The model must represent these effects for all DIME actions as well as other events (disasters, market crashes, regime changes, war, etc).

Areas:	E-DIEL-ESI	Phases:	0, I, II, III,	IV, V	
Missions:	CW, UW, EA				
Nouns:	HN economy, good	s/services, cu	urrency, HN	populati	ion, wealth,
	HN financial institu	tions			
Verbs:	distribute, earn, pro	vide, acquir	e		
Child of:					
A-D-14	Diplomatic Actions	for Multi-Na	ational Exer	cises	
A-E-01	Establishing Dis	stribution	Centers	for	Humanitarian
	Assistance/Disaster	Relief			
A-E-11	Hiring of Host Cour	ntry National	s		
E-E-08	Effects of Noncomb	atant Evacua	ation Operat	ions on t	the Economy

E-E-09	Economic Response Rule of Law Enforcement
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
A-L-08	Counter-Corruption Activities
Peer of:	
A-E-05	Economic Information Operations
A-E-07	Economic Intelligence Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates

E-E-03 Changes in Host Nation Wealth/Income Distributions

The DIME/PMESII model suite will represent Changes in Host Nation Wealth/Income Distributions due to DIME actions. The requirement includes the effects of income changes and flow of wealth on HN population such as improvements to quality of life, perception on HN government effectiveness, support for dissidents, and long-term outlook. The economic effects (increase demand for goods/services, expansion of tax-base, etc) must also be included.

goods/services,	expansion of iax	ouse, erej must a	iso be mem	ucu.	
Areas:	E-DIEL-E	Phases:	0, I, II, III	, IV, V	
Missions:	CW, UW, EA				
Nouns:	HN governmer per capita inco	nt, goods/services me	s, HN popula	ation, qu	ality of life,
Verbs:	improve, suppo	ort, perception			
Parent of:					
E-S-11	Effects of Mas	ss Gatherings, St	rikes, Civil	Disobec	lience, Protests,
Child of:	& RIOIS				
A-E-01	Establishing Assistance/Dis	Distribution aster Relief	Centers	for	Humanitarian
A-E-11	Hiring of Host	Country Nationa	ls		
E-E-08	Effects of Non	combatant Evacu	ation Opera	tions on	the Economy

E-E-09	Economic Response Rule of Law Enforcement
A-E-03	Building and Securing Host Nation Essential Services
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
Peer of:	
A-E-05	Economic Information Operations
A-E-07	Economic Intelligence Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates

E-E-04 Effects on Markets

The DIME/PMESII model suite will represent Effects on Markets due to DIME actions. The requirement includes effects such as changes in prices; availability of goods, raw materials, production capacity; and labor availability for the full spectrum of market types (open, black, hidden, and labor). These effects could be the result of government regulation, trade restrictions, flow of capitol, new opportunities, uncertainty in market/politics, changes in consumer behavior (saving, purchasing), demographic trends, and government

spending.	
Areas:	E-DIMEL-EIN Phases: 0, I, II, III, IV, V
Missions:	CW, UW, EA, LE
Nouns:	HN economy, goods/services, prices, raw materials, labor,
	markets, consumer behavior, demographic trends
Verbs:	produce, distribute
Child of:	
A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-E-13	Establishing and Maintaining Refugee Camps
A-E-20	Spending to Support Rule of Law
E-E-09	Economic Response Rule of Law Enforcement

A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-03	Building and Securing Host Nation Essential Services
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-E-17	Improvement of Ministry of Interior
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
Peer of:	
A-E-05	Economic Information Operations
A-E-07	Economic Intelligence Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates

E-E-05 Changes in the Availability, Cost, and Distribution of Goods and Services

The DIME/PMESII model suite will represent Changes in the Availability, Cost, and Distribution of Goods and Services due to DIME actions. The requirement includes changes due actions such as political and policy changes; diplomatic relationships and agreements; information campaigns or population education; economic actions (infrastructure *improvement*, foreign investment, capitol availability, imports/exports, etc.); and law enforcement activities. The model must represent changes in capacity, quality, cost, and viability; differentiate between short-term and long-term changes; impacts to and due to wages, labor availability, and associated productive and technical skills; social, political, security, and economic stability; and long-term foreign trade balance for sustainable economic growth. Perception of work force, consumer markets, and investors on prospects must also be included.

U U	1 1
Areas:	-IEL-E Phases: 0, I, II, III, IV, V
Missions:	CW, UW, CM, FID, HA/DR, SIB/R, EA, LE, SI
Nouns:	goods and services, diplomatic relationships and markets
	agreements, HN population, education, law
Verbs:	distribute, acquire, provide, produce, train, respond
Parent of:	
A-I-01	Intelligence Operations on Host Nation Conditions

Child of:	
A-E-01	Establishing Distribution Centers for Humanitarian
	Assistance/Disaster Relief
E-E-08	Effects of Noncombatant Evacuation Operations on the Economy
A-E-13	Establishing and Maintaining Refugee Camps
E-E-09	Economic Response Rule of Law Enforcement
A-E-02	Building and Securing Lines of Communication
A-E-03	Building and Securing Host Nation Essential Services
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-M-01	Response to WMD Attack
A-E-17	Improvement of Ministry of Interior
A-M-02	Response to Conventional Attack
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
A-L-08	Counter-Corruption Activities
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
Peer of:	
A-E-05	Economic Information Operations
A-E-07	Economic Intelligence Operations
E-E-07	Effects of Combat Operations on the Economy
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-S-02	Quality of Life Perception
A-E-14	Mitigation of Destabilizing Effects
A-D-18	Destabilization Operations
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates
E-E-11	Effects of Industrialization on Host Nation
E-E-12	Effects of Trade Agreements on Economy

E-E-06 Effects of Human Resources Training on Economy

The DIME/PMESII model suite will represent Effects of Human Resources Training on Economy due to DIME actions. This requirement includes the social, political, and economic impacts such as raising expectations; increased competitiveness; and economic expansion/diversification/efficiency. Secondary impacts include demands on educational infrastructure; increased political involvement

growth of m	hiddle class; change in demand for goods and services; expansion tax
	base; potential to transform society at large; and improved quality
	of military and law enforcement recruits.
Areas:	-IEL-PMES Phases: 0, V
Missions:	EA, SI
Nouns:	employment, HN population, HN citizens, HN government,
	political parties, goods/services, society, military, law enforcement
Verbs:	retain, improve, distribute, produce, provide, involvement,
	enhance, recruit
Child of:	
A-E-11	Hiring of Host Country Nationals
A-E-16	Stability Operations (Economic)
E-E-11	Effects of Industrialization on Host Nation
A-E-09	Activities to Improve Infrastructure
A-I-16	Training of Host Nation Government Personnel
A E 21	Spanding for / Davalopment of Other Host Nation Ministries and

A-E-21 Spending for / Development of Other Host Nation Ministries and Agencies

E-E-07 Effects of Combat Operations on the Economy

The DIME/PMESII model suite will represent Effects of Combat Operations on the Economy due to DIME actions. The requirement includes the effect combat operations and supporting activities have on the HN economy. The near-term economic effects of trade disruption, infrastructure damage, and security uncertainty are also included as well as the long-term effects of supporting activities and local employment.

1 2	
Areas:	-M-PMESIN Phases: III, IV
Missions:	CW, UW, FID, HA/DR, EA
Nouns:	HN economy, combat operations, infrastructure, military, trade,
Verbs	quality of life, goods, markets, trade, sanctions, perception
v ci 03.	restrict operate monitor negotiate
Parant of	restrict, operate, monitor, negotiate
A-E-07	Economic Intelligence Operations
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-02	Quality of Life Perception
E-P-07	Destabilizing Effects
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-11	Hiring of Host Country Nationals
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
A-M-04	Military Training
A-M-06	Military Exercises
A-L-06	Martial Law and Law Enforcement Operations

A-M-10	Military and Naval Presence
A-M-11	War and Military Invasion
Peer of:	
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-10	Effects of Sanctions (Economic)
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population

E-E-08 Effects of Noncombatant Evacuation Operations on the Economy

The DIME/PMESII model suite will represent Effects of Noncombatant Evacuation Operations on the Economy due to DIME actions. In addition to the economic impact of evacuation of HN citizens and foreign mission personnel (embassy, military attaches, etc), the requirement must also account for long-term economic impacts associated with evacuation of HN citizens employed by or otherwise supporting the embassy, the military, and other government agencies.

Areas:	-DM-PES Phases: II, III
Missions:	CM, HA/DR, NEO, EA
Nouns:	NEO, evacuation, population, production, goods, HN government,
	international community, HN populace, HN businesses, stock
	market; essential services
Verbs:	evacuate, trade, provide, conduct, operate, monitor
Parent of:	
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-P-07	Destabilizing Effects
Child of:	
A-D-01	Support to the Ambassador
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-M-03	Foreign Non-Combatant Evacuation Operations
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country
	Nationals

E-E-09 Economic Response Rule of Law Enforcement

The DIME/PMESII model suite will represent Economic Response Rule of Law Enforcement due to DIME actions. The requirement includes the resulting increased tax revenues and associated governmental services; improved business climate (increased certainty in system, improved stability); impact to markets (open, hidden, black); increase in investment options and changes in long-term investment habits; increased security of life, property, and legal rights; increased security of movement (goods and people); increased customs control; improved quality of goods and services due to regulatory review; improved quality of life and domestic production; and the associated secondary economic political and societal impacts

Areas:	-EL-PESIN Phases: 0, IV, V
Missions:	SIB/R, EA, LE
Nouns:	rule of law, population, production, goods, markets, trade,
	sanctions
Verbs:	enforce, conduct, monitor, negotiate
Parent of:	-
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-E-20	Spending to Support Rule of Law
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-L-08	Counter-Corruption Activities
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots
A-L-09	Improvement of Legal and Law Enforcement Ministries

E-E-10 Effects of Sanctions (Economic)

The DIME/PMESII model suite will represent Effects of Sanctions (Economic) due to DIME actions. The requirement includes the effects of all types of sanctions (economic, technology, information, contacts, employment opportunities, contracting opportunities, etc) and the resulting economic impacts. The secondary economic impacts (uncertainty in local economy, reduction in market's ability to meet demand, reduction in investment capitol, changes in quality of life, etc) must also be included. Note that sanctions can be apply to a wide range of actors (nation states, regions, political/religious/ethnic groups, etc) and may include unwarranted

Areas:	-DIE-PES	Phases:	I, IV	
Missions:	DS, EA, SI			
Nouns:	sanctions, HN ed	conomy, market	s, investment capital, quality of li	ife

Verbs:	discrimination, enhance, reduce, enforce, develop
Parent of:	
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-05	Economic Information Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
E-S-02	Quality of Life Perception
E-S-06	Epidemic Breakout
E-E-13	Effects of Changes in Host Nation Infrastructure
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
Child of:	
A-D-17	Multi-party Diplomatic Negotiations
A-D-18	Destabilization Operations
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-L-07	Enforcement of International Resolutions
E-P-11	Effects of Third-Party External Diplomatic Actions
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
D	& Riots
Peer of:	
E-E-07	Effects of Combat Operations on the Economy
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-06	Effects of Changes to Government Leadership
A-E-14	Mitigation of Destabilizing Effects

E-E-11 Effects of Industrialization on Host Nation

The DIME/PMESII model suite will represent Effects of Industrialization on Host Nation due to DIME actions. This requirement includes the secondary impacts associated with industrialization such as economic (fiscal policy, banking systems, changes in credit/investment systems), social (demographic shifts, urbanization, perceptions/growing expectations) environmental (pollution, demand for raw materials/water/energy), political (regulation, unionization and professionalization of work-force, develop of interest industrial groups), and infrastructure (loads on distribution, educational, power production, urban essential services, communication systems). Long-term impacts include decreasing family sizes, changes in gender division of labor, and shifts in cultural attitudes/norms/values.

Areas:	-E-PESN Phases: 0, V
Missions:	EA
Nouns:	HN economy, banking systems, financial institutions, population, raw materials, water, workforce, industrial
Verbs:	improve, observe, support, provide, distribute, hire, employ, perception
Parent of:	
A-I-01	Intelligence Operations on Host Nation Conditions
E-E-01	Changes in the Domestic Production by Economic Sector and Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
E-E-06	Effects of Human Resources Training on Economy
E-N-03	Changes in Host Nation Environment
Child of:	
A-E-06	Mitigation of Long-term WMD Effects
A-E-17	Improvement of Ministry of Interior
A-E-09	Activities to Improve Infrastructure
A-L-08	Counter-Corruption Activities
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies
Peer of:	
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-03	Building and Securing Host Nation Essential Services
A-E-05	Economic Information Operations
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-E-13	Effects of Changes in Host Nation Infrastructure
E-E-12	Effects of Trade Agreements on Economy

E-E-12 Effects of Trade Agreements on Economy

The DIME/PMESII model suite will represent Effects of Trade Agreements on Economy due to DIME actions. This requirement includes all economic impacts such as changes to the labor force; availability of goods and services; movement of

capitol; changes in demand signal from the industrial and infrastructure base; and HN citizen perceptions on quality of life. The economic impacts of international agreements (e.g. inclusion into WTO, UN sanctions/embargoes, free-trade pacts) must also be included. The requirement must represent these effects due to tariffs, subsidies, protectionism, special agreements, sanctions/embargoes, or economic incentives (e.g. price wars).

Areas:	-DE-PESN Phases: 0, V
Missions:	EA, SI
Nouns:	HN economy, labor force, goods/services, capital, infrastructure,
	HN citizens, international agreements
Verbs:	employ, change, hire, distribute, produce, increase/decrease,
	improve, negotiate, develop, perception
Parent of:	
A-E-07	Economic Intelligence Operations
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-08	Internal Repercussions of a Trans-National Organization's Actions
	Regarding Host Nation
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding
	Host Nation
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
E-N-03	Changes in Host Nation Environment
A-E-09	Activities to Improve Infrastructure
Child of:	1
A-D-17	Multi-party Diplomatic Negotiations
A-E-16	Stability Operations (Economic)
A-D-20	Advocacy Actions by US Government
A-L-07	Enforcement of International Resolutions
E-P-11	Effects of Third-Party External Diplomatic Actions
A-L-08	Counter-Corruption Activities
Peer of:	1
A-E-05	Economic Information Operations
A-I-01	Intelligence Operations on Host Nation Conditions
E-E-05	Changes in the Availability. Cost. and Distribution of Goods and
	Services
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-06	Effects of Changes to Government Leadership
E-E-13	Effects of Changes in Host Nation Infrastructure
A-D-12	Diplomatic-Like Interactions Between Organizations
E-E-11	Effects of Industrialization on Host Nation

E-E-13 Effects of Changes in Host Nation Infrastructure

The DIME/PMESII model suite will represent Effects of Changes in Host Nation Infrastructure due to DIME actions. The changes can be either improvements due to construction / maintenance or degradations due to deterioration or damage (natural or man-caused). The requirement includes infrastructure such as transportation and distribution networks (airports, railways, roads); communication and information technologies; and essential services. The requirement must include the impact on military mobility and law enforcement capability; these capabilities need to be considered in future decisions by all actors. The undesirable effects must also be included such as increased insurgent and criminal mobility/capability; creation of new targets/vulnerabilities; new avenues of attack. The impacts of spending associated with improvement and maintenance of these infrastructures are included elsewhere.

Areas:	-E-PMEN Phases: 0, I, II, III, IV, V
Missions:	BPC, EA
Nouns:	HN economy, HN population, infrastructure
Verbs:	improve, construct, repair
Parent of:	
A-E-07	Economic Intelligence Operations
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-02	Quality of Life Perception
E-S-03	Effects of Restriction on Population Movement
E-S-07	Migration
E-N-03	Changes in Host Nation Environment
Child of:	
A-D-14	Diplomatic Actions for Multi-National Exercises
A-E-10	Economic Actions Supporting Joint Military Exercises
A-E-13	Establishing and Maintaining Refugee Camps
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-03	Building and Securing Host Nation Essential Services
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-M-01	Response to WMD Attack
A-E-17	Improvement of Ministry of Interior
A-M-02	Response to Conventional Attack
A-M-07	Logistics
E-E-10	Effects of Sanctions (Economic)
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
E-P-10	Effects on Host Nation by Forward Bases
A-M-11	War and Military Invasion
----------	--
A-E-09	Activities to Improve Infrastructure
Peer of:	
A-E-05	Economic Information Operations
E-E-07	Effects of Combat Operations on the Economy
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-06	Improvement of Host Nation Government Communication
	Networks
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-03	Changes in Government Structure or Functions
E-E-11	Effects of Industrialization on Host Nation
E-E-12	Effects of Trade Agreements on Economy

E-S Societal Effects

E-S-01 Effect of Foreign Presence on Host Nation Norms and Behaviors

The DIME/PMESII model suite will represent Effect of Foreign Presence on Host Nation Norms and Behaviors due to DIME actions. The requirement includes the full range of short-term and long-term behavioral changes. Long-term changes must include including consumer spending, civility, gender-based behaviors, recreational habits, and social value shifts due to an outside cultural influencer. The secondary effects due to these behavioral changes (e.g. economic trends, creation of generation gaps, change resistance from population segments, evolution of political thought, change in expectations/perceptions) must also be included.

Areas:	-D-S Phases: 0, I, II, III, IV, V
Missions:	COIN, FID, HA/DR, BPC, TSC
Nouns:	behavior, HN population, foreigners, culture, HN economy, status,
	well-bring
Verbs:	influence, change, perception, involvement, observe
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-E-11	Hiring of Host Country Nationals
A-E-18	Spending in Support of Host Nation Ministry of Interior
E-M-01	Effects of Foreign Military Support/Operations on Host Nation
	Military
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-14	Mitigation of Destabilizing Effects
E-E-10	Effects of Sanctions (Economic)
E-E-11	Effects of Industrialization on Host Nation
A-L-07	Enforcement of International Resolutions
A-M-10	Military and Naval Presence
A-M-11	War and Military Invasion
E-N-03	Changes in Host Nation Environment

O-D-04	Perception of Environment, Actions, and Events
A-E-09	Activities to Improve Infrastructure
E-M-02	Effects of Multi-National Exercises on Military
Peer of:	
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-S-02	Quality of Life Perception

E-S-02 Quality of Life Perception

The DIME/PMESII model suite will represent Quality of Life Perception due to DIME actions. The requirement includes all aspects of quality of life perception (economic, security, future prospects, stability, political legitimacy, etc) as viewed from the societies value set. The secondary effects associated with movement in quality of life (changes in demands for goods/services, expectations for future growth or opportunities, establishment of greater societal goals) must also be included as well as the impacts these have on the HN

Areas:	-IE-PS Phases: 0, IV, V
Missions:	SI
Nouns:	HN economy, security, well-being, family, values, goods/services, opportunities
Verbs:	improve, changes, access, acquire, establish, expect
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief
E-E-09	Economic Response Rule of Law Enforcement
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-02	Building and Securing Lines of Communication
A-E-03	Building and Securing Host Nation Essential Services
A-E-04	Repatriation / Relocation Efforts
A-E-05	Economic Information Operations
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-E-07	Effects of Combat Operations on the Economy
A-M-01	Response to WMD Attack
A-E-17	Improvement of Ministry of Interior
A-M-02	Response to Conventional Attack
A-M-07	Logistics
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-06	Effects of Changes to Government Leadership
E-S-06	Epidemic Breakout
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-14	Mitigation of Destabilizing Effects
E-E-13	Effects of Changes in Host Nation Infrastructure
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders

A-I-09	Changing/Shaping Message/Position of Societal Leaders
E-E-10	Effects of Sanctions (Economic)
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population
A-L-07	Enforcement of International Resolutions
E-N-03	Changes in Host Nation Environment
A-E-09	Activities to Improve Infrastructure
A-I-15	Information Operations
A-L-10	Barely Legal, Extra-Legal, and Criminal Activities
Peer of:	
E-E-01	Changes in the Domestic Production by Economic Sector and
	Region
E-E-02	Changes in the Flow of Capital
E-E-03	Changes in Host Nation Wealth/Income Distributions
E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors
E-S-03	Effects of Restriction on Population Movement
E-S-04	Effects of Societal Leaders
E-S-05	Impact to Stability and Security due to Events
E-P-07	Destabilizing Effects
E-S-07	Migration

E-S-03 Effects of Restriction on Population Movement

The DIME/PMESII model suite will represent Effects of Restriction on Population Movement due to DIME actions. The requirement includes limitation due to law, government regulations, and martial law; regional security, quarantines, borders, and check-points; local autocratic restrictions (criminal syndicates, renegade authority, brigands). The effects impacts must include changes in trade, security, popular sentiment, etc. Self-imposed movement restrictions due to safety, fear, and economics fall under decision-making

Areas:	-ML-PESI Phases: 0, IV, V
Missions:	CM, FID
Nouns:	government regulations, martial law, regional security, trade, security, mobility, opportunity, well-being
Verbs:	impose, enforce, restrict, provide
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-07	Migration
Child of:	

A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-M-05	Actions Supporting Host Nation Counter-Insurgency
A-M-07	Logistics
E-S-06	Epidemic Breakout
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
E-E-13	Effects of Changes in Host Nation Infrastructure
A-D-18	Destabilization Operations
A-L-06	Martial Law and Law Enforcement Operations
E-S-09	Effects of Discrimination in Host Nation
A-L-07	Enforcement of International Resolutions
A-M-11	War and Military Invasion
Peer of:	
A-E-02	Building and Securing Lines of Communication
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-S-02	Quality of Life Perception
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,
	& Riots

E-S-04 Effects of Societal Leaders

The DIME/PMESII model suite will represent Effects of Societal Leaders due to DIME actions. Societal leaders can effect both society and all its sub-components (political, economic, etc). These effects are due to their influence on perceptions, attitudes, and social norms and ultimately social behavior which manifests as effects such as economic (boycotts), political (vote influencing, shaping political platforms), military (troop morale or loyalty), information (focused rhetoric), and infrastructure (energizing construction and improvement activities e.g. habitat for humanity).

Areas:	-I-S Phases:
Missions:	HA/DR, SIB/R, SI
Nouns:	leaders, HN population, society, well-being, status, beliefs
Verbs:	influence, change, perception, involvement, observe
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-05	Impact to Stability and Security due to Events
E-P-07	Destabilizing Effects
E-S-07	Migration
Child of:	
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-I-15	Information Operations
A-L-10	Barely Legal, Extra-Legal, and Criminal Activities
Peer of:	

- E-P-02 Changes in Political Involvement of Host Nation Citizens
- E-S-02 Quality of Life Perception

E-S-05 Impact to Stability and Security due to Events

The DIME/PMESII model suite will represent Impact to Stability and Security due to Events for pertinent actions and effects across the DIME/PMESII elements. The requirement includes all impacts due to scheduled, anticipated, and unscheduled events.

Areas:	E-DIMEL-PMESN Phases: 0, IV, V
Missions:	
Nouns:	weather, stability, security populace
Verbs:	observe, mitigate, respond
Parent of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
A-E-19	Spending in Support of Host Nation Ministry of Defense
A-E-18	Spending in Support of Host Nation Ministry of Interior
E-P-01	Changes in Population Loyalty to Host Nation Government
E-S-08	Effects of Legislation, Law Enforcement, and Regulations
A-E-14	Mitigation of Destabilizing Effects
E-P-07	Destabilizing Effects
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-M-10	Military and Naval Presence
Child of:	·
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
E-S-04	Effects of Societal Leaders
A-D-18	Destabilization Operations
A-D-19	Deterrence
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
A-M-11	War and Military Invasion
A-L-10	Barely Legal, Extra-Legal, and Criminal Activities
Peer of:	
A-E-11	Hiring of Host Country Nationals
A-E-20	Spending to Support Rule of Law
E-S-02	Quality of Life Perception
E-S-10	Impact of Terrorist/Insurgent Groups on Host Nation Population

E-S-06 Epidemic Breakout

The DIME/PMESII model suite will represent Epidemic Breakout due to DIME actions. The requirement includes all aspects of epidemic breakouts such as prevention; preparation and mitigation; and the impacts of breakouts. Preventative

actions include immunizations, infrastructure improvements (clean water, sewage, etc), population education, medical training, and intelligence collection on medical cases. Preparations include medical stores, planning, population education, and pre-positioning while mitigation actions include quarantines, intelligence collection, plan execution, information operations to quell fears, and other appropriate HA/DR actions. The impacts of breakouts include political fall-out, break-down in security, lack of goods or services, potential impact to infrastructure capabilities, fear and mistrust, disinformation, migration, and other disaster-related impacts.

Areas:	E-IEL-PESI Phases: 0, I, II, III, IV, V
Missions:	HA/DR, DS
Nouns:	disease, HN government, leadership, infrastructure, food, water,
	medical supplies, personnel, storage, security
Verbs:	prevent, prepare, mitigate, train, intell collection, educate,
	dissemination, protect, distribute, produce, provide
Parent of:	
E-S-02	Quality of Life Perception
E-S-03	Effects of Restriction on Population Movement
A-E-12	Humanitarian Assistance/Disaster Relief Operations
A-E-14	Mitigation of Destabilizing Effects
E-P-07	Destabilizing Effects
A-I-10	Intelligence Collection to Support Host Nation
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
E-P-10	Effects on Host Nation by Forward Bases
A-E-09	Activities to Improve Infrastructure
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-09	Negotiating Refugee Safe Havens
E-E-10	Effects of Sanctions (Economic)
E-S-07	Migration
E-N-03	Changes in Host Nation Environment
A-E-21	Spending for / Development of Other Host Nation Ministries and Agencies
Peer of:	
A-E-04	Repatriation / Relocation Efforts

E-S-07 Migration

The DIME/PMESII model suite will represent Migration due to DIME actions. This requirement includes all types of migration such as long-term economic migration and short-term forced migration. Forced migration can be due to security concerns (war, invasion, lawlessness), lack of basic needs (food, water, heating fuel), physical danger (threats, violence, epidemics), evacuations, or forced resettlement. The model must represent a range of migration scales (number of people involved) and from a variety of geographic areas (including interstate migration). The primary

and secondary impacts of migration on all actors in the region must be included (e.g. economic, social, security, infrastructure, political). The model must account for the causes of migration and permit trans-national migration. The impacts associated with migration between regions and nations must also be included as well as the impacts to the refugees/migrants, their regions of transit; and their surroundings (environmental impacts, changes in local economy, security, stability, etc). The movements of nomadic groups must also be included.

Areas:	-MEL-PMESN Phases: 0, I, II, III, IV, V
Missions:	CW, UW, EA, LE
Nouns:	security, resettlement, HN citizens, HN population, basic needs,
	refugees
Verbs:	move, produce, provide, observe, support
Parent of:	
A-E-07	Economic Intelligence Operations
E-S-06	Epidemic Breakout
A-D-16	Establishing Relations In Absence of State
A-I-14	Needs Assessments Supporting Decision-Making
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-09	Negotiating Refugee Safe Havens
A-M-01	Response to WMD Attack
A-M-02	Response to Conventional Attack
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-S-03	Effects of Restriction on Population Movement
E-S-04	Effects of Societal Leaders
E-P-07	Destabilizing Effects
E-E-13	Effects of Changes in Host Nation Infrastructure
A-E-15	Economic Development Supporting Disaster Recovery
A-L-05	Operations Against Criminal Syndicates
E-N-03	Changes in Host Nation Environment
O-D-04	Perception of Environment, Actions, and Events
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies
Peer of:	
A-E-02	Building and Securing Lines of Communication
A-E-04	Repatriation / Relocation Efforts
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-P-01	Changes in Population Loyalty to Host Nation Government

E-S-02 Quality of Life Perception

E-S-08 Effects of Legislation, Law Enforcement, and Regulations

The DIME/PMESII model suite will represent Effects of Legislation, Law Enforcement, and Regulations due to DIME actions. The requirement also includes political, economic, and informational impacts. Individual and group behavioral changes must also be included.

entanges must a	
Areas:	-IL-PESI Phases: 0, IV, V
Missions:	LE, SI
Nouns:	government, laws, population, supporters
Verbs:	enforce, oppose, respond, support
Parent of:	
E-S-03	Effects of Restriction on Population Movement
E-S-09	Effects of Discrimination in Host Nation
Child of:	
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-M-05	Actions Supporting Host Nation Counter-Insurgency
E-P-12	Effects of Factional Group Activities
E-S-05	Impact to Stability and Security due to Events
A-D-20	Advocacy Actions by US Government
A-D-21	Security and Law Enforcement for US
A-D-07	Support to Host Nation for Compliance with International
	Conventions and Standards
A-L-09	Improvement of Legal and Law Enforcement Ministries
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies
Peer of:	
A-E-17	Improvement of Ministry of Interior
E-I-01	Effects of Information Gathering on Host Nation Government
	Actions
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-07	Destabilizing Effects
A-L-05	Operations Against Criminal Syndicates
A-L-06	Martial Law and Law Enforcement Operations
E-N-03	Changes in Host Nation Environment

E-S-09 Effects of Discrimination in Host Nation

The DIME/PMESII model suite will represent Effects of Discrimination in Host Nation due to DIME actions. The requirement includes both legislated and institutional (cultural) discrimination between people groups based on any criteria (religion, gender, age, handicap, ethnicity, background, caste, language, nonpolitical ideology) and secondary impacts resulting from discrimination and disenfranchisement of these groups (social, political, economic, opportunity). The degrees of discrimination (minor to violent) must be included as well as the potential for other actors to leverage or feed discriminatory sentiments to advance their agendas.

Areas:	-IEL-PESI	Phases:	0, IV, V
--------	-----------	---------	----------

Missions:	LE, SI		
Nouns:	culture, disenfrashisement, discrimination, HN population, HN		
	citizens, HN government		
Verbs:	ignore, serve, support, observe		
Parent of:			
E-P-05	Changes in Perception of Government/Authority Legitimacy		
E-S-03	Effects of Restriction on Population Movement		
A-M-09	Deterrence of Foreign/Proxy Attackers on Host Nation		
A-D-20	Advocacy Actions by US Government		
A-L-07	Enforcement of International Resolutions		
Child of:			
E-P-12	Effects of Factional Group Activities		
E-S-08	Effects of Legislation, Law Enforcement, and Regulations		
A-I-15	Information Operations		
Peer of:	-		
A-E-18	Spending in Support of Host Nation Ministry of Interior		
A-E-04	Repatriation / Relocation Efforts		
A-E-05	Economic Information Operations		
E-P-02	Changes in Political Involvement of Host Nation Citizens		
E-P-06	Effects of Changes to Government Leadership		
E-P-07	Destabilizing Effects		
A-D-15	Interactions with Aboriginal/Nomadic Peoples and other		
	Minorities		
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes		
E-P-08	Internal Repercussions of a Trans-National Organization's Actions		
	Regarding Host Nation		
E-P-09	Internal Repercussions of an Outside Nation's Actions Regarding		
	Host Nation		

E-S-10 Impact of Terrorist/Insurgent Groups on Host Nation Population

The DIME/PMESII model suite will represent Impact of Terrorist/Insurgent Groups on Host Nation Population due to DIME actions. This requirement includes societies perception of these groups and societies reaction to existence their existence. Social responses regarding recruitment and support are included. This must include the impacts associated by all actions taken but terrorist/insurgent groups (attacks, propaganda, IO, crime, security enforcement, development of parallel/shadow government formation).

Areas:	S	Phases:	0, V
Missions:	CT, TSC		
Nouns:	terrorist, insurg government, m	ents, HN populat ilitary	tion, crime, security, HN
Verbs:	recruit, support	, attacks, enforce	, observe, protect
Parent of:			
A-E-18 A-E-02	Spending in Su Building and Se	pport of Host Na ecuring Lines of	tion Ministry of Interior Communication

A-M-05	Actions Supporting Host Nation Counter-Insurgency		
E-P-01	Changes in Population Loyalty to Host Nation Government		
E-P-05	Changes in Perception of Government/Authority Legitimacy		
E-S-02	Quality of Life Perception		
A-E-14	Mitigation of Destabilizing Effects		
A-D-18	Destabilization Operations		
A-L-05	Operations Against Criminal Syndicates		
A-L-06	Martial Law and Law Enforcement Operations		
Peer of:			
A-D-06	Diplomatic Actions to Prepare for Stability Operations		
A-E-20	Spending to Support Rule of Law		
E-E-07	Effects of Combat Operations on the Economy		
A-L-01	Identification, Disruption, and Interdiction of Financial Support for		
	Destabilizing Actors		
A-L-02	Identification, Disruption, and Interdiction of Institutional Support		
	for Destabilizing Actors		
A-L-03	Identification, Disruption, and Interdiction of Local Support for		
	Destabilizing Actors		
E-P-06	Effects of Changes to Government Leadership		
E-S-05	Impact to Stability and Security due to Events		
A-L-04	Identification, Disruption, and Interdiction of Recruitment for		
	Destabilizing Actors		

E-S-11 Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots

The DIME/PMESII model suite will represent Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots due to DIME actions. This requirement includes the effects due to all types of collective, public activities associated with social/political causes or events. This includes public events (sports competitions, festivals, funerals, and celebrations), strikes/boycotts, marches, civil disobedience, protests, riots, and mobs. The model must represent the full range of activities: spontaneous to planned and organized; legal to illegal; small scale to large scale; local to dispersed; peaceful to violent and distructive; awareness campaign to challenging authority/legitimacy. In addition to the responding actions taken, the model must include the secondary effects such as impact of additional security requirements, loss of revenues (boycotts), disruption to government operations (e.g. military, law enforecement), reduction in producitivity, transportation impacts (traffic jams), impacts to local security (e.g. mobs), and changes in authority's legitimacy due to its response.

Areas:	-IL-PESIN	Phases:
Missions:	LE	
Nouns:	impacts, results,	event, protester, greivance, police
Verbs:	congregate, colle	ect, gather, protest, demonstrate, riot, attack,
	damage, destroy	, kill, control, disperse, incite
Parent of:		
E-E-09	Economic Respo	onse Rule of Law Enforcement

E-E-04	Effects on Markets
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and
	Services
E-P-12	Effects of Factional Group Activities
E-N-01	Effects of Changes in Essential Public Services on Host Nation
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-E-10	Effects of Sanctions (Economic)
A-L-09	Improvement of Legal and Law Enforcement Ministries
Child of:	
E-E-03	Changes in Host Nation Wealth/Income Distributions
A-D-18	Destabilization Operations
Peer of:	
A-I-02	Intelligence Operations on Host Nation Government
E-S-03	Effects of Restriction on Population Movement
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-L-06	Martial Law and Law Enforcement Operations

E-I Information Effects

E-I-01 Effects of Information Gathering on Host Nation Government Actions

The DIME/PMESII model suite will represent Effects of Information Gathering on Host Nation Government Actions due to DIME actions. The requirement must include HN response to outside collection activities (facilitate or thwart depending on collector) as well as HN response to internal collection actives. Internal collections include support for decision makers, regulator oversight, and law enforcement investigation.

J	0
Areas:	D-IL-PMEI Phases: 0, I, IV, V
Missions:	CM, COIN, FID, HA/DR, SIB/R, SI
Nouns:	HN government, information, law enforcement, military
Verbs:	gather, collect, respond, facilitate, thwart
Parent of:	
E-P-03	Changes in Government Structure or Functions
Child of:	
A-D-01	Support to the Ambassador
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-D-02	Negotiations with Host Nation Government
A-E-20	Spending to Support Rule of Law
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-02	Intelligence Operations on Host Nation Government
A-L-08	Counter-Corruption Activities
Peer of:	
A-I-03	Collection of Host Nation Citizen Perceptions

- A-I-05 Collection and Use of Refugee Information
- E-S-08 Effects of Legislation, Law Enforcement, and Regulations

E-I-02 Effects of Information Gathering on Host Nation Citizens

The DIME/PMESII model suite will represent Effects of Information Gathering on Host Nation Citizens due to DIME actions. The requirement includes how perceptions, attitudes, and actions/behavior are impacted or changed due to information collection activities. Note that changes can only occur if the collection activities are known or suspected.

Areas:	D-IL-SI Phases: 0, IV, V
Missions:	CM, FID, HA/DR, SIB/R, SI
Nouns:	HN government, HN citizens, information, law enforcement,
	military, attitudes, actions/behaviors
Verbs:	gather, collect, respond, perception
Parent of:	
O-D-04	Perception of Environment, Actions, and Events
Child of:	-
A-I-12	Intelligence, Surveillance, Reconnaissance for Embassy
A-D-02	Negotiations with Host Nation Government
A-D-09	Negotiating Refugee Safe Havens
A-E-20	Spending to Support Rule of Law
Peer of:	
A-E-04	Repatriation / Relocation Efforts
A-I-03	Collection of Host Nation Citizen Perceptions
A-I-05	Collection and Use of Refugee Information
A-I-11	Improvement of Host Nation Intelligence, Use of Intelligence, and
	IO Capabilities
A-I-15	Information Operations

E-I-03 Effects of Information Dissemination on Host Nation Government

The DIME/PMESII model suite will represent Effects of Information Dissemination on Host Nation Government due to DIME actions. This requirement incldues how the disseminated information changes the processes, procedures, plans, decisionmaking, or execution of current or future programs for the full range of government agencies at all levels (national, provencial, local).

	····, ····, ····, ····, ····, ····, ·
Areas:	-DI-PMIN Phases: 0, IV, V
Missions:	CM, FID, HA/DR, SIB/R, SI
Nouns:	HN government, information, law enforcement, military
Verbs:	disseminate, analysis, respond, distribute
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-03	Changes in Government Structure or Functions
E-P-05	Changes in Perception of Government/Authority Legitimacy
Child of:	

A-D-02	Negotiations with Host Nation Government
A-D-04	Embassy Communications
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-02	Intelligence Operations on Host Nation Government
A-I-03	Collection of Host Nation Citizen Perceptions
A-I-05	Collection and Use of Refugee Information
A-L-08	Counter-Corruption Activities
Peer of:	-
A-I-04	Information Dissemination

E-I-04 Effects of Information Dissemination on Host Nation Citizens

The DIME/PMESII model suite will represent Effects of Information Dissemination on Host Nation Citizens due to DIME actions. The requirement includes the differing impacts on various sub-groups within the HN.

Areas:	-I-SI Phases: 0, IV, V
Missions:	CM, FID, HA/DR, SI
Nouns:	HN government, HN citizens, information, law enforcement,
	military, attitudes, actions/behaviors
Verbs:	disseminate, analysis, respond, distribute
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-02	Quality of Life Perception
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster
	Relief
A-D-11	Diplomatic Action to Support Training Host Nation Government
	Personnel
A-D-02	Negotiations with Host Nation Government
A-D-04	Embassy Communications
A-D-06	Diplomatic Actions to Prepare for Stability Operations
A-D-09	Negotiating Refugee Safe Havens
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-03	Collection of Host Nation Citizen Perceptions
A-I-05	Collection and Use of Refugee Information
Peer of:	
A-E-04	Repatriation / Relocation Efforts
A-E-05	Economic Information Operations
A-I-04	Information Dissemination
E-I-05	Effects of Independent Media Outlets on Perceptions and Attitudes

E-I-05 Effects of Independent Media Outlets on Perceptions and Attitudes

The DIME/PMESII model suite will represent Effects of Independent Media Outlets on Perceptions and Attitudes due to DIME actions. This requirement includes the impact associated with non-government run media outlets, especially outlets espousing specific social, political, or ideological agendas.

	Je seem, permen, er meeregrem ugennus
Areas:	-I-PESI Phases: 0, I, IV, V
Missions:	SI
Nouns:	media outlets, HN government, HN population, non-government,
	information
Verbs:	distribute, perceptions, provide, disseminate
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-P-10	Effects on Host Nation by Forward Bases
A-I-15	Information Operations
E-P-11	Effects of Third-Party External Diplomatic Actions
Child of:	
A-L-08	Counter-Corruption Activities
Peer of:	-
A-E-05	Economic Information Operations
A-I-03	Collection of Host Nation Citizen Perceptions
A-I-04	Information Dissemination
E-I-04	Effects of Information Dissemination on Host Nation Citizens
E-P-02	Changes in Political Involvement of Host Nation Citizens
E-P-03	Changes in Government Structure or Functions
E-P-04	Effects of External Group Involvement in Host Nation Politics
A-D-18	Destabilization Operations
A-I-08	Changing Influence/Exposure of Societal Leaders
A-I-09	Changing/Shaping Message/Position of Societal Leaders
A-D-12	Diplomatic-Like Interactions Between Organizations
E-S-09	Effects of Discrimination in Host Nation
A-E-21	Spending for / Development of Other Host Nation Ministries and
	Agencies

E-N Infrastructure Effects

E-N-01 Effects of Changes in Essential Public Services on Host Nation

The DIME/PMESII model suite will represent Effects of Changes in Essential Public Services on Host Nation due to DIME actions. This requirement includes the full range of PMESII such as quality of life, access to nessesities, economic changes, information dissemmination, demand on infrastructure, political legitimacy, military morale, etc.

Areas:	-E-ESN	Phases:	0, IV, V
Missions:	SSTR, SI		

Nouns:	utilities, public services, capacity
Verbs:	restore, provide, enhance, maintain
Parent of:	
E-P-01	Changes in Population Loyalty to Host Nation Government
E-P-05	Changes in Perception of Government/Authority Legitimacy
E-S-02	Quality of Life Perception
E-N-03	Changes in Host Nation Environment
Child of:	
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief
A-D-09	Negotiating Refugee Safe Havens
A-E-18	Spending in Support of Host Nation Ministry of Interior
A-E-03	Building and Securing Host Nation Essential Services
A-E-06	Mitigation of Long-term WMD Effects
A-E-08	Establishing and Maintaining Logistical Support for Host Nation
A-E-14	Mitigation of Destabilizing Effects
A-E-15	Economic Development Supporting Disaster Recovery
A-E-16	Stability Operations (Economic)
A-E-09	Activities to Improve Infrastructure
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots
Peer of:	
A-I-01	Intelligence Operations on Host Nation Conditions
A-I-06	Improvement of Host Nation Government Communication Networks
E-E-05	Changes in the Availability, Cost, and Distribution of Goods and Services
E-P-04	Effects of External Group Involvement in Host Nation Politics
E-P-07	Destabilizing Effects
E-S-07	Migration
E-N-03	Changes in Host Nation Environment

E-N-02 Effects of Restored/Impaired Infrastructure on Host Nation

The DIME/PMESII model suite will represent Effects of Restored/Impaired Infrastructure on Host Nation due to DIME actions. The requirement includes all types of non-essential infrastructure including transportation facilities (roads, ports, railways, airports), educational facilities/capabilities, non-emergency communication systems (TV, radio, internet, print media), and the industrial base as it impacts the economy. The effects of improved/reduced environmental conditions are also included.

Areas:	-E-PESN	Phases:	0, IV, V
Missions:	SSTR, SI		
Nouns:	roads, railways, airports, capacity		
Verbs:	restore, provide, enhance, repair, maintain		
Parent of:			

A-E-07	Economic Intelligence Operations		
E-E-01	Changes in the Domestic Production by Economic Sector and		
	Region		
E-E-02	Changes in the Flow of Capital		
E-E-03	Changes in Host Nation Wealth/Income Distributions		
E-E-04	Effects on Markets		
E-E-05 Changes in the Availability. Cost. and Distribution of C			
	Services		
E-P-01	Changes in Population Loyalty to Host Nation Government		
E-P-05	Changes in Perception of Government/Authority Legitimacy		
E-S-02	Quality of Life Perception		
E-N-03	Changes in Host Nation Environment		
Child of:	-		
A-D-10	Diplomatic Actions to Support Humanitarian Assistance/Disaster		
	Relief		
A-D-09	Negotiating Refugee Safe Havens		
A-E-18	Spending in Support of Host Nation Ministry of Interior		
A-E-02	Building and Securing Lines of Communication		
A-E-03	Building and Securing Host Nation Essential Services		
A-E-06	Mitigation of Long-term WMD Effects		
A-M-01	Response to WMD Attack		
A-E-17	Improvement of Ministry of Interior		
A-M-02	Response to Conventional Attack		
A-M-07	Logistics		
A-E-14	Mitigation of Destabilizing Effects		
A-D-18	Destabilization Operations		
A-E-15	Economic Development Supporting Disaster Recovery		
A-E-16	Stability Operations (Economic)		
A-E-09	Activities to Improve Infrastructure		
A-L-08	Counter-Corruption Activities		
E-S-11	Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests,		
	& Riots		
Peer of:			
A-I-01	Intelligence Operations on Host Nation Conditions		
A-I-06	Improvement of Host Nation Government Communication		
	Networks		
E-E-11	Effects of Industrialization on Host Nation		
E-E-12	Effects of Trade Agreements on Economy		

E-N-03 Changes in Host Nation Environment

The DIME/PMESII model suite will represent Changes in Host Nation Environment due to DIME actions. This requirement includes both the changes in the HN environment as well as the full range of secondary effects due to these changes. The changes must include pollution levels, the water table, deforestation, land fertility, and resource depletion. These changes can be due to industrialization, urbanization, poor stewardship, government policies, economic pressures, and many other DIME actions. Secondary effects must include long-term sustainability of HN population; health impacts to humans, livestock, and crops; HN social response; and regional and international response to environmental changes.

Areas:	-DIMEL-PESN Phases: 0, IV, V	
Missions:	DS, EA, SI	
Nouns:	pollution, HN environment, water, resources, HN population,	
	health, regional and international	
Verbs:	respond, repair, improve, deplete, restore, sustain	
Parent of:		
E-S-01	Effect of Foreign Presence on Host Nation Norms and Behaviors	
E-S-02	Quality of Life Perception	
E-S-06	Epidemic Breakout	
E-S-07	Migration	
Child of:		
A-E-05	Economic Information Operations	
A-M-01	Response to WMD Attack	
A-M-02	Response to Conventional Attack	
E-N-01	Effects of Changes in Essential Public Services on Host Nation	
E-N-02	Effects of Restored/Impaired Infrastructure on Host Nation	
E-P-06	Effects of Changes to Government Leadership	
E-E-13	Effects of Changes in Host Nation Infrastructure	
A-D-20	Advocacy Actions by US Government	
E-E-11	Effects of Industrialization on Host Nation	
A-D-07	Support to Host Nation for Compliance with International	
	Conventions and Standards	
A-L-07	Enforcement of International Resolutions	
E-E-12	Effects of Trade Agreements on Economy	
A-M-11	War and Military Invasion	
A-E-09	Activities to Improve Infrastructure	
Peer of:		
A-E-06	Mitigation of Long-term WMD Effects	
E-N-01	Effects of Changes in Essential Public Services on Host Nation	
E-S-08	Effects of Legislation, Law Enforcement, and Regulations	

12 Detailed List of Measures

This appendix provides the full details of the high-level Measures of Effectiveness (MoPEs and MoFEs) described in Chapter 3.

12.1 Measures of Policy Effectiveness

The highest level of measures presented here are the Measures of Policy Effectiveness. These address high-level, national policies and seek to achieve broad objectives. As stated in Chapter 3, the policies presented below are representative of well-governed nation-states and are organized into five major groups.

MoPE-TN: Trans-National Issues

TN-01 Promote International Peace and Security

The objectives of this policy are: promotion of international peace and security through arms control measures; recognition of zones of control or influence; participation in and recognition of treaty organizations; non-proliferation of WMD; and verification of compliance with international law, agreements, resolutions, or treaties. Arms control includes establishing limits on ballistic missiles and other delivery systems (ex. armed satellites), agreements to not pursue specific weapon systems (e.g. the neutron bomb), and establishing demilitarized zones by mutual agreement of hostile parties.

TN-02 International Treaties, Conventions and Standards

Policies of this type include recognizing, signing, and complying with international conventions, agreements, treaties, and standards. Examples of international conventions include financial definitions, rules of war, and international standards, while examples of international agreements include agreements about law enforcement, sovereignty rights, accepted use of non-territorial spaces, and safe passage rights. Financial definitions establish common understandings of concepts such as ownership, debt, contracts, liability, security, credit, debt, and various types of property, while rules of war cover treatment of enemy combatants and enemy civilians, use of property/infrastructure by occupying forces in occupied territories, and establishment of war crime laws and jurisdictions. International extradition treaties, laws for organizations such as Interpol, and conventions/controls regarding international illicit drug trafficking (drugs, humans, etc) are covered under

international law and law enforcement policies. Treaties recognizing national sovereignty and territorial integrity also include agreements about international broadcasting and non-interference criteria as well as recognition of exclusive economic zones (fishing rights, etc.). Agreements regarding the use of non-territorial spaces and safe passage cover the fishing, mining, and resource harvesting in international waters; safety of travelers over land, sea, and air; visa and passport conventions; safety of diplomats and inviolability of embassies and diplomatic pouches; and the freedom of navigation and recognition of international traffic lanes (e.g. sea, air, and outer space). Finally, conventions regarding international standards include standards regarding time zones, weights, measures, and data formats; patents, copyrights, and intellectual property; communication standards; consumer protection regulations applied to international trade; and international scientific standards, information sharing agreements, and knowledge transfers (e.g. weather and geosciences data).

MoPE-FA: Foreign Affairs

FA-01 Expanding the Nation's Territory, Rights of Dominion, Zones of Control, or Spheres of Influence

This policy area is typically aggressive in nature and sometimes involves expansion by force. It can be achieved through efforts that range from diplomatic actions (ex. declarations of intentions or statements of claims) all the way to military occupation of a territory and control of its boundaries. The same policies can be applied in order to expand spheres of influence. Strategies can include threats, coercion, invasion, isolation, etc. Note that for regions that are internationally recognized as legitimate national territories, "expansion" may be viewed as a legitimate extension of national power (e.g. imposition of control on poorly governed regions or retaking of lands that had previously been conquered by other powers).

FA-02 Enhancing the Nation's Trade and Access to Resources

Policies of this nature include the creation and maintenance of trade agreements to enhance the nation's economic, political, or strategic footing—and thus improve the nation's access to resources. These enhancements can be achieved in a variety of ways ranging from brute force and invasion to quid pro quo and treaty. Colonialism in all its forms may also be considered.

FA-03 Enhancing Allies' Military Preparedness or Security

Policies in this category include agreements regarding arms sales and the sharing of technical information or intelligence. This category also covers activities such as cooperative training ventures, joint exercise, and joint campaigns.

FA-04 Enhancing Allies' Political, Economic, and Social Stability

This category addresses efforts to increase the political, economic, and social stability of neighbors through a variety of actions such as issuing statements of support; providing economic or material aid; signing trade agreements; or conducting information campaigns. This could include undermining insurgent groups or other adversaries of the ally.

FA-05 Increasing the Political, Economic, and Social Instability of the Nation's Adversaries

Policies designed to destabilize adversaries' political, economic, or social systems are covered in this category. These policies could authorize operations such as information campaigns that denounce the adversaries' leadership and efforts to devalue or counterfeit the adversaries' currencies. Such policies could also impose trade embargoes or tariffs. This policy category can also authorize support for limited military or paramilitary operations, insurgencies, revolutions, or calls to overturn existing governments.

FA-06 Shape Perspectives, Attitudes, Norms, or Processes of Other Nations

Policies under this category seek to establish specific attitudes or perspectives within other nations (i.e. in government circles, among ordinary citizens, or in interest groups). These attitudes or perspectives could be of any nature (economic, social, political, etc.) and could be achieved through any means (information campaign, economic interaction, education, economic aid, etc.). Additionally, the policies could seek to change, alter, or establish norms or processes (social, political, etc.) within the other nations through similar means.

MoPE-IA: Ideological Advancement

IA-01 Promote Human Development

Human Development policy includes supporting disease prevention and control at international and national levels; improving and extending access to medical care; supporting education about health and nutrition; and promoting access to education by supporting literacy campaigns and improving and extending language education.

IA-02 Promote Democracy as a Method of National/Collective Decision-Making

This can be done by supporting groups who monitor host nation elections and by sending diplomatic complaints about irregular elections practices.

IA-03 Promote an Ideology or Political Perspective

Countries that wish to promote an ideology often do so by means of strategic communications and public diplomacy. They also may monitor the international media and publish rebuttals or critiques of whatever propaganda that they wish to counter.

IA-04 Promote Human Rights/Human Dignity

Human Rights policy includes: supporting international anti-slavery and antitrafficking conventions; promoting the human treatment of the mentally retarded, mentally ill, and developmentally disabled; opposing eugenics; criticizing inhuman punishments (ex. stoning, burying alive) of lawbreakers; criticizing mistreatment of prisoners and ordinary citizens by inhumane governments; publicizing the plight of prisoners of conscience; establishing and publicizing a policy granting the right of refuge for victims of violence and persecution under specific circumstances; criticizing policies and practices that discriminate against people on the basis of their religious, ethnic, cultural/linguistic, racial, gender, or minority identities; criticizing forced surgical or chemical treatments that cause irreversible alterations or mutilations of the body; combating unethical and involuntary medical experimentation on humans; and promote personal security (freedom from fear and violent attack).

IA-05 Promote Knowledge Discovery and Technological Advancement

The pursuit of science, technology, and the fine arts all fall under this category. Since this policy seeks to expand knowledge, technology, and the arts, it is distinct from educational and human development policies which seek to propagate existing knowledge and capabilities.

MoPE-RI: Responsibility Issues (RI)

RI-01 Prepare for Natural Disasters, Mitigate their Effects, and Provide Relief for Survivors

This can be done, for example, by establishing and maintaining early warning systems for drought, famine, etc.; by enhancing the readiness of particular host nations (increasing food storage capacity, improving emergency communications networks, etc.); and by establishing capabilities for disaster relief.

RI-02 Support Actions and Agencies that Promote Sustainable Economic Growth at National and Regional Levels

This policy includes: support of the World Bank and the International Monetary Fund; membership in World Trade Organization; and signing bilateral trade agreements, among others.

RI-03 Support Environmental Stewardship

Environmental policy might involve signing conventions about the sustainable use/harvesting of natural resources (fishing, forestry, etc.); signing conventions about environmental pollution (acid rain, lead, asbestos, etc.); and preventing the spread of animal and plant diseases.

MoPE-II: Internal Issues

II-01 Promote the Rule of Law

This is a unilateral policy to combat theft, corruption, and illegitimate coercion. Supporting policies could include anti-money laundering campaigns/efforts; promotion of transparency and oversight within the government; protection of whistle-blowers / witness protection programs; defense and maintenance of habeas corpus and other established legal procedures; support for international journalist organizations; security for property; security of human life / freedom from fear; and efforts to limit looting and trafficking of national treasures (e.g. archaeological artifacts).

II-02 Consolidate Power and Eliminate Opposition

Policies of this nature, which often are adopted when regimes change, seek to create cohesion within the governmental structure (either formally or informally) in order to advance the agenda of the new regime. The means for consolidating power and eliminating opposition may include offering incentives, persuasion, negotiation, coercion, violence, or some combinations of these.

II-03 Internal Development

Policies of this type focus on the internal development of the nation or regions. Implementation of these policies may include promotion of educational programs and establishment of standards; improvement of business opportunities; promoting industrial development or access to natural resources; fiscal or monetary actions; or development of supporting infrastructure.

II-04 Enhance Internal Stability

Enhancing internal stability includes reducing the volatility of economic, political, and social conditions, promoting the rule of law, and improving security. Policies which would stabilize one or more of these areas fall into this category. Examples include creation of guaranteed loans to stabilize the economy; establishing price controls on selected goods; passing laws that aim to enhance the transparency and accountability of government; and creation of checkpoints and boarder crossings to enhance security.

The next section discusses the Measures of Force Effectiveness that support these highlevel policies.

12.2 Measures of Force Effectiveness

For each MoE presented below, there are actually three MoEs:

- The *Actual* or *Ground Truth* MoE for the condition being evaluated;
- The *Perceived* MoE for the condition held by an actor (includes credibility);
- The *Attitude* of each actor regarding the condition (this includes both an attitude about the legitimacy of a government effort and the expectations of the actor)

MoFE: Relationships between Actors (RA)

This category involves the bilateral and multilateral relationships between actors. Note that an actor's real attitude can differ from a third party's perception or interpretation of what that attitude is.

RA-01 Bilateral/multilateral relationship

How much have the bilateral interactions and agreements strengthened the relationship between the actors? How effective are the actors in articulating and communicating their needs, objectives, and programs? How effective, beneficial, and efficient has the relationship been for achieving the stated goals? How balanced is the relationship between the actors?

RA-02 Deterrence

How effective are policies and actions in deterring adversarial aggression (e.g. policies regarding spheres of influence and definitions of hostile actions; communication; national posturing; military preparedness; other forms of disincentives; alliances and treaties, etc.)?

RA-03 Cultural Brokerage Skills

How well does an outside actor speak the foreign language, adequately communicate his or her message, correctly interpret the intentions and attitudes of others, avoid miscommunications/misinterpretations, and avoid creating problems or causing offense? How adept is the actor at influencing others and negotiating/arbitrating deals? How good is his/her compliance with local laws, customs, and traditions (e.g. protocol, etiquette, etc.)? How well does the actor meet the expectations that natives of the country have for outsiders?

RA-04 Hierarchical Relationships

How much have hierarchical interactions, exchanges of support and services, and agreements strengthened the relationship between actors? How effective are the constituents in articulating and communicating their needs and how effective are the providers in developing and implementing programs that service the constituents? How responsive, responsible, and fair are the providers to the constituents?

MoFE: Government Institutions (GI)

This category concerns the functioning of a government as well as the effectiveness with which the government achieves its goals (governance).

GI-01 Elections and Political Process

How effective is the electoral and political process at achieving successful transitions from one governing party, regime, or system to the next (e.g. in a peaceful and non-threatening manner; in a way that provides access to the process by most voters and/or citizens; by means of fair and auditable voting or referendum processes; etc.)?

GI-02 Legislative Process

How effective is the legislative body in acting to create laws and policies that meet the needs of the state?

GI-03 Legislative Support

How effective are the supporting agencies in identifying and prioritizing the needs and problems within the state; identifying and providing viable solutions; and maintaining oversight of legislated programs?

GI-04 Governance

How rigorous, efficient, and effective is the government's bureaucracy in administering the functions of government in accordance with laws, regulations, and

standards? How rigorous and reasonable are those laws, regulations, and standards?

GI-05 Civil Service Standards

Compared with civil and commercial law, how much more rigorous are civil service standards for government officials? To what extent are the civil service standards enforced?

GI-06 Proportionality of Response Process

How proportional is the government in the execution of its responsibilities, in punishing lawbreakers, and in responding to criticism and grievances?

GI-07 Rule-of-Law

How effective are government institutions at establishing and enforcing the rule of law accurately and fairly? How many obstacles prevent citizens from obtaining complete information about the government's administrative, legislative, executive, and judicial actions? How many provisions or processes are there that help ordinary citizens obtain legal counsel or appeal convictions? How effective are such legal aid or appeal processes? What proportion of government spending lacks oversight or is not clearly accounted for? How many newspapers, broadcast news agencies, and other media are there that freely, regularly, and objectively report on government activities?

GI-08 Laws, Rulings, and Regulations

To what extent are laws, rulings, and regulations actually enforced? How well do these laws, rulings, and regulations achieve their stated goals?

GI-09 Preparedness

How effective is the government at identifying, planning for and preparing for disasters or other contingencies (including dissemination of plans; obtaining buy-in from other agencies and citizenry; and maintaining preparedness)?

GI-10 Government Officials and Leaders

How effective are the government officials or other leaders in identifying problems or needs; developing solution programs; articulating their program objectives; obtaining buy-in for stakeholders and citizenry; and executing the programs?

GI-11 Evacuation and Resettling Efforts after Disasters

How effective and timely are evacuation, support, resettlement, and compensation efforts associated with disasters or catastrophic events? How fair and equitable are these efforts across different population groups (including returning people to their original locations)?

GI-12 Urban Planning

How comprehensive and well-informed are the objectives and development plans? How feasible (in terms of project costs, impacts, benefits) are the objectives and developments plans? How effective are planners in obtaining consent from all the stakeholders? How fair, open, and transparent is the planning process? How faithful, efficient, effective, non-corrupt are the implementation efforts of the plan? How effective and non-corrupt are the maintenance efforts? To what extent are the regulation, review, and oversight processes well-established, known, open, transparent, and non-corrupt?

GI-13 Freedoms & Rights

How effective are mechanisms that protect and ensure the freedoms and rights of citizens and governed (e.g. freedom of press, public speech, human rights, fair treatment, non-discrimination, treatment under the law, association, etc.)?

MoFE: Social Institutions (SI)

This category involves all the non-governmental institutions, networks, and norms which influence or shape social behavior and interactions (e.g. kinship, ethnic, religious, ideological, business, professional, criminal, insurgent, or other people group).

SI-01 Institutional Effectiveness

Given a specific social institution, network, or norm: How effective is it in shaping behavior (e.g. political activism, moral criticism, etc.); influencing perceptions, attitudes, and values; impeding or facilitating change; identifying and solving social problems, and impacting other social institutions, networks, or norms?

SI-02 Governmental Policy Impact

How effective are current government policies and actions at strengthening (or weakening) a given institution, network, or norm? How effective are government policies in mitigating conflict between social institutions, networks, and norms?

MoFE: Force-on-Force Conflict (FF)

This category focuses entirely on measures associated with active military conflict. These are simple, representative and belong to a well-defined field.

FF-01 Warfighting and Mission Execution

How effective are the plans, training, manning, equipment, policies, logistics, support infrastructure, leadership, and esprit de corps in executing the desired military missions?

FF-02 Military Readiness

How well prepared (with respect to plans, training, staffing, equipment, policies, logistics, support infrastructure, leadership, and esprit de corps) are military forces to execute and accomplish anticipated missions? How comprehensive is the set of anticipated missions?

FF-03 Military Force Sufficiency

How sufficient is the force structure in size and capability to meet the current and future needs of the government? How sufficient is the support infrastructure and logistics network in supporting the employed force? How effective are the policies in achieving the sufficient force structure? How effective are the recruitment and retention policies in achieving associated manning requirements?

FF-04 Occupation and Control of Hostile Territory

How able and effective is the force in executing border and internal control of occupied hostile territory? How able and effective is the force in moving freely through the territory while detecting, restricting, and controlling movement of hostile forces? How able and effective are forces at conducting searches, disarming hostile forces, and eliminating armed threats?

FF-05 Intelligence, Surveillance, and Reconnaissance

How effective is the force, supporting agencies, and allies in identifying collection requirements, collection of the required information, analyzing collected data, and disseminating information to decision makers? How accurate, timely, and useful is the information in supporting the tactical and strategic objectives of the force?

FF-06 Militia Demobilization

How effective are agencies at identifying militia groups, personnel, and leaders to be demobilized; at negotiating, planning, organizing, and communicating demobilization efforts; executing and overseeing efforts as planned; transitioning

militiamen to civilian occupations; and redirecting/transitioning militia assets to other uses as agreed by the parties involved?

FF-07 Transition from Martial Law to Civilian Control

How effective were the planners in obtaining consent from the stakeholders? How comprehensive are the plans and policies regarding the transition? How effective are the execution and oversight of the plans? How faithful are the transitioning parties to adhering to the policies and plans? How smooth and peaceful is the process? How has the transition impacted the economy, security, and governance?

FF-08 Border Security, Counter-Piracy, Interdiction, Counter-FRIS

How effective are border police and coast guard services at combating international smuggling, illegal entry, human trafficking, drug trafficking, and piracy? How effective are government agents at detecting and stopping money laundering and illicit funding of insurgent and criminal groups? How effective are police at detecting and stopping insurgent and criminal recruitment efforts?

MoFE: Economy & Investment (EI)

EI-01 Human Capital

How effective, efficient, timely, and accurate are government agencies in predicting and planning for human capital needs? How suitable are the human capital goals in light of anticipated demand? How practical, efficient, and effective are policies and programs for achieving these goals? How well does the human capital infrastructure and institutions serve these goals?

EI-02 Economic Infrastructure

How efficient and effective are the transportation networks (roads, bridges, railways, waterways, etc.), nodes (ports, airports, rail yards, warehouses, etc.), and assets (trains, planes, trucks, etc.) at moving raw materials and goods? What is the sufficiency of the underlying support infrastructure (power grid, fuel storage, pipelines, reservoirs, communications, waste disposal, etc.) to support the current and expected industrial needs? What are the bottlenecks and critical nodes based on current and projected use rates? What is the projected longevity of the current infrastructure based on anticipated use rates and what are the projected repair timelines (with costs and impacts)? What is the sufficiency of the transportation networks, nodes, and assets; underlying support infrastructure; and human capital to support current and projected industrial needs?

EI-03 Resource Development

How efficient and effective are efforts to harvest, process, distribute, and utilize natural resources (agriculture, water, mines, fisheries, forestry, petroleum, wind, geothermal, solar, etc.)? How well distributed are these resource development efforts across the national territory and across budgetary/administrative timelines? What is the sustainability of the current practices and consumption levels? What is the sufficiency of the current production levels to meet current and projected consumption levels? Is there sufficient excess capacity in case of disaster or crises? How effective and efficient are recycling and reprocessing programs at conserving natural resources?

EI-04 Targeted Aid

What percentage of aid actually goes to the intended programs? Once within a program, what percentage of the aid is used as intended? What is the lost productivity of the program as a result of the lost aid? How much external damage (e.g. increase in criminal activity by unemployed, lost days in school by children of displaced people) is caused by the lost aid? How quickly and efficiently is the aid processed? What is the return on investment for the targeted aid?

EI-05 Capital Improvements

How much do the improvements impact the overall economy? What is the long-term usefulness of the improvements? What is the return on investment for the improvements? What are the environmental impacts of the improvements? What additional demands have the improvements created (labor, space, costs)? What additional capacities have the improvements enabled? What is the sufficiency of these capacities for long-term growth?

EI-06 Support of Business by Government

How supportive are local jurisdictions in building and improving economic resources (infrastructure, local labor, technical skills and training)? How much have policies (regulations, fees, oversight, payroll taxes, other taxes, insurance requirements, tax incentives) affected business performance and opportunities? How much has migration impacted the labor supply (immigration, discrimination, etc.)? How much have zoning and local ordinances impacted business, the labor supply, the supply of housing and transportation for workers, and the economy? How much have ownership laws, contract laws, and investment laws impacted business?

EI-07 Monetary and Financial

How much has the availability of credit affected business performance and opportunities? How much have oversight regulations impacted investment and the

stability of banking and credit-providing institutions? How much has corruption impeded business development and reduced profit margins?

MoFE: Sufficiency & Utility (SU)

This category presents indicators that measure how well specific needs are met and whether they are met in a sufficient and timely manner.

SU-01 Infrastructure

How sufficient, efficient, and effective is the infrastructure (water, sewage, power, fuel, transportation, distribution systems, etc.) in meeting the current and projected basic needs of society and the commercial needs? How comprehensive are the maintenance, upkeep, growth, improvement, and development plans? How effective are planners in obtaining consent in future plans? How feasible and sustainable are growth plans? How vulnerable is the system to disruption by either unexpected contingencies or planned major maintenance cycles (e.g. lack of excess capacity or redundancy)?

SU-02 Security of Life

How sufficient, efficient, and effective are police and security forces in averting violence against officials (elected, appointed, hired); violence against leaders (including non-government, social, business); and violence against citizens (other than criminal or imprisoned citizens)? How fair and responsive are police and security forces in the performance of their duties to all sectors and groups within society?

SU-03 Security of Private Property

How sufficient, efficient, and effective are current policies, laws, and courts in protecting the rights to ownership of private property? How sufficient, efficient, and effective are current policies and laws in supporting the physical security of private property from theft, destruction, or unlawful use?

SU-04 Security of Government Facilities

How well secured are critical government facilities (e.g. arsenals, bases, police stations, etc.), critical infrastructure (e.g. power plants, water treatment facilities, etc.), and public infrastructure (roads, bridges, hospitals, schools, etc.)?

SU-05 Counter-Terrorism

How sufficient, efficient, and effective are the counter-terrorism forces, activities, and policies in collecting and processing intelligence and performing surveillance

on terrorist cells? How sufficient and effective are the forces at infiltrating terrorist cells; averting attacks; mitigating the effects of attacks; interdicting funding and other support; and eliminating terrorist cells and groups?

SU-06 Counter-Insurgency

How sufficient, efficient, and effective are COIN forces, activities, and policies in collecting and processing intelligence and performing surveillance on insurgent organizations? How sufficient and effective are the forces at infiltrating insurgent organizations, averting attacks, mitigating the effects of attacks, interdicting funding and other support, controlling or eliminating insurgent recruitment efforts, and eliminating insurgency cells, groups, and leaders? How effective are COIN activities and policies at protecting the public from reprisals and coercion by insurgents? How effective and efficient are COIN information operations at shifting public support away from insurgencies; moving insurgent leaders away from violent policies; and negotiating peaceful solutions? How successful are planners in obtaining consent of all stakeholders regarding peace negotiations?

SU-07 Basic Needs (food, water, clothing, shelter, fuel, medical)

How much of the country's current and anticipated needs for water and fuel can be met using local or national sources? How affordable is food, clothing, housing, and medical care? That is, what proportions of per capita income do the costs of food, clothing, housing, and medical care represent?

SU-08 HA/DR

How many of the people displaced by the humanitarian emergency remain without housing at the end of a humanitarian mission? How effectively, efficiently, and promptly do deployed forces respond to requests for assistance by the ambassador/embassy during the emergency? How completely, efficiently, and effectively are the negative effects of the emergency on HN infrastructure mitigated?

MoFE: Decision-making and Implementation (DM)

DM-01 Anticipation of Decision

How effective are the supporting agencies in anticipating potential issues or decision points? How well informed are the supporting agencies regarding current and evolving needs and situations which may require decisions (e.g. changes in policy or activities)? How timely and responsive are these agencies in preparing decision makers for taking action beforehand?

DM-02 Information Collection

How effective are the supporting agencies in identifying collection requirements, collecting the required information, analyzing collected data, and disseminating information to decision makers? How accurate, timely, and useful is the information in supporting the decision maker? How sufficient is the provided information for making an informed decision?

DM-03 Decision-making Process

How effective and efficient is the decision-making process in reaching a decision? How much agreement was achieved in the final decision by all stakeholders? How timely was the final decision?

DM-04 Quality of Decisions

How focused, relevant, and comprehensive are final decisions for achieving their original objectives? How well-informed are decisions? How fair and equitable are decisions and how well do they balance all relevant factors, interests, and parties? How final are final decisions (i.e. are most final decisions executed and not revisited without sufficient cause)?

DM-05 Implementation Plans for Decisions

How efficient is the planning process for implementing decisions? How faithful and accurate are implementation plans to the intent of decisions? How practical and easy to execute are such plans?

DM-06 Execution of Decision

How faithful and accurate is the execution of implementation plans? What is the speed, efficiency, and fairness of the execution?

DM-07 Impact of Decision

How well are policy objectives achieved as a result of a decision, its implementation plan, and its execution? How much does each of these factors contribute to the achievement of policy objectives?

MoFE: Enforcement (EN)

This category covers the enforcement of laws, policies, standards, codes, and regulations. Enforcement activities include policing, judging, and sentencing; inspection, review, and remediation; and auditing and oversight.

EN-01 Rule of Law Agencies and Institutions

How effective and efficient are the police and oversight agencies in enforcing the rule of law? How proportionate are the punishments to the crimes? In other words: are punishments so much more onerous than the crimes they cover that ordinary citizens and police feel reluctance to report law breakers or arrest them? How fair are the policies?

EN-02 Law Enforcement

How effective are the law enforcement agencies and policies? How close is the correlation between change in the crime rate and efforts to improve or maintain law enforcement, manning, and training? How responsive are the law enforcement agencies in executing their mission? How committed are the officers to executing their missions (i.e. performance of duty regardless of cost to self or danger)? How disciplined and professional are the officers?

EN-03 Judicial Process

To what extent are law-breakers held accountable? To what extent is the judicial process impartial and timely? How much does the judiciary process impact crime rates? How well protected and free from intimidations are witnesses, jurors, judges, prosecutors, and investigators? How transparent is the judicial process and how well do defendants understand the process and their rights? What is the quality of defense council, and how much access to defense counsel do defendants have? How well-established are the legal procedures and how faithful are courts to these procedures? How accessible is the appeal process?

EN-04 Penal Process

How faithful is the penal process to judicial sentences? How humane are prison conditions? How well are descriptions of prison conditions and information about the status of prisoners communicated to the public? How well are prisoners protected from mistreatment, prison violence, and retribution? How humane are the sentences (i.e. no forced sterilization, no torture, sufficient food, medical treatment, etc.)? To what extent is the state benefiting from the penal system (i.e. prison labor, organ harvesting, human experimentation, etc.)? How effective are rehabilitation, retraining, and reintegration programs at preventing recidivism?

EN-05 Oversight Agencies

How effective and efficient are oversight agencies in the performance of their duties? How responsive are these agencies to whistle-blowers and tips? How well are whistle-blowers shielded from retribution? How visible, well-established, comprehensive, and uniformly applied are the oversight procedures? How effective are the oversight agencies in auditing, reviewing, and identifying serious violations, and how often do their activities lead to sanctioning, prosecuting, and punishment? How faithful, professional, and impartial are the oversight agencies in the performance of their duties? How effective are the oversight agencies at deterring corruption?

EN-06 Common Crime Prevention

How effective are the law enforcement agencies, judiciary, and penal system in preventing criminal activities? To what extent did each policy or agency contribute to the changing crime rates? How prevalent, powerful, and socially influential are crime syndicates? To what extent is corruption present in the private sector? To what extent is corruption present in the government? How effective are crime education and awareness programs (e.g. counter-scam warnings)?

EN-07 High Crime Prevention

How effective are security agents and law enforcement agencies in combating drug trafficking, illegal arms smuggling, human trafficking, kidnappings, terrorism, assassinations, and piracy? How effective are these agencies in detecting, infiltrating, and preventing conspiracies and coups?

EN-08 Blockade and Sanction Compliance

How effective are government agencies in obtaining the compliance of other nations to unilateral or multilateral blockades and sanctions? How effective are these agencies in publicizing such blockages and sanctions? How effective are national and international monitoring agencies in detecting violations of these blockades and sanctions and in identifying the violators?

EN-09 Environmental Stewardship

How effective, prompt, and accurate are national and international monitoring agencies in detecting sudden or slowly emerging threats to the environment? How sufficient, effective, and efficient are environmental clean-up agencies in responding to and mitigating environmental emergencies (spills from oil tankers, accidental release of toxic chemicals, etc.)? How effective are environmental agencies in planning and coordinating current and future efforts to reduce ongoing threats to the environment (air and water pollution, soil erosion, declines in crucial species such as honeybees and other crop pollinators, etc.)?

EN-10 Counter-Corruption and Anti-Crime Operations

How have changes in activities enhanced crime prevention? How have countercorruption operations impacted corruption within the government or society? How have the counter-corruption activities been hampered by systemic corruption? How has judicial effectiveness increased as a result of these activities?

MoFE: Information (IN)

IN-01 Information Operations

How sufficient, effective, and efficient are national agencies in disseminating news about national policies and actions and in changing world public opinion about the country and its foreign policies? How sufficient, effective, and efficient are these agencies in detecting, tracking, and counteracting propaganda and misinformation campaigns launched by adversaries?

IN-02 Public Records

How effective are the various government agencies (administrative, parliamentary, law enforcement, military commands, and judicial) in creating, maintaining, and organizing systematic sets of government records? How effective are the laws and regulations governing private sector activities in creating, maintaining, and organizing archives of documents such as contracts, deeds, export licenses, tax records, credit records, and other documents necessary for regular commerce? How effective are law enforcement agencies and regulatory bodies in preventing breaches of individual privacy or national security?

IN-03 Freedom of Media

How effective are laws, regulations, the judicial process, and law enforcement in providing and maintaining access to meetings, hearings, negotiations, and other public events to journalists and other representatives of the media? How restrictive are regulations regarding licensing of new media outlets and utilizing news distribution channels (radio and television airwaves, internet, postal services, movie theaters, etc.)? How much do the costs of taxes and licensing fees on the media inhibit the creation of new media outlets and reduce the effectiveness of established media outlets? How effectively are conflicts about freedom of the press versus demands for regulation or censorship by community spokespeople or security agencies resolved? To what extent does government regulation inhibit free speech and prevent the circulation of information about government failures and deliberate violations of the law? How effective and efficient are the processes for obtaining permission to publicize and hold mass meetings, peaceful protests, and lawful demonstrations?

IN-04 Information (collect, process, disseminate)

How effective are public information agencies at collecting, analyzing, explaining, and disseminating the information needed by voters and citizens for making informed decisions? How many public information outlets (public libraries, educational and public interest channels on television and radio, venues for live public lectures and debates, health centers and clinics, websites) are there per capita in the various parts of the country (both rural and urban)? Are private information agencies permitted who can criticize or supplement government information campaigns? Are any members of society (women; the blind and deaf; speakers of minority languages; rural communities) greatly disadvantaged with respect to access to information? How effective are efforts to expand access to information for these people? How effective are public information agencies in refuting misinformation? How effective are information campaigns at advancing mission goals? How well do these information activities support COIN, CT, or HA/DR efforts?
13 Selected List of Data Sources

The below list identifies a non-exhaustive list of open-source DIME/PMESII related databases which are readily available at the time of printing. No examination was made to assess the quality or comprehensiveness of any databases nor are any of these databases recommended for use in any analysis—they are simply presented *as is*. The databases are organized into the following categories: Multiple Areas, Overarching, Diplomatic, Information, Military, Economic, Legal, Political, Societal, Infrastructure, and Other.

Multiple

This category is reserved for data sets which contained data from multiple sources. In selected cases, some entries in this category are in fact low-level Information sources.

Britannica statistics offer demographic, infrastructure, and economic statistics by country.

http://geoanalyzer.britannica.com/

The CIA World Factbook is an information source that includes high-level, aggregated "data" across the PMESII spectrum. It is not, in the strictest sense, a database though it contains useful data points.

https://www.cia.gov/library/publications/the-world-factbook/

The NationMaster data source is a compilation of many databases and includes spatial distributions of selected data.

http://www.nationmaster.com/index.php

DataWeb is a network of online data libraries covering demographic, economic, health, income, unemployment, labor, transportation, family dynamics, and vital statistics data.

http://www.thedataweb.org/index.html

Overarching

Weather Impacts to Decision-making and Military Operations

Global Multihazard Frequency and Distribution database http://www.ciesin.columbia.edu/eidata/resource.jsp

Diplomatic Actions

While there are many narrative information sources on Diplomatic actions, there are few databases that address capabilities and capacities of individual nations.

General

The Correlates of War Diplomatic Exchange Data Set: Tracks diplomatic representation at the level of chargé d'affaires, minister, and ambassador between states from 1817-2005. This data set is hosted by Reşat Bayer, Koç University. http://correlatesofwar.org

Support to Host Nation for Compliance with International Conventions and Standards

Australian Maritime Safety Authority monitors compliance with international standards by conducting inspections of ships, cargoes and cargo handling equipment in Australian ports, oversighting ship operations in Australian waters and issuing certificates of competency to seafarers.

http://www.amsa.gov.au/About%5FAMSA/ Customs-Trade Partnership Against Terrorism (C-TPAT) http://www.cbp.gov/xp/cgov/trade/cargo_security/ctpat/ Equasis Database http://www.equasis.org/EquasisWeb/public/HomePage

Diplomatic Actions to Support Humanitarian Assistance/Disaster Relief

FEMA Responder Knowledge Base http://www.miniatlasofhumansecurity.info/en/access.html World Health Organization Centre for Research on the Epidemiology of Disasters Emergency Events Data base (EM-DAT). http://www.emdat.be/ International Crisis Behavior: Collects data on all international crises since the end of World War I. http://www.cidcm.umd.edu/projects/project.asp?id=15

Multi-party Diplomatic Negotiations

International Crisis Behavior Project http://www.cidcm.umd.edu/projects/project.asp?id=15

Advocacy Actions by US Government

Department of State, Bureau of Democracy, Human Rights, and Labor, Annual Reports on the U.S. Record of Support for Human Rights and Democracy, http://www.state.gov/g/drl/rls/shrd/index.htm

Information Actions & Effects

General

SITE Intelligence Group Monitoring Service: By monitoring terrorist and extremist websites and penetrating password-protected Al Qaeda linked sites, SITE provides a state-of-the-art intelligence service Source: http://www.siteintelgroup.org/

Information Dissemination

Historical Trends in Media Freedom: Provides historical maps which graphically
demonstrate trends in media freedom over the past quarter century
http://www.freedomhouse.org/template.cfm?page=5
The Angus Reid Global Monitor
http://www.angus-reid.com/
Arab Public Opinion Surveys
http://sadat.umd.edu/surveys/index.htm
New Russia Barometer
http://www.abdn.ac.uk/cspp/catalog1_0.shtml
New Europe Barometer
http://www.abdn.ac.uk/cspp/nebo.shtml
New Baltic Barometer
http://www.abdn.ac.uk/cspp/catalog2_0.shtml
Southeast Europe Barometer
http://www.abdn.ac.uk/cspp/seb.shtml
Eurobarometer
http://ec.europa.eu/public_opinion/index_en.htm
World Poll Analyses
http://www.gallup.com/poll/WorldPollChannels.aspx
Muslim-West Relationships
http://www.gallup.com/tag/Muslim-West%2bRelationships.aspx
Transatlantic Trends
http://www.transatlantictrends.org/trends/TTSplash.cfm
Afrobarometer
http://www.afrobarometer.org/surveys.html
Arab Barometer
http://www.arabbarometer.org/
Asian Barometer
http://www.asianbarometer.org/
Latinobarometer
http://www.latinobarometro.org/
GlobeScan
http://www.globescan.com/index.htm
Israeli-Palestinian Public Opinion Polls
http://truman.huji.ac.il/default.asp

Palestinian Center for Public Opinion http://www.pcpo.ps/polls.htm The Pew Global Attitudes Project http://pewglobal.org/

Military Actions & Effects

General

The Correlates of War database contains over 100 years of data on military conflicts, civil wars, and militarized interstate disputes.

http://www.correlatesofwar.org/

The Small Wars Journal publishes many first-hand narratives for Afghanistan and Iraq. Though the narratives not a database and many accounts are not substantiated, it is a potentially useful information source.

http://smallwarsjournal.com/

Economic Actions & Effects

General

United Nations Industrial Development Organization (UNIDO) http://www.unido.org/index.php?id=o3474

Food and Agriculture Organization of the United Nations (FAOSTAT): Provides time-series and cross sectional data relating to food and agriculture for some 200 countries.

http://faostat.fao.org/

TradeStats ExpressTM and Industry Trade Data and Analysis: The latest annual and quarterly trade data. Contains links to current trade statistics from the U.S. government, select trade and economic data published by other countries, and similar trade resources.

http://tse.export.gov/

Exporter Database: Offers tables that provide an annual statistical snapshot of U.S. exporters: their number, characteristics, and geographic distribution.

http://ita.doc.gov/td/industry/otea/edb/index.html

Trade Capacity Building Database: Offers access to the full set of survey data, covering FY1999–FY2008. Since 2001, the U.S. Agency for International Development (USAID) has conducted an annual survey on behalf of the Office of the U.S. Trade Representative (USTR) to identify and quantify the U.S. Government's trade capacity building activities in developing countries and transitional economies.

http://qesdb.cdie.org/tcb/index.html

United Nations Commodity Trade Statistics Database (UN Comtrade): Provides 1 billion trade records starting from 1962.

http://comtrade.un.org/

USA Trade Online (U.S. Bureau of the Census): Provides access to current and cumulative U.S. export and import data for over 18,000 export commodities and 24,000 import commodities.

http://www.usatradeonline.gov/

USITC Trade DataWeb (U.S. International Trade Commission): Provides international trade statistics and U.S. tariff data to the public full-time and free of charge.

http://www.dataweb.usitc.gov/

OECD Statistics Portal (Organisation for Economic Co-operation and Development: Provides selected data, databases and reports on 25 topics from agriculture to transport.

http://www.oecd.org/statsportal/0,2639, en_2825_293564_1_1_1_1_1_00.html Penn World Table: Offers purchasing power parity, GDP and national income accounts, converted to international prices for 168 countries from 1950-2000 with growth rates. Provided by the University of Pennsylvania's Center for International Comparisons

http://pwt.econ.upenn.edu/php_site/pwt61_form.php

World Development Indicators: A data query that offers a 5-year, 54-indicators segment from the World Development Indicators database. Provided by the World Bank

http://www.worldbank.org/data/onlinedatabases/onlinedatabases.html

World Trade Organization: Provides comprehensive, comparable and up-to-date statistics on trade in merchandise and commercial services for an assessment of world trade flows by country, region, and main product groups or service categories (sector, region, subject)

http://www.wto.org/

Bilateral Trade: Tracks total national trade and bilateral trade flows between states from 1870-2006. This data set is hosted by Katherine Barbieri, University of South Carolina, and Omar Keshk, Ohio State University.

Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief

There are many scholarly articles about the economic effects of HA but no data bases. Probably this is because the scale and characteristics of HA operations vary so much that they are not very comparable. Also, the size and types of the economies affected also vary greatly. The data is anecdotal.

Activities to Improve Infrastructure

Estache, Antonio and Ana Goicoechea "A 'Research' Database on Infrastructure -Economic Performance." World Bank Policy Research Working Paper 3643, June 2005.

http://www-

wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/06/16/000016406_20050616100502/Rendered/PDF/wps3643.pdf

Development Executive Group, Database of contracts awarded for infrastructure development, https://www.devex.com/contracts/search?keywords=Infrastructure&reset_base=1 Global Competitiveness Report www.weforum.org World Business Environmental Survey http://info.worldbank.org/governance/wbes/ Demographic and Health Surveys http://www.measuredhs.com/ UN Millennium Indicators Database http://unstats.un.org/unsd/mi/mi_goals.asp UN-habitat Database http://www.unhabitat.org/programmes/guo/guo_indicators.asp International Energy Agency www.iea.org World Energy Outlook www.worldenergyoutlook.org Energy Information Administration www.eia.doe.gov/emeu/international/electric.html *South African Development through Electricity (SAD-ELEC)* http://www.sad-elec.com/ Energy Regulators Regional Association (ERRA), Energy Tariff Data http://www.erranet.org/Products/TariffDatabase Organización Latinoamericana de Energía (OLADE), Sistema de Información Económica-Energética http://www.olade.org.ec/siee/defaultin.asp World Bank Benchmarking, Water & Sanitation, http://www.worldbank.org/html/fpd/water/topics/bench_network.html Joint Monitoring Programme, World Health Organization-UNICEF, http://www.wssinfo.org/en/welcome.html World Health Organization, http://www.who.int/en/ Water Utilities Partership (Africa) http://www.wupafrica.org/spbnet/angl/waterf.html International telecommunications Union http://www.itu.int/home/index.html ITU Regulatory Database http://www.itu.int/ITU-D/treg/profiles/guide.asp?lang=en Universal Postal Union http://www.upu.int/statistics/en/index.shtml *Railisa Database* http://www.uic.asso.fr/stats/ Janes World Railways 2003/04 http://jwr.janes.com/ International Transport Statistics Database http://www.iraptranstats.net/defn_infra

Humanitarian Assistance/Disaster Relief Operations

United Nations Office for the Coordination of Humanitarian Affairs Relief Web http://www.reliefweb.int/rw/dbc.nsf/doc100?OpenForm

Economic Development Supporting Disaster Recovery

Trade Capacity Building Database http://qesdb.cdie.org/tcb/index.html

Spending in Support of Host Nation Ministry of Defense

Defense Security Cooperation Agency (DSCA) list of military sales, http://www.dsca.osd.mil/research.htm Defense Security Cooperation Agency (DSCA) list of Foreign Military Sales (FMS) Contract Awards http://www.dsca.osd.mil/PressReleases/by-date/news_index.htm Defense Security Cooperation Agency (DSCA) Foreign Military Training and DoD Engagement Activities of Interest http://www.state.gov/t/pm/rls/rpt/fmtrpt/

Spending to Support Rule of Law

Department of State, Bureau of Democracy, Human Rights, and Labor, Annual Reports on the U.S. Record of Support for Human Rights and Democracy, http://www.state.gov/g/drl/rls/shrd/index.htm The Worldwide Governance Indicators (WGI) data base, http://info.worldbank.org/governance/wgi/index.asp

Spending for / Development of Other Host Nation Ministries and Agencies

Department of State Combined Resource Summary for State Operations and Foreign Assistance www.state.gov/f/releases/iab/fy2009supp/html/123945.htm Trade Capacity Building Database http://qesdb.cdie.org/tcb/index.html

Changes in the Domestic Production by Economic Sector and Region

World Bank Country Statistical Information Database, http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,content MDK:20541648~menuPK:64133156~pagePK:64133150~piPK:64 133175~theSitePK:239419~isCURL:Y~isCURL:Y,00.html

Changes in the Flow of Capital

World Bank, Global Development Finance (GDF), International Official Net Transfers, http://data.un.org/Browse.aspx?d=ICS UN Conference on Trade and Development's Foreign Direct Investment database http://stats.unctad.org/fdi/ TradeStats Express.TM and Industry Trade Data and Analysis http://tse.export.gov/

Changes in Host Nation Wealth/Income Distributions

World Bank Country Statistical Information Database, http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,content MDK:20541648~menuPK:64133156~pagePK:64133150~piPK:64 133175~theSitePK:239419~isCURL:Y~isCURL:Y,00.html Failed States Index, http://www.fundforpeace.org/web/index.php?option=com_content&task=view&i d=99&Itemid=140

Changes in the Availability, Cost, and Distribution of Goods and Services

The Penn World Table provides purchasing power parity and national income accounts converted to international prices for 188 countries for some or all of the years 1950-2004. The European Union or the OECD provide more detailed purchasing power and real product estimates for their countries and the World Bank makes current price estimates for most PWT countries at the GDP level. There are two releases of the Penn World Table. PWT6.2 – Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006. PWT6.1 – Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), October 2002. Both are co-located at:

http://pwt.econ.upenn.edu/php_site/pwt_index.php

US Department of Labor, Bureau of Labor Statistics, Import/Export Price Indices -International Price Program – (IPP)

http://data.bls.gov/PDQ/outside.jsp?survey=ei

New Zealand, Office for Statistics, Consumers Price Index,

http://www.stats.govt.nz/datasets/economic-indicators/consumers-price-indexcpi.htm

Organisation for Economic Co-operation and Development (OECD) Consumer Price Indices

http://manyeyes.alphaworks.ibm.com/manyeyes/datasets/oecd-consumer-priceindices-2006/versions/1

United Kingdom, Office for National Statistics,

http://www.statistics.gov.uk/statbase/tsdataset.asp?vlnk=7174

Effects of Trade Agreements on Economy

US Department of Commerce, International Trade Administration, TradeStats Express,

http://tse.export.gov/

Law Enforcement Actions

Worldwide Governance Indicators (WGI): Reports aggregate and individual governance indicators for 212 countries and territories over the period 1996–2007, for six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. The aggregate indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. The individual data sources underlying the aggregate indicators are drawn from a diverse variety of survey institutes, think tanks, non-governmental organizations, and international organizations.

http://info.worldbank.org/governance/wgi/index.asp

Operations Against Criminal Syndicates

Department of State, Bureau of International Narcotics and Law Enforcement Affairs, Annual International Narcotics Control Strategy Report (INCSR), http://www.state.gov/p/inl/rls/nrcrpt/index.htm Interpol Operational data services and databases for police, http://www.interpol.int/Public/icpo/corefunctions/databases.asp

Enforcement of International Resolutions

International Committee of the Red Cross databases on international humanitarian law, National Implementation Database http://www.icrc.org/ihl-nat

Political Effects

The Polity Project: The Polity IV dataset covers all major, independent states in the global system (i.e., states with total population of 500,000 or more in the most recent year; currently 162 countries) over the period 1800-2007. In the late 1990s, Polity became a core data project in the U.S. Government's State Failure Task Force global analysis project (since, renamed the Political Instability Task Force; PITF). http://www.systemicpeace.org/polity/polity4.htm

Major Episodes of Political Violence, 1946-2008: Annual, cross-national timeseries, general conflict magnitude data on interstate, societal, and communal warfare (independence, interstate, ethnic, and civil; violence and warfare).

http://www.systemicpeace.org/inscr/inscr.htm PITF State Failure Problem Set 1955-2007: Annual data on cases of ethnic war, revolutionary war, adverse regime change, and genocide/politicide (also, consolidated cases of political instability), includes annual indicators of numbers of rebels, area affected, and numbers of deaths.

http://www.systemicpeace.org/inscr/inscr.htm

Terrorism & Preparedness Data Resource Center (TPDRC): Archives and distributes data from a variety of sources. It also organizes and streamlines access to extant research and administrative data from across the world that are relevant to the study of terrorism and the response to terrorism for descriptive and scientific analysis by academics and researchers.

http://www.start.umd.edu/start/

Terrorist Organization Profiles (TOPs) and Global Terrorism Database (GTD) http://www.start.umd.edu/start/

Freedom in the World Historical Rankings: Comparative scores for all countries from 1973 to 2006

http://www.freedomhouse.org/template.cfm?page=5

Failed States Index (FSI): Focuses on the indicators of risk and is based on thousands of articles and reports that are processed by our CAST Software from electronically available sources.

http://www.fundforpeace.org/web/index.php?option=com_content&task=

view&id=99&Itemid=140

Conflict Assessment System Tool (CAST)

 $http://www.fundforpeace.org/web/index.php?option=com_content\&task$

=view&id=105&Itemid=143

Minorities At Risk Project monitors the status of politically-active communal groups around the world.

http://www.cidcm.umd.edu/projects/project.asp?id=17

The International Crisis Group Reports is mainly a collection of narrative reports http://www.crisisgroup.org/home/index.cfm?l=1

International Crisis Behavior: Collects data on all international crises since the end of World War I.

http://www.cidcm.umd.edu/projects/project.asp?id=15

Corruption Perceptions Index (CPI): Ranks 180 countries by their perceived levels of corruption, as determined by expert assessments and opinion surveys.

http://www.transparency.org/policy_research/surveys_indices/cpi

Global Corruption Barometer: A survey that assesses general public attitudes toward and experience of corruption in dozens of countries around the world.

http://www.transparency.org/policy_research/surveys_indices/gcb

Bribe Payers' Index (BPI): Assesses the supply side of corruption and ranks corruption by source country and industry sector.

http://www.transparency.org/policy_research/surveys_indices/bpi

Worldwide Governance Indicators (WGI) (also Law Enforcement/Legal): Reports aggregate and individual governance indicators for 212 countries and territories over the period 1996–2007, for six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The aggregate indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. The individual data sources underlying the aggregate indicators are drawn from a diverse variety of survey institutes, think tanks, non-governmental organizations, and international organizations.

http://info.worldbank.org/governance/wgi/index.asp

Kansas Event Data System (KED): Uses automated coding of English-language news reports to generate political event data focusing on the Middle East, Balkans, and West Africa. These data are used in statistical early warning models to predict political change. The ten-year project is based in the Department of Political Science at the University of Kansas.

http://web.ku.edu/~keds/

Changes in Political Involvement of Host Nation Citizens

Polity IV dataset

http://www.systemicpeace.org/polity/polity4.htm

Changes in Perception of Government/Authority Legitimacy

CAST,

http://www.fundforpeace.org/web/index.php?option=com_content&task=view&i d=105&Itemid=143

Transparency International Databases, including the Corruption Perceptions Index (CPI),

http://www.transparency.org/policy_research/surveys_indices/cpi *Global Corruption Barometer*,

http://www.transparency.org/policy_research/surveys_indices/gcb Bribe Payers' Index (BPI),

http://www.transparency.org/policy_research/surveys_indices/bpi

Effects of External Group Involvement in Host Nation Politics

Mini Atlas of Human Security http://www.miniatlasofhumansecurity.info/en/access.html

Societal Effects

Ethnologue

http://www.ethnologue.com/

Human Relations Area Files

http://www.yale.edu/hraf/

Systemic Peace provides several datasets of interest including: Integrated Network for Societal Conflict Research (INSCR), Forcibly Displaced Populations 1964-2007, High Casualty Terrorist Bombings, 1994-2009, Major Episodes of Political Violence, 1946-2008, and PITF State Failure Problem Set 1955-2007. These resources provide a wide range of information relating to political violence and many associated effects. http://www.systemicpeace.org/inscr/inscr.htm

Social Vulnerability Index (SoVI) and Terrorism & Preparedness Data Resource Center (TPDRC) are two databases which provide comparative data at the county level on social vulnerability to hazards and extreme events, based on the synthesis of 42 socioeconomic, demographic, and built environment variables.

http://www.start.umd.edu/start/

The Association of Religion Data Archives (ARDA): A collection of surveys, polls, and other data submitted by researchers and made available online by the ARDA. There are nearly 400 data files included in the ARDA collection.

http://www.thearda.com/Archive/Browse.asp

Pew Global Attitudes Project: A series of worldwide public opinion surveys that encompasses a broad array of subjects ranging from people's assessments of their own lives to their views about the current state of the world and important issues of the day. More than 175,000 interviews in 55 countries have been conducted as part of the project's work.

http://pewglobal.org/

UNESCO Institute for Statistics: Global and internationally comparable statistics on education, science, culture and communication. The Data Centre contains over 1,000 types of indicators and raw data on education, literacy, science and technology, culture and communication.

The UIS collects the data for more than 200 countries from Member States and international organizations.

http://www.uis.unesco.org/ev.php?ID=2867_201&ID2=DO_TOPIC

WHO Statistical Information System (WHOSIS): An interactive database bringing together core health statistics for the 193 WHO Member States. It comprises more than 70 indicators, which can be accessed by way of a quick search, by major categories, or through user-defined tables. The data can be further filtered, tabulated, charted and downloaded. The data are also published annually in the World Health Statistics Report released in May.

http://www.who.int/whosis/en/

Quality of Life Perception

World Values Survey http://www.worldvaluessurvey.org/

Epidemic Breakout

Global Response Database (GRD), http://www.unaids.org/en/KnowledgeCentre/HIVData/CRIS/grd.asp World Health Organization Statistical Information System (WHOSIS), http://www.who.int/whosis/en/

Migration

Migration Research Institutes Database,

http://ftp.unesco.org/migration/MIGWEBintro.shtml *ILO International Labour Migration Database*, http://www.ilo.org/public/english/protection/migrant/info/ilm_dbase.htm *Office of the United Nations High Commissioner for Refugees*, *Data on Refugees 1975-2007* http://data.un.org/Browse.aspx?d=MDG

Effects of Discrimination in Host Nation

Minorities At Risk Project http://www.cidcm.umd.edu/projects/project.asp?id=17

Infrastructure

AQUASTAT database

The AQUASTAT database provides information on water and agriculture by countries in the following main categories: Land use and population, Climate and water resources, Water use, by sector and by source, Irrigation and drainage development, and Environment and health. The AQUASTAT database can be queried on-line and the query results can be downloaded in CSV format. The current database regroups data per 5-year period and shows for each variable the value for the most recent year during that period, if available. For example, if for the period 1998-2002 data are available for the year 1999 and for the year 2001, then the value for the year 2001 is shown. It should be noted however that for most variables no time series can be made available yet, due to lack of sufficient data.

http://www.fao.org/nr/water/aquastat/dbase/index.stm

Other Databases of Interest

Overseas Private Investment Corporation (OPIC) http://www.opic.gov/ The Political Terror Scale http://www.politicalterrorscale.org/

14 Data Requirements

An expanded discussion on data, focused on the requirements associated with "good data" is presented below.

14.1 Data Collection Best Practices

In order to have a good data set, it is necessary that the collection methodology conform to best practices. While there is no universally agreed upon set of best practices for data collection, the follow list represents a core set of methods that are generally accepted by most researchers:

Informal interviewing of SMEs

Was the interview conducted by only one interviewer or by many interviewers? If many interviewers took part, were the data compiled by the various interviewers compared? Were their results consistent? That is, how much inter-researcher reliability was there?

Use of a structured protocol during formal interviewing of SMEs

How much did context or framing affect particular answers? For example, if respondents were asked to evaluate water quality, were they given a context-free Likert question ("Is water quality [a] good, [b] fair, [c] poor?") or were they asked to compare the current water quality with the previous years' water quality?

If the members of the target population speak a foreign language, was the translation of the questions into the foreign language accurate? (That is, were the questions translated into the foreign language and then back-translated into the original language to test for accuracy? Was the protocol pre-tested on a small sample of native speakers and corrected, based on their feedback, before being used for interviewing the target population?)

How much latitude did the interview protocol permit the interviewee? Were the answers pure contrasts (ex. "yes/no"), Likert scales (ex. "Do you (1) strongly disagree, (2) disagree, (3) neither disagree nor agree,..."), or percentages (ex. "What percentage of your daily time was involved in...")?

Did the interview protocol include subjective, open-ended questions? If so, how were answers to these subjective questions coded?

Was the interview conducted by only one interviewer or by many interviewers? If many interviewers took part, were the data compiled by the various interviewers compared? Were their results consistent? That is, how much inter-researcher reliability was there?

Focus Group data elicitation

How were the focus groups chosen? How many focus groups were formed? How many times did they meet with the researcher? Were the data from one focus group

compared with data from other focus groups? Were data from one focus group compared with data obtained later from the same group?

Distribution of a survey to a sample of the target population

Was the sample random? What methods were used to ensure that the sample was random? If a truly random sample could not be obtained, was the sample at least representative of the target population? What methods were used to ensure that the sample was representative?

Was the survey pre-tested on a small representative sample before being mailed to the full sample, to detect errors or ambiguities in phrasing?

How was the survey distributed? Regular Mail? E-mail? By hand (ex. at offices where people apply for public services)? How were the completed surveys collected (ex. mailed in, via web sites, physically collected)? How did the distribution and collection methods affect the randomness of the sample? Could these methods have introduced sampling bias? What percentage of the targeted subjects bothered to return the survey?

Did the interview protocol include subjective, open-ended questions? If so, how were they coded?

Telephone Polling of a Sample of the targeted population

What percentage of the targeted population was missed because people have unlisted telephone numbers or cell phones? Did this introduce bias into the sample? How many languages are spoken by the target population? Were the respondents asked what their native languages are? Was the polling agency capable of asking the same questions in a number of languages, so that respondents could understand the questions and answer in their native languages?

Manual collection of information from a sample of open written sources

How were the open sources selected? What percent of all relevant sources were included in the sample? What criteria were used to select the sample of open sources (ex. source—news stories, scholarly articles, books, encyclopedias, wikis—language, date of publication, local availability)? Bearing all of these selection criteria in mind, how representative of the total set of relevant open sources is the sample?

When the information was analyzed, how were data gaps dealt with? To illustrate: if the goal was to collect information about five issues, and 20 of the 40 sources consulted had no information about Issue # 1, was Issue # 1 retained in the final analysis, despite the significant gaps in data, or was it thrown out?

If the items extracted from the open sources were manually coded (ex. words such as "liberty," "unconstrained," "not coerced," and "voluntary" are all coded as examples of "freedom of action"), were many different coders employed? If so, was any measure of coder inter-reliability made? Was there a clear protocol or manual for the coding process, so that each coder had relatively little latitude when deciding how to code a particular item?

Automatic extraction of information from open written sources

While very similar to the manual collection of information from a sample of open written sources, there are additional nuances associated with automated extraction methods such as: Was the reliability of the automated data extraction method established prior to data collection? How many false positives and false negatives does the method produce when applied to a ground-truth data set? (see Schrodt 1993; Schrodt and Gerner1994; Schrodt, Simpson and Gerner2001)

Consistency of Multiple Sources of Qualitative Data

If public opinion is being measured in two ways (ex. automated extraction of data from online media; public opinion polling), how well does the data from one source support the data from the other source?

If data from open sources can be compared with data from classified sources, are they consistent? Do open sources appear to be less accurate than classified sources?

Manual collection of information from open visual sources (maps, photographs, aerial photographs, films, etc.)

How were the open sources selected? What percentage of all relevant sources was included in the sample? What criteria were used to select the sample of open sources?

How was the visual information in these sources coded? For example, if the effort involved counting the number of single-family dwellings per square mile in a city or province, how were single-family dwellings distinguished from stores, apartment buildings, schools, and so on? How many coders were employed? How high was the inter-reliability of the coders?

Collection of New Quantitative Data

Was the new collection effort patterned after previous efforts or pre-existing data bases, so that comparable data categories were created that would apply for both past and present time periods? Was the data collection effort systematic across the entire area of responsibility? That is, were the same questions posed for different geographical regions, so that these regions could be compared systematically?

Transfer of Data from Official or Pre-existing Data Bases

Were the data transferred from one pre-existing data base or many? Were separate data categories in one data base merged to make them compatible with data categories in another data base? What distortions of the data set could result?

The aforementioned best practices apply to all collection methods, regardless of whether the data is quantitative or qualitative. However, if the data is qualitative – and this is the case for a very large portion of the DIME/PMESII problem space – then extra care must be taken when transforming qualitative data into numbers and creating data bases.

14.2 Proposed Metadata Tags

Metadata is critical to data reusability. It is through the use of metadata tags that the original scope, purpose, limitations, etc. of the data set can be known and through this its future applicability determined. Thus, not only should the DIME/PMESII modeling suite be designed to accept, process, and utilize metadata indicators or tags that identify the sources of input data, but future collection activities should produce metadata tags for each data set that is created. Such a capability should allow the operator to examine data outputs and trace them back to their original sources. Traceability of data is especially important for suites of modeling tools (such as COMPOEX), in which the input data for a particular tool may consist of output data from a series of other tools. Without being able

to trace data back to its original sources, the operator would be hard put to evaluate the quality of the data.

Metadata tags should also include indicators of data quality. Although it is not possible to require conformity to any single, uniform standard for DIME/PMESII data quality – given the great diversity of data collection methods and formats in the theoretical social sciences and in applied disciplines such as policy studies, intelligence studies, and security studies – it is possible to identify best practices for data collection and use in all of these fields. The metadata tags proposed here are:

- Detailed description of original purpose and research questions to be answered
- Detailed description of the region and time period covered by the data set
- Date of all data refreshes including which portions were updated
- Details of the collection methodology (e.g. what were the questions asked in the survey in both the original language and English, etc.), data analysis techniques, and aggregation methods
- Historical description of development process including the evolving ground conditions and methodology during the all collection efforts
- Detailed definitions of categories, items, and terms of reference
- Recommended interpretation of data by originator
- Originator's caveats and description of intended uses
- Originator's thoughts on further applicability beyond original scope
- Originator's recommendations for expanding the data set
- Explicit assumptions including underlying social theory, scale, coverage, etc.
- Estimates of data quality measures (see below)
- List of know deficiencies, inconsistencies, limitations, and cautions
- Estimate of error bounds for each data field
- Organization of the data set
- History of all modifications to database including reprocessing (aggregation, recoding), reorganization, updates, or corrections
- Recommended use and original applicability
- Recommended refresh schedule and list of specific event triggers that will require immediate updating

In many respects, these metadata tags resemble the sections of a peer-reviewed journal article associated with the data set. Unfortunately, such critical information is often lost or poorly documented. By including these metadata tags within the data set—essentially "stapling the report to the data file"—it will be guaranteed that this information will not be lost.

14.3 Generic Problems in Maintaining Quality Data

In practice, DIME/PMESII analysis makes use of both qualitative and quantitative data. To maintain the quality of all data types, a range of problems must be solved. Through interviews, discussions, and reviews, several important "lessons learned" regarding data

quality were identified. They are listed below. While the list is incomplete, it does represent a partial "map through the minefield" of data use and misuse.

The first step in using any data set is to understand it. This involves identifying all the explicit and implicit assumptions inherent in the data set. These assumptions can be rooted in either the underlying theory associated with the statement of the problem (i.e. the question to be answered) or in the collection and analysis methodologies. Equally important are the definitions associated with the data points as well as the organization of the database. Other aspects of the data set – in particular, its freshness, thoroughness, and completeness – must also be considered. That is, are the initial ground conditions associated with the data still valid? How much of the problem space does the database cover? How many critical aspects and details of the phenomena are included in the data set? Finally, determining the applicability of the data set to problems outside its original scope is crucial for assessing its proper use.

Bearing this in mind, lessons learned include:

- Many data sets lose their usefulness if they are not maintained and refreshed periodically. Obviously, modelers cannot use an obsolete data set if the ground conditions of the desired scenarios have changed since the data were collected. But they also must take care not to use an assembly of data sets for a given application if all these data sets are not equally up-to-date. An old data set is not compatible with newer data sets. Perhaps the most important obstacle here is cost; it is expensive to collect new data. Of course, this is a managerial and budgetary problem, not a technical problem.
- Data sets must also be properly archived so that they can be easily accessed and do not decay over time. Archivists must keep up with developments in information technology, so that data bases in outmoded formats or on old platforms can be converted to new formats. Conversion, of course, may introduce errors if not done carefully. Finally, if a data base is proprietary or restricted, some process must be established for modelers to obtain long-term licenses or short-term access.
- Few data sets are thorough enough for addressing multiple problems. For example, a data set that lists every criminal act (location, date, and type) but lacks information about the severity of the act, the perpetrator, and the manner of the act can be used to calculate crimes rates for various periods but is not adequate for finding correlations between criminal activities, age and sex of the perpetrators, and political unrest. (Young 2009)
- Few data sets are complete enough for every use. For instance, a data set about economic activity may not cover the entire time period that is to be examined or may have gaps in coverage that must be filled. When a whole range of data points (ex. "economic activity from 1977 to 1987") is missing, extrapolation may compensate for this large gap. On the other hand, when the coverage is spotty, leaving small gaps unfilled at unpredictable intervals (ex. data points for economic activity in June 1977 and April 1982 are missing but are found for all other months in the time period being examined), the remedy may be interpolation.

- Extrapolation and interpolation do not always work for most data sets and there is rarely consensus about both the methods used and the credibility of the results. On a positive note, it has been learned that in some cases the analytic concerns associated with a data set's gaps are either unfounded or easily overcome through simple data interpolation. Thus, the incompleteness of a data set does not necessarily invalidate its use.
- Another common problem encountered with DIME/PMESII model suites is the difficulty of adjudicating and interpreting a data set for use as input for different analytic models. For example, consider a data set of opinion polling which includes information about both perceptions and attitudes. If the analysis is to use two different models—one requiring perception inputs and the other attitudinal inputs—the conversion of the data set into model input is often subject to an individual modeler's subjective interpretation or recoding schema. Also, reconciling different definitions is often necessary. Using this same example, the definitions used within the data set are not always consistent with the definitions in a model. Finally, multiple data sets often exist that employ identical definitions but contain divergent or inconsistent data points. The adjudication of conflicting data sets often presents an analytic challenge—especially if the frequency and scale of the differences is significant.
- It is also common for a model to require data at a different granularity level than the data set presents. Moving between levels of granularity, through either aggregation or disaggregation, is a significant challenge.
- Semantic incompatibilities between data sets are another problem. These arise from the definitions of the categories used for collecting and coding data. For instance, one econometric data set may define an "unemployed person" as "someone who is actively seeking employment," thus excluding those who have become discouraged and are no longer looking for work. Another data set, however, may use a broader definition that includes all previously employed people who have lost a job during the period under consideration, whether or not they are actively seeking to rejoin the labor force. To reconcile these conflicting definitions, it might be possible to adjust the figures provided by one data set so that they are comparable with those in the other data set. In some cases, however, such incompatibilities cannot be resolved.
- Semantic incompatibility may also have negative consequences for the interoperability of models. To illustrate: two models may both draw data from a common set of data bases, but the first model may aggregate or manipulate the data differently than the second model and for different purposes. If the output categories of the first model are defined differently from the input categories of the second model, data cannot flow smoothly from the first to the second. If the two models also draw some of their inputs from completely different data bases, the likelihood of semantic incompatibilities is greater.
- Another difficultly is in tracing how errors, inconsistencies, or semantic incompatibilities propagate from a data set throughout an analysis.
- The limited adherence to best practices regarding data collect or generation has the potential to damage the credibility of the resulting analysis regardless of the data set's quality. This is because a data set, with limited documentation and

traceability, can lead to unanswerable questions regarding its applicability, validity, and adequacy. By strictly adhering to existing best practices (e.g. documentation of sources, methods, assumptions, underlying theories, etc.) and the inclusion of detailed metadata tags, such concerns would be greatly mitigated.

Despite the fact that the lessons learned described above are commonly acknowledged by modelers, they might not always be in a position to apply them. When modelers have to deal with tight schedules or constraints on resources, they might have to use data sets or data input methods that have all of the above flaws. This can lead to either the use of poor data sets or the misuse of data beyond its area of applicability.

In some cases—when reliable data is completely absent—they may even manufacture "data" by means of the "Bunch of Guys Sitting Around Talking" (BOGSAT) method or by eliciting approximations from SMEs. Such "data" is actually generated from the SMEs' knowledge of phenomena. However, by using SME knowledge in this way, modelers often commit the logical fallacy of arguing from general propositions to specifics. An example of this fallacy would be: asking an expert on a particular country who has long-term experience and deep but slightly dated general knowledge of it to describe the current political maneuverings of the factions in its capital city. One cannot derive specific data points about a rapidly changing phenomenon from general knowledge. This is no more valid than asking an American meteorologist to answer the question, "What's the weather like in Cincinnati?" without giving him or her an opportunity to collect fresh data.

Put differently, knowledge is not the same as data since knowledge is inherently an aggregation of data and information. Although it is possible to aggregate data into knowledge, it is not always possible to disaggregate knowledge into specific, precise data sets or data proxies. By using data proxies instead of real data, of course, the modelers may reduce the validity and credibility of their analyses.

This fallacy can be mitigated somewhat if the question concerns an aspect of society that changes rather slowly, if the SME has just recently returned from the country in question, and if he or she has developed specialized knowledge about the topic. Thus, if modelers were to ask a political scientist who studies the political institutions of a country, "Who are the main decision-makers of this country? Would they probably agree to form a military alliance with the United States?" they are more likely to get valid answers. One assumes that the political scientist knows the key decision-makers, knows their biographies and past attitudes about the United States, knows who their constituencies and clients are, knows what the attitudes and interests of these constituencies are and knows how the decision-makers have dealt with each other in the recent past. Hence it is reasonable to expect that he or she can deduce from these rather specific facts what the current positions of these decision-makers are likely to be about this issue. Because the SME's knowledge is specific and relatively fresh and because the phenomenon in question - the structure of the governing elite and the interests and attitudes of its members - changes relatively slowly, the SME's deductions are more likely to be correct. To return to the previous illustration: this is like asking a meteorologist who has just returned from Cincinnati about the weather there.

The most satisfactory use of SMEs, then, is to utilize them as highly informed reporters. To continue with the same illustration, the modeler would send an SME to the country in question and ask him or her to interview its key decision-makers about their attitudes toward the United States. In this case the SME is not manufacturing data; rather, he or she is collecting it. The data that such a SME reporter can provide is likely to be of higher quality than data collected by untrained reporters because the SME can compare the current situation with the past and detect subtle changes that might elude a non-expert. The SME also knows the language and traditions of the country and can evaluate informant statements more accurately than an untrained reporter. Of course, newspaper reporters have interviewing skills of their own that an SME might not have. So the best approach might be to send a team of reporters and SMEs to the country to collect the data.

The above issues cannot be resolved simply by establishing a priori standards for data quality and data organization. The variety of relevant data and data collection methods is too great to be covered by standards at this stage in the development of DIME/PMESII modeling. However, there are best practices that mitigate some of these concerns.

15 Sample Scenario

In this chapter, the analysis of a notional disaster relief scenario is setup in the context of the core descriptive requirements and appropriate measures. The notional Humanitarian Assistance/Disaster Relief scenario was developed for the fictitious country "Z" to stimulate discussions on analysis methodologies at the FY08 World Class Models Sea Shaping Workshop (August 6-8, 2007). Using the methodology proposed in Chapter 4, the scenario is first framed and objectives identified (Step 1) before the Descriptive Requirements and Measures of Effectiveness are considered (Step 2). Next in Step 3, using the analysis of the existing tools presented in Chapter 7 and Appendix 0, a modeling suite is selected followed by the determination of model and data coverage in Step 4. Only afterwards in Step 5 does modeling and analysis begin.

Step 1: Identify, Define, and Bound the Scenario

The first step in any analysis is identifying what questions need to be answered, defining the criteria for success, and bounding the problem space.

Background

Country Z is a tropical island nation is the western Pacific with a population of 90,000,000, 35% of whom are Muslim. Overall, country Z has problems with poverty, corruption, crime, and natural hazards (earthquakes and typhoons). The land mass is an Archipelago with more than 1,000 islands rich in natural resources. Large portions of major islands, where the Mulsims represent 90% of the local population, are poorly governed with active separatist movements and Islamic extremism; these same regions also contain developed mineral deposits. Minor terrorist attacks are somewhat frequent in urban areas, targeting Western facilities, tourist attractions, foreigners, and the central government. The civilian government is friendly to the US.

Disaster – The Triggering Event

In September, Country Z experiences a 7.5 magnitude earthquake (see Figure 7 for geography). The initial casualty estimates are 200,000 dead, 125,000 injured, and 500,000 displaced and homeless with tens of thousands missing. The quake has disrupted the infrastructure: rail, air transportation, and port facilities have all been damaged. The main airport in the capital is operational after some runway repair though no fuel stores are readily accessible. The Prime Minister of Country Z immediately requests international aid and assistance in helping the citizens.



Figure 7: Geography of Country Z

Starting Conditions

Non-governmental organizations (NGOs) provide the majority of aid with US mobility and lift resources for distribution. Host nation and international aid groups, as well as Muzawwar and Associated Movement (MAM) groups also provide aid. Regional governments will work with the USG to allow operations within their territory to provide HA and security.

International assistance is complicated by interference from Islamic Extremist groups. Terrorist attacks continue in urban areas, targeting Western facilities, tourist attractions, and foreigners. There is a minimal threat to Air Lines of Communications /Sea Lines of Communications (ALOCs/SLOCs) that lead to the area of responsibility (AOR). The international aid groups are not authorized to use pre-positioned stocks or equipment.

Military assets should be seen as a tool for complementing existing relief mechanisms to provide specific support to specific requirements. Any use of military assets should be, at its onset, clearly limited in time and scale and include an exit strategy that defines clearly how the function it undertakes could, in the future, be undertaken by civilian personnel.

Assumptions

- Country immediately requests international aid and assistance
- US response begins within 24 hours of the request

- Countries nearby to Country Z support effort; assist with overfly/throughput rights
- Blue has access to airfields
- Prepositioned stocks or equipment are not available

Host Nation Z - Green Objectives

- Assist casualties and displaced people
- Reestablish functioning infrastructure and security
- Prevent an unstable environment that may be exploited by Islamist militant organizations to undermine legitimacy of the government
- Prevent potential civil unrest

Host Nation Z – Green Criteria for Success / Measures of Policy Effectiveness (MoPEs)

- Most casualties identified and next-of-kin notified within a short period after the disaster
- Funeral rites for most victims are complete within the time periods specified by national religious tradition or national civil law
- Basic care for most orphans and injured provided within a short period after the disaster
- Short-term repairs of damaged critical infrastructure ex. sewage systems, pipelines for water and natural gas are completed in cooperation with US forces within a short period after the disaster
- Most of the damage to roads, telephone lines, and other infrastructure has been identified and prioritized for repair within a few weeks after the disaster
- In most parts of the disaster area, at least a few food markets, banks, hospitals, telephone and radio linkages, gasoline and fuel stations, and fire and police stations are re-opened within a short period after the disaster
- In every administrative district in the disaster area, at least one office of disaster relief is opened within a few days after the disaster where citizens can request services and complain about neglect, mistakes, injustices, and inefficiencies
- At least some injustices in distributing relief assistance are recognized, corrected, and publicized by HN government
- Most attempts to organize and stage anti-government demonstrations blocked by police
- Most efforts to disseminate anti-government propaganda blocked by police

Host Nation Z – Green's Actions

- Country Z government will lead DR efforts to the extent possible and will coordinate US and other foreign support
- HN police and military will maintain security where able
- HN Ministry of Interior will collect and disseminate data about casualties, take charge of funeral rites and interment of disaster victims, and facilitate searches for missing persons

- HN Ministry of Interior will provide census data about disaster area population to all relief workers, collect data about the population in the disaster area, and compare it with data collected by US forces
- HN Ministry of Interior will direct local administrative offices to cooperate with US forces in providing information about infrastructure (maps, diagrams of electrical grid, etc.)
- HN Ministry of Interior officials will keep track of short-term repairs completed by both US forces and local workers and establish priorities for long-term repair efforts
- Local Ministry of Interior officials will open disaster relief offices in each administrative district, provide staff for them, and determine how requests for aid and complaints will be processed
- Local Ministry of Commerce officials will keep track of the number of markets, banks, hospitals, and other key facilities that have been opened in the disaster area and will provide as much assistance as possible to owners and operators

Host Nation Z – Green's Forces

- Army distributed throughout the islands of the nation
- Limited lift restricts army's ability to mass effectively
- Small navy consisting of limited patrol craft and harbor security forces
- Aged air force of limited capability
- Government has resources for relief but is hindered by damaged infrastructure
- Disaster has overwhelmed security capability, many areas ungoverned
- Third party countries contribute supplies and resources.
- Country A (regional ally) provides significant military capabilities such as airlift, logistics, medical, and C2 other neighbors also contribute airlift
- Country Z government is receptive to working with regional allies

US – Blue's Objectives

- Support the HN (Country Z) Government
- Assist casualties and displaced people
- Military Support to the wider (Country Z) Society
- Re-establish functioning infrastructure and security
- Prevent potential civil unrest
- Prevent an unstable environment that may be exploited by Islamist militant organizations to undermine legitimacy of the government
- Improve the image of the US here and abroad

US – Blue Criteria for Success / Measures of Policy Effectiveness (MoPEs)

- Identification and tracking of most US and allied citizens in disaster area complete within a short period after the disaster
- Shelters for most US and allied citizens procured and secured by US forces, and transport to these shelters provided within a short period after the disaster

- Shelter, basic medical care, and emergency clothing, food, and water supplied to most displaced people not already housed in HN emergency facilities within a short period after the disaster
- Responses to most HN government requests for emergency aid complete within a few days after the disaster
- US military forces deployed to most of the unsecured parts of the disaster zone within a few days after receipt of requests for security assistance from HN government
- Most short-term repairs of damaged critical infrastructure ex. sewage systems, pipelines for water and natural gas are completed in cooperation with HN officials and technicians within a short period after the disaster
- Most of the damage to roads, telephone lines, and other infrastructure has been identified and prioritized for repair within a few weeks after the disaster
- Most complaints made to US forces by local people about the distribution of disaster relief have either been addressed directly or have been forwarded to the HN official who is responsible
- Responses to most anti-US propaganda appearing in local HN newspapers and broadcasts are made by US embassy within a few days after they appear
- HN opinions of the US HA operation are generally favorable during and immediately after the execution of the operation
- International opinions of the US HA operation are generally favorable during and immediately after the execution of the operation

US – Blue's Actions / CONOPs

- Remain in a supporting role to government
- Minimize footprint
- Speedy response: quick deployment of responders & equip
 - Push initial relief supplies to FOBs
- Coordination with Allied Partners: cross-level support capabilities, avoid duplication
- Strategic communication; describe and explain planned US actions to HN population in advance of and during execution; describe and explain US actions to neighboring countries during and after execution
- Military support will flow from theater and from CONUS
- Avoid open-ended, long-term activities
- Hand-off functions to NGOs as they become capable
- Logistics: Immediate Humanitarian Assistance
 - Limited engineering support
 - Coordinated Support with HN government
 - Support to deployed JTF
- Force Flow / Strategic Lift
 - Survey existing APOD, SPOD, Main Supply Routes (MSRs)
 - Nearby major port serves as hub for flow of materials
 - Inter Theater support: Air Mobility Command (AMC) established air channels that service Country Z Capital will be used to move personnel and supplies

- Expect movement requirements to quickly exceed channel capabilities requiring coordination with AMC for additional lift support
- Sealift support for movement of required in-theater land based forces (coordinated through TRANSCOM)
- Heavy military helicopters deploy via strategic lift from within theater (PACOM)
- 2 x CH-47 per C-5: Reassemble and self-deploy

US – Blue's Forces

- PACFLT is JTF Commander, provides sea-based Logistics & C2
- Supplies flow from within theater and CONUS
 - Main airport will be primary air distribution hub
 - Local MHE, cargo handling are augmented by USAF
 - US Forces at airport require tents, field kitchen, latrine trailers
- Army Forces

•

- Aviation TF HQ, 2x GS Aviation Battalion
 - Joint cargo A/C, AVIM
 - Horizontal Engineer Co
- Medical Units:
 - Hospital force packages
 - Area Medical Co
 - · Preventive Med Det, Medical Log Spt
- Logistics Units
 - CSSB HQ
 - Support Maintenance Platoon
 - Joint High Speed Vessel (JHSV)
 - Water Purification Team
- Air Force
 - 6 C-130
 - Contingency Response Group (CRG)
 - Expeditionary Medical Support (EMEDS)
 - Civil Engineer Squadron
- Navy
 - Surface Combatants (CVN, DDG (x2), CG, LCS)
 - Amphibious Ships (LHD/LHA, LPD, LSD)
 - Other Ships: TAOE, JHSV x2, USNS Mercy, Special Mission Survey Vessel
 - Aircraft
 - 6 MH-60R
 - 14 MH-60S
 - 5 P-3
 - Other Assets
 - NMCB(-) (Seabees)
 - Combat Camera Team
- USMC
 - MEU(SOC)
 - 6 KC-130 (on call)

- MARSOC

US – Blue C4ISR and Space

- Maintain capability to track disposition of isolated joint forces
- Execute sensing strategies that support protection of the transportation system
- Provide threat warning support to air and ground forces
- Primary US communications links will be established using tactical assets or commercial services where available
 - Include SIPRNET, NIPRNET, INMARSAT, UHF SC TACSAT
 - AMHS capability and deployable LAN also provided
- Geo-location, GPS, Weather, Communications, Imagery

US – Blue Force Distribution

- FW lift assets (C-130, C-17, charters) carry supplies, personnel and support equipment into capital airport
 - Supports total 8 transports per day (MOG 2)
 - Additional Contingency response elements deploy with aerial port equip to distribute from secondary locations
 - HN provides land transport to affected areas if airlift is not required or available
- RW and C-130 distribute supplies to forward locations for distribution by HN government and NGOs
- Precision Airdrop of relief supplies will be available to areas not accessible by other means
- Support priority: water, class I, class VIIIa, class IIIb, and class II / IV
- Medical support deploys to designated relief camps to meet critical needs for indigenous population, NGO/OGAs
- Execute deployment, redeployment, reconstitution and retrograde of forces as required

Muzawwar and Affiliated Movement (MAM) – Red Objectives

- Undermine legitimacy of national Government
- Persuade majority of the population to withdraw their support for the existing national government
- Prevent loyal government officials from carrying out their disaster relief tasks
- Provide financial, logistical, and military support for an Islamic insurgency
- Replace secular government with Islamic regime

Muzawwar and Affiliated Movement (MAM) – Red Criteria for Success / Measures of Policy Effectiveness (MoPE)

- Reduced attendance at meetings of local governing councils by a significant amount
- Organized and staged numerous anti-government demonstrations during the disaster period
- Caused a significant shift in public opinion of the HN government from favorable or neutral to negative during and immediately after the disaster period

- Prevented a significant number of loyal government officials from carrying out their disaster relief tasks during the disaster period
- Provided a significant amount of financial, logistical, and military support for an Islamic insurgency during the disaster period

Muzawwar and Affiliated Movement (MAM) - Red Actions

- Organize and fund MAM and related charities to compete with government agencies in providing relief
- Threaten foreign aid workers to gain regional influence and recognition
- Secretly threaten loyal government officials to prevent them from carrying out disaster relief tasks efficiently
 - Reluctant to be seen as direct cause of national government ineffectiveness during the crisis; prefer to portray official inaction as the result of widespread corruption, cronyism in hiring, etc.
- Conduct piracy with small boats to help finance MAM operations
- Collect "taxes" from areas under MAM control to help finance MAM operations
- Execute large-scale bombings, suicide bombings, IEDs, VBIEDs attacks
 - Reluctant to be seen in direct attacks against relief workers, may attack targets of opportunity (IEDs, sniping)
 - Targets include central and Western government assests
- Use front organizations to proselytize, run schools, conduct fundraising, politics
 - Will use these services to recruit
 - recruit volunteers and sympathizers to work with charities initially and with "armed wing" eventually
- Initiate strategic communications campaign
 - Highlights government inability to respond adequately
 - Asserts Western countries provide aid only to gain influence

Muzawwar and Affiliated Movement (MAM) – Red Forces

- Several thousand fighters armed with Small Arms, RPGs, mines, mortars, MANPADs
- Several hundred coordinators, strategists, organizers, public speakers/preachers, recruiters, and education/propaganda cadres
- Extensive knowledge of local politics, social structure, and geography

Step 2: Generate Modeling Requirements and Associated Measures

The first step (Step 2.1) is the develop scenario indicators associated with the objectives. The development of indicators is scenario specific and can be as complex or detailed as desired. For this example scenario, the indicators will be straightforward with details provided below.

The removal of non-critical requirements (Step 2.2) is accomplished through SME review as is Step 2.3: the linking of requirements and measures as suggested in Appendix 12.

Within a single mission (e.g. HA/DR), multiple requirements are linked (see Figure 8). Furthermore, the simultaneous missions are also linked one to another through the requirements (e.g. Non-combatant Evacuation Operations linked with HA/DR while also linked with Foreign Internal Defense, etc.) as seen in Figure 9. All together, this yields the final linking as presented in Figure 10. The linkages of descriptive requirements to the seven blue objectives are as follows:

Objective 1: Support to the HN (Country Z) Government

This objective includes supporting the host nation government by providing security; negotiations, training staff, and providing logistical support. The following requirements support this objective:

A-D-01	Support to the Ambassador
A-D-02	Negotiations with HN Government
A-D-05	Improvements to HN Diplomatic Capabilities
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country
	Nationals
A-D-10	Diplomatic Actions to Support HA/DR
A-D-12	Diplomatic-like Interactions Between Organizations
A-M-07	Logistics
1. /	

Indicators: Compliance of citizenry with governmental laws and regulations as indicated by tax revenues, registration of assets, etc. Degree of positive control by central government over regional government (e.g. compliance by police forces with central government mandates).

Objective 2: Assist casualties and Displaced People

The purpose of this objective is to provide disposition of casualties; and provide food, shelter, and medical support for refugees, evacuees, and displaced persons. The following requirements support this objective:

- A-D-09 Negotiating Refugee Safe Havens
- A-M-03 Foreign NEO
- A-E-01 Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief
- A-E-13 Establishing and Maintaining Refugee Camps

Indicators: Change in numbers of people requiring assistance and the degree to which assistance is needed. Number of people in refugee camps and the conditions within the camps. Rate of relocating people from refugee camps/status to normalcy. Degree of self-sufficiency and sustainable living conditions of affected peoples and areas.

Objective 3: Military Support to the Wider Country Z Society

The purpose of this objective is to provide military support to Country Z citizens as well as government. Military support includes distribution of goods and services, transporting relief goods or relief personnel, and security or technical assistance such as communications restoration, relief supply management, or provision of emergency medical care. The following requirements support this objective:

E-M-03 Effects on Military due to Operations

- E-E-04 Effects on Markets
- E-E-05 Changes in Availability, Cost and Distribution of Goods and Services
- E-S-01 Effect of Foreign Presence on HN Norms and Behaviors
- E-S-05 Impact to Stability and Security due to events

E-I-05 Effects of Independent Media Outlets on Perceptions and attitudes Indicators: Reduction in number of affected persons without aid or with inadequate aid. Efficiency and sufficiency of aid distribution network. Reduction in medical care demand signal throughout affected regions. Change in number of security incidences in and near affected regions. Stability in price of food/goods in spite of aid distribution.

Objective 4: Re-establish Functioning Infrastructure and Security

This objective is critical to rebuilding the host nations and re-establishing the host country's independence. General actions include road repair, airspace management, and power generation. The following requirements support this objective:

A-E-02	Building and Securing Lines of Communication
A-E-03	Building and Securing Host Nation Essential Services
E-N-01	Effects of Restored Essential Public Services on HN
E-N-02	Effects of Restored/Impaired Infrastructure on HN

Indicators: Degree to which critical infrastructure has been restored and that infrastructure has enabled a return to pre-disaster normalcy. Ability of affected regions to regain and return self-sufficiency in critical areas (sufficient adequate housing; medical services; food production and distribution; water and sewage; etc.).

Objective 5: Prevent Potential civil Unrest

This objective is essential in maintaining the host nation's stability. The following requirements support this objective:

- E-P-01 Changes in Population Loyalty to HN Government
- E-P-02 Changes in Political Involvement of HN Citizens
- E-P-06 Changes in Perception of Government/Authority Legitimacy
- E-I-05 Effects of Independent Media Outlets on Perceptions and attitudes

Indicators: Reduced participation at rallies by Islamist Militant Organizations. Reduced credibility of message. Degree to which legitimate problems cited are promptly and adequately addressed.

Objective 6: Prevent an Unstable Environment that may be Exploited by Islamist Militant Organizations to Undermine Legitimacy of the Government

This objective is essential to alleviate the underlying conditions, motivators, and enablers of radical Islamist extremism, militancy and terrorism which would lead to further instability. The following requirements support this objective:

A-L-01 Identification, Disruption and Interdiction of Financial Support for Destabilizing Actors

A-L-02	Identification, Disruption and Interdiction of Institutional Support
	for Destabilizing Actors
A-L-03	Identification, Disruption and Interdiction of Local Support for
	Destabilizing Actors
A-L-04	Identification, Disruption and Interdiction of Recruitment for
	Destabilizing Actors
A-L-06	Martial Law and Law Enforcement Operations
E-S-10	Impact of Terrorist/Insurgent Groups on HN Population

Indicators: Degree to which legitimate problems cited are promptly and adequately addressed. Popular sentiment regarding local or central government versus Islamist Militant Organizations. Degree to which citizens comply with laws or customs in spite of militant rhetoric or actions. Degree to which social, political, and economic life is returning to pre-disaster normalcy.

Objective 7: Improve the image of the US here and abroad.

This objective is important because the perception of the US is essential in fostering goodwill. It is in the best interests of the United States and its allies to deploy US forces to provide humanitarian assistance (HA) to those in need. US forces are uniquely equipped and structured to provide a rapid and capable response when such missions arise.

- A-I-03 Collection of HN Citizen Perceptions
- A-I-04 Information Dissemination
- E-P-01 Changes in population Loyalty to HN Government

E-I-05 Effects of Independent Media Outlets on Perceptions and attitudes Indicators: Improved interactions between US forces and local citizens, local officials, and governmental officials. Increased quality (cooperation, information shared, etc.) of official interactions. Changes in social behavior to US forces on the street (e.g. increased willingness to conduct vendor sales, greet US forces, be seen near US forces, etc.). Changes in opinion polling data. Changes in the nature of media reports. Changes in tone, strength, content, or frequency in rhetoric of opposing or anti-American groups. Changes in tone, strength, content, or frequency of statements by allies or neutral parties.

	Actions	Related H	Requirem	nents		Impacts	Related 1	Requiren	nents		
#			Actions					Effe	ects		
	Diplomatic	Information	Military	Economic	Legal	Political	Military	Economic	Societal	Information	Infrastructure
1	Support to	Intell Ops on HN	Response to	Est Distro Ctrs	ID/Disrpt/Intrdict	Δ in Pop Loyalty	Foreign Sprt /	∆ Dom Product	Foreigners on	Info Collect on	Essential Public
	Ambassador	Conditions	WMD Attack	for HA/DR	Funds: Dstbl	to HN Gov't	Ops on HN Mil	(Sector, Region)	Norms & Behav	HN Gov't Actions	Services on HN
2	Negots w/ HN	Intell Ops on HN	Response to	Build/Lecure	ID/Distrpt/Intrdict	△ Political	Multi-Nat'l	△ Flow of Capital	Quality of Life	Info Gathering on	∆ Infrastructure
2	Gov't	Gov't	Convent'l Attack	Lines of Comm	Inst'l Sprt: Dstbl	Activity of Pop	Exercises on Mil		Perception	HN Pop	ofn HN
3	Negots W/ Local	Collect HN	Foreign NEQ	Build/Secure	D/Distrpt/intraict	A Gov't struct or	will due to Ops	A HN wealth /	Restrictions on	Into Dissem on	Am HN Envirn
4	Eeaders Embacov Commo	Info Discom	Mil Training	Essent i Services	ID/Distrat/Intrdict	Funct Outcide Involm't		Income Distro	Societal Londore	Info Discortion	r
-	Embassy Comms	IIIO Disseili	win training	Relocate Efforts	Recruit: Detbl	in HN Politice		Widi Kets	Societai Leauers	HMCitizone	
5	Improve HN Diplo	Collect & Use of	Support to HN	Econ Info Ons	Cntr-Criminal	A Percents of		A Avail/Cost of	Events: Stability	3rd Party Media	
-	Capability	Refugee Info	COIN Efforts		Syndicates Ops	Gov't Legit		Goods/Services	& Security	Percept/Attitude	
6	Diplo Acts: Prep	Improve HN Gov't	Mil Exercises	Mitigate WMD	Martial Law & LE	∆ Gov't		HR Training on	Epidemic		
	for Stability Ops	Comms	1	Effects	Ops	Leadership		Econ	Breakout		
7	Comply w/ Int'l	Info Exchange	Logistics	Econ Intell Ops	Enforce Int'l	Destabilizing		Combat Ops on	Migration	1	
	Conv'tns & Stds	Program	-		Resolutions	Events		the Economy	-		
8	Evac Embassy &	Alter Influence of	Improve of MoD	Est & Maint Log	Cntr-Corrupt	Trans-Nat'l Org's		NEO on Economy	Legislation, LE, &		
	Support Staff	Ldrs		Support for HN	Activities	Acts (Internal)			Regulations		
9	Negot Refugee	∆ Message /	Deter Foreign /	Improve	Improve Legal &	Outside Nation's		Econ Response	Discrimination in		
	Safe Havens	Position of Ldrs	Proxy Attackers	Infrastructure	LE Ministries	Acts (Internal)		to Rule of Law	HN		
10	Diplo Acts to	Intell Collect to	Mil & Naval	Econ Actions for		HN by Forward		Sanctions (Econ)	Terror / Insurgt		
44	Support HA/DR	Support HN	Presence	Joint Mil Exer		Bases		In the state Provide state	Grps on HN Pop		
	Dipio-Act for HN	Improve HN Inten	war & will	HIRING HN		3rd-Party Extrni		Industrialization	Strikes, Protests,		
12	Diplo-Like Acts	ISP for Embasey	invasion	HA/DR Ope		Eactional Group		Trade	Riots, Gathering	1	
	Btwn Orgs	loit for Embassy		- month ops		Activities		Agreements			
13	Diplo Preps for	HN Internal		Est & Maint				A HN			
	WMD CM	Dissem of Info		Refugee Camps				Infrastructure			
14	Diplo Acts: Multi-	Needs Assess for		Mitigate Destable			•		(0)		
	Nat'l Exercises	Decision-Making		Effects			0	verarching	(8)		
15	Diplo Aborgn'l,	Info Ops		Econ Dev for	Clater	Evente	A	Decisions	Contout	Dretecolo	Environment
	Nomad, Minority			Disaster Recov	Sidles	Evenis	ACIUIS	Decisions	CONTEXT	FIOLOCOIS	Environment
16	Est Relatns:	Training of HN		Stability Ops	PMESII Ground	Time and Space	By Power or	Decision-making	History	Social Norms &	Physical Terrains
47	Absent a State	Gov't Personnel		(Econ)	Truth	Franks Transla 0	Authority (HN)	in Hierarchical	In the second section of the	Expectations	Network
17	Multi-party Diplo			Improve Mol	Actor Percepts of	Events, Trends, &	By Region	Individual	Interpretation &	RUES &	Natural Resouces
18	Destabilization			Spending fr	ations a	und dama		a in dea	o nin tive		d and a
10	Ons				ctions a	na depe	naencie	es in des	criptive	requirer	nents ^a
19	Deterrence			Spending fo						al atrata	al
1				MoD C	irawn fro	om interv		ITN SMES	s, nation	al strate	gies,
20	Advocacy Acts			Spending		(1		dl farmer	terel a s	- 1 -	
	by US Gov't			Rule of L		lesson	s learne	a trom s	stuales,	etc.	
21	Security & LE for			Spend / Det							
	US			Other Agencies		Implicit Req'ts					

Figure 8: Notional Linkage between Requirements within HA/DR Mission



Figure 9: Notional Linkage of Requirements across Missions

MISSION	: HUMANIT	ARIAN ASSIS	STANCE/DISA	STER	RELI	EF OPERA	TIONS
Support to the HN (Country Z) Government	Assist casualties & displaced people	Military Support to wider Country Z Society	Re-establish functioning infrastructure and security	Prev poter civil u	ent ntial nrest	Prevent an unstable environment	Improve the image of the US here and abroad
Support to Ambassador Negotiations with HN Government	Negotiating Refugee Safe Havens Foreign NEO	Effects on Military due to Operations	Building and Securing LOCs Building and Securing HN	Chang popula Loyah HN G	jes in ation ty to Sovt	ID, Disrupt & Interdict Financial Support for Destabilizing Actors	Collection of HN Citizen perceptions
Improvements to HN Diplomatic Capabilities Evacuation of Embassy Personnel and Affiliated Host Country	Establishing Distribution Centers for Humanitarian Assistance/ Disaster Relief	Markets Changes in Availability, Cost and Distribution of Goods and Services Effect of Foreign Presence on	Essential Services Effects of Restored Essential Public Services on HN	Chang Politi Involve of F Citize Chang Percept Govt/Au Legitin	Jes in ical ement IN ens Jes in tion of thority macy	ID, Disrupt & Interdict Institutional Support for Destabilizing Actors ID, Disrupt & Interdict Local Support for Destabilizing Actors	Information Dissemination Changes in Population
Nationals Diplomatic Actions to Support HA/DR Diplomatic-like	and Maintaining Refugee Camps	HN Norms & Behaviors Impact to Stability and Security due	Effects of Restored/ Impaired Infrastructure on HN		Impact	ID, Disrupt & Interdict Recruitment Destabilizing Actors of Terrorist/ Insur-	gent
Interactions b/n Organizations		to events	cts of Independent N	Aedia Out	Martial Enforce	Law and Law ement Operations Perceptions and a	attitudes

Figure 10: Requirements Supporting HA/DR Operations

These remaining requirements and measures are then prioritized and ranked by the SMEs. No additional, scenario-specific requirements or measures (Step 2.5) are relevant to this notional example.

Step 3: Select Model Suite

In this step, consisting of 3 sub-steps, the models discussed in Chapter 7 and Appendix 17 are reviewed and compared against the scenario's requirements developed above in Step 2. For the notional scenario, it is determined that the following collection of models meets the needs of the scenario:

- Analyzing Complex Threats for Operations and Readiness (ACTOR)
- Advanced Global Intelligence and Leadership Experiment (Agile)
- Conflict Assessment System Tool (CAST)
- Conflict Modeling, Planning and Options Exploration Program (COMPOEX)
- Integrated Gaming System (IGS)
- Interim Semi-static Stability Model (ISSM)
- Massachusetts Institute of Technology State Stability Model (MITSSM)
- Military Operations Other Than War/Flexible Asymmetric Simulation Technologies (MOOTW/FAST)
- Nexus
- Organizational Risk Analyzer (ORA)
- Peace Support Operations Model (PSOM)
- Senturion

In Step 3.2, the model experts together with the analysts assess the data requirements for each model for the given scenario. For the purposes of this exercise, assume all the required data is available. Finally, in Step 3.3, the model linking methodology is selected. For this scenario, COMPOEX is selected to serve as the backplane for the models.

Step 4: Determine Model & Data Coverage

With the models and linking methodology selected, Step 4.1 is complete once the data is all assembled. For this sample scenario, it is assumed that no tweaks or model improvements (Step 4.2) nor any workarounds (Step 4.3) are considered. The resulting model and data coverage for this notional scenario is presented in Table 8 (see page 1 at end of this Appendix). Note that, even for this sample scenario, there are several descriptive requirements not addressed by the models identified. The uncovered descriptive requirements are:

Weather Impacts to Decision-making and Military Operations
Support to the Ambassador
Improvements to HN Diplomatic Capabilities
Evacuation of Embassy Personnel and Affiliated Host Country
Nationals
Foreign NEO
Building and Securing Lines of Communication
ID, Disruption and Interdiction of Local Support for Destabilizing
Changes in Political Involvement of HN Citizens
charges in Fondeau Involvenent of The Chizens
Effect of Foreign Presence on HN Norms and Behaviors
Impact to Stability and Security due to events

Finally, SMEs review and document the accuracy and limitations of the representation in Step 4.4 resulting.

Step 5: Begin Modeling and Analysis

At this point, actual modeling and analysis could begin using the suite and associated measured developed above. Though not discussed here, the final results of the analysis—which will inform and aid decision-makers—are the ultimate objective.

This notional Humanitarian Assistance (HA) scenario was developed and used to provide an example of how to apply the descriptive requirements to a scenario and identify potential models. The objectives of the scenario were described and several descriptive requirements which support these objectives were also selected. The general interdependencies were identified to provide an overview of other descriptive requirements that may be related and may also be applicable to the scenario. Associated MoPs and MoEs should be identified by the analyst to support the comprehensive definition of the capabilities of future government-owned model suites.

		POEX		5	
	Descriptive Requirements	ve Covi	Sentin Sentin	Nexus	
0-D-03	Social Process of Decision-making				
0-D-04	Perception of Environment, Actions, and Events				
O-E-01	Time and Space				
O-E-02	General Events, Trends, and Cycles				
O-E-04	Weather Impacts to Decision-making and Military Operations				
A-D-01	Support to the Ambassador				
A-D-02	Negotiations with HN Government				
A-D-05	Improvements to HN Diplomatic Capabilities				
A-D-08	Evacuation of Embassy Personnel and Affiliated Host Country Nationals				
A-D-09	Negotiating Refugee Safe Havens				
A-D-10	Diplomatic Actions to Support HA/DR				
A-D-12	Diplomatic-like Interactions Between Organizations				
A-I-03	Collection of HN Citizen perceptions				
A-I-04	Information Dissemination				
A-M-03	Foreign NEO				
A-M-07	Logistics				
A-E-01	Establishing Distribution Centers for HA/DR				
A-E-02	Building and Securing Lines of Communication				
A-E-03	Building and Securing Host Nation Essential Services				
A-E-13	Establishing and Maintaining Refugee Camps				
A-L-01	ID, Disruption and Interdiction of Financial Support for Destabilizing Actors				
A-L-02	ID, Disruption and Interdiction of Institutional Support for Destabilizing Actors				
A-L-03	ID, Disruption and Interdiction of Local Support for Destabilizing Actors				
A-L-04	ID, Disruption and Interdiction of Recruitment for Destabilizing Actors				
A-L-06	Martial Law and Law Enforcement Operations				
E-P-01	Changes in population Loyalty to HN Government				
E-P-02	Changes in Political Involvement of HN Citizens				
E-P-06	Changes in Perception of Government/Authority Legitimacy				
E-M-03	Effects on Military due to Operations				
E-E-04	Effects on Markets				
E-E-05	Changes in Availability, Cost and Distribution of Goods and Services				
E-S-01	Effect of Foreign Presence on HN Norms and Behaviors				
E-S-05	Impact to Stability and Security due to events				
E-S-10	Impact of Terrorist/Insurgent Groups on HN Population				
E-I-05	Effects of Independent Media Outlets on Perceptions and attitudes				
E-N-01	Effects of Restored Essential Public Services on HN				
E-N-02	Effects of Restored/Impaired Infrastructure on HN				

Table 8: Model Coverage for Sample Scenario
16 Detailed List of Framework & Architecture Requirements

The following requirements provide an indication of the areas of performance that need to be specified for an ideal DIME/PMESII model suite infrastructure. The requirements are too expansive to be achievable in the near term for anything close to a realistic cost. They are also, in some instances, too ill-defined to be included as part of a request for proposal. They do, however, provide a solid foundation for development of such a specification or for evaluation of candidate infrastructures.

1.	Operator Interface
1.1.	Setup
1.1.1.	Definition of the analysis topic includes the following:
1.1.1.1.	The system shall address both causal reasoning and diagnostic reasoning analysis topics.
1.1.1.2.	The system shall assist in the decomposition of the analysis topic into subcomponents by providing a recommendation, the logic for the recommendations, and the required content, resolution, and fidelity of information for the inputs and outputs. The system shall support decomposition of the analysis topic in a distributed collaborative manner.
1.1.1.3.	The system shall use standard descriptions of analysis topics and subcomponents that can be operated on with system logic. The system shall establish and publish the ontology to be used for the definition of analysis topics and their subcomponents.
1.1.1.4.	Based upon the information requirements, the system shall identify the analysis context which will consist of the aspects of the description of the world that need to be represented by the analysis tools.
1.1.1.5.	The system shall use standard descriptions of analysis context that can be operated on with system logic. The system shall establish and publish the ontology to be used for the definition of analysis context.

1.1.1.6.	The system shall assist with outlining how to combine the results from each subcomponent to address the analysis topic
1.1.1.7.	 Analysis Tool Recommendation. The system shall assist in the determination of the most appropriate analytic tool for each subcomponent to include: Recommend the most appropriate analytic tool for each subcomponent Provide the logic for the selection of the preferred analytic tool for each subcomponent Rank ordered alternatives for analytic tools for each subcomponent Provide the limitations of each alternative of analytic tool for each subcomponent Provide the analyst the capability to designate the analytic tool to be applied to each subcomponent
1.1.1.8	The system shall provide an infrastructure to facilitate automation of system setup for subcomponents selected for analysis with the model suite. This shall include: - Provide the capability to define the analysis context appropriate for each simulation run, recommend an analysis context based upon the problem definition and model capability to include the capability to define and modify the analysis context. The system shall map the analysis topic definition into model requirements. - Establish and publish the ontology for the statement of model requirements and capabilities and publish the mapping between the analysis topic ontology and the model requirements and capabilities ontology.
1.1.1.9.	The system shall propose a Design of Experiment (DOE) for employment of the model suite in addressing the analysis topic that shall consider exploration of alternatives using multiple models that address the same analysis space but employ different theories or approaches.
1.1.2.	Composition of models. The system shall assist with composing the optimum collection of models for addressing the defined problem.
1.1.2.1.	Catalog of models and data sources. The system shall maintain a catalog of all the models available within the system that includes model name, version number, purpose, capabilities, and limitations using the model requirements and capabilities ontology.

1.1.2.2.	Assist selections of models to address issue of the day. The system shall recommend the models to use to best meet the defined problem to include: - Provide the logic for the selection of recommended models over any other available alternatives to include at least the resolution of the analysis and the topic context - Identify the risks with respect to confidence interval and sensitivity to the analysis resulting from the identified shortcomings and express this using the analysis topic definition ontology - Propose strategies to mitigate the identified shortcomings of the recommended models with respect to addressing the analysis topic and identify if the mitigation strategy requires significant changes to the analysis topic definition, decomposition, and resulting selection of models. - Presentation of the logic used in the selection of model recommendations shall use the ontology of model requirements and capabilities.
1.1.2.3.	Ensure data compatibility. The system shall assess the data specifications of the models of the final composed simulation design for data compatibility.
1.1.2.4.	 Ensure semantic compatibility. The system shall assess the data specifications of the models of the final composed simulation design for semantic compatibility to include: The system shall establish and publish the ontology used for the semantic description of models to include provisions for expressing the implicit and explicit assumptions and abstractions, the operational range, and the direction, dependency, and dimension of information flow of the model. The system shall identify potential risks and limitations in addressing the analysis topic arising from any lack of semantic compatibility of the selected model set. If self adapting models are used, the system shall re-evaluate semantic compatibility each time a model adapts and notify the operator to include: revisions necessary to the potential risks and limitations in addressing the analysis topic arising from any lack of semantic compatibility provide the operator the option of terminating execution of the simulation if a specific user defined semantic incompatibility condition is reached.

1.1.2.5.	Display construction and interactions of collection of models. The system shall provide the analyst with a representation of the organization and interactions expected during execution of the models of the final composed simulation design through the use of an industry scheme such as UML.
1.1.2.6.	Identify constraints. The system shall present to the analyst a description of the limitations of the final composed simulation design in addressing the defined problem using the ontology of the analysis topic definition.
1.1.2.7.	Operator selection of models. The system shall provide the analyst the capability to edit and process the final composed simulation design.
1.1.2.8.	Store system model configuration. The system shall provide for the model composition list to be stored for later use with identifier information at any point in the composition definition process.
1.1.3.	Scenario construction. The system shall assist in the creation of model scenarios to address the defined problem.
1.1.3. 1.1.3.1.	Scenario construction. The system shall assist in the creation of model scenarios to address the defined problem. Mapping problem definition to scenario content. The system shall provide a mapping of the analysis topic context definitions to identification of aspects of scenario content to include recommending a specific scenario content based upon identified aspects of scenario content and models and publish the ontology for scenario description.
1.1.3. 1.1.3.1. 1.1.3.2.	Scenario construction. The system shall assist in the creation of model scenarios to address the defined problem.Mapping problem definition to scenario content. The system shall provide a mapping of the analysis topic context definitions to identification of aspects of scenario content to include recommending a specific scenario content based upon identified aspects of scenario content and models and publish the ontology for scenario description.Scenario creation tools. The system shall provide a toolset to facilitate scenario development.
1.1.3. 1.1.3.1. 1.1.3.2. 1.1.3.3.	Scenario construction. The system shall assist in the creation of model scenarios to address the defined problem.Mapping problem definition to scenario content. The system shall provide a mapping of the analysis topic context definitions to identification of aspects of scenario content to include recommending a specific scenario content based upon identified aspects of scenario content and models and publish the ontology for scenario description.Scenario creation tools. The system shall provide a toolset to facilitate scenario development.Store, retrieve and edit scenarios. The analyst shall be provided the capability to store scenarios at any point in the development process, add identifier information to any saved scenario, and maintain and allow additions to a library of standard scenarios.

1.1.4.1.	Initialization of description of the simulated world. The system shall pre-fill the variables that describe the conditions of the world that includes: - The system shall provide for default data for all variables of the complete description of the world. to include a library of default data sets and recommended usage based on the problem definition. The analyst shall be able to select any default set, modify it, and save it as a new default. - The system shall provide the capability to initialize any variable of the complete description of the world automatically through retrieval of information from Command and Control and operational database systems and maintain a list of available C2 and database systems and the data they are capable of providing. - The system shall associate specific world description data with specific data sources. - The system shall conduct validity checks of all retrieved data. - The system shall provide for resolution of any conflicts in values for any world description data that has more than one possible source and he resolution scheme shall be visible and modifiable by the analyst. - The system shall assign a confidence level to all initial values of the complete description of the world and define and promulgate allowed entries for the confidence level of world description data.
1.1.4.2.	Initialization of model tasking. The system shall generate model-tasking files for models that require direction or tasking.
1.1.4.3.	Notification of time step. The system shall provide all models with the simulation time step to be used during execution.
1.1.5.	Time step determination. The system shall provide the analyst the capability to define the simulated period in the synthetic operations space (time step) at which all models will update the complete description of the world.
1.1.5.1.	Identify allowable alternatives. The system shall present to the analyst the allowable time step options.
1.1.5.2.	Recommendation of time step. The system shall recommend a time step to use based upon the problem and scenario definitions and provide the logic for the recommended time step.
1.1.6.	Execution paradigms. The system shall provide flexibility of operational modes.

1.1.6.1.	Multiple paradigms. The system shall be capable of operating under multiple different execution paradigms to include as a minimum single run interactive, single run non-interactive, multi-run interactive and multi-run non-interactive (batch).
1.1.6.2.	Level of consistency between simulations. The analyst shall be provided the capability of defining the level of consistency or randomness between execution runs.
1.1.7.	Setup file. The system shall save all setup information in a single setup file.
1.1.7.1.	Additional file identification. The analysts shall be provided the capability to add identifier information to any saved system setup file.
1.2.	Operation. The system shall provide the analyst the capability to control the execution of the model runs.
1.2.1.	Visibility into progress. The system shall provide insight into the evolution of the complete description of the world as model execution progresses.
1.2.1.1.	Viewing data and metadata. The system shall provide the capability for the analyst to define the format and view any data or metadata in the system at any time.
1.2.1.2.	Tracking world description changes. The system shall provide a trace of what in the world description changes for each time step.
1.2.1.3.	Explanation of world description changes. The system shall provide an explanation for the observed changes in the world description, to include causes and chains of causes.
1.2.2.	Operator intervention. The system shall provide the analyst the capability to control and intervene with operations at any point during execution.
1.2.2.1.	Start, stop, pause, resume. The system shall provide the analyst the capability to start, pause, resume, or stop execution of the models.
1.2.2.2.	Conditions for termination. The system shall provide the analyst the capability to establish conditions for termination of scenario execution.

1.2.2.3.	Description of the world checkpoints. The system shall provide the analyst the capability to save the complete description of the world at any point during model execution. The system shall: - provide the analyst the capability to manually or automatically save the complete description of the world at designated intervals of time or by designating criteria within the synthetic (modeled) environment. - save the complete description of the world any time operations are interrupted. - provide the analyst the capability to recall any saved complete description of the world to use as an initial state of another run.
1.2.2.4.	Change time steps. The system shall provide the analyst the capability to change the synchronization time step of the models during execution. The analyst shall be able to automatically and manually change the time step by designating criteria for any combination of world description variable values.
1.2.2.5.	Modify the description of the world. The system shall provide the analyst the capability to modify any value of the world description at any point during the execution or in a saved description, and will check for discontinuities and conflicts and provide a warning and recommend a fix.
1.2.2.6.	Modification to the model suite composition. The system shall allow for dynamic modification of the model suite used to represent the evolution of world conditions to include: - continually assess the evolution of conditions and dynamics among the actors in the simulated world representation to determine if changes are required to the manner in which the world is represented - identify when a change is needed in the resolution with which any aspect of the simulated world is represented - identify when statically modeled information needs to be modified to dynamically modeled information. - identify when dynamically modeled information can be modified to statically modeled information. - identify when additional representations are required within the simulated representation of the world - identify the risks and limitations to the analysis if the identified changes to the representation of the world are not enacted - provide the analyst the ability to dynamically modify in any way desired the composition of the world
1.2.3.	Performance monitoring. The system shall provide the analyst a means of monitoring the performance of the system during execution.

1.2.3.1.	Current time interval. The system shall provide indication of the time interval currently being modeled.
1.2.3.2.	Error and warning notification. The system shall provide warnings and error notifications in plain English rather than numeric codes concerning issues with any application or infrastructure component. Reports will be made when: - available computing resources prevent any application from process fast enough to remain synchronized with the other applications -the scenario requires any application or collection of applications to addressing conditions near its limit of credibility -the scenario requires any application or collection of applications to addressing conditions beyond its limit of credibility
1.2.3.3.	Resolution monitoring. The system shall monitor the resolution required during system execution and identify when a change in the resolution of any aspect of the description of the world is required and recommend model substitution necessary to achieve the change in resolution.
1.3.	Output. The system shall provide the analyst the capability to process and format the system output.
1.3.1.	Display, edit, and print. The system shall provide for the display, editing, and printing of any system data file.
1.3.1.1.	Text. The system shall allow for text output of any system data and a tool to edit the data.
1.3.1.2.	Graphical. The system shall allow for graphical output of any system data while maintaining a linkage between graphical and tabular data. The system shall provide the analyst the capability to select and view in tabular format the data associated with any data point of a graphical display. Selected data may consist of any combination of variable values from the complete description of the world.

1.3.1.3.	Editing displayed data. The system shall provide for user selectable editing of display data. The system shall provide the capability for the analyst to: - select any color for any data displayed - segregate displayed data into layers and the layer shall show through where data or text is not drawn - select any data to add to a layer - highlight displays by specific data or sections of the display (via click and drag using shapes such as a square, circle, or ellipse) - allow for multiple descriptions of the world spaced in time to be displayed simultaneously - minimize, maximize, resize, and close the data display window. - create user profiles for tailoring for display preferences (such as default font style and size) - use edit operations (Undo, cut, Copy, Paste, Delete, Select All) for any objects on any output display screen - resize the display to allow for zooming, re-centering the display, and cropping the display - directly revert backwards five revisions of an object being modified while that object is open for modification
1.3.2.	Tailor or filter results to be presented. The system shall provide the capability to filter and tailor the results to be displayed.
1.3.2.1.	Selection of data to assess or display. The system shall provide the capability to select the data to be displayed or analyzed by world description variable.
1.3.2.2.	Select conditions on data. The system shall provide the capability to select conditions on the data to be displayed or analyzed on a variable-by-variable basis.
1.3.2.3.	Selection of units. The system shall provide the capability for the analyst to select the units with which the data is displayed.
1.3.2.4.	Selection of resolution. The system shall provide the capability
	for the analyst to select the resolution to which the data is displayed.
1.3.3.	The analyst to select the resolution to which the data is displayed. Data mining. The system shall provide tools that assist the analyst in discovering patterns and significance in the generated data.

1.3.3.2.	User defined query. The system shall provide the capability of searching all the data and metadata within the system by user-defined query.
1.3.3.3.	Saving queries. The system shall provide the capability for saving any query for later use and establish and publish a naming convention for searches.
1.3.4.	Analysis support. The system shall provide tools to help the analyst process and associate meaning with the data generated.
1.3.4.1.	Statistical package support. The system shall provide standard statistical processing tools to include: - The statistical processing will include routines for determining the central tendency and statistical variability of a data population including determination of mean, median, mode, variance, standard deviation, and range. - The statistical processing shall support hypothesis testing - The statistical processing tools will include the capability to generate two and three dimensional plots of data populations including the ability of stretching, shrinking, and annotating the graphs, change the limits or scale of the axes, generate histrograms, and overlay data from multiple simulation runs for comparison. - The model suite shall support statistical investigations into the relationships, correlation, and changes over time of variables descriptive of the world. This shall include insights into the relationships via correlation techniques, measures of multicollinearity, heteroscedasticity, and autocorrelation, identifying the factors that produce a pattern in a series of data over time and recommend how to use these factors to forecast future behavior of the series, and analysis into data variation attributed to identifiable causes and to chance.
1.3.4.2	Comparison capabilities. The system shall provide the analyst the capability to compare results across multiple simulation runs. This includes the capability to compare the values of any set of world description values across simulation runs representing multiple courses from an initial state, with world description values stored from any previous simulation run, or with comparable stored database values.
1.3.4.3	Trend Analysis. The system shall identify trends across multiple runs as variables are changed and assess the identified trends with respect to the analysis topic and objectives to recommend new or improved courses of action

1.3.4.4	Provide metrics on effectiveness of actions. The system shall assist with the evaluation of the effectiveness of simulated courses of action through the evaluation of metrics. This will include: - The system shall recommend metrics of the effectiveness of operational options based upon the problem definition and evaluated from the values of world description variables. The model suite will provide a hierarchy of metrics that define the key components and relationships between and among relative Measures of Merit (MoM) including but not limited to Measures of Political Effectiveness (MoPE), Measures of Force Effectiveness (MoFE), Measures of Effectiveness (MoE), Measures of Performance (MoP), and Measures of Activity / Dimensional Parameters (MoA / DP). The metrics hierarchy provided will articulate the contribution, correlation, and combination algorithms used with regard to measures of merit and be assessed relative to scale, type (nominal, ordinal, interval, ratio), range, and accuracy. Any combination of metrics will be accompanied by indicators of sub-metric contribution, correlation, and combination. - The system shall provide the analyst the capability to define metrics and the system shall quality check analyst defined metrics to ensure that they can be evaluated from world description variables. - The system shall allow the analyst to select the metrics to be evaluated for any given simulation run or combinations of runs. - The system shall evaluate all metrics selected by the analyst.
1.3.4.5	Identification of capabilities. The system shall identify specific capabilities necessary to implement each course of action under investigation. The system shall be able to address capabilities including but not limited to force structure elements, training, manpower, and logistics. For each time step the system shall identify which capabilities were associated with which specific actions and the results or consequences of those actions. The data structure associating capabilities, actions, and consequences shall be capable of being searched and sorted by any data element entry value.
1.3.4.6	Saving collaborative scripts. The system shall provide a means of saving scripts of analysis procedures with a unique file identifier related to the problem definition, date/time stamp, and user supplied identifier information. The scripts will be searchable based on any aspect of the identifier.

1.3.4.7	Identify error bounds on results. The system shall provide error bounds on the values of all the variables of the complete description of the world at each update. The system shall consolidate the error estimates of each model into error estimates for the system while tracking error accumulation for each variable from time step to time step showing the growth of error as a function of simulated time. The system shall track contributions to total error by source to include uncertainties in source data and modeling errors.
1.3.4.8	Likelihood of alternative. For simulations that generate multiple alternative evolutions of the complete description of the world, the system shall calculate the likelihood of each alternative.
1.3.4.9	Probability of alternative. For simulations that follow one evolution of the complete description of the world, the system shall identify to the operator if the path followed is below a user defined probability threshold, and if so, the system shall indicate limitations to addressing the analysis topic.
1.3.4.10	Credibility checks. For each time step and each variable of the world description, the system shall perform credibility checks of the value. The system shall alert the analyst whenever the value of any variable exceeds a set credibility limit and provide the analyst the capability to manually set the acceptable credibility limit for any variable or combination of variables of the complete world description. The system shall provide the option for applying Boolean logic to credibility limits for issuing warnings or terminating the simulation run.
1.3.4.11	Determination of confidence levels. The system shall determine confidence levels for each value of the complete description of the world at each time step, the system shall: - alert the analyst whenever the value of any variable exceeds a set confidence limit - recommend acceptable confidence limits for each variable of the complete description of the world based on the problem definition. - provide the analyst the capability to manually enter a confidence limit value for any variable of the complete description of the world - provide the option for designating exceeding the acceptable confidence limit of any combination of world description variable values as a threshold for terminating the simulation run - provide the option for applying Boolean logic to credibility limits for issuing warnings or terminating the simulation run

1.3.4.12	Consideration of confidence levels. The system shall account for the confidence level of input data in the determination of error bounds, credibility values, and confidence levels.
1.3.4.13	Relation of confidence limits to risk. The system shall relate the confidence limits of the final outputs of the simulation to risks associated with the analysis results.
1.3.4.14	Relation of confidence limits to robustness. The system shall relate the confidence limits of the final outputs of the simulation to the robustness of the alternative concepts of operations under investigation.
1.3.5.	Distributed collaborative analysis. The system shall provide the capability for distributed collaborative analysis.
1.3.5.1.	Collaboration types. The system shall allow for sequential, parallel, and interactive collaboration.
1.3.5.2.	Session control. The system shall provide for collaborative session control including designating who may join or control aspects of a collaborative session, designate which sites have access to what data, and provide the potential for all distributed users to have access to any and all data generated by or held within the system.
1.3.5.3.	Interface. The system shall provide a web-portal-like interface to allow for the transfer of data, application control, display, and inter- analyst communications.
1.3.6.	Report preparation. The system shall support report preparation by the analyst.
1.3.6.1.	User annotation. The system shall develop and document an interface that allows the analyst or any application to manually enter free text descriptive data and analysts' observations to any analysis product and allow searches to be conducted.
1.3.6.2.	Export of data. The system shall provide tools to allow for the export of analysis products or file. The analyst shall be able to define the delimiters on the data file and ASCII format and export graphical displays in a vectorized PDF format as well as other common graphical formats (jpg, gif, tif, bmp).

1.3.6.3.	Interface to Microsoft Office. The system shall be capable of interoperation with Microsoft Office to support data exchange, presentations, and publications using textual and graphical formats, including Excel, jpeg, and gif, for inclusion in Office programs.
1.3.6.4.	Output templates. The system shall provide the capability for the analyst to create standard output templates that link specific data or metadata to specific blanks of the template and the system will pre-fill all fields in user defined templates that require specific data or metadata values.
1.4.	Metadata management. The system shall provide for the creations, storage, maintenance, searching, and display of metadata.
1.4.1.	On data source. Metadata shall include the source of the data with which the system is initiated.
1.4.1.1.	Source type. Metadata shall include flags for the initiation data indicating if it is default, user entered, or retrieved from a C2 system or database.
1.4.1.2.	Header information. Metadata shall include header information that includes classifications and dissemination restrictions, analysis dates and keywords selected by the analyst.
1.4.1.3.	Data pedigree. Metadata shall include the pedigree of data that indicates the processes, models, and sequences used to produce it. The system shall define and promulgate the metadata that identifies pedigree information.
1.4.1.4.	Analyst's comments. The system shall provide the capability of saving analyst's comments as metadata.
1.4.1.5.	Timestamp. Metadata shall include time stamps indicating when data or metadata is updated.
1.4.1.6.	Metadata quality assurance. The system shall perform a metadata quality assurance task after each completed simulation time step and analysis task to ensure that all metadata has been updated.
1.4.2.	Maintenance. The system shall provide the capability to manage and search metadata.
1.4.2.1.	Search of metadata. The system shall provide the capability to search metadata by any field using wildcards or matching search entries.

1.4.2.2.	Sorting of metadata. The system shall provide the capability to sort metadata by any metadata field.
1.4.2.3.	Modification. All system shall provide users a means to modify any metadata content.
1.4.2.4.	Track changes. The system shall track all changes to metadata.
1.4.3.	Display. All displays generated by the system shall be capable of displaying the metadata associated with the data displayed.
1.4.3.1.	Selection of metadata to display. The system shall provide the analyst the capability to select the metadata to display.
1.4.3.2.	Metadata to display. The system shall provide the capability to display the selected metadata associated with any displayed data through a means no more complex than a right mouse click on the displayed data.
1.5.	System utility. The system shall provide tools that will facilitate the use of the system.
1.5.1.	On-line assistance. The system shall provide online information to assist the analyst with system operation.
1.5.1.1.	Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation.
1.5.1.1.	Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation. Glossary of terms. On-line help shall include access to a glossary of terms.
1.5.1.1. 1.5.1.2. 1.5.2.	Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation. Glossary of terms. On-line help shall include access to a glossary of terms. Process assistance. The system shall provide process assistance to support the analyst with system operation.
1.5.1.1. 1.5.1.2. 1.5.2. 1.5.2.1.	 Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation. Glossary of terms. On-line help shall include access to a glossary of terms. Process assistance. The system shall provide process assistance to support the analyst with system operation. Wizards. The system shall provide wizards for any distinct process.
1.5.1.1. 1.5.1.2. 1.5.2. 1.5.2.1. 1.5.2.2.	 Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation. Glossary of terms. On-line help shall include access to a glossary of terms. Process assistance. The system shall provide process assistance to support the analyst with system operation. Wizards. The system shall provide wizards for any distinct process. User defined scripts. The system shall provide the capability for the analyst to define scripts of defined processes for any segment of system operation.
1.5.1.1. 1.5.1.2. 1.5.2. 1.5.2.1. 1.5.2.2. 1.5.3.	 Help screens. The on-line assistance component of the system shall include a "help" option that provides guidance to the user through any stage of operation. Glossary of terms. On-line help shall include access to a glossary of terms. Process assistance. The system shall provide process assistance to support the analyst with system operation. Wizards. The system shall provide wizards for any distinct process. User defined scripts. The system shall provide the capability for the analyst to define scripts of defined processes for any segment of system operation. Embedded training. The system shall incorporate embedded training for all aspects of system operation.

1.5.3.2.	Tailoring or scripts. The embedded training application shall include logic that will automatically tailor session scripts based upon the performance of the analyst.
1.5.3.3.	Recordkeeping. The embedded training application shall include a recordkeeping function of what training has been completed by each individual.
1.5.4.	On-line documentation. The system shall provide online documentation.
1.5.4.1.	Operations manuals. The system shall include online operations manuals for all models and all aspects of the system infrastructure.
1.5.4.2.	System information. The system shall include online system information including the descriptions of the functionality of all models and infrastructure tools.
1.5.4.3.	Troubleshooting. The system shall include operations troubleshooting documentation.

2.	System control. The system shall provide centralized control of all system operations.
2.1.	Execution control. The system shall provide centralized control of all execution processes.
2.1.1.	Simulation start. The system shall automatically coordinate the simultaneous start of all models.
2.1.2.	Pause and resume. The system shall allow the analyst to pause and resume execution of the simulation.
2.1.2.1.	Controlling. The system shall allow the analyst to pause or resume execution of the simulation using no more than two keystrokes or mouse clicks.
2.1.2.2.	Coordination of pause. The system shall automatically coordinate the pausing of all models.
2.1.2.3.	Coordination of resume. The system shall automatically coordinate the simultaneous resumption of the execution of all models when the analyst executes the system resume command.

2.1.3.	Suspend. The system shall provide the capability to suspend a simulation run.
2.1.3.1.	Controlling
2.1.3.2.	Saving state. When a run is suspended, the complete description of the world, system configuration, and run time conditions will be automatically saved so the run can be resumed at a later time.
2.1.3.3.	Naming saved state. Each time a run is suspended, the information stored will automatically be provided a unique file identifier related to the problem definition and scenario content.
2.1.3.4.	Date time stamp
2.1.3.5.	Additional identifying information. The analysts shall be provided the capability to add identifier information to any saved file.
2.1.4.	Timing control. The system shall control the execution timing of the models to ensure that they remain synchronized.
2.1.4.1.	Synchronization time step. The infrastructure shall be capable of executing any synchronization time step supported by any model.
2.1.5.	Simulation termination. The system shall control the termination of the simulation run.
2.1.5.1.	When end conditions reached. The system shall determine when defined termination requirements have been met.
2.1.5.2.	The analyst shall be provided the capability to terminate the simulation.
2.1.5.3.	Saving description of the world. When a run is terminated, the complete description of the world will be automatically saved with identifier information and date/time stamp. Any saved file will be able to have the identifier information and date/time stamp added.
2.2.	Coordination. The system shall coordinate the flow of data between models.
2.2.1.	Track which models are participating. The system shall identify which models are participating in each simulation run.
2.2.2.	Model registration. The system shall ensure that all models participating in the simulation register with the control module.

2.2.3.	Track which models produce what data. The system shall maintain a record of which models are producing data that is required by other models.
2.2.4.	Track which models consume which data. The system shall maintain a record of which models require, as input, data generated by other models.
2.2.5.	World description variable population. The system shall ensure that only one value is generated for each state variable for each time step of the simulation execution.
2.2.5.1.	Identification of potential data conflict. The system shall identify all state variables for which multiple models are generating a value.
2.2.5.2.	Determination of state variable value. The system shall determine the value to be written to the complete description of the world for any variable for which multiple models are generating a value. The system shall allow designation model priority or combinatorial logic for providing the world description value for any common variables amongst models.
2.2.5.3.	Notification of variables not being updated. The system shall notify the analyst when world description variables are not being updated by the models being executed.
2.2.5.4.	Ensure fully populated world description. The system shall ensure that the complete description of the world is fully populated after each time step and properly propagated forward in time.
2.2.6.	Ensure complete simulation cycles. The system shall ensure sufficient models are included in the composed simulation to execute complete simulation cycles.
2.2.6.1.	Map inputs to events. The system shall map required model inputs to the simulated events that generate them.
2.2.6.2.	Identification of simulated events. The system shall identify all events that will be simulated by the models included in the composed simulation design.
2.2.6.3.	Fulfillment of inputs requirements. The system shall identify if the input required for all models is generated by the models of the composed simulation design. The system shall alert the user and identify alternative sources for missing data.

2.3.	Data exchange. The system shall ensure proper data exchange between all the models and the models and the complete description of the world.
2.3.1.	Data packaging. The system shall ensure that all data is packaged in the manner required by the receiving application.
2.3.2.	Data routing. The system data routing shall ensure that all models receive all needed input data generated by any other model.

3.	Model Interoperability. The system shall ensure model interoperability to include:
3.1.	Negotiate timing. The system shall negotiate timing between models with different timing schemes to ensure they remain synchronized and results remain causal.
3.2.	Negotiate data. The system shall negotiate data schemes between models to include:
3.2.1.	Reordering, repackaging, and filtering of data needed to ensure communications between models.
3.2.2.	A one-to-many, many-to-one, and many-to-many conversions of data needed to ensure communications between models.
3.2.3.	Provide for any addition of static data to outgoing data packets needed to ensure communications between models.
3.2.4.	Provide for filling of partial data packets with most recent data to ensure data requirement compliance on receiving side.
3.2.5.	Perform any unit and coordinate conversion needed to ensure communications between models.
3.2.6.	Perform any algorithmic and inference combinations of data needed to ensure communications between models.
3.2.7.	Perform any cross-resolution conversion of data needed to ensure communications between models.
3.2.8.	Correct for any data discontinuities needed to ensure communications between models.

3.2.9.	Determine which data negotiation schemes are required for any needed data exchange between models. This includes:
3.2.9.1.	Register data requirements and outputs for each model.
3.2.9.2.	Maintain a library of data negotiation services.
3.2.9.3.	Present to the analyst a list of negotiation services automatically selected and the logic for the selection.
3.2.9.4.	Present to the operator a description of all available data negotiation services.
3.2.9.5.	Provide the analyst the capability to override any automatically selected negotiation services with one manually selected.
3.2.9.6.	Provide the analyst the capability to save the configuration of selected negotiation services.
3.2.10.	Track errors introduced by data conversions and:
3.2.10.1.	Alert the analyst whenever the value of any conversion induced error exceeds a set limit.
3.2.10.2.	Recommend acceptable limits for each converted datum.
3.2.10.3.	Provide the analyst the capability to manually set the acceptable limit for any conversion induced datum error.
3.2.10.4.	Provide the analyst the capability to manually enter a conversion induced datum error.
3.2.10.5.	Provide the option for designating when exceeding the acceptable conversion induced error limit as a threshold for terminating the simulation run.
3.2.11.	Provide for resolution of any data name conflicts including a scheme for resolution that does not require modification of the models.
3.2.12.	Provide the status of negotiation services including any errors or warnings generated.
3.3.	Negotiate protocols. The system shall be capable of negotiating between multiple native network protocols for the models of the system including:

3.3.1.	Register which network protocol is native to each simulation.
3.3.2.	Automatically determine which network protocol negotiation scheme is required for communication between models.
3.3.3.	Maintain a library of network protocol negotiation services.
3.4.	Negotiate data distribution schemes. The system shall be capable of negotiating between multiple data distribution schemes for the models of the system including:
3.4.1.	Register which data distribution scheme is native to each simulation.
3.4.2.	Automatically determine which data distribution scheme negotiation scheme is required for communication between models.
3.4.3.	Maintain a library of data distribution scheme negotiation services.
3.5.	Provide consistent description of critical state parameters. The system will provide a consistent description of critical state parameters to all models. This will include:
3.5.1.	Fractionalization
3.5.2.	Geographic information (natural and cultural features)
3.5.3.	State boundaries
3.5.4.	Environmental conditions
3.5.5.	Critical state parameters at any temporal resolution
3.5.6.	Critical state parameters at any spatial resolution

4.	System Integration and Maintenance. The system shall facilitate integration of models and life cycle maintenance of the system.
4.1.	Model Integration. The infrastructure shall provide tools for the integration of models into the system.
4.1.1.	Definition of Supported Interfaces. The system shall publish all currently supported Application Program Interfaces (APIs).

4.1.1.1.	The system shall publish the details of all implemented negotiation schemes.
4.1.2.	Definition of Required Model Information. The infrastructure shall provide model suppliers a definition of the information required about the models to ensure successful integration.
4.1.2.1.	Reverse Engineering Tools. Reverse engineering tools to estimate semantic content (tools to aid in compliance)
4.1.2.2.	Best Practices. The infrastructure shall supply development principles and best practices to developers of models to be specifically developed for inclusion in the system.
4.1.3.	IDE for Integration Middleware. The system shall provide an Integrated Development Environment (IDE) for the development of all middleware required to integrate a model into the system.
4.1.3.1.	Middleware for Timing. The IDE shall provide tools for the development of timing translators for all the potential timing negotiations required by the system
4.1.3.2.	Middleware for Data. The IDE shall provide tools for the development of data translators for all the potential data negotiations required by the system
4.1.3.3.	Middleware for Protocols. The IDE shall provide tools for the development of protocol translators for all the potential protocol negotiations required by the system
4.1.3.4.	Data distribution registration. The IDE shall provide tools to integrate a model's input requirements and output generation into the system's data distribution registration scheme
4.1.3.5.	Model control. The IDE shall provide tools to integrate a model's control features including user interface and commands into the system's control mechanisms
4.1.3.6.	Initialization through system (infrastructure) interfaces. The IDE shall provide tools to adapt a model's initialization to be provided through the system initialization interface
4.1.3.7.	Model Data Taps. The IDE shall provide tools to interface a model's inputs, outputs, and internal state to allow the system to record these at any time to support testing and analyses.

4.1.3.8.	Help/definitions/wizards. The IDE shall provide tools to fully integrate a model's on-line and off-line help, provision of definitions, and wizards into the system's help functionality.
4.1.3.9.	Store model meta data. The system shall store all model descriptive meta data in a library to include: - unique identification of all models with a defined convention and version change identity - automatically recognize and respond to namespace overlaps for integrated models - maintain a database of names to disambiguate the names created for integrated models and the common name of the model - store information on the semantic content, interface, middleware modules, and inputs/outputs of all models
4.1.4.	Compliance Testing
4.1.4.1.	 Standard Suites. The system shall provide standard sets of model suites and scenarios to support integration compliance testing. This should include: recommend a test suite configuration for optimal efficiency of compliance testing allow for the use of simple data sources such as data tables to be substituted for models to provide specific inputs to models under test allow for the use of simple data sinks to be substituted for models receiving specific inputs from models under test
4.1.4.2.	Interface Verification. The system shall verify the interface of a model undergoing compliance testing. This should include: - automatically verify the inputs and outputs of models - automatically verify the connectivity of a model in compliance testing and constantly report the status to include visually reporting if a model's interface is correctly connected, such that a non-connected, partially-connected, or fully-connected interface is unambiguous - visually displaying the data requirements of each of the interfaces in the test suite - shall create, update, and store an Interface Validation list to report the connectivity status of the models that are connected within a simulation test environment
4.1.4.3.	Data Flow Trace. The system Debugger shall be capable of tracing the data flow into and out of integrated models during compliance testing with a Data Flow Tracer.
4.2.	Maintenance

4.2.1.	Performance Testing. The system shall provide for performance testing to ensure proper operation and isolate problems.
4.2.1.1.	 Health Checks. The system shall provide for system health checks to include: provide for a generic health check of all the system infrastructure hardware and software components provide for specific health checks of all hardware and software necessary for execution of the planned scenario to include model availability and connectivity allow for scheduling of health checks including automatically prior to execution of a scenario, manually via scheduling, operator request, a designated triggering event (to include system pause, resume, suspend, or exceeding an error bound) network management capabilities that are accessible to the system operator that automatically provide status changes to the suite networked management devices that comprise the model suite and its external systems Any issues identified during the health checks shall be presented to the operator such as advisory faults when a system is approaching outof-tolerance status, warning faults if the system is out-of-tolerance and this affects system performance and may damage the system has failed and shutdown.

4.2.1.2.	Problem Isolation. The system shall be capable of controlling the execution of any set of integrated models in a de-bug mode to include:- provide the operator the capability to control the execution of the simulation in debug mode including to start, stop, pause, and resume execution of the simulation and direct the system to pause at any multiple of time steps- capable of temporarily suspending execution of a set of integrated models in the debug mode by setting a control condition in the data flow trace- visually report the status of a simulation execution including if a Data Sink, Data Store, or integrated model has begun, completed, or is currently executing provide the capability for the complete debug environment to be saved at any point in the debug process including at designated intervals of time, by designating a criteria for one or more world description variables or infrastructure operational conditions, manually, and any time the operations are interrupted provide the analyst the capability to recall any saved complete debug environment to use as an initial state of another run- allow the operator to control the data providing the description of the simulated world while in the debug mode in the same manner as for normal execution and provide an option to initialize the system from data recorded during a previous execution-allow for the data providing the description of the simulated world to be modified at any point in debug mode execution to come from direct operator input, previous recorded data, or stepped through a range of inputs check if the operation of all models remains synchronized-provide error messages for any issues that prevent execution while in the debug mode- provide warning messages for any situation that is out of normal operational conditions set by data or metadata values or conditions
4.2.1.3.	Regression Testing. The regression test environment shall provide the same control and recording capabilities of the integration testing and problem isolation environments, and the system shall report success or failure on each portion of the regression test suite with explanatory details for failures.
4.2.2.	Maintenance Support. The system shall provide support to facilitate the correct use of the system.
4.2.2.1.	Help System. The system shall provide a Help system to provide users with information related to the correct operation of the maintenance functionality. The Help System shall provide context sensitive help in the correct operation of the maintenance functionality and visually oriented examples of the components of the model suite that are accessible through the maintenance functionality.

4.2.2.2.	IDE Tutorial. The system shall include tutorials that explain and demonstrate the capabilities of the system. The system shall include an IDE tutorial that demonstrates creating, saving, loading, modifying, and exporting each type of test environment and a demonstration of the suite's model negotiation middleware creation. The tutorial will include an IDE tutorial that demonstrates the creation, saving, loading, modifying, and exporting of a Data Store and Data Sink.
4.3.	Validation Testing. The system shall provide for validation testing against actual operational data
4.3.1.	Context Definition. The system shall emulate the initial context definition on which the operational data is based.
4.3.1.1.	Operational Context Definition Assessment. The system shall assess operational context definition such as reading in the operational context definition from intelligence sources, defining the context in the standard system context definition ontology, and identify the organizations and interactions in the standard analysis topic definition ontology that must be represented to simulate the evolution of the operational data.
4.3.1.2.	Operational Data Assessment. The system shall perform an assessment of the operational data to determine its accuracy and limits and shall assign uncertainty bounds to the operational data based upon the estimated errors in the data collection systems.
4.3.1.3.	Model Suite Context Assessment. The system shall assess the context definition possible within the model suite. Based on the description of organizations and interactions that need to be represented in the simulation, the system shall recommend a model set to be used for the validation testing and provide the operator the capability to accept the recommended model set and make any changes to it. The system shall identify the context definition that can be represented by the selected model set.
4.3.1.4.	Context Difference Assessment. The system shall identify the differences in the operational context and the simulation context provided by the selected model set.
4.3.1.5.	Allowed data differences. Based on the identified differences in context, the system shall determine how much variation from the operational data will be allowed for the system to be considered valid for that context and provide identification of the reasons why the recommended limits were chosen.

4.3.1.6.	Validation data collection. The system shall recommend data to be recorded to support validation, allow the operator to modify the recorded data and format, record the data, and report the data necessary for its validation.
4.3.1.7.	Validation Assessment. The system shall conduct a validation assessment of the simulation to include a comparison of the data produced by the simulation with the ground truth of collected operational data while considering the uncertainties in both data sets. The system shall identify the operational context limits of when the simulation produces valid results for specified accuracies using the analysis context ontology.
4.3.2.	Administrative Rights. The system shall be capable of controlling the administrative rights to use of the DPMS integrated models with an Administrator.
4.4.	Documentation
4.4.1.	Software Code Documentation. The infrastructure code shall be documented to a level sufficient for an independent party to conduct lifecycle maintenance on the system.
4.4.1.1.	Software Design. The infrastructure design shall be documented using a recognized standard description language.
4.4.1.2.	Software Implementation. The implemented software shall be documented to include detailed descriptions of the functionality of each software module, its designation of variables, inputs, outputs, dependencies, and interactions.
4.4.1.3.	Software Testing. All verification and regression tests for the infrastructure software shall be documented using a standard description format. Infrastructure software test documentation shall include the setup, conditions, and prerequisites required for the test and results of all completed verification tests of the infrastructure software shall be documented in a standard format.
4.4.2.	Interface Definitions. The system shall document all internal and external interfaces using a recognized standard description language.
4.4.3.	Operations. The system shall provide operators manuals for the infrastructure.

4.4.3.1.	Simulation Operations. The system shall provide manuals that describe the operation of the system in support of analyses.
4.4.3.2.	Integration Operations. The system shall provide manuals that describe the use of the tools that facilitate the integration of models into the system.
4.4.3.3.	Maintenance Operations. The system shall provide manuals that describe maintenance operations and the use of the tools that support them.
4.4.4.	Configuration Management. The system shall institute a configuration management system for all infrastructure software and documentation.

5.	System Architecture
5.1.	Flexibility
5.1.1.	Execution mode. The system shall be capable of supporting multiple execution modes.
5.1.1.1.	Network Execution Modes. The system shall be capable of executing within a diverse network environment including on a standalone computer system, on a distributed heterogeneous network of non-physically co-located machines, and be capable of transparently transferring data products from models operating on different operating systems.
5.1.1.2.	Processor modes. The system shall be capable of transparently supporting execution and communication for a heterogeneous processor system including 32 and 64-bit processors.
5.1.1.3.	Computation Modes. The system shall be capable of supporting different computation modes (including scalar, vector, dataflow, and cluster) and automatically optimize the workload.
5.2.	Performance. The system shall be designed so that there are no performance bottlenecks.
5.2.1.	Processing Power. The system shall have sufficient processing resources to execute all software models and applications simultaneously.

5.2.2.	Memory. The system shall have sufficient memory so that memory paging is not necessary for execution of any collection or configuration of models.
5.2.3.	Storage
5.2.3.1.	On-line Storage. The system shall have sufficient storage such that all scenarios, setup information, simulation results, and analysis results for simulations run within the last six months can be stored on- line.
5.2.3.2.	Archival Storage. The system shall have the capability to archive the scenario, setup information, simulation results, and analysis results for an unlimited number of simulation runs.
5.2.4.	Bandwidth Capacity. The system shall have sufficient bandwidth capability to ensure proper execution of all operations.
5.2.4.1.	Causal Execution. The system shall have sufficient bandwidth to ensure the causal relationship between models is maintained.
5.2.4.2.	Quality of Service (QoS) Contracts of Models. The system shall have sufficient bandwidth to meet the QoS contracts of supported models.
5.2.5.	Database Performance. Database performance shall be sufficient to support simulation and analysis activities.
5.2.5.1.	During Simulation Execution, database access, search, and join speed shall be sufficient to not adversely affect model causality during execution.
5.2.5.2.	During Analysis, database access, search, and join speed shall be sufficient to not slow analysis speed by more than 10%.
5.3.	Scalability. The system shall support scalability of operations
5.3.1.	Applications. There shall be no practical limit to the number of models and other applications that can be included in system operations.
5.3.2.	Collaborative Sites. There shall be no practical limit to the number of sites that can be included in system operations.
5.3.3.	Users. There shall be no practical limit to the number of users that can be included in system operations.

5.4.	Availability. The system shall be designed to ensure that it is available to provide operational support to the users of this system depending upon the criticality of its current mission.
5.4.1.	Operational Availability Measure. The system shall have an operational availability measurement.
5.4.1.1.	Operational Availability Definition. Operational availability shall be defined as the Mean Time Between Maintenance (MTBM) divided by the sum of the MTBM, the Mean Time To Repair, and the Mean Logistics Delay Time.
5.4.2.	Inherent Availability. The system shall have an inherent availability measurement.
5.4.2.1.	Inherent Availability Measure. Inherent availability shall be defined as the Mean Time Between Failure (MTBF) divided by the sum of the MTBF and the Mean Time to Repair (MTTR). MTTR shall include verification that the system has successfully returned to an operational status.
5.4.3.	Independence of Availability. Availability shall not change with respect to the differing uses of the system.
5.4.3.1.	Availability by Time. Availability of the system shall not vary by time of day, day of the week, month, or season.
5.4.3.2.	Availability by location. Availability shall not vary by location.
5.4.3.3.	Availability by Mode. Availability shall not vary by operational mode.
5.4.3.4.	Availability by Users. Availability shall not vary by the number or type of users.
5.5.	Reliability. The system shall provide the reliability required to support the use and operation of the system.
5.5.1.	Single Point of Failure. The system shall have no single point of failure.
5.5.1.1.	Degraded Modes. The system shall be designed so that any hardware or software failures result in degraded modes of operation rather than total system failure.
5.6.	Maintainability

5.6.1.	Routine Maintenance. The system shall allow for maintenance operations and analysis operations to be conducted simultaneously.
5.6.1.1.	The system shall provide features and capabilities that allow for - maintaining the system for on-line and off-line configuration verification - allow for performance monitoring and diagnostic checks, including restoring the system to its default operational state - allow for off-line dedicated maintenance functions to perform troubleshooting as needed - have a corrective maintenance plan that shall include but is not limited to fault isolation, and replacement of failed components and include documentation in sufficient detail to guide the maintainer through the maintenance procedure and return the system to an operational status
5.7.	Security. The system shall provide security measures for the handling of sensitive information.
5.7.1.	Multi-level classification. The system shall be capable of operation at any level of classification
5.7.1.1.	Simultaneous operation. In the distributed mode, the system shall be capable of operating with different workstations operating at different classification levels and the system shall display on the operators display the classification at which the workstation is operating.
5.7.2.	Information Assurance (IA). The system shall comply with DoD information assurance policies and practices.
5.7.2.1.	Anti-Tamper. The system shall be IAW with requirements for the prevention of system tampering as specified in the Interim Defense Acquisition Guidebook (formerly DoD 5000.2-R).
5.7.2.2.	IA Policies. The system shall be IAW with requirements for IA certification and accreditation as specified in DoD Directive 8500.1, DoD Instruction 8500.2, DoD Directive 8580.1, and DoD Instruction 5200.4 (DITSCAP).
5.7.3.	Privacy. The system shall be IAW with DoD Instruction 5400.11 regarding the handling and management of privacy data.
5.7.4.	Releaseability. The system shall follow necessary guidelines regarding the releaseability of sensitive information.

5.7.4.1.	Security Guidance. The system shall be IAW OPNAVINST 5513.1E (DoN Security Classification Guides).
5.7.4.2.	Safeguards. The system shall accommodate DoD safeguards to ensure that US-only and sensitive information is not released to unauthorized users.
5.8.	Portability. The system shall be portable.
5.8.1.	Operating System Portability. The system shall be portable with respect to the Operating System needed to host its execution.
5.8.1.1.	OS Portability - Linux. The system shall be executable on a PC/Linux environment using the Linux Operating System.
5.8.1.2.	OS Portability - Windows. The system shall be executable on a PC/Windows environment using the currently supported Windows Operating systems.
5.8.1.3.	OS Portability – Apple. The system shall be executable on an Apple/Mac environment using the currently supported OS X operating system.
5.8.2.	Data Portability. The system shall be portable with respect to the data used by the system.
5.8.2.1.	ASCII portability. The system shall have a single unique character set that applies to all ASCII data files.
5.8.2.2.	Binary portability. The system shall adhere to the IEEE format for binary data files.
5.8.3.	Database Portability. The system shall ensure database portability
5.8.3.1.	The system shall ensure portability across different versions of a database application
5.8.3.2.	The system shall ensure portability across different database applications
5.9.	Interoperability. The system shall be interoperable with existing and planned OPNAV systems and their data links.
5.9.1.	Internet Protocol Interfaces. The system Internet Protocol interfaces shall be IPv6 compliant and interoperable with IPv4 legacy systems.

5.9.2.	Metadata. All metadata shall adhere to the latest version of the DoD Discovery Metadata Specification (DDMS).
5.9.3.	Information Exchange. The system shall achieve 1 compliance with the system critical information exchange requirements.
5.9.3.1.	Data Integrity. The system shall provide for the integrity of data used within and without the system. This includes: - provide at least 0.9999 data integrity as required by the external systems with which the model suite communicates - use the Internet Protocol that best supports maintaining the integrity of the system's data - support the network monitoring capabilities necessary to ensure the transmission of accurate, complete, and current data to the internal and external system components using said data
5.9.4.	Tagged Data. All of the system data that has the potential to be exchanged shall be tagged.
5.9.4.1.	JTA standard. All data tags shall be IAW the most recent version of the Joint Technical Architecture (JTA) standard, JTA Volume I, for tagged data items.
5.9.4.2.	Tag Registration. All data tags shall be registered IAW the DoD XML Registry and Clearinghouse Policy and Implementation Plan.

17 Model Synopses

This appendix presents brief synopses of selected models currently in use within the DIME/PMESII modeling community. The information provided in each synopsis includes:

- Name of model
- Date and version of model examined
- Organization responsible for model (e.g. sponsor or developer)
- Contact information for model owner/distributor
- Ownership of model (e.g. government owned, proprietary, freeware, etc.)
- Description or overview of model
- Methodology used within the model
- Key inputs and outputs
- Hardware requirements or host platforms
- Software development or coding language
- References for software documentation
- Discussion of the model's known strengths and limitations

CAST

Conflict Assessment System Tool

Version Identifier & Date: 2008

Responsible Organization: The Fund for Peace, 1701 K Street, Washington, DC, 20006

Contact Information: Pauline Baker, 202-223-7946, pbaker@fundforpeace.org

Government-Owned? No, proprietary

Description/Overview: CAST is an analytical tool used to assess conflict risk. Among other products, it is used to produce a "failed state" index for as many as 177 countries including the United States. It is based on 12 social, economic, political, and military indicators supported by approximately 200 low-level measurements from various media sources. It is constantly refined by an improved understanding of the causes of state failure from historical events. It can highlight potential strengths, weaknesses and vulnerabilities to anticipate the likelihood of stability, conflicts, population migrations and economic collapses and inform decisions in preventive diplomacy and peace-keeping missions.

Methodology: CAST is based on the assumptions that 1) strong (i.e., legitimate, representative and competent) institutions (5 core institutions have been identified including the judicial system, the civil service, the police, the military and leadership) are needed to manage internal peaceful resolution of problems within a state, and 2) there are 12 main social, economic, political and military indicators of the drivers of conflict that create pressures on that state which affect a country's stability, peace and prosperity. The methodology is based on an immunological approach that views internal conflicts as pathological symptoms of state failure. Measurements for the 12 main indicators and strength of institutions are collected from computerized content analysis of published articles, essays, reports, statistics and live media feeds. In addition, the methodology includes "stings," unanticipated, unique, and cultural or other idiosyncratic factors which can act as accelerators of conflict, such as spoilers, coups, a sudden drop in the currency, etc... For achieving a rating of each indicator, the "saliency" of each measurement, based on the number of hits in the documents, defines the weight of the corresponding indicator. The results are reviewed with statistical and other data and by subject matter experts. Trends are developed by serial runs of the data over different time slices and depicted visually in graphs and charts. Patterns of interaction among the different measures and indicators can be detected from the historical trend lines. The software allows the analyst to customize the parsing by adding specific words or phrases relevant to a geographical area or topic of interest. Filters are also built into the software to compensate for possible false positives or media distortions.

Key Inputs:

- English-language media sources and key sentence patterns correlated with the desired measurements.
- Quantitative data from published studies
- Expert knowledge
- Polling or surveys

Key Outputs:

- The failed state index
- Indicator trends for twelve variables:
- Mounting Demographic Pressures
- Massive Movement of Refugees or Internally Displaced Persons
- Legacy of Vengeance-Seeking Group Grievance or Group Paranoia
- Chronic and Sustained Human Flight
- Uneven Economic Development Along Group Lines
- Sharp and/or Severe Economic Decline
- Criminalization and/or Delegitimization of the State
- Progressive Deterioration of Public Services
- Suspension or Arbitrary Application of the Rule of Law & Widespread Violation of Human Rights
- Security Apparatus Operates as a "State Within a State"
- Rise of Factionalized Elites
- Intervention of Other States or External Political Actors

Special studies that drill-down on provincial or municipal level stability, topical studies (e.g., correlating militia activity with poppy production), or issue salience among the population to measure the on impact of a military force on public opinion.

Hardware: Intel PC

Software: .NET architecture, C# and C++.

Documentation: [Bak03], [Bak05]

Known Strengths: CAST provides a tool to assess potential problems before conflicts erupt based on empirical data. It is not limited to the availability of subject matter experts or pre-existing statistical data sets that often are uneven in quality or based on information provided by weak states with poor statistical capabilities. It evaluates conflict risks within a society as expressed through public sources, including the media, government reports, think tank studies, magazine articles, polls, interviews, essays, editorials and corporate and academic reports. It does not just rely on individual leaders or elites. The CAST model has been validated and used in Capstone military exercises. A predictive capability exists by inferring from trends on historical cases. CAST can also be used to monitor the full spectrum of conflict to track trends over time and assess the outcome of interventions (diplomatic, economic or military) in post-conflict situations. The vast amount of data, and the speed with which it can be gathered, makes this approach flexible, timely and precise.

Known Limitations: The reliance on published English media sources can provide a Western perception bias on the results obtained. To overcome this, the FfP obtains feeds from local and regional sources, including national newspapers and opposition publications. Other limitations are due to limitations in parsing natural language text. Although problems such as double counting is avoided, other problems such as limited data from relatively closed or deceptive societies can produce results with somewhat lower confidence levels. The FSI covers countries that are members of the UN, except for those that are so small that insufficient data is available.
CogSim

Version Identifier & Date: 2008

Responsible Organization: Naval Research Laboratory

Contact	Information:	Myriam	Abramson,	202-404-7342
myriam.abra	amson@nrl.navy.mil			

Government-Owned? Yes

Description/Overview: This model evolves coalitions from the interactions and adaptation of cognitive map agents. A population of agents can be ``seeded" with cognitive map variants characterizing different cultures or different affiliations. The end results indicate whether coalitions are possible, between whom, and what cognitive maps emerge. The results are visualized on a 2D grid and measured with a clustering metric.

Methodology: The methodology for this model is based on the cognitive map representation of an agent's beliefs and on a modified Particle Swarm Optimization algorithm for the evolution of beliefs based on interaction outcomes. In this approach, the cognitive map of an agent consists of concept nodes, utility nodes representing the desirable/undesirable goal states, and "policy" nodes that represent the possible actions of an agent. Functional and structural updates of the cognitive map occur at each iteration.

Key Inputs:

- Cognitive maps of population groups.
- Cognitive and social influence parameters
- Population size

Key Outputs:

- Population clustering metric indicating degree of coalition
- Belief diversity metric

Hardware: All platforms

Software: Java, Repast

Documentation: [Abr08]

Known Strengths: This approach provides insight on what causes groups to emerge or diverge at a more fundamental level than the stated position and influence of key actors. This approach can be used to model the interactions of agents from different cultures represented by a set of prescriptive rules (e.g. proverbs). For example, the impact of a foreign presence in a multi-ethnic society can be modeled, quantified and evaluated over several time cycles based on the interaction of cognitive map agents. Comparisons between initial and final cognitive map variants can provide structural content insights in addition to predictive trends.

Known Limitations: Not too sensitive to the quality of the data but data in the form of cognitive maps might be hard to obtain.

COMPOEX

Conflict Modeling, Planning and Options Exploration Program (DARPA)

Version Identifier & Date: User Interface Version 1.10.78, Backplane Server Version 2.6.4, dated 29 February 2008.

Responsible Organization: BAE Systems

Contact Information: Craig Lawrence, craig.t.lawrence@baesystems.com

Government-Owned? Yes

Description/Overview: COMPOEX is a planning framework developed by DARPA as a decision aid for operational planners in DIME/PMESII scenarios in identifying the best composite course of action (COA) for DIME "lines of effort" taking into account 2nd and 3rd order desirable and undesirable effects. The architecture of COMPOEX consists of a campaign planning tool and an option exploration tool on the client side, leveraging from a modeling capability substrate, the backplane, on the server side. COMPOEX provides a set of reusable generic models that are constructed using several off-the-shelf modeling toolkits such as Soar, iThinkTM, VensimTM, and NETICATM, a means to instantiate the models for a particular scenario, and a library of plan actions that can operate on the models.

Methodology: COMPOEX is a planning toolkit for coordinated DIMEFIL actions where the effects of a plan are explored by an ensemble of interacting models. It uses a mesomodeling abstraction approach integrating models at the national, regional, provincial and local level in a principled way. Each category in the PMESII spectrum maps to one or more computational models such as agent-based models, social networks, Bayesian nets, and System Dynamics, etc. Together, the model variables at each time step form a state vector representing the current situation mapped to pre-defined "zones" in the geographical area of interest. The following models for a Southeast tri-border area of Malaysia, Indonesia and the Philippines scenario are included in COMPOEX. Those models can be adapted to other scenarios.

- Political-Social: 1 large agent-based model (PSTK) encompassing all three countries and 7 zones
- 2. Population: 4-5 population groups modeled in each of the 7 zones, for a total of about 30
- Economic / Infrastructure: 3 national level economic models, 7 zone-level economic and infrastructure models (each divided into 11 separate "industries")
- Information / Media: 3 national level models
- Rule of law: 7 zone-level models
- Incident Generator: 7 zone-level models
- Military: 7 zone-level models
- Corruption: 7 zone-level models

Key Inputs:

• Candidate plans from different "lines of effort" and synchronized at different temporal patterns.

- Conceptual models relating information sources to PMESII systems are sketched by the analyst.
- Domain-specific models are constructed from model building tools and library.
- Linkage between model outputs to other model inputs are specified using a model editor tool.

Key Outputs: The outputs of the different models combine into a state vector from which other models draw their inputs. The effects of the plan (both intentional and unintentional) that the analyst wants to explore are graphically displayed compared to a baseline over the planning horizon. Different runs can be superimposed for comparison.

Hardware: Cross-platform

Software: Java

Documentation: [KC07], [Wal08]

Known Strengths: Plans from different factions can be integrated into a synchronization matrix to provide wargame adjudication. The framework allows the analyst to compose multiple models at different levels of granularity. DIME/PMESII generic models are provided such as power structure, economic, information/media, corruption, security, etc. Not all integrated modeling toolkits are open source or government-owned but new ones can easily be added in a plug-and-play fashion. There is a causal tracing capability between the variables (outcomes). The toolkit was partially validated by DARPA's Go/No-Go Phase I performance goal on the number of predicted unfavorable outcomes, and by experts'review.

Known Limitations: Effects cannot be obtained at the local level but only at the regional, provincial, and national level. The temporal time step granularity for the synchronization of models is fixed at one week. The visualization of the outcomes is not displayed in a geo-spatial context. Assumptions contained within built-in models may not be valid for all regions or scenarios—specialized tailoring may be required.

DIAMOND-US

Diplomatic and Military Operations in a Non-War fighting Domain.

Version Identifier & Date: US version 1.2.2 using UK 2.4.2 with DROMAS (Re-usable Object-Modeling Application Suite) 3.0.4, 2004

Responsible Organization: Dynamics Research Corp., 3505 Lake Lynda Drive, Suite 100, Orlando, Florida 32817

Contact Information: Wayne Randolph, wrandolph@drc.com,407-380-1200 X118

Government-Owned?: Yes (except for DROMAS)

Description/Overview: Based on DIAMOND-UK, it is a medium-level stochastic simulation designed to address force structure operational issues for peace-keeping and humanitarian aid missions. DIAMOND-US provides access to a unit order of battle (UOB) tool to structure forces in a peace support operation scenario. Scenarios have been developed for the 2004 events of Operation Iraqi Freedom in the Baghdad region. It is not intended to be a single-model solution but rely on other models in a given scenario. Interoperability between models relies on the REDIS (Reverse Engineering For Data Integration and Sharing) methodology which was used to develop an XML DIF.

Methodology: The representation of a scenario consists of arc-node relationships relating entities in a geo-spatial environment. Entities interact with each other and the environment and exchange or consume key commodities such as food, fuel and ammunition. Entities are organized into parties that have relationship with one another which define their interactions. The model includes a mechanism to represent each party's concept of operations by nesting objectives in a series of plans and for those objectives to consist of a series of missions that entities can prosecute during a campaign. Commanders within a party allocate resources to achieve their objectives in line with the sequence of plans and the simulation completes when a set number of parties achieve their end state conditions or when a predetermined period of time has elapsed.

Key Inputs: The inputs, consisting of nodes, associated entities, entity relationships, and arcs, are scenario dependent. They can be at any level of detail but are usually at an aggregated level (e.g., squad to battalion). Nodes represent physical locations such as cities or villages and arcs represent the routes between the nodes.

Key Outputs: User-specified low-level indicators of the state of the world are stored in a database for each time step of the simulation. The data collected can then be queried by the analyst to produce high-level indicators.

Hardware: Intel PC

Software: Windows XP, Visual C++

Documentation: Diamond Analytical Reference Guide, P.W. Bailey, Diamond User's Guide, Dynamic Research Corp. [DH06]

Known Strengths: Civilians and key actors can be represented in the combat model. Weather and terrain are factored in the simulation. The model has a negotiation mechanism to obtain access to an area denied to one party by another and to allow multiparty co-operation to achieve aims and objectives without having to rely entirely on their own resources.

Known Limitations: Limited capability for armed conflict restricted to ground forces. The medium-resolution combat model is not accurate enough for end-to-end modeling of counter-insurgency (CI) operations. However, CI can be investigated in a useful manner. Limited capability for non-kinetic simulations such as opinion dissemination and cultural models. Some information on the specific outcomes of the simulation cannot be recorded. Should normally be used for medium-level to medium-high-level resolution outcomes in peace and support operations in a federated simulation with other models.

Interim Semi-static Stability Model (ISSM)

Version: 4.0, 6/7/06 plus minor later updates

Responsible Organization: Hartley Consulting, Inc

Contact Information: Dr. Dean S. Hartley III, 106 Windsong Ln, Oak Ridge, TN 37830: 865-425-9752; DSHartley3@comcast.net; http://dshartley3.home.comcast.net/~dshartley3/

Ownership: Hartley Consulting, available to others through signed agreement

Description/Overview: The ISSM is a political, military, economic, societal, information, & infrastructure (PMESII) model that supports measuring, tracking, projecting and understanding the status of fragile states, including any diplomatic, informational, military, & economic (DIME) activities before, during, and after any intervention. In an operational setting, it is a stand-alone tool that supports measuring, tracking, projecting and understanding the status of a real OOTW, phase 0 through phase 5. In an analysis setting, the ISSM receives its information about the OOTW from a simulation, such as DIAMOND, and other sources of data about the simulated situation and supports measuring, tracking, projecting and understanding the status of a simulated OOTW. The ISSM consists of four Excel workbooks: a Controller to coordinate the operations of the system; a Preprocessor to support custom logic in converting available data into ISSM inputs; a Main program to evaluate the outputs; and a Postprocessor to support custom logic in converting the outputs into any additional, user-specified outputs.

Methodology:

Excel workbooks with VBA code

Ouasi-implementation of influence diagrams

Key Inputs: Thirty-four (34) PMESII variables with up to 129 observations (2.5 years at one per week or more than 10 years at one per month) are required. Typical PMESII variables include: status of armed forces, paramilitary forces, etc.; nature of government's opposition & factionalization; status of economy; status of education, media, corruption, etc.; status of migrants, internally displaced persons, expatriates; status of basic needs. Also, an optional 90 DIME variables with up to 129 observations are supported, but not required. Typical DIME interventions include: repair of roads, railroads, bridges, schools, etc.; training of politicians, bureaucrats, teachers, police, soldiers, etc.; economic support, elections support, etc.; provision of medical aid, food, water, shelter, etc.

Key Outputs:

- Effectiveness and fairness of government
- Legitimacy of government
- Economic status
- Satisfaction of basic needs
- Safety and security
- Internal unrest
- Popular tolerance of the status quo
- Final Measure of Effectiveness (MOE): Level of civil stability and peace

Hardware: Modern PC

Software: Windows XP, MS Excel 2003

Documentation: Users' Guide (75 pp.), Analysts' Guide (320 pp.) proprietary Programmers' Guide (250 pp.), V&V report, and sample data set

Known Strengths: The ISSM is a high-level, small footprint model of DIME/PMESII operations that has a fair degree of validity. It runs extremely rapidly.

Known Limitations: The ISSM is not a simulation. It requires periodic observations of the state of the real or simulated world. The validity of the ISSM is subject to the current limited state of understanding of the true interactions of PMESII variables.

MANA

Map Aware Non-Uniform Automata

Version Identifier & Date: 3.0, 2005

Responsible Organization: Defence Technology Agency (DTA), New Zealand Defence Force, Naval Post Graduate School (NPS).

Contact Information: Michael Lauren, m.lauren@dta.mil.nz, Gary Horne, gehorne@nps.edu

Government-Owned? No, Copyrighted

Description/Overview: MANA is an abstract combat model of asymmetric warfare based on chaos and complexity theory. It was developed to rapidly explore emergent kinetic behaviors based on the simple behaviors of individuals or groups (squads) in contrast to top-down military simulations. It has been used to explore peacekeeping and maritime patrolling movements, crowd behavior, and irregular warfare scenarios such as those in Mogadishu described in *Black Hawk Down*. It leverages from the ISAAC/EINSTEIN model developed by the Center for Naval Analysis.

Methodology: MANA is based on cellular automata theory where each particle (agent) reacts to its surroundings according to pre-defined rules with the addition of certain important features: (1) an episodic memory map storing situational awareness data, (2) communications to share situational awareness data, (3) a terrain map, (4) waypoints, and (5) pre-defined triggers for behavioral (personality) changes. Resources can be used metaphorically to represent emotions such as morale, fear, fatigue or anger. There is a capability based on the difference between detection and identification to model changes in affiliation in civilian population from neutral to friend or foe.

Key Inputs:

- Personality weightings such as risks, preferences, and desires of agents toward certain goals such as the tendency to go near the enemy.
- Move constraints: trajectory modifiers based on critical mass. For example, an agent will be constrained to move toward an enemy unless sufficient friendly support can be provided.
- Weapons, sensors, movement speed, resources (e.g. fuel), and communications
- Movement behaviors for terrain effects and obstacle avoidance.

Key Outputs: Data is written as a time series in Excel format for later analysis. Examples of pre-defined outputs follow:

- All step-by-step data
- Casualty locations data
- Agent state data
- Detection data

Hardware: Intel PC

Software: Windows XP, Delphi

Documentation: MANA User's Manual, [LS02]

Known Strengths: MANA has an extensive scenario tool as well as a paintbrush terrain tool with built-in terrain features. The scenario is written out as an XML file. Entities can be dragged and repositioned on the screen to explore specific configuration. Agents can be separately saved and reused in different scenarios. It has partial realistic communication settings at the message level (and not at the packet level) for net-centric operations including factors such as latency, reliability and buffer queues. MANA is good to evaluate the robustness of certain strategies in a given scenario and the impact of certain variables.

Known Limitations: The affiliation parameter is fixed to 3 values (red, blue, and white) which constrains the usability of MANA in counter-insurgency scenarios where the identity of the enemy in a population is subtly shifting. There is no capability to add additional user-defined attributes, resources and alternate behaviors. Workarounds need to be found for goal-oriented behavior typical of human decision-making.

MITSSM

MIT State Stability Model

Version Identifier & Date: 2006

Responsible Organization: MIT Sloan School of Management

Contact Information: Nazli Choucri, nchoucri@mit.edu and Michael Siegel, msiegel@mit.edu

Government-Owned: Yes, Government owns royalty-free license to use the model

Description/Overview: The MITSSM is a generic model to understand and predict state stability by identifying "tipping points." It was developed as part of the Pre-Conflict Anticipation & Sharing (PCAS) DARPA program. The initial model of state stability includes models of insurgent activity and recruiting to undermine regime legitimacy. The population is divided into segments, general population, dissidents, and insurgents. Policies, such as the removal of insurgents or curfews, can affect the flow of population from one segment to another. The assumption of this state stability model is that insurgent actions are "messages" (perceived or real) influencing the support given by the general population to the current regime and that weak states are prone to civil war because of the states' inability to prevent recruiting of the general population into the insurgency.

Methodology: The model is based on a System Dynamics (SD) perspective that views instability and change as pressures (or "loads") mounting against a resistance capacity ("resilience"). System dynamics has been used to model a wide variety of interacting systems and simulate the effects of different policy levers at the macro level. Its main strengths are its capabilities to model the feedback loops of complex systems. The causal logic has to be explicitly quantified into difference equations. The modeling methodology is modular: a high-level system loop is designed first based on key system features. More granularity can then be added at different stages. This capability enables SD to model "system of systems" characterized by highly interconnected components. The model leverages from social science studies and subject matter experts. Actions by insurgents undermining regime legitimacy are considered as "loads" on the regime resilience as a function of economic performance, political capacity, social capacity and regime legitimacy.

Key Inputs:

- Population birth/death rate
- Economic performance (GDP index)
- Initial political capacity
- Initial social Capacity
- Initial regime legitimacy

Key Outputs:

- Regime resilience
- Insurgency factor

Hardware: Intel PC

Software: Windows XP, Vensim (from Ventana Systems, Inc.)

Documentation: [CEG+05], [CEG+06], http://web.mit.edu/smadnick/www/wp/2005-13.pdf

Known Strengths: This model has shown how SD can be used for intervention policies, in this case how to combat insurgent recruitment through the comparison of two policies: removing insurgents or respond to anti-regime messages. Its strength is not in quantifying relationships between input and output but in identifying "tipping points" such as exponential increase in insurgent growth when state capacities decline below a certain threshold. The strength of SD lies in understanding the effects of complex system relationships through key factors and in its intuitive graphical representation.

Known Limitations: Quantifying and translating causal relationships into mathematical relationships might take some effort but this process can be mitigated by the automated discovery of non-linear equations in empirical data to fit the model. Identifying those causal relationships at the aggregate level in the first place might not be possible for certain models where only the micro-behaviors are known. Hybrid models with an agent-based modeling paradigm have been developed to mitigate some of this limitation (the MIT State Stability Model has been successfully combined with ABM models to address this issue.)

Nexus

Version Identifier & Date: 2008

Responsible Organization: OSD PA&E

Contact Information: Deborah Duong, debbie.duong.ctr@osd.mil

Government-Owned? Yes

Description/Overview: Agent-based model of stakeholder agents representing population groups to evaluate political support for the insurgency in scenarios of irregular warfare. Based on the narrative paradigm and cognitive dissonance theory, agents evaluate historical actions in light of their web of trust toward other groups to determine their support toward insurgency. The model is being expanded to take into account behaviors related to corruption.

Methodology: The model is based on cognitive agents represented by a constraint satisfaction neural network, a Boltzmann machine, evolving interpretations of evidence and blame. The neural network has 3 layers of nodes representing the perception toward other social groups: the support, trust and blame layers. Each node represents a population group with inhibitory and excitatory links to other nodes representing perceptions of support, trust and blame toward other groups. Each event is interpreted in light of the current weights of the network that will in turn influence the interpretation of future events according to the narrative paradigm theory. Additional layers can be added to represent blame for population groups in key historical events.

Key Inputs:

- Population groups
- Support of population groups for each other.

Key Outputs: Allegiance between population groups

Hardware : All platforms

Software: Java

Documentation: [DMM+07][MDS+08]

Known Strengths: Nexus can predict coalition between population groups and take into account past events in predicting future behavior.

Known Limitations: Key data for affinity between groups might be unknown. Trust, blame and trustworthiness beliefs might be hard to quantify accurately.

National Operational Environmental Modeling (NOEM)

Version Identifier & Date: NOEM Release 0.2.0, dated 7 August 2008

Responsible Organization: Air Force Research Laboratory, Information Directorate

Contact Information: Dr. John Salerno, john.salerno@rl.af.mil

Government-Owned? Yes – all open source

Description/Overview: NOEM is a strategic analysis/assessment tool developed by AFRL/RI in collaboration with AFRL/RH, AFOSR, Sandia National Laboratory and AFIT, that provides insight into the complex state space (as a system) that is today's modern operational environment. NOEM supports baseline forecasts by generating plausible futures based on the current state. It supports what-if analysis by forecasting ramifications of potential "Blue" actions on the environment. NOEM also supports sensitivity analysis by identifying possible pressure (leverage) points in support of the Commander that resolves forecasted instabilities, and by ranking sensitivities in a list for each leverage point and response. NOEM can be used to assist Decision Makers, Analysts and Researchers with understanding the operational environment of a nation state, the consequences of implementing specific policies, and the ability to plug in new operational environment theories/models as they mature. NOEM is built upon an open source license-free set of capabilities, and aims to provide support for pluggable modules that make up a given model. The architecture of NOEM consists of a four major components: (1) the Model, (2) Model Population Subsystem, (3) Experiment Manager, and (4) Data Visualization and Analysis Tools. The Model is composed of several modules (as defined using stability operations theory) that depict the various operational environment of a nation-state, which are carefully integrated together to ensure input/output dependencies are maintained between the modules. The Model Population Subsystem aims to provide multiple ways to populate the data repository to provide current & past snapshots in time for the nation-state. The Experiment Manager provides a set of interfaces to seamlessly integrate all model components. Data Visualization & Analysis Tools provide an analytical capability to exercise the model and a plug-in environment that allows for easy integration of future advanced analysis tools for baseline forecasting, what-if analysis, sensitivity-analysis, model knowledge elicitation, and model adaptation.

Methodology: NOEM is based on several AFIT Masters' theses (Capt JD Robbins's *Investigating the Complexities of Nation-building: A Sub-National Regional Perspective*, Capt Gerald Fensterer's *Planning and Assessing Stability Operations: a Proposed Value Focus Thinking Approach*, and Capt Nathan Nysether's *Classifying Failing States*). NOEM provides an architecture that is plug & play. It primarily uses a systems dynamics (SD) model for its mathematical analysis, but also supports non-SD models such as for a java-wrappered Economics module. At the module level, each module publishes its outputs & subscribes to others it needs. Each module is designed to be modular to accommodate additional modules with varying theories. Modern Design of Experiments techniques will also be used to analyze the SD model for key inputs/outputs to serve as possible leverage points to assist with the development of future courses of action. The following modules for one region in Iraq are currently included in the latest NOEM release: Economics, Crime, Demographics, Health, Utilities (Electric,

Water/Sanitation). The baseline for this one region will be completed by the end of Dec 08 and will also include the following modules: Banking & Finance, Governance, Civil Defense, Indigenous Military, Border Patrol, Facility Protection Services, Police, Behavior, Migration, and Utilities (Oil, Natural Gas, and Telecommunications). All 18 regions within Iraq will be comprehensively modeled by May/Jun 09. In addition, external forces such as insurgency, coalition forces, and weather/natural disasters will all be added.

Key Inputs: Estimated currently at 1200 fixed and variable inputs; key ones to be defined by sensitivity analysis

Key Outputs: Outputs can be tailored on an experiment basis. Parameters that are published by each module can be chosen as an output to monitor.

Hardware: Cross-platform (JAVA based)

Software: Ptolemy II, Eclipse, JackRabbit (all open systems, license free) - no cost of ownership

Documentation: NOEM (Phase I) Final Report, NOEM User Document

Known Strengths: Free Open Source Software, No Cost to Run, Framework for Social Behavioral Analysis, Easy to Use, Minimal Time to Run

Known Limitations: Limited Community Research on Nation-State Stability, Behavior modeling and metrics for stability.

ORA

Organizational Risk Analyzer

Version Identifier & Date: 1.9.4, 2008

Responsible Organization: Center for Computational Analysis of Social and Organizational Systems (CASOS) at Carnegie Mellon University, http://www.casos.cs.cmu.edu

Contact Information: Kathleen M. Carley, kathleen.carley@cs.cmu.edu

Government-Owned? No, copyrighted

Description/Overview: ORA is a framework for dynamic network analysis (DNA) of conflict scenarios. DNA extends social network analysis and link analysis to the assessment of multiple networks of different entities and links that may (or may not) be temporally or geo-spatially linked. Using well-validated social science and cognitive science findings a series of techniques were created and implemented in ORA for inferring missing links, evolving networks over time, forecasting information diffusion and belief change, and inferring the command structure for specific tasks. Graph theoretic, machine learning, statistical and agent-based modeling techniques are used to identify patterns and assess change. ORA can assess any networks involving who, what, where, why, how or the connections between them and how they changes over time. ORA can also assess trail connecting who was where when. ORA can convert networks to trails and trails to networks. Common networks that analysts use ORA to assess include: social networks, knowledge networks, capabilities networks, activity networks, task networks, resource networks, communication networks, and alliance networks. ORA provides the capability to assess network performance and vulnerability in complex what-if scenarios, visualize networks and comparative network metrics such as agent betweenness, centrality, and closeness, and extract networks from text sources such as email. ORA can also link to data in other forms such as PenLink, AnalystNotebook, CSV files, and SQL databases.

Methodology: DNA's methodology of computational organization theory is based on a combined "meta-matrix" representation combining multiple interlocking networks and a variable tie (link) representation and a trail representation of who was where providing temporal and geospatial context among nodes. Graph metric, standard social network metrics, pattern identification algorithms for both trail and network data, clustering algorithms, and visualization algorithms can then be run to assess social networks, semantic networks, knowledge networks, activity networks, etc. and to assess and identify patterns in trails. In addition, there are several integrated models for belief formation and an agent-based simulation (using DyNet) that can be run using this representation to evolve the underlying networks change in diffusion and effort are directly measured and a canonical classification task is also used to measure accuracy and agreement, and diffusion in the organization.

Key Inputs: Network entities and primitive relations, as well as attributes on those network entities. The types of entities are as follows:

• Who: Actors, People, Organizations, Nation-States etc., Roles

- What: Tasks, Events, Actions, etc.
- How: Knowledge, Beliefs
- How: Resources
- Where: Locations

Primitive relations include the influence of each actor on other actors, who has what resources, who was where, preferences of actors (stubbornness), and so on. In addition, attributes of the nodes such as nationality for Actors, GNP for nation-states, DIME/PMESII area for Resources and Tasks can be input. These networks are then tagged also by time (WHEN) so change can be assessed. NOTE: the system has graceful degrade functionality so that if only part of the information is available, e.g., Actors and who talks to whom, whatever analyses can be done are still done. The native format for ORA is DynetML; however, there are import facilities for I2/AnalystNotebook, PenLink, data in CSV format, UCINET-dl files, Pajek files, and many other formats.

Key Outputs: There are four key types of outputs:

- Identified Groups & Clusters: there are 7 different pattern identification and grouping algorithms for nodes in networks and several for paths in trails. For networks the grouping algorithms include both fuzzy group and discrete group identifiers.
- Ranking of entities: There are about 100 social network and dynamic network metrics for ranking different entities according to a wide range of criteria. The user does not need to know which metric to use when but can simple call a report for a task and all relevant metrics that can be run on the data are run. All metrics have been validated. Standard social network metrics include:
- Betweenness centrality
- Centrality measures
- Closeness measures
- Clustering coefficient
- Number of strong components in the graph (cliques)

Dynamic network metrics include:

- 1. Resource congruence
- 2. Cognitive demand (emergent leadership)
- 3. Workload
- 4. Shared situation awareness
- 5. Specialized expertise
 - Evolution or change in network A variety of techniques exist for assessing change:
 - Statistical change detection techniques
 - Difference statistics
 - Over time visualization for both networks and metrics
 - MRQAP for regression on network data
 - Performance outcomes and impact of Course of Action Performance outcomes are estimated based on the existing network, and under two change conditions immediate impact and near term. Immediate impact analysis uses a comparative

static approach. Near term impact uses a multi-agent simulation approach. A series of metrics are available including:

- Resource congruence
- Belief change
- Accuracy
- Diffusion
- Task effectiveness

Hardware: Intel PC, also there are 64 and 32 bit Linux versions

Software: Java 1.6 front end and C++ backend: Versions exist for Windows XP and Linux systems

Documentation: [CR04] [Car] [CLK01] There is also extensive internal help that comes with ORA as part of the download, along with lesson plans, and a dataset for learning with.

Known Strengths: ORA provides a complete suite of network metrics to evaluate complex situations. This is supplemented with machine learning algorithms to evaluate change. It is used as an analyst tool to exploit vulnerabilities in networks through targeting points in the supply chain or information warfare. Its intuitive visualization makes it possible to understand quickly the impact of an intervention through different perspectives. It is used as an analyst tool to assess the C2 organization of one's own unit to identify capability gaps, assess shared situation awareness etc. It has been tested and can rapidly assess million node networks. Key algorithms are all multi-threaded. And the system can be run on a variety of platforms. In addition, ORA can be run with or without the interface and API's exist for most reports so that ORA can be used as an analytic back end in a variety of other tools.

Another key strength is that ORA helps the analyst assess change in beliefs and attitudes either generically or for just the political elite. Also, ORA has limited capability for assessing missing links or relations using both other networks and attributes of nodes. ORA has an integrated ability to do geo-spatial visualization and some location based reasoning for identifying locations where activity is on-going, and assess the movement of groups and resources over time.

In ORA nodes can have attributes and reports can be done selecting on or contrasting behavior vis these attributes. Nodes representing resources, actions, and tasks can be classified by their DIME / PMESII relevance. Once this is done, when groups are located the relative involvement of the group in DIME/PMESII activity or capability can be assessed. Nodes representing actors can be tagged by nationality or religion and cross-cultural differences examined. ORA also provides a complete suite of metrics for evaluating coded text documents at three levels – content analysis, semantic network analysis, and meta-network analysis. Key tools for identifying clusters of people+idea, or people+resources are used by analysts to assess psyops, humint, and open source data that has been coded in to authors, concepts, and documents.

Known Limitations: One assumption made is that the set of nodes and most relationships in a scenario are known in advance. There are some techniques for assessing missing relationships – but more could be added. A second assumption is that

destabilizing an organization involves the removal of certain key nodes (people or resources) either temporarily or permanently. Other criteria for destabilization could be explored (such as the introduction of agents of change) and inference to missing nodes and relationships could be made (through analogical reasoning and relational learning). These options exist in the DyNet parent – Construct – but have not yet been instrumented for ORA.

PoFED

Politics of Fertility and Economic Development

Version Identifier & Date: November 2007

Responsible Organization: Sentia Group, Inc., 1066 31st St. NW, Washington, DC 20007

Contact Information: Brian Efird, (202) 777-3651, bae@sentiagroup.com

Government-Owned? No, proprietary

Description/Overview: PoFED is a formal model of demographic change in a population given certain endogenous political conditions. It has been used to explain and predict economic equilibrium conditions such as the poverty trap in a sample of 100 countries from 1960 to 1990. It is supported by a large amount of literature showing the complex formal relationship between rising income, increasing political capacity, domestic instability, human capital, and freedom associated with democracy, and reduced fertility. The model has shown the importance of the political conditions as catalyst for demographic transitions by affecting expected economic outcomes. It has also demonstrated the importance of capital investment, human capital, and political capabilities as a tool of growth. Furthermore it demonstrated the indirect importance of personal freedom in generating long term growth and minimizing domestic instability. Extensions suggest the importance of income distribution on long term growth and stability.

Methodology: PoFED is a dynamic structural model. The formal implications of this model are based on endogenous growth theory. The logic is supported by game theoretical model of treating individuals, firms, and governments as actors maximizing their expected utility. Non-linear differential equations reflecting this optimization are applied to dynamic variations in state factors to determine the change and dynamics of interrelated factors. Political stability and the rule of law increase productivity and income. Individuals choose to have fewer children if their income rises, because other activities including work itself take away from the available time, and the costs of children rise with expectations of increased education. The growth of societies is therefore uneven. Relatively poor societies thus have the highest opportunity to increase economic expansion if stability and political capacity can be enhanced. However the variation in success and failure is large. When balanced growth is achieved the rate of economic growth decreases to a stable state, but it is difficult to detail a society because of the large accumulated wealth and well established political structures. Politics factors have a lower impact as regulations are institutionalized

Key Inputs:

- A population of agents (decomposed into young adults, children, and older adults)
- Political capacity (effectiveness of government, rule of law)
- Human capital (education, skills)
- Current physical capital (income, investments, equipment, FDI)
- Political instability (measured as the proportion of physical capital destroyed in violent uprisings)

• Freedom (measured by composite freedom house indicators)

Key Outputs:

- Birth
- Freedom
- Political Instability
- Political Capacity
- Human Capital
- Income

Hardware: Windows PC-based

Software: Stata and R

Documentation: [FKZ99]

Known Strengths: This model provides a political explanation for economic growth, political change, domestic instability and political development that is self-reinforcing. That is, a level of political capacity can trigger growth and development that will in turn favor political stability and increased political capacity and the emergence of democratic freedom. It can be used to model the effects of public policy in allocating expenditures on a country's development trajectory.

Known Limitations: Does not account for cultural factors or exogenous factors affecting demographics such as population migration.

PSOM (UK)

Peace Support Operations Model

Version Identifier & Date: 2.0, 2007

Responsible Organization: J-8 Warfighting Analysis Division

Contact Information: CDR Brett Pierson, 703-571-0869, brett.pierson@js.pentagon.mil

Government-Owned? Yes

Description/Overview: Originally developed in the UK by DSTL (Defence Science and Technology Laboratory), PSOM is now collaboratively developed by a UK/US team. Post-intervention wargame focused on nation-building by ensuring security, "consent", stability, and "fear" as key enablers. Model can be used also to demonstrate the growing of an insurgency movement, therefore allowing the model to examine CONOPs for quelling unrest.

Methodology: Multi-sided, turn-based computer wargame of aggregated agents at the strategic/higher operational level. Blue, Green and Whites (NGOs) have different peace support operational moves, such as enforce, stabilize, etc., with different effects on security, "consent", stability, and "fear" depending on their success against Red factions strategies such as disruption, attacks, etc. Moves have a typical 30-day time span. Civilians are non-playable and population decisions, such as inform, crime, migration, rioting, etc., are based on current conditions. It includes game-theoretical models and social science models of rioting and deprivation.

Key Inputs:

- Area of operations divided into equal squares encoded with terrain, population density, strategic infrastructure, and perceptions of security and political support.
- Factions, units, "stances" (activities).
- Casualties depend on rules of engagement (ROE) and force protection specified but ultimately are a result of engagement as dictated by stances and locations.
- Personality characteristics such as reputation, leadership, experience and fatigue will determine "soft" effects such as fear and deterrence.
- Expectation values for goods and marginal gain coefficient determine results of a move.
- Memory coefficient for effect of past experiences.

Key Outputs: Output is visualized as numeric color coded values on a variety of metrics regarding reconstruction, casualties, infrastructure, criminality and government legitimacy. Also features a media headline generator that serves to represent public opinion and drive High Level Game decisions.

Hardware: Intel PC

Software: Windows XP, Visual Basic.NET, Microsoft Visual Studio

Documentation: PSOM Overview Document, Sept. 2007; User Requirements' Document for PSOM v.2, 2007; [Par05][Bod06][pso07]

Known Strength: Completely driven by editable scenario and data files, PSOM provides an easy visual interface of the qualitative and quantitative results of the simulation. It includes military, information, economic, migration, criminality, deterrence, recruitment, and rioting models. It provides a platform for learning negotiation strategies and the whole-of-government approach to SSTR through wargaming exercises. Also allows for high-level game inputs representing the real-world non-predicable events that drive irregular situations such as environmental or political decisions.

Known Limitations: High-level, low-resolution model that may not capture real-world complexity and provide detailed answers.

Pythagoras

Version Identifier & Date: 1.10, 2007

Responsible Organization: US. Marine Corps Combat Development Command (MCCDC), C19, 3300 Russell Road, Quantico, VA 22134, Naval Post Graduate School (NPS) Seed Center, http://harvest.nps.edu

Contact Information: Gary Horne, gehorne@nps.edu, Lt. Robin Marling, robin.marling@usmc.mil

Government-Owned? Yes

Description/Overview: Pythagoras is a time-step agent-based simulation environment for irregular warfare at the operational/tactical level integrating physics-based effects with personality and human factors. It was developed by MCCDC as part of the "data farmable" models of Project Albert to explore outliers and parameters' sensitivity. It has been used to model current and historical scenarios. It leverages from earlier agent-based models such as Socrates and MANA.

Methodology: Pythagoras is driven almost exclusively by agents' behaviors implemented with "soft" decision rules and "soft" variables. Each agent has its own threshold, randomly distributed, for fuzzy-logic membership of key factors affecting its behavior. Each agent has desires, terrain and movement preferences, an affiliation (red, blue, green), weapons, and leadership personality. Resources, such as fuel and ammunitions, are consumable entities evolving over time. Pre-defined "triggers" induce a change of behavior for an individual or a class of agents. For example, a triggering event may cause an agent to shift from movement method to another; this could change the behavior exhibited when an 'enemy agent' is detected, e.g., after being attacked, some percentage of agents might switch from a 'pursue enemy' movement method to a 'hide from enemy' movement method. Stochastic kinetic effects due to weapons, sensors and terrain characteristics can also be specified for Monte Carlo confidence estimation. Communication channels spread status information within a specified number of hops at each time step. "Non-lethal" weapons can be used to model social influence mechanisms affecting the adversary in information warfare. 3D scenarios, involving UAVs for example, can be specified using altitude and height attributes.

Key Inputs: All inputs are user-specified through the scenario tool for the following categories:

- Terrain
- Weapons
- Affiliation
- Sensors
- Comms
- Resources
- Agents (Behaviors, Personality/Leadership/Obedience/etc., Preferences, Desires)
- Behaviors

Key Outputs: The outputs are the measures of effectiveness (MOEs) selected in a scenario. MOEs time series can be selected for an individual or an agent class for any of

the defined attributes, resources and objectives. All actions and states are recordable. Some of the pre-defined MOEs are:

- Change in affiliation
- Change in vulnerability
- Agent comms effectiveness
- Distance to final waypoint objective

Indicators can be extracted separately from those time series and graphically displayed.

Hardware: Platform independent

Software: Java 1.5

Documentation: Pythagoras Manual and tutorials, [BHM05], [BHT03]

Known Strengths: The GUI-based scenario tool is fairly comprehensive and intuitive and enables non-programmers to develop agent-based models. Scenarios are saved in an XML file which can be created, read and modified by other tools. The model is extendable through the use of generic resources and attributes. User-defined terrain features can be overlayed on a background map. The gradient property of affiliation can be used to model multiple dynamic heterogeneous behaviors in a scenario and to model effects rather than objectives. The agents are adaptable in the sense that they can adjust their behavior and characteristics according to certain triggers and situations.

Known Limitations: Pythagoras has originally been conceived for tactical combat scenarios and adapted for COIN to take into account human factors. It might take some time to find the right metaphors to adapt a scenario according to Pythagoras modeling constraints. There is no GIS capability and terrain features have to be manually entered. However, this limitation has been mitigated by auxiliary scenario generation tools from NPS.

Rebellion

A Computational Agent-based Model of Civil Violence

Version Identifier & Date: Netlogo 4.0.2 model, 2008, available at http://ccl.northwestern.edu/netlogo/models/Rebellion

Responsible Organization: The Brookings Institution

Contact Information: Joshua M. Epstein

Government-Owned? No, open-source

Description/Overview: This is a stylized model on the dynamics of decentralized upheaval. Two models are examined: Model I on a "decentralized rebellion" (i.e. insurgency) against a central authority and Model II on a central authority seeking to suppress a civil war between two ethnic groups.

Methodology: The models are based on simple agent-based behavioral rules. In Model I, one rule relates the agent's grievance and perceived risk (probability of being arrested times risk aversion) to the decision to join the rebellion (the agent becomes "active"). The police arrest a random rebellious agent within their vision range. The rebellions have been shown to follow an outburst pattern (punctuated equilibrium) characteristic of complex systems. Model II introduces some population dynamics. In this last model, an "active" agent kills a member of the other group.

Key Inputs: Heterogeneous actors are members of the general population with certain characteristics:

- Perceived hardship (uniformly distributed across all agents)
- Perceived legitimacy of the regime (Model I) or of the other group (Model II) (equal across all agents)
- Risk aversion (uniformly distributed across all agents) that weighs in the decision of whether to join the rebellion according to prospect theory [KT79]
- Vision range (equal across all agents)
- and police actors that represent the central authority with certain characteristics:
- Vision range that may be different from the general population (equal across all police)

Key Outputs:

- Insurgency factor
- Time to next rebellion outburst
- Tipping points (high grievance but no rebellion)
- Peacekeeping force deterrence evaluation

Hardware: Intel PC

Software: NetLogo 4.0.2

Documentation: [ESP01], [Eps02]

Known Strengths: It is possible to model deterrence in the ratio of police to population necessary to prevent civil violence. It is possible to predict the next rebellion outburst

based on the data generated by the model and to assess the number of peacekeeping forces to prevent a civil war.

Known Limitations: The model is based on local behavioral rules that exclude social influence in joining the rebellion. There is however a spatial correlation between the ratio of police-to-rebels in the vision range and the decision to join in the rebellion that simulates mob behavior.

SEAS-VIS

Synthetic Environments for Analysis and Simulation-XXX

Version Identifier & Date: SEAS-VIS 5.6, 31 March 2008

Responsible Organization: Simulex, Inc., http://www.simulexinc.com

Contact Information: Dr. A. R. Chaturvedi, alok@simulexinc.com

Government-Owned? No, proprietary, commercial-off-the-shelf

Description/Overview: SEAS-VIS is a virtual, synthetic environment replicating the real world, international system using a comprehensive, "all of government", "N" – sided approach to assess operations in areas such as irregular warfare. It models all aspects of PMESII at configurable levels of detail. It is based on well-established theories across a broad spectrum of studies such as socio-economic theories of subjective well-being [Die84] [KDS99]; prospect [KT79], relative deprivation [Gur70], individuals' goal seeking and context specific value prioritization; psychological theories of valence and arousal; communication theories such as agenda setting and framing, group and organization theories such as alliance formation.

Methodology: SEAS-VIS is a virtual, synthetic environment replicating the real world, international system using a comprehensive, "all of government", "N" – sided approach to assess operations in areas such as irregular warfare. It models all aspects of PMESII at configurable levels of detail. It is based on well-established theories across a broad spectrum of studies such as socio-economic theories of subjective well-being [Die84] [KDS99]; prospect [KT79], relative deprivation [Gur70], individuals' goal seeking and context specific value prioritization [Mas52] [Ing90]; psychological theories of valence and arousal [Meh73]; cognitive theories such as elaboration likelihood model and memory-based process model [Pet86] [Lav02]; communication theories such as agenda setting [Iyengar] and framing [Dru03], group and organization theories such as social identity and resource mobilization [Taj81] [Jen83]; international relations theories such as alliance formation [Wal87] [Mea01].

Key Inputs: Diplomatic (Engage, Coerce, Threaten, etc.), Information (Media Campaign, PSYOP, etc.), Economic (Embargos, Blockades, Expand Trade Relations, etc.), Finance (Provide Personnel, Freeze Assets etc.), Intelligence (Provide Incentives to Informants etc.) and Law Enforcement (Arrest, Train Personnel, etc.) actions at individual and group levels. Impact of military actions – combat, troop presence, destruction, casualties, etc. at node or geography levels

Key Outputs: PMESII Indices (Political Stability, Military Strength, Economic Stability, Social Stability, Availability of Information, Access to Infrastructure, etc.) and Public Opinion, Perception of needs, Wellbeing, Organization Membership, Media Subscription, Arousal, Will to Fight at Individual and Group levels; Attitude of key leaders, organizations and institutions to other leaders, organizations and institutions; Economic indicators on GDP, Consumption, Production, Trade, Unemployment, Inflation at different geographic levels

Hardware: Platform independent, scalable from laptop to High Performance Computing

Software: Linux distribution or MacOSX operating systems, Java SE

Documentation: Simulex SEAS user-level FAQ (2007), [CCM+05], [CDC+04], [Cha05] [CDS04]

Known Strengths: SEAS-VIS represents all aspects of PMESII at different levels of granularity: temporal, spatial and societal as well as strategic, operational, or tactical. It leverages from multiple open-source data feeds in an N-sided environment under which all agents autonomously sense their environment and behave toward achieving their goals. Multiple Human-in-the-Loop users/players can participate as agents in the N-sided environment and forecast their intervention strategies, such as Red cell and Blue cell strategies. SEAS-VIS offers explanation capabilities from the micro agent level to the macro emergent level, and it includes a rich set of visualization and analysis tools available over the Web that include geo information, glyphs, networks, floating point data, trend line, correlation, and end state analysis capabilities. SEAS-VIS is capable of integrating with any other model through its SimBridge technology, which is HLA-compliant. Currently SEAS-VIS contains data on 62 countries at different levels of resolution.

Known Limitations: Kinetic events are not directly modeled; however, action sets are provided which replicate the impact of the kinetic activity on PMESII elements within the society represented. For example, the impact of an IED attack may induce changes in agent well-being, attitude and goals. Integrating SEAS-VIS with kinetic models such as JSAF, One SAF, and IGS, can provide direct kinetic actions that SEAS-VIS agents can sense, recognize and then respond.

Note: SEAS-VIS is a proprietary model. None of the authors or model analysts supporting this effort had access to or reviewed any proprietary information. This assessment was made wholly on publicly available assessments and discussions regarding SEAS-VIS.

Senturion

Version Identifier & Date: 7.35, as of 29 February 2008

Responsible Organization: Sentia Group, Inc., 1066 31st St. NW, Washington, DC.

Contact Information: Brian Efird, (202) 777-3651, bae@sentiagroup.com

Government-Owned? No, proprietary

Description/Overview: Senturion simulates and models stakeholder (actor) behavior for complex political outcomes such as negotiations, decision making, conflict termination and settlement, elections, and CT/COIN operations. It has been applied and validated against approximately 300 political scenarios in the Middle East, Asia, Latin America, Africa and Europe.

Methodology: Senturion simulates political dynamics and interactions of key actors to predict change in behavior using risk behavior analysis, game theoretic (spatial bargaining) and decision theoretic algorithms for multi-dimensional issues. The methodology includes a structured interview process of subject matter experts (SMEs), combined with modeling of SME inputs. A risk profile for each stakeholder evolving over time is derived by relative comparison on the importance of the issues based on the median voter theory. The methodology is an agent-based approach where pairwise game-theoretic interactions between stakeholders evolve over time until no bargaining occurs.

Key Inputs:

- Stakeholders (actors to include elites, population segments, third parties, etc)
- Issues (potential outcomes) that will define the bargaining space
- Position on issues, influence, and importance of the issues for each stakeholder

Key Outputs:

- Potential coalition formation
- Evolving stakeholder relationships
- Prediction on the support of issues
- Impacts of change in the environment
- Government stability and regime change
- Visualization of the outcomes

Hardware: Stand-alone Microsoft Windows-based platform

Software: C# engine with Macromedia Flash interface

Documentation: User manual and technical documentation available. [ABEK06]

Known Strengths: The model's outcomes have been validated in approximately 300 scenarios. The input is very simple to elicit from SMEs or other data sources. The model provides insights into complex decision making to identify second and third order effects. The methodology could be integrated with and leverage from other approaches such as social networks and system dynamics.

Known Limitations: The model requires high-quality data and extensive subject matter expertise. This limitation is mitigated by a Monte Carlo analysis on the SMEs' input to produce a confidence interval on the outcome.

SIAMTM

Situational Influence Assessment Module

Version Identifier & Date: 6.1, February 5, 2007

Responsible Organization: Science Applications International Corporation

Contact Information: Julie A. Rosen, SAIC, tel: 703-676-7354; email: Julie.A.Rosen@saic.com

Government-Owned? No, but USG agencies have Government Purpose Rights for use

Description/Overview: SIAM is a user-centric decision support desktop application for reasoning under uncertainty. At its core, SIAM is a Bayesian inference net technology. However, the analytical engine is complemented with a user-interactive front-end that allows planners, operators, and analysts the ability to construct and analyze the inference networks to reflect changes in a situation, or changes in our knowledge of the situation as time evolves.

Methodology: SIAM's analytical engine is founded in the mathematical theory of Bayesian inference networks. The user-interactive front end allows the human to create cause and effect factors—represented by nodes—and the conditioning relationships—represented by directed arcs, or links—from cause to effect. Users then can assign parametric values to the nodes and links based on expert judgment. These parameters can be assigned to alternate, possibly time-based, "snap shots" of the situation. SIAM's analysis tools include forward belief propagation ("what if"), as well as backward-looking sensitivity analyses to support resource allocation to improve the likelihood of the desired outcome.

Key Inputs: Human-created cause and effect factors (nodes) and directed arc (links) connecting cause with one-or-more effects. Human-assigned parameters for node beliefs (marginal probabilities) and link strengths (conditional probabilities or weights for a linear sum averaging).

Key Outputs: Beliefs of all node elements in the inference network (forward propagation). Sensitivity analysis results of the user-selected node (child) to each of the node's ancestral influences.

Hardware: Dell Pentium IV, 2.4GHz, 512 MB RAM, 150MB available hard disk

Software: Windows XP, SP1 (or later), IE v. 6.0 SP1

Documentation: An introduction to SAIC's modeling process, and the SIAM desktop software can be found at www.inet.saic.com. A prior version (v 5.0) of the SIAM User Guide is available from this web site. Additionally, Admin Guide and User Guide (PDF format) appropriate to the installed software are installed with the application [HS97][RS00].

Known Strengths: Interactive construction and analysis of Bayesian inference networks. User-assigned parameters for both node and links. User-specified "snap shots" (called excursions in SIAM) allow users to consider alternate course of actions and/or alternate hypotheses of the evolving situation. Embedding of model fragments allows users to de-

clutter the screen display; also allows for separation of efforts into complementary domains of expertise. Evidence (txt, pdf, html, doc, xls) documents can be uploaded (or reference through a properly constructed URL) to the elements of the model. Alternate belief evaluation algorithms can be accommodated by SIAM's underlying architecture; e.g., law of total probability using link "strengths" versus linear weighted sum of cause "weights." Import/export of model content by way of XML. API available to use SIAM "engine" with data from peripheral applications.

Known Limitations: Does not currently employ parametric assignment from peripheral applications for automated updating of parameters. Does not currently provide user interface for complete conditional probability matrix; versus the currently employed "Causal Strengths" (CAST) approximation.

STRATMAS®

Version Identifier and Date:

- STRATMAS® version V.7.5, 2008.
- Cupol Planning version 5.1, 2008.

Responsible Organization:

- STRATMAS® is owned by the Swedish National Defence College
- Cupol Planning 5.1 is owned by Cupol International Inc.

Contact Information:

- STRATMAS®: S Anders Christensson
- Cupol Planning: Peter Kimber

Descriptive Overview: STRATMAS® societal models are based on the assumption that deprivation of food, water, shelter, medical care, and lack of employment and criminal activities create disaffection within the overall population. Disaffection is assumed to create conditions of potential violence that may lead to actual violence under appropriate circumstances. Violence levels could be reduced by the actions of military and security forces in the short term, or by removal of the causes and effects of deprivation in the longer term. In order to promote an increased understanding of the impact of different properties within the overall modeling environment, the abovementioned and other properties have been organized into six different themes. This organization relates to intelligence processes that describe the strategic context in terms of themes, special systems, and actors of relevance. In the case of STRATMAS® the following six themes were identified: Political, Government, Economic, Social, Quality of Life, and Environment. Each of these themes has one or more associated process variables (PV) or indicators representing activities taking place within the synthetic representation of a country of interest.

Within STRATMAS®, Process Variable or Indicator Data associated with each of the themes can be displayed at the national, regional, or user-selected grid-square level of resolution. During use of the software events taking place in the country of interest are reflected in the values of the set of Process Variables, Changes in those variables can be displayed as a time-dependent graph, numerically, or as color-coded changes in contour-like maps. Five basic scenario categories have been developed for STRATMAS®, they include: Peace Enforcement, Peace Keeping, Humanitarian Assistance, Disaster Relief, and Non-Combatant Evacuation. Scenario development involves the definition of actors (including military units and civilian entities), orders and actions, and the target(s) of those actions in an appropriate level of detail.

A military actor in STRATMAS® is visually defined by icons described in the DoD Mil-Std 2525B document. Icons for selected civilian entities (including police forces as well as water-, food-, shelter-, and medical care-providing entities) have been developed by the STRATMAS® development team. A plan for actors and other entities assumes that properties of a starting condition and an end-state have been defined. The plan also can identify a series of activities through which the required end-state might be achieved. Elaborate military plans can involve the production and integration of multiple plan components by teams of individuals. Plans may be constructed from the top-down with the aid of deductive reasoning, or from the bottom-up through processes that specify how small elements should be linked to form larger elements, for example.

Model-based processes can calculate the impact of plan actions by modifications in the values of the Process Variables or Indicators. These processes can also be used to assess the impact of plan modification on overall plan outcome(s). Evaluation of model-generated outcomes by subject matter experts could be used to identify possible problems and inconsistencies associated with the models used to describe the activities within the synthetic representation of the country of interest that has been implemented in STRATMAS®. Furthermore, a series of different plans could be developed and used to identify potential "best case," "worst case," and "most likely case" outcomes and to define optimal conditions needed to achieve a required outcome.

Activities aimed at assessing the robustness of particular plans can involve the systematic variation of plan components and observation of the impact of those changes on overall activities. It is believed that these activities go beyond the normal processes associated with NATO Guidelines of Operational Planning (GOP) or Effects-Based Planning considerations which do not generally test for plan robustness. However, war gaming can be undertaken to check the robustness of a plan in Effect Based Operational planning (EBO). The ability to inject specific plan elements provides an environment for testing those elements before they are integrated into a larger, overall, plan.

Methodology: The user (planner) can create any flavor of a plan such as a Blue-, Red-, or Green-plan and configure resources, locations and commands (orders) accordingly. The configured plan setup is then delivered into STRATMAS® for simulation, additionally the planner can also select appropriate scenario (developed in Cupol Planning by a SME, Subject Matter Expert) to go with a plan into simulation, that is, a plan with all its actions, resources, locations, start and duration orders combined with a set of predefined static scenario events for a full plan of action simulation combined with a scenario. Cupol Planning has a full interface to Google Earth that allows the planner to 'see' where each planned resource and action is placed (latitudes and longitudes), how it moves from point to point to increase the understanding of a plan in a geographical context.

- STRATMAS®: Built on Control theory, a step-by-step purpose driven analysissynthesis process based on societal dynamics and economic models representing a country. STRATMAS® has been used in explorative exercises for validation and line-graphical output. Historical and country-specific thematic data of real and semi-real data has been used as input.
- Cupol Planning originates from the industrial planning and Quality Functions Deployment methodology, (QFD). It supports the military Dynamic Observe-Orient –Decision-Act loop, which is based on psychological dynamic decisionmaking and decision modeling. Cupol Planning provides an easy entry to the planning process as a front end editor to the analysis and simulation environment in STRATMAS[®]. The Cupol Planning environment is based on the Microsoft Visio[™] Tool environment, Visio makes it easy to learn and easy to create plans. Cupol Planning supports a number of planning contexts and flavors such as, EBAO (Effects Based Approach to Operations), GOP (Guidelines for Operational

Planning), Government Agency Co-Operation Planning (Sometimes referred to as Civil Inter-Agency Planning), and other Civilian planning methods.

Key Inputs: Strategic data, such as Objectives, Tasks/Actions, Resources, Locations, Orders, Time-duration, Populations, Population-Ethnicity.

Key Outputs: Validation Matrix, Tasks versus Objectives a (QFD matrix). Multiple setups of alphanumerical reports, Gantt page(s), and XML-based simulation input.

Hardware:

- STRATMAS® runs on Windows, UNIX and MacOS X. Optimization runs on XSERVER clusters.
- Cupol Planning is a Microsoft VisioTM based application and runs on Window PC.

Software:

- STRATMAS® is self-contained software. Client is JAVA built, Server Dispatcher and optimization is coded in C++. STRATMAS® supports one Client Server user or multiple Clients with Multiple Server Users. Multiple users in a staff or multiple staff's practitioners can be either active or passive client users.
- Cupol Planning is a Microsoft .NET/JAVA based application using MS office software as the front end. Communications between the two systems STRATMAS® Client and Cupol Planning is xml based. Planning information is formatted into a TacLan.xml file comparably to BML.xml.

Documentation: Models are documented in qualitative CLD (Causal Loop Diagrams), Qualitative quantitative STELLATM notation and spatial description.

Known Strengths: Configurable planning procedure with support for distributed analysis, planning, simulation and optimization. User perceive short training period to be productive. Fast and responsive analysis time, quick and fast interactive analysis change, try, modify input and run analysis in less than a couple of minutes to broaden a viewers understanding.

Known Weaknesses: Not HLA compatible and does not support regional or continent based analysis, planning, and optimization. Can not automatically instantiate the tactical version of STRATMAS®.

18 Bibliography

[ABEK06] Mark Abodollahian, Michael Baranick, Brian Efird, and Jacek Kugler. Senturion: A predictive political simulation model. Technical report, National Defense University, July 2006. [ABEK06] Mark Abodollahian, Michael Baranick, Brian Efird, and Jacek Kugler. Senturion: A predictive political simulation model. Technical report, National Defense University, July 2006. [Abr08] M. Abramson, Coalition Formation of Cognitive Agents, International Conference on Computational Cultural Dynamics, Association for the Advancement of Artificial Intelligence, 2008 [Agn92] Robert Agnew, "Foundation for a General Strain Theory." Criminology 30(1): 47-87, 1992. Robert Agnew, "Testing the Leading Crime Theories: An [Agn95a] Alternative Strategy Focusing on Motivational Processes." Journal of Research in Crime and Delinquency 32:363-398, 1995. Robert Agnew, "Determinism, Indeterminism, and Crime: An [Agn95b] Empirical Exploration." Criminology 33:83-109, 1995. [Ake00] Ronald L. Akers, Criminological Theories: Introduction, Evaluation, and Application. Los Angeles: Roxbury, 2000 [Ake06] Ronald L. Akers, "Comments on Heimer, DeCoster, and Ünal's 'Opening the Black Box: the social psychology of gender and delinguency." P. 152 in Mathieu Deflem (ed.), Sociological Theory and Criminological Research: Views from Europe and the United States. Emerald Group Publishing, 2006 Robert Agnew and H. White, "An Empirical Test of General Strain [AW92] Theory." Criminology 30(4): 475-99, 1992. [Bak03] Pauline H. Baker. Armed Conflict in Africa, chapter Conflict Resolution: A Methodology for Assessing Internal Collapse and Recovery. Triangle Institute for Strategic Studies, Lanham, MD and Oxford: The Scarecrow Press, 2003. [Bak05] Pauline Baker. Cast. In Agent-based and Other Analytic Tools in Support of Stability Operations MORS Workshop. MORS, 2005. [BHM05] Edd Bitinas, Zoe Henscheid, and Donna Middleton. Pythagoras, an agent-based environment. In Agent-based and Other Analytic Tools in Support of Stability Operations MORS Workshop. Military Operation Research Society, 2005.
[BHT03]	Edmund J. Bitinas, Zoe A. Henscheid, and Lap V. Truong. Pythagoras: A new agent-based simulation system. <i>Technology</i> <i>Review Journal</i> , Spring/Summer:45-58, 2003.
[Bid75]	H. Bidna, "Effects of increased security on prison violence." <i>Journal of Criminal Justice</i> 3: 33-46, 1975
[Bla05]	Curtis L. Blais. Modeling and simulation for military operations other than war. In <i>Proceedings of the 2005 Interservice/Industry Training, Simulation and Education Conference</i> , 2005.
[BMSY08]	Ed Bitinas, Donna Middleton, Brittlea Sheldon, and Mitch Youngs. The Pythagoras Counterinsurgency Application to Support The Marine Corps Irregular Warfare Study – Columbia Scenario, Presentation, March 2008.
[BMSY08]	Ed Bitinas, Donna Middleton, Brittlea Sheldon, and Mitch Youngs. The Pythagoras Counterinsurgency Application to Support The Marine Corps Irregular Warfare Study – Columbia Scenario, Presentation, March 2008.
[BO'C05]	Ursula-Sigrid Bougoure and Aron George O'Cass, "A Cross Cultural Examination of Consumer Behaviour & GM Food Products: Results from Australian and South Korean Female Consumers." <i>ANZMAC 2005 Conference Proceedings</i> . Fremantle, Western Australia, 2005.
[Bod06]	Howard Body. Analysing stabilisation operations. Published with the permission of the Defence Science and Technology Laboratory DSTL on behalf of the controller of HMSO, 2006.
[Boh91]	James Bohman, New Philosophy of Social Science: Problems of Indeterminacy. Cambridge, MA: MIT Press, 1991
[Bur05]	Steven Burnett. Modeling human behavior in a saso environment using project albert pythagoras model. In <i>Agent-based and Other</i> <i>Analytic Tools in Support of Stability Operations MORS</i> <i>Workshop</i> . Military Operation Research Society, 2005.
[BvD95]	R. Arjen Boin and Menno J. van Duin, "Prison Riots as Organizational Failures: A Managerial Perspective." <i>The Prison</i> <i>Journal</i> 75 (3): 357-379, 1995
[Car]	Kathleen M. Carley. Dynamic network analysis for counter-terrorism.
[CCM+05]	A. R. Chaturvedi, R. Chaturvedi, M. Mulpuri, D. Lengacher, S. Mellema, P. Poddar, C. Foong, and B. Amstrong. Understanding insurgency using computational experimentation: A case-study of Indonesia. In <i>Proceedings of the Agent 2005 Conference on Generative Social Processes, Models and Mechanisms</i> , 2005.

- [CCT+] Alok Chaturvedi, Michael Cibulskis, Yee Ling Tham, Brian Armstrong, Daniel Snyder, Paul Everson, and Jason Shreve. Integrated planning & experimentation.
- [CDC+04] A. R. Chaturvedi, D. Dolk, R. Chaturvedi, C. Foong, M. Mulpuri, D. Lengacher, S. Mellema, and Y. Tham. Agent-based computational model of a virtual international system. In *Proceedings of the Agent 2004 Conference on Social Dynamics: Interaction, Reflexivity and Emergence*, 2004.
- [CDS04]Alok R. Chaturvedi, Rae W. Dehncke, and Daniel R. Snyder.
Simulating non-kinetic aspects of warfare. In Interservice/Industry
Training, Simulation, and Education Conference, 2004.
- [CEG+05]Nazli Choucri, Christi Electris, Daniel Goldsmith, Dinsha Mistree,
Stuart e. Madnick, J. Bradley Morrison, Michael D. Siegel, and
Margaret Sweitzer-Hamilton. Pcas final report. Technical report,
Computer Information Systems Laboratory (CISL), Sloan School
of Management, Massachusetts Institute of Technology, 2005.
- [CEG+06]Nazli Choucri, Christi Electris, Daniel Goldsmith, Dinsha Mistree,
Stuart e. Madnick, J. Bradley Morrison, Michael D. Siegel, and
Margaret Sweitzer-Hamilton. Understanding & modeling state
stability: Exploiting system dynamics. Technical report, Computer
Information Systems Laboratory (CISL), Sloan School of
Management, Massachusetts Institute of Technology, 2006.
- [CG05] Lars-Erik Cederman and Luc Girardin. Measuring Grievance: Ethno-Political Exclusion and Civil War Onset. In *Mapping the Complexity of Civil Wars*, 2005.
- [CG99] Kathleen M. Carley and Lee Gasser. *Multiagent systems: a modern approach to distributed artificial intelligence*, chapter Computational Organization Theory. MIT Press, Cambridge, MA, 1999.
- [Cha05] A.R. Chaturvedi. Synthetic environment for analysis and simulation. In *Agent-based and Other Analytic Tools in Support of Stability Operations MORS Workshop*. Military Operation Research Society, 2005.
- [Cha77] G. Chartrand. *Graphs as Mathematical Models*. Prindle, Webber & Schmidt, 1977.
- [CLK01] Kathleen M. Carley, Ju-Sung Lee, and David Krackhardt. Destabilizing networks. *Connections*, 24(3), 2001.
- [Coh65] A. Cohen, "The Sociology of the Deviant Act: Anomie Theory and Beyond." *American Sociological Review* 30: 5-14, 1965.
- [Col82] Mark Colvin, "The 1980 New Mexico Prison Riot." Social Problems 29 (5): 449-463, 1982.

[Col92]	Mark Colvin, The Penitentiary in Crisis: From Accommodation to Riot in New Mexico. New York: SUNY Press, 1992.
[CR04]	Kathleen M. Carley and Jeff Reminga. ORA: Organization risk analyzer. Technical Report CMU-ISRI-04-106, Carnegie Mellon University, 2004.
[CR09]	Clark, Mark and Anne Russell, "Tracking Political Fragmentation: New Approaches for Measuring Political Fragility and other HSCB Events." Presented at the Patuxent Defense Forum, Saint Mary's College of Maryland, April 21-22, 2009. See http://www.smcm.edu/democracy/_assets/_documents/Tracking%2 0Political%20Fragmentation%20in%20Failing%20States%20- %20New%20Approaches%20v.21.pdf
[DA03]	Paul K. Davis and R. H. Anderson. Improving the composability of department of defense models and simulations. Technical report, RAND Corporation, 2003.
[DARPA-09]	
	http://www.js.pentagon.mil/descriptivesum/Y2009/DARPA /0603760E.pdf
[Def06]	Mathieu Deflem, <i>Sociological Theory and Criminological Research: Views from Europe and the United States</i> . Emerald Group Publishing, 2006.
[DH06]	Andrew J. Duck and Bernard Hayes. DIAMOND as a stability and support operations model. In <i>Proceedings of the Spring Simulation and Interoperability Workshop</i> , 2006.
[DHL96]	Lisa Witzig Davidson, Margaret Daly Hayes. James J. Landon, "Humanitarian and Peace Operations: NGOs and the Military in the Interagency Process" December 1996 (http://www.ndu.edu/inss/books/books%20- %201996/Humanitarian%20and%20Peace%20Ops%20- %20Dec%2096/index.html).
[Die84]	E. Diener. Subjective well-being. <i>Psychological Bulletin</i> , 95:542-575, 1984.
[Die99]	Diener, E., & Lucas, R. E, 1999. Personality and Subjective Well- Being, in Kahneman et. al. (eds)_ <i>Well-being: The foundations of</i> <i>hedonic psychology</i> , New York: Russell Sage Foundation.
[DMM+07]	D. Duong, R. Marling, L. Murphy, J. Johnson, M. Ottenberg, B. Sheldon, and S. Stephens. Nexus: An intelligent agent model of support between social groups. In <i>Agent 2007 Conference on Complex Interaction and Social Emergence</i> . Argonne National Laboratory, 2007.
[DMM+07]	D. Duong, R. Marling, L. Murphy, J. Johnson, M. Ottenberg, B. Sheldon, and S. Stephens. Nexus: An intelligent agent model of

	support between social groups. In Agent 2007 Conference on Complex Interaction and Social Emergence. Argonne National Laboratory, 2007.
[DoD 5000.59]	DoD Modeling and Simulations (M&S) Management
[DoD 5000.61]	DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation
[DoD 5200.1-R]	DoD Information Security Program Regulation
[DoD-CIO03]	DoD CIO Memorandum "Internet Protocol Version 6 (IPv6), June 9 2003"
[DoDD 5200.1]	DoD Information Security Program Directive
[DoDD 8500.1]	Information Assurance (IA)
[DoD-DMS1.4]	DoD Discovery Metadata Specification, version 1.4.1 (refer to the DDMS website at https://metadata.dod.mil/mdr/irs/DDMS/)
[DoDI 5200.40]	DoD Information Technology Security Certification and Accreditation Process (DITSCAP)
[DoDI 8500.2]	Information Assurance Implementation
[DoD-XML]	DoD XML Registry and Clearinghouse Policy and Implementation Plan
[Dor02]	K.B. Doran, "Lessons learned in cross cultural research of Chinese and North American consumers." <i>Journal of Business Research</i> 55: 823–829, 2002.
[Dru03]	Druckman, J. N., & Nelson, K. R. 2003, Framing and Deliberation: How citizens' Conversations Limit Elite Influene, <i>American Journal of Political Science</i> , 47, 729-745.
[Dun93]	R. I. M. Dunbar, "Coevolution of neocortical size, group size and language in humans." <i>Behavioral and Brain Sciences</i> 16 (4): 681-735, 1993.
[Dur95]	E Durkheim, <i>The Rules of the Sociological Method</i> . Edited by Steven Lukes; translated by W. D. Halls. New York: Free Press, 1895/1982.
[Dur97]	E. Durkheim, Suicide. New York: Free Press, 1897/1997.
[EAW03]	N. Engleback, M. Anderson, and John Wasser. Some uses of agent-based models in the new zealand defence force. In <i>Maneuver Warfare Science</i> , pages 155-169. USMC Combat Development Command, Quantico, VA, 2003.
[Efi]	Brian Efird. Senturion, model overview and applications. Published as a briefing by the Sentia Group.
[EIA-649]	National Consensus Standard for Configuration Management

[Ell84]	D Ellis, "Crowding and prison violence: Integration of research and theory." <i>Criminal Justice and Behavior</i> 11 (3). 277-308, 1984.
[Els89]	John Elster, Nuts and Bolts for the Social Sciences. Cambridge: Cambridge University Press, 1989.
[Eps01]	Joshua M. Epstein, John D. Steinbruner, and Miles T. Parker. Modeling civil violence: An agent-based computational approach. Technical Report 20, Center for Social and Economic Dynamics, The Brookings Institution, January 2001.
[Eps02]	Joshua M. Epstein. Modeling civil violence: An agent-based computational approach. <i>Proceedings of the National Academy of Sciences</i> , 99(3):7243-7250, 2002.
[Fes54]	Leon Festinger. A theory of social comparison process. Human Relations, pages 117-140, 1954.
[Fes57]	Leon Festinger. <i>A Theory of Cognitive Dissonance</i> . Stanford University Press, 1957.
[FFM08]	Klaus Fischer, Michael Florian; and Thomas Malsch, <i>Socionics: Scalability of Complex Social Systems</i> . Heidelberg: Springer Verlag, 2008.
[Fis85]	Walter R. Fisher, The Narrative Paradigm: In the Beginning, <i>Journal of Communication</i> , 35, 1985.
[FKZ99]	Yi Feng, Jacek Kugler, and Paul J. Zak. The path to prosperity: A political model of democraphic change. Technical report, School of Politics and Economics, Claremont Graduate University, November 1999.
[Gae94]	G Gaes, "Prison crowding research reexamined." <i>The Prison Journal</i> 74 (3): 329-363, 1994.
[Gan02]	CDR Aasgeir Gangsaas, "Measures of Merit for Defense Resource Planning of Small-Scale Contingencies." Power Point briefing. Office of the Secretary of Defense, Program Assessment & Evaluation Division, 7-9 October 2002. (ftp://ftp.rta.nato.int/PubFullText/RTO/TR/RTO-TR-SAS-027/TR- SAS-027-ANN-I-PPT4.pps)
[GSL+08]	Rebecca A. Grier, Bruce Skarin, Alexander Lubyansky, Lawrence Wolpert. <i>Implementing the Cultural Dimension into a Command and Control System</i> . PowerPoint Briefing, Aptima, 2008.
[Gur70]	T. R. Gurr. <i>Why men rebel</i> . Princeton University Press, Princeton, NJ, 1970.
[Har06]	Dean S. Hartley. Problems with DIME/PMESII models. Presentation at the INFORMS Military Applications Society Conference, 2006.

[Har07]	Dean S. Hartley. Measuring success in the 21st century. OR/MS Today Magazine, June 2007.
[HC05]	Martin Hagger and Nikos Chatzisarantis, <i>The Social Psychology of Exercise and Sport</i> . New York: MacGraw-Hill, 2005
[Hea05]	Joseph Heath, "Methodological Individualism." Article in the <i>Stanford Encyclopedia of Philosophy</i> , 2005. http://plato.stanford.edu/entries/methodological-individualism/
[Hei04]	David R. Heise. <i>Agent Culture: Human-Agent Interaction in a Multi-cultural World</i> , chapter Enculturating Agents with Expressive Role Behavior, pages 127-142. Lawrence Erlbaum Associates, 2004.
[Her99]	Mark Herman. Entropy-based warfare: Modeling the revolution military affairs. <i>Joint Force Quarterly Military Journal</i> , pages 85-90, 1999.
[Hof01]	Geert Hofstede, Culture's Consequences, Comparing Values, Behaviors, Institutions, and Organizations Across Nations, Sage Publications, 2001
[HS97]	Bradd C. Hayes and Jeffrey I. Sands. Doing windows: Non- traditional military responses to complex emergencies. Technical report, Naval War College, Center for Naval Warfare Studies, Newport, RI, 1997.
[Hum05]	M. Humphreys. Natural resources, conflict, and conflict resolution - uncovering the mechanisms. <i>Journal of Conflict Resolution</i> , 49(4):508-537, 2005.
[IEEE 1012]	Standard for Software Verification and Validation
[IEEE 1012a-1998]	Supplement to the Standard for Software Verification and Validation
[IEEE 1220-1998]	Standard for Application and Management of the Systems Engineering Process
[IEEE 1278.1A]	Distributed Interactive Simulation Standard
[IEEE 1516-2000]	Standard for Modeling & Simulation HLA Standard
[IEEE/EIA 12207.0]	Standard for Information Technology - Software life-cycle processes - Description
[IEEE/EIA 12207.0]	Standard for Information Technology - Software life-cycle processes - Implementation considerations
[IEEE/EIA 12207.1]	Standard for Information Technology - Software life-cycle processes - Data
[Ing90]	Ingelhart R. 1990. <i>Cultural Shift in Advanced Industrial Society</i> . Princeton: Princeton University Press

[Jen83]	Jenkins, J. C., 1983. Resource Mobilization Theory and the Study of Social Movements, <i>Annual Review of Sociology</i> , Vol. 9, pp. 527-553
[JFC06]	JFCOM. Commander's handbook for an effect-based approach to joint operations. Joint Forces Command Pub 26 Feb 2006, February 2006.
[JHU07]	Technical Report: Naval Research Laboratory Diplomatic, Information, Military, Economic (DIME), Political, Military, Economic, Social, Information, Infrastructure (PMESII) Modeling requirements Workshop (5 Dec 2007), Johns Hopkins University Applied Physics Lab NSAD-R-08-016.
[Joh90]	O. P. John. <i>Handbook of Personality: Theory and Research</i> , chapter The Big Five factor taxonomy: Dimensions of personality in the natural language and in questionnaires. New York: Guilford, 1990.
[JTAv6]	JTA Standard, JTA Volume I, version 6.0
[Kah99]	Kahneman, D., 1999. Objective happiness. In D. Kahneman, E. Diener, & N. Schwarz (Eds.). <i>Well-being: The foundations of hedonic psychology</i> , pp. 3-25. New York: Russell Sage Foundation.
[KC07]	Alexander Kott and Peter S. Corpac. COMPOEX technology to assist leaders in planning and executing campaigns in complex operational environments. In <i>12th International Command and Control Research and Technology Symposium</i> , Adapting C2 to the 21st Century, 2007.
[KDS99]	D. Kahneman, E. Diener, and N. Schwarz. <i>Well-being: The Foundations of Hedonic Psychology</i> . New York: Russell Sage Foundation, 1999.
[KLJ98]	John C. Kunz, Raymond E. Levitt, and Yan Jin. The virtual design team: A computational simulation model of project organizations. <i>Communications of the Association for Computing Machinery</i> , 41(11):84-92, 1998.
[Kos92]	Bart Kosko. <i>Neural Networks and Fuzzy Systems</i> . Prentice-Hall, Englewood Cliffs, NJ, 1992.
[Kot07]	Alexander Kott, editor. <i>Information Warfare and Organizational Decision-Making</i> . Artech House, 2007.
[KS05]	Lawrence A. Kuznar and Robert Sedlmeyer. Collective violence in Darfur: An Agent-based model of Pastoral Nomad/Sedentary Peasant Interaction. <i>Mathematical Anthropology and Cultural Theory</i> . 2005.

[KS05]	Lawrence A. Kuznar and Robert Sedlmeyer. Collective violence in Darfur: An Agent-based model of Pastoral Nomad/Sedentary Peasant Interaction. Mathematical Anthropology and Cultural Theory. 2005.
[KT79]	Daniel Kahneman and Amos Tversky. Prospect theory: an analysis of decision under risk. <i>Econometrica</i> , 47(2):263-292, 1979.
[Lat96]	Bibb Latane. Dynamic social impact: The creation of culture by communication. <i>Journal of Communication</i> , 46(4):13-25, 1996.
[Lav02]	Lavin, H., 2002. On Line vs. Memory-based Process Models of Political Evaluations, in K. Monroe (ed), Political Psychology, 225-248. NJ:Erlbaum.
[LMA07]	Tirza Leader, Brian Mullen; and Dominic Abrams, "Without Mercy: the immediate impact of group size on lynch mob atrocity." <i>Personality and Social Psychology Bulletin</i> 33 (10):1340-1352, 2007.
[LS02]	M. Lauren and R. Stephen. MANA: Map-aware non-uniform automata - a New Zealand approach to scenario modelling. <i>Journal of Battlefield Technology</i> , 5:27-31, 2002.
[Mac03]	E. P. MacKerrow. Understanding why. Los Alamos Science, (28), 2003.
[Mar70]	Gary T. Marx, "Issueless Riots." <i>Annals of the American Academy of Political and Social Science</i> 391: 21-33, 1970.
[Mas52]	Maslow, A. 1952. Toward a Psychology of Being, New York: Nostrand
[Max04]	Joseph A. Maxwell, "Causal Explanation, Qualitative Research, and Scientific Inquiry in Education." <i>Educational Researcher</i> 33 (2): 3-11, 2004.
[MEC07]	Mack, Gregory A., Eick, Stephen G., and Mark A. Clark"Models of Trust and Disinformation in the Open Press." In Model-Driven Linguistic Pattern Analysis. 2007 IEEE Aerospace Conference. ISBN: 1-4244-0525-4.
[MDS+08]	Robin Marling, Deborah Duong, Bob Sheldon, Steve Stephens, Lauren Murphy, Jeffery Johnson, and Michael Ottenberg. A Semantic Differential Approach to Incorporating Qualitative Data into Nexus, an Interpretive Agent Model of Support between Social Groups. In proceedings of the <i>Second World Congress on</i> <i>Social Simulation (WCSS)</i> , 2008.
[Mea01]	Mearsheimer, J., 2001. The Tragedy of Great Power Politics, New York: Norton Books
[Meh73]	Mehrabian, A., & Russell, J.A. 1973. A measure of arousal seeking tendency. <i>Environment and Behavior, 5,</i> 315-333.

- [Mer38] Robert K. Merton, "Social Structure and Anomie." *American Sociological Review* 3: 672-82, 1938.
- [MHC09] R. P. McGlynn, D. J. Harding, and J. L. Cottle, "Individual-Group Discontinuity in Group-Individual Interactions: Does Size Matter?" *Group Processes Intergroup Relations* 12 (1): 129-143, 2009.
- [MIL-HDBK-29612/2A] Instructional Systems Development/Systems Approach to Training and Education
- [MIL-PRF-87268A(1)] Manuals, Interactive Electronic Technical General Content, Style, Format, and User Interaction Requirements
- [MJ09] Marshall, Monty G. and Keith Jaggers, "Polity IV Project: Political Regime Characteristics and Transitions, 1800-2007," Center for Systemic Peace and George Mason University. 2009 http://www.systemicpeace.org/polity/polity4.htm
- [MM97] John C. Mowen and Michael Minor, *Consumer Behavior: a framework*. Fifth Edition. New York: Prentice Hall, 1997.
- [MN05] Charles M. Macal and Michael J. North. Tutorial on agent-based modeling and simulation. In *Proceedings of the 2005 Winter Simulation Conference*, 2005.
- [MN06] Charles M. Macal and Michael J. North. Tutorial on agent-based modeling and simulation part 2: How to model with agents. In *Proceedings of the 2006 Winter Simulation Conference*, 2006.
- [MPICE]Measuring Progress In Conflict Environments (MPICE), Version1.0, August 2008. http://handle.dtic.mil/100.2/ADA488249
- [MR06] Mitchell, Ronald B. and Rothman, Steven B., "Creating Large-N Datasets from Qualitative Information: Lessons from International Environmental Agreements." Prepared for delivery at the 2006 Annual Meeting of the American Political Science Association, September 1-3, 2006.

http://www.saramitchell.org/MitchellRothman.pdf

- [MT97] S. R. Musse and D. Thalmann. A model of human crowd behavior: Group inter-relationship and collision detection analysis. In Computer Animation and Simulations, Proceedings of the Eurographics workshop. Springer-Verlag, 1997.
- [Mye07] Roger B. Myerson. Force and restraint in strategic deterrence: A game-theorist's perspective. Monograph published by the Strategic Studies Institute of the U.S. Army War College, November 2007.
- [NATO02] NATO Code of Best Practice for C2 Assessment Rev. Ed. CCRP, Washington, DC, 2002.
- [NMN02] Herert L. Needleman; Christine McFarland; Roberta B. Ness; Stephen E. Fienberg; and Michael J. Tobin, "Bone lead levels in

	adjudicated delinquents: a case control study." <i>Neurotoxicology and Teratology</i> 24 (6): 711-717, 2002
[NPA07]	John A. Nagl, David H. Petraeus, James F. Amos, and Sarah Sewall. <i>The U.S. Army/Marine Corps Counterinsurgency Field Manual</i> . University of Chicago Press, 2007.
[NPA07]	J. A. Nagl, D. H. Petraeus, and J. F. Amos. <i>The US Army/Marine Corps Counterinsurgency Field Manual</i> . University of Chicago Press, 2007.
[NPAS07]	John A. Nagl, David H. Petraeus, James F. Amos, and Sarah Sewall. <i>The U.S. Army/Marine Corps Counterinsurgency Field Manual</i> . University of Chicago Press, 2007.
[NRC08]	National Research Council, <i>Behavioral Modeling and Simulation:</i> <i>from individuals to societies</i> . Edited by G. L. Zacharias, J. MacMillan, and S. B. van Hemel. Washington, D.C.: National Academy Press, 2008
[NRC98]	National Research Council, <i>Modeling Human and Organizational Behavior: applications to military simulations</i> . Edited by R. W. Pew and A. S. Mavor. Washington, D.C.: National Academy Press, 1998.
[NRL08]	The DIME/PMESII Model Suite Requirements Specification Project (DRAFT Submitted to OPNAV N81), NRL Code 5508 Project Submission, December 2008.
[NUAF-B]	National Imagery and Mapping Agency Standards (NGA) for Data, United States Imagery and Geospatial Information Services (USIGS) Architectural Framework, Revision B, 23 June 1998
[O'B01]	Sean O'Brien. Analyzing Complex Threats for Operations and Readiness (ACTOR). Technical Report, Center for Army Analysis, September 2001.
[OPNAV]	OPNAV N816M, DIME/PMESII Requirements & Measures Database, Version 1.00, July 2009.
[Par05]	Jon Parkman. Peace support operations study. MORS Workshop Presentation by the Defence Science and Technology Laboratory DSTL, 2005.
[Pet86]	Petty, R. E & Cacioppo, J. T. 1986. The Elaboration Likelihood Model of Persuasion, In L. Berkowitz (ed), <i>Advances in</i> <i>Experimental Social Psychology</i> , 19, 123-205, New York: Academic Press
[PM05]	David V. Pynadath and Stacy C. Marsella, PsychSim: Modeling Theory of Mind with Decision-Theoretic Agents, in <i>International</i> <i>Joint Conference on Artificial Intelligence</i> , 2005.

[PS03]	P. G. Patterson and T. Smith, "A Cross-Cultural Study of Switching Barriers and Propensity to stay with service providers." <i>Journal of Retailing</i> 79: 107-120, 2003.
[pso07]	Peace support operations study and peace support operations model (psom). MORS Workshop Presentation, December 2007.
[PT97]	R. Pawson and N. Tilley, <i>Realistic Evaluation</i> . London: Sage, 1997
[RS00]	Julie A. Rosen and Wayne L. Smith. Influence net modeling for strategic planning: A structured approach to information operations. <i>Phalanx</i> , 33(4), 2000.
[SAM+07]	V.S. Subrahmanian, Massimiliano Albanese, Maria Vanina Martinez, Dana Nau, Diego Reforgiato, Gerardo I. Simari, Amy Sliva, Octavian Udrea, and Jonathan Wilkenfeld, CARA: A Cultural Reasoning Architecture, <i>IEEE Intelligent Systems</i> , Vol. 22, No. 2
[Say92]	A. Sayer, <i>Method in social science: A realist approach</i> . Second edition. London: Routledge, 1992.
[SB05]	Barry G. Silverman and Gnana K. Bharathy. Modeling the personality and cognition of leaders. In <i>Conference on Behavioral Representation in Modeling and Simulation SISO</i> , 2005.
[SB07]	Cortez Stephens and Mike Bailey. USMC irregular warfare project. Talk at the Naval Research Laboratory, July 2007.
[SBN06]	Barry G. Silverman, Gnana Bharathy, and Benjamin Nye. Gaming and simulating ethnopolitical conflicts. In <i>Descartes Conference</i> <i>on Mathematical Models in Counterterrorism</i> , Washington, DC, August 2006.
[SBR05]	Paul J. Sticha, Dennis M. Buede, and Richard L. Rees. It's the people, stupid: The role of personality and situational variables in predicting decisionmaker behavior. In <i>73rd MORS Symposium</i> , June 2005.
[SBR06]	Paul J. Sticha, Dennis M. Buede, and Richard L. Rees. Bayesian model of the effect of personality in predicting decisionmaker behavior. In <i>Fourth Bayesian Modelling Applications Workshop at UAI</i> , 2006.
[SEDRIS]	http://www.sedris.org/edcs.htm
[SGDW07]	Greg S. Schmidt, Jason Goffeney, Jason Dalton, and Ruth Willis, Generating Imagery for Forecasting Terror Threats, SPIE Newsroom: Electronic Imaging and Signal Processing, January, 2007
[Sil07]	Barry G. Silverman. Human terrain data - what should we do with it? In <i>Winter Simulation Conference</i> , 2007.

[SL04]	K. M. Sheldon and S. Lyubomirsky. <i>Positive Psychology in Practice</i> , chapter Achieving Sustainable new happiness: Prospects, practices and prescriptions, pages 127-145. John Wiley & Sons, 2004.
[SNBE07]	Larry G. Silverman, Benjamin Nye, Gnana K. Bharathy, and Roy J. Eidelson. Modeling Factions for Effects Based Operations: Part I Leader and Follower Behaviors. <i>Computational & Mathematical Organization Theory</i> , 13(3), 2007.
[Spr00]	Sproles, Noel, "Coming to grips with measures of effectiveness," <i>Systems Engineering</i> 3 (1): 50-58, 2000.
[Sro56]	Srole, L."Social integration and certain corollaries: an exploratory study." <i>American Sociological Review</i> 21: 709-716, 1956.
[SRT+05]	Barry G. Silverman, Richard L. Rees, Jozsef A. Toth, Jason Cornwell, Kevin O'Brien, Michael Johns, and Marty Caplan. Athena's prism - a diplomatic strategy role playing simulation for generating ideas and exploring alternatives. In <i>Proceedings of the International Conference on Intelligence Analysis</i> , McLean, VA, May 2005. Mitre.
[SSC04]	C. Schreiber, S. Singh, and K.M. Carley. Construct - a multi-agent network model for the co-evolution of agents and socio-cultural environments. Technical Report CMU-ISRI-04-109, CASOS - Center for Computational Analysis of Social and Organizational Systems, Carnegie Mellon University, 2004.
[SSC04]	C. Schreiber, S. Singh, and K.M. Carley. Construct - a multi-agent network model for the co-evolution of agents and socio-cultural environments. Technical Report CMU-ISRI-04-109, CASOS - Center for Computational Analysis of Social and Organizational Systems, Carnegie Mellon University, 2004.
[Sti08]	Paul J. Sticha. APOLLO-DI: An analytical tool for predicting a subject's decision making. Retrieved from https://eroom.rosettex.com/eRoom/NTA/SocialSciencesCollaborati on, 2008.
[SU03]	B. Sheldon and S. Upton. Analysis of counterrorism using the agent-based model Socrates and natural algorithms. In <i>Maneuver Warfare Science</i> , pages 125-140. USMC Combat Development Command, Quantico, VA, 2003.
[Taj81]	Tajfel, H. 1981. Human Groups and Social Categories: Studies in Social Psychology. Cambridge: Cambridge University Press
[Tal07]	Nassim Nicholas Taleb. <i>The Black Swan</i> . Random House, New York. 2007

[TBK08]	Glenn Taylor, Robert Bechtel, and Keith Knudsen. PSTK: A toolkit for modeling dynamic power structures. In <i>Behavior Representation in Modeling and Simulation Conference</i> , 2008.
[TFVW04]	Glen Taylor, Richard Frederiksen, Russell R. Vane, and Edward Waltz. Agent-based simulation of geo-political conflict. In <i>Innovative Applications of Artificial Intelligence</i> , 2004.
[TVS78]	Charles R. Tittle; Wayne J. Villemez; and Douglas A. Smith, "The Myth of Social Class and Criminality: An Empirical Assessment of the Empirical Evidence." <i>American Sociological Review</i> 43 (5):1978, pp 643-656.
[UCC96]	Bert Useem; Camille Graham Camp, George M. Camp, <i>Resolution of Prison Riots: Strategies and Policies</i> . New York: Oxford University Press, 1996
[UK97]	Bert Useem and P. Kimball, "A Theory of Prison Riots." <i>Theory and Society</i> 16 (1): 87-122, 1987.
[US 07]	US Department of Defense. DOD Architecture Framework - Volume I: Definitions and Guidelines, April 2007.
[Veg06]	Milan N. Vego. Effects-based operations: a critique. <i>Joint Force Quarterly</i> , 41, 2006.
[VT04]	Russ Vane and Glenn Taylor. <i>AGILE User's Guide</i> . General Dynamics - Advanced Information Systems, 2004.
[Wal08]	Ed Waltz. Situation analysis and collaborative planning for complex operations. In <i>13th International Command and Control Research and Technology Symposium</i> , C2 for Complex Endeavors, 2008.
[Wal87]	Walt, S., 1987, Origins of Alliances, Ithaca: Cornell University Press.
[Wan68]	Jules J. Wanderer, "The 1967 Riots: A Test of the Congruity of Events." <i>Social Problems</i> 16 (2): 193-198, 1968.
[Web-01]	Website: http://www.genuinetesting.com/s07/measure.html (Access 17 Feb 2009)
[Wei05]	Jeremy M. Weinstein. Resources and the information problem in rebel recruitment. <i>Journal of Conflict Resolution</i> , 49(4):598-624, 2005.
[Wei99]	Gerhard Weiss, editor. <i>Multiagent systems – A Modern Approach</i> to Distributed Artificial Intelligence, MIT Press, 1999
[Wiki01]	http://en.wikipedia.org/wiki/Analysis_of_variance#History
[Wiki02]	Wikipedia; http://en.wikipedia.org/wiki/Semantic_interoperability