Requirements for a Government Owned DIME/PMESII Model Suite

Office of the Secretary of Defense
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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 (Framework) 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. ..................................................................................SAIC  
- Robert Rubel, Ph.D. ................................................................................US Naval War College  
- John Salerno, Ph.D. ................................................................................Air Force Research Laboratory  
- Jerry Smith, Ph.D. ..................................................................................OPNAV N81  
- Yuna Wong, Ph.D. ..................................................................................OSD PA&E (SAIC)
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 (DIMEL\(^1\))
- 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 (coup) 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, counter-piracy, 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 society. 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:

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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.

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\(^3\) 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](image)

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

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 models. 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:

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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)
### Table 1: Comparison of COMPOEX to Framework Requirements

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<thead>
<tr>
<th>COMPOEX Comparison</th>
<th>System Integration and Maintenance</th>
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<td>4.1 Model Integration</td>
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<td><strong>2. System control</strong></td>
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<td>2.1 Execution control</td>
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<td>2.2 Coordination</td>
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<td><strong>3. Model Interoperability</strong></td>
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<td>3.2 Negotiate data</td>
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<td>3.3 Negotiate protocols</td>
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<td>3.3 Negotiate data distribution</td>
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<td>3.5 Consistent Descriptions</td>
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<td><strong>5. System Architecture</strong></td>
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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.
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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)
In addition to specific questions regarding past and ongoing 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 stakeholders 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 thorough 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 developmentg 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 government-owned, 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.
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 actors—to 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, decision-making 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. Man-scheduled 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”). 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 Decision-making (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 capital, banking activities, providing credit, production of goods, 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 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
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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 government-owned, 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.
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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 DIMEL/PMESII acronym. Thus the first requirement "Support to Ambassador," indicated by A-D-01, is identified as an Action (A) that is primarily Diplomatic (D) in nature. Similarly, the requirement for "Migration," indicated by E-S-7, is the 7th social effect requirement. Note the implicit Overarching requirements in grey are always scenario specific and thus too numerous to explicitly catalog.
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)?

![Figure 3: Hierarchy of Measures](image-url)

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 potential MoEs. As one moves further up the hierarchy of measures, the 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).
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 MoE’s:

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

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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 nauseum*. 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 sub-categories (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-of-engagement
  - **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 process\(^8\). Examples include scaled qualitative (Likert) data and scores resulting from an Analytical Hierarchy Processes.

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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 part\(^9\). 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.

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\(^8\) 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.
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 → 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.
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 data\textsuperscript{10}.

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

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\textsuperscript{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.\(^\text{11}\)
- 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.

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\(^{11}\) 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).

Table 3: Organization of Framework Requirements

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

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 sub-component. 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 sub-components 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 utilize. 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 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 textual 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
- Agile
- Apollo
- CAST
- Centurion
- COMPOEX
- Integrated Gaming System (IGS)
- Interim Semi-static Stability Model (ISSM)
- MIT State Stability Model
- MOOTW
- Nexus
- Organizational Risk Analyzer (ORA)
- PSOM
- Synthetic Environments for Analysis and Simulation (SEAS)

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
The comparisons, by descriptive requirement, are presented in Table 4. Note that in this

<table>
<thead>
<tr>
<th>#</th>
<th>Diplomatic</th>
<th>Information</th>
<th>Military</th>
<th>Economic</th>
<th>Legal</th>
<th>Effects</th>
<th>Overarching (9+)</th>
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<td>Support to Ambassadors</td>
<td>Intel Ops on HN Conditions</td>
<td>Response to WMD Attack</td>
<td>Est Dir to Cns for HA/DR</td>
<td>ID/Disrupt/Intact Funds: DBtl</td>
<td>△ in Pop Loyalty to HN Gov’t</td>
<td>PMESI Ground Truth</td>
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<td>Intel Ops on HN Gov’t</td>
<td>Response to Convent’l Attack</td>
<td>Build/Secure Lines of Comm</td>
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<td>Events, Trends, &amp; Cycles</td>
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<td>DN/Disrupt/Intact Services: DBtl</td>
<td>△ Gov’t Struct or Fund</td>
<td>△ Dom Product (Sector, Region)</td>
<td>PMESI Orgns</td>
</tr>
<tr>
<td>4</td>
<td>Embassies/Communities</td>
<td>Info Dissemination</td>
<td>Mil Training</td>
<td>Repatriate/Relocate Efforts</td>
<td>ID/Disrupt/Intact Recruit: DBtl</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>5</td>
<td>Improve HN Dipl Capabilities</td>
<td>Improve HN Gov’t Comms</td>
<td>Improve Military Info Ops</td>
<td>Econ Info Ops</td>
<td>Enforce Int'l Resolutions</td>
<td>△ Avail/Cost of Goods/Services</td>
<td>Events, Trends, &amp; Cycles</td>
</tr>
<tr>
<td>6</td>
<td>Diplomacy Acts: Prepared for Stability Ops</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>7</td>
<td>Comply w/Int’l Conv’ts &amp; stds</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Avail/Cost of Goods/Services</td>
<td>Events, Trends, &amp; Cycles</td>
</tr>
<tr>
<td>8</td>
<td>Evacuation &amp; Support Staff</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>9</td>
<td>Negotiate Refugees’ Safe Havens</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>10</td>
<td>Diplomatic Acts to Support HADR</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>11</td>
<td>Diplomatic Acts to Support HADR</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>12</td>
<td>Diplomatic Support for HN</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>13</td>
<td>Diplomatic Acts for WMD CM</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>14</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>15</td>
<td>Diplomatic Acts for WMD CM</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>16</td>
<td>Diplomatic Acts: Disaster Recovery</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>17</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>18</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>19</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>20</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
<tr>
<td>21</td>
<td>Diplomatic Acts: Multi-Nat’l Exercises</td>
<td>Improve HN Info Exchange Program</td>
<td>Improve Info Exchange Program</td>
<td>Improve Logistics</td>
<td>Enforce Int’l Resolutions</td>
<td>△ Gov’t Leadership</td>
<td>Events in Organizational Environment</td>
</tr>
</tbody>
</table>

*Note: A model only needs to address some portion of a Descriptive Requirement to receive “credit” coverage. Thus a Blue or Green requirement should not be interpreted as completely or adequately address for all applications. For example, several models address the effects of E-S-7 “Migration” but no models currently can identify the precise conditions that initiate migration or the manner or pattern of the resulting migration.*
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:

A-D-15 Interactions with Aboriginal/Nomadic Peoples and other Minorities
A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
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
E-I-2 Effects of Information Gathering on Host Nation Citizens

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 sources:

- 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 assessment\(^\text{12}\) 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.
Table 5: Data Availability Assessment

<table>
<thead>
<tr>
<th>Actions (79)</th>
<th>Effects (47)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diplomatic</strong></td>
<td><strong>Political</strong></td>
</tr>
<tr>
<td>1. Support to Ambassador of Gov’t</td>
<td>△ in Pop Loyalty to Gov’t</td>
</tr>
<tr>
<td>2. Negotls w/ HN Gov’t</td>
<td>Foreign Sprs / Opns on HN Mil</td>
</tr>
<tr>
<td>3. Negotls w/ Local Leaders</td>
<td>Multi-Nat’I Exer exercises on Mil</td>
</tr>
<tr>
<td>4. Embassy Comms</td>
<td>Δ Dom Product (Sector, Region)</td>
</tr>
<tr>
<td>5. Improve HN Dipl Cap</td>
<td>Foreigners on HN Gov’t Actions</td>
</tr>
<tr>
<td>6. Diplo Acts: Prep for Stability Ops</td>
<td>Info Collect on HN Gov’t</td>
</tr>
<tr>
<td>7. Comply with Conv’ts &amp; Stds</td>
<td>Info on Collect on HN</td>
</tr>
<tr>
<td>8. Evac Embassy &amp; Support Staff</td>
<td>Essential Public Services on HN</td>
</tr>
<tr>
<td>9. Dipl Acts to Support HADR</td>
<td>Info Infrastructure on HN</td>
</tr>
<tr>
<td>10. Dipl Acts for HN Gov’t’s Pers Train</td>
<td>Military Training Repatriate / eps in HN</td>
</tr>
<tr>
<td>11. Dipl-Like Acts Bw’n Orgs</td>
<td>Against Human Rights</td>
</tr>
<tr>
<td>12. Dipl Acts: Multi-Natl’I Exer</td>
<td>Repatriation / Mediation</td>
</tr>
<tr>
<td>15. Dipl Acts: Multi-Natl’I Exer</td>
<td>Information Sharing / Cybersecurity</td>
</tr>
<tr>
<td>17. Multi-party Diplo Negot</td>
<td>Diplomacy / Mediation</td>
</tr>
<tr>
<td>18. Diplomacy’s Opns</td>
<td>Diplomacy / Mediation</td>
</tr>
<tr>
<td>19. Advocacy Acts by US Gov’t</td>
<td>Diplomacy / Mediation</td>
</tr>
<tr>
<td>20. Security &amp; LE for US</td>
<td>Diplomacy / Mediation</td>
</tr>
</tbody>
</table>

*Note: Geographic regions considered excluded United States. A data source only need to address some portion of a Descriptive Requirement for any considered region to receive “credit” for coverage. The Blue category requires 2+ in dependent 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.*
Table 6: State of Analytic Capability Assessment

<table>
<thead>
<tr>
<th>#</th>
<th>Diplomatic Information</th>
<th>Actions (79)</th>
<th>Military</th>
<th>Economic</th>
<th>Legal</th>
<th>Political</th>
<th>Military</th>
<th>Economic</th>
<th>Societal</th>
<th>Information</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Support to Ambassador</td>
<td>Intell Ops on HN Conditions</td>
<td>Support to WMD Attack</td>
<td>Est Distro Ctrs for HA/DR</td>
<td>ID/Disrupt/Intimid Funds</td>
<td>Δ In Pop Loyalty to HN Gov't</td>
<td>Δ Foreign Sprt/Opns on HN Mil</td>
<td>Δ Dom Product (Sector, Region)</td>
<td>Foreigners on HN Gov't</td>
<td>Info Collect on HN Gov't</td>
<td>Essential Public Services on HN</td>
</tr>
<tr>
<td>2</td>
<td>Diplomats w/ HN Gov't</td>
<td>Intell Ops on HN Gov't</td>
<td>Response to Convent'l Attack</td>
<td>Build/Secure Lines of Comm</td>
<td>ID/Disrupt/Intimid Instl Trpt</td>
<td>Δ Political Activity of Pop</td>
<td>Δ Flow of Capital</td>
<td>Quality of Life Perception</td>
<td>Foreigners on HN Pop</td>
<td>Info Dissem on HN Gov't</td>
<td>Infrastructure on HN</td>
</tr>
<tr>
<td>3</td>
<td>Negots w/ Local Leaders</td>
<td>Collect HN Citizen Percepts Info Dissem</td>
<td>Foreign NEO</td>
<td>Build/Secure Essential Services</td>
<td>ID/Disrupt/Intimid Local Sprt</td>
<td>Δ Gov't Struct or Func</td>
<td>Δ Government Multi-Nat'l Exercise on HN Mil</td>
<td>Δ Youth in HN Politics</td>
<td>Δ Restrictions on Pop Movement</td>
<td>Info Dissem on HN Gov't</td>
<td>Info Dissem on HN Citizens</td>
</tr>
<tr>
<td>5</td>
<td>Improve HN Diplomats</td>
<td>Collect &amp; Use of Refugee Info</td>
<td>Support to HN CON Efforts</td>
<td>Econ Info Ops</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Specific of Gov't Legit</td>
<td>Δ Aval / Cost of Goods / Services</td>
<td>Events: Stability &amp; Security</td>
<td>Δ Public Media Consent / Percept / Attitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Diplomats: Prepar for Stability Ops</td>
<td>Intell Collect to Support HN Support Staff</td>
<td>Econ Info Programs</td>
<td>Econ Info Programs</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Gov't Leadership</td>
<td>Δ Gov't HR Training</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Comply w/ Int'l Comms &amp; Standards</td>
<td>Information Exchange Program</td>
<td>Logistics</td>
<td>Econ Info Programs</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Evacuation of Diplomats &amp; Staff</td>
<td>Inter Influence of Leaders</td>
<td>Improve of MoD</td>
<td>Support to MoD Cntr-Criminal</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Negotiators</td>
<td>'d Message / Position of Leaders</td>
<td>Improve of MoD</td>
<td>Support to MoD Cntr-Criminal</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Diplomats to Support HA/DR</td>
<td>Collect to Support HA/DR</td>
<td>Mil &amp; Naval Presence</td>
<td>Econ Info Programs</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Diplomats for HN Gov't Pers</td>
<td>Improve HN Intelligence</td>
<td>War &amp; Mil Invasion</td>
<td>Econ Info Programs</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Diplomats Like Acts of HN Gov't</td>
<td>Improve HN Intelligence</td>
<td>Hiring HN Citizens</td>
<td>Econ Info Programs</td>
<td>Cnr-Criminal Syndicates Ops</td>
<td>Δ Overarching Events</td>
<td>Δ Global Economic Response</td>
<td>Δ Government Epidemic Breakout</td>
<td>Δ POW Management</td>
<td>3rd Party Media Consent / Percept / Attitude</td>
<td></td>
</tr>
</tbody>
</table>
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.

Table 7: Comparison of COMPOEX to Framework Requirements

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

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 conducted by the U.S. military with those carried out by other organizations is not prudent, for many reasons (e.g., 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, specifically, needs to be addressed.

- **Time Scales:** The relationship between short-term behavioral change and long-term 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 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 one 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 transscopic 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 society. This disparity between technical capabilities and sociological theoretical 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.
9 Acronyms & Glossary

Actor ...................... Any agent or entity within the model that responds to the PMESII 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
CM ............................. 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 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 ...............Expedition 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
HA .....................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

MAM .........................Muzawwar 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

MHE .........................Material Handling Equipment

MoD ..........................Ministry of Defense

Modular......................Pertaining to the design concept in which interchangeable units are employed to create a functional end product

MOEs .........................Measures of Effectiveness

MOG ..........................Mobility Operations Group

MoI ..........................Ministry of Interior

MOPs ..........................Measures 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

MTBM .........................Mean Time Between Maintenance

MTTR ..........................Mean Time To Repair

NEO ..........................Non-Combatant Evacuation Operation

NG .............................Natural Gas

NGO .........................Non-Governmental Organization (e.g. Red Cross International)

Ontology ....................A 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

OPAL .........................Objective, 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 System..............A 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
PMESII ..................Political, Military, Economic, Social, Infrastructure, and
Information
PMESII ..................Political, Military, Economic, Societal, Information, and
Infrastructure
PMESIN..................Political, Military, Economic, Societal, 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
POSIX........................Portable Operating System Interface
Reliability................The probability that a system will perform its intended function for
a specified period of time
ROE........................Rules of Engagement
RPGs ........................Rocket-Propelled Grenade
SEAD ........................States/Events/Actors/Decision-making
Semantics ...............A description of what a model does and how it does it. It includes
the assumptions and abstractions either explicit or implicit in a
model
SLOCS ................Sea Lines of Communications
SME ........................Subject Matter Expert
Specification ............A 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
Standard ..................A 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
TAFIM .....................Technical Architectural Framework for Information Management
Theory Triangulation .The application and combination of more than a single research
methodology to study a particular phenomenon
UOB ........................Unit Order of Battle
USG........................United States Government
WMD ........................Weapons of Mass Destruction
WTO ........................World 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

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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, V
Missions:
Nouns: time, distance
Verbs: 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, organizations, OODA
Verbs: decide, influence, deter, communicate, act

Child of:
A-I-12   Intelligence, Surveillance, Reconnaissance 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, V
Missions:
Nouns: decision maker, perceptions, biases, goals, abilities, personality
Verbs: 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 leaders, corporate bodies, members
Verbs: decide, compromise, 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, beliefs, values, opinions
Verbs:  aware, perception, prefer
Parent of:
A-I-03  Collection of Host Nation Citizen Perceptions
E-S-01  Effect of Foreign Presence on Host Nation Norms and Behaviors
A-I-10  Intelligence Collection to Support Host Nation
E-S-07  Migration
Child of:
E-I-02  Effects of Information Gathering on Host Nation Citizens
A-D-20  Advocacy Actions by US Government

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, V
Missions:
Nouns:  process, goal, rules
Verbs:  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
Nouns: embassy functions, diplomatic community, military forces, 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 relations with the HN.

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 decision-making; 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.

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
A-D-12 Diplomatic-Like Interactions Between Organizations

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

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.

Areas: -D-PS Phases: IV, V
Missions: COIN, FID, HA/DR, SIB/R, SSTR, BPC, TSC, CMO
Nouns: embassy activities, embassy personnel, HN businesses, financial institutions, stock market, HN populace, HN
Verbs: access, operations, military engagements, secure, receive, conduct, 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 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
A-M-04 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 Military
E-P-01 Changes in Population Loyalty to Host Nation Government
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-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.*

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:
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, shelter, HN populace, essential services
Verbs: provide, construct, repair, secure, perception, information dissemination, comply

Parent of:
A-M-03 Foreign Non-Combatant Evacuation Operations
A-E-01 Establishing Distribution Centers for Humanitarian Assistance/Disaster 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, SI
Nouns: military forces, civilian government agencies, HN government, HN Population, essential services
Verbs: operations,, negotiate, decide, prepare, provide, secure, receive, perception

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A-D-04 Embassy Communications
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<td>E-E-08</td>
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</table>

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 personnel such 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.
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 multi-national 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.
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, pre-positioning). Also indicates the effects those agreements and preparations have on diplomatic efforts and relations with the HN and the region.
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-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 requirement 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, aboriginal/nomadic 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.

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, military
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, group, entity, currency, debts, agreements
Verbs: enforce, devalue, refuse, change, dissolve

A-D-18  Destabilization Operations

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

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-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-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-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
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
E-P-07 Destabilizing Effects
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-16 Stability Operations (Economic)
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-P-10 Effects on Host Nation by Forward Bases
A-I-15 Information Operations
E-S-11 Effects of Mass Gatherings, Strikes, Civil Disobedience, Protests, & Riots

Child of:
A-D-01 Support to the Ambassador
A-D-17 Multi-party Diplomatic Negotiations
E-S-10 Impact of Terrorist/Insurgent Groups on Host Nation Population
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
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-D-19 Deterrence
A-D-20 Advocacy Actions by US Government
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-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:  CT
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.

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-I-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

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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.

Areas: D-I-PSI Phases: 0, IV, V
Missions: CM, COIN, FID, HA/DR
Nouns: HN populace, HN citizens
Verbs: Intel collection, polling, perception

Parent of:
A-I-03 Collection of Host Nation Citizen Perceptions
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-I-12 Intelligence, Surveillance, Reconnaissance for Embassy
A-I-03 Collection of Host Nation Citizen Perceptions
A-E-14 Mitigation of Destabilizing Effects
A-D-18 Destabilization Operations
A-E-16 Stability Operations (Economic)
O-D-04 Perception of Environment, Actions, 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 Gathering on Host Nation Government Actions
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
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, information
Verbs: consumption and dissemination, deliver, perception
**Parent of:**
- A-I-07 Establishment & Support of Information Exchange Program
- A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities

**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-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-15 Information Operations

**Peer of:**
- A-E-05 Economic Information Operations
- A-E-06 Mitigation of Long-term WMD Effects
- 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
- A-I-13 Host Nation Internal Dissemination of Information
- E-I-05 Effects of Independent Media Outlets on Perceptions and Attitudes
- A-L-08 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.

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
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: establish, 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
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.

Areas: D-DI-PSI  Phases: 0, IV, V
Missions: SI
Nouns: leaders, policy makers, pundits, HN government, HN Populace
Verbs: influence, change. Perceive

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-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-10 Intelligence Collection to Support Host Nation
A-I-09 Changing/Shaping Message/Position of Societal Leaders
A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
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-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 Fractional 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 aspects 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-PMSI          Phases:  0, V
Missions: 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
security; support for development of organizational structure and processes; 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:
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
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.

Areas: D-DI-PMI Phases: 0, I, II, IV
Missions: CM, COIN, FID, HA/DR, NEO, SIB/R, DS
Nouns: embassy staff, ambassador, intelligence, reconnaissance
Verbs: surveillance, interpret, gather, collect, report

Parent of:
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-07 Establishment & Support of Information Exchange Program
E-I-02 Effects of Information Gathering on Host Nation Citizens
E-I-01 Effects of Information Gathering on Host Nation Government Actions
O-D-01 Decision-making in Hierarchical Organizations

Child of:
A-D-01 Support to the Ambassador
A-D-04 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).

Areas: D-I-PI Phases: 0, I, II, III, IV, V
Missions:
Nouns: HN, information, intelligence, internal comms barriers
Verbs: movement, deliver, Child of:
A-D-14 Diplomatic Actions for Multi-National Exercises
A-D-02 Negotiations with Host Nation Government
A-E-20 Spending to Support Rule of Law
A-I-02 Intelligence Operations on Host Nation Government
A-E-12 Humanitarian Assistance/Disaster Relief Operations
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-I-04 Information Dissemination
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
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:
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-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 bureaucrats. Events must cover preparatory 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 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-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.

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-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-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.

Areas: -M-PMS  Phases: 0, I, V
Missions: CM, FID, NEO, SIB/R, BPC, TSC, SI
Nouns: multi-nation, exercises
Verbs: conduct, train

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

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 citizens, HN government, military community, supplies, HN essential services Verbs: acquire, transport, distribute, store, move, perception

Parent of:
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, inter-governmental 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:
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

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-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
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.

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
E-M-02 Effects of Multi-National Exercises on Military
E-M-03 Effects on Military due to Operations

Peer of:
A-I-06 Improvement of Host Nation Government Communication Networks
A-M-01 Response to WMD Attack
A-M-02 Response to Conventional Attack
E-P-06 Effects of Changes to Government Leadership
A-D-17 Multi-party Diplomatic Negotiations
A-D-18 Destabilization Operations
A-I-15 Information Operations
E-P-11 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 these actions have on the HN.

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, SI
Nouns: population, refugee, displaced person
Verbs: monitor, reunite, assist

Parent of:
Changes in Host Nation Wealth/Income Distributions
Changes in Population Loyalty to Host Nation Government
Changes in Political Involvement of Host Nation Citizens
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-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, productions, 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-P Phases: 0, IV, V
Missions: COIN, HA/DR, EA, SI
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 workforce imbalances. Infrastructure is covered in A-E-9.

Areas: -E-EIN

Missions: HA/DR, SIB/R, EA, SI

Nouns: logistical assets, production, goods, consumption, markets, trade, sanctions, employment

Verbs: maintain, operate, negotiate, hire, distribute, monitor

Parent of: 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 captured in the Effects of Improved HN Infrastructure (E-E-13) requirement.

Areas: -DE-PESN
Missions: BPC, EA, SI
Nouns: HN infrastructure, labor, services
Verbs: build, repair, construct, establish, maintain

Parent of:
A-E-07 Economic Intelligence Operations
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
E-E-13 Effects of Changes in Host Nation Infrastructure
E-E-06 Effects of Human Resources Training on Economy
E-E-11 Effects of Industrialization on Host Nation
E-N-03 Changes in Host Nation Environment

Child of:
E-S-06 Epidemic Breakout
O-E-03 Actions in Preparation for Anticipated and Scheduled Events
A-E-12 Humanitarian Assistance/Disaster Relief Operations
A-E-15 Economic Development Supporting Disaster Recovery
A-D-20 Advocacy Actions by US Government
A-D-07 Support to Host Nation for Compliance with International Conventions and Standards
A-I-14 Needs Assessments Supporting Decision-Making
A-M-10 Military and Naval Presence
E-P-10 Effects on Host Nation by Forward Bases
E-E-12 Effects of Trade Agreements on Economy

Peer of:
A-E-17 Improvement of Ministry of Interior
E-P-06 Effects of Changes to Government Leadership
A-L-08 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
Missions: FID, BPC, TSC, CMO, EA, SI
Nouns: exercises, HN forces, HN military, goods, consumption, markets, trade, sanctions
Verbs: repatriate, operate, negotiate, monitor, produce
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-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 Conventional Attack  
E-S-06  Epidemic Breakout  
O-E-04  Weather Impacts to Decision-making and Military Operations  

Peer of:  
A-E-01  Establishing Distribution Centers for Humanitarian Assistance/Disaster Relief  
A-I-10  Intelligence Collection to Support Host Nation  
A-L-06  Martial Law and Law Enforcement Operations  

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:  
-M-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 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-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 Destabilizing Actors
A-I-11 Improvement of Host Nation Intelligence, Use of Intelligence, and IO Capabilities
A-I-15 Information Operations

Child of:
A-D-02 Negotiations with Host Nation Government
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-S-06 Epidemic Breakout
E-S-05 Impact to Stability and Security due to Events
A-E-12 Humanitarian Assistance/Disaster Relief Operations
E-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 Population
A-M-10 Military and Naval Presence

Peer of:
A-E-13 Establishing and Maintaining Refugee Camps
A-E-07 Economic Intelligence Operations
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 long-term aid to rebuild 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
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 capital, 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-21 Spending 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.

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, EA
Nouns: MOD, HN military, personnel, infrastructure, employment, security
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.

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, and IO Capabilities
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 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, DS, LE

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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 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: intelligence, law enforcement, military, information, financial support, non-nations state actor
Verbs: collection, analysis, interdict, operate, disrupt

Parent of:
E-P-01 Changes in Population Loyalty to Host Nation Government
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-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.

Areas: -DIMEL-PMESI-FRIS  Phases: 0, IV, V
Missions: COIN, FID, LE
Nouns: intelligence, law enforcement, military, information, financial support, 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-D-09 Negotiating Refugee Safe Havens
A-E-20 Spending to Support Rule of Law
A-E-14 Mitigation of Destabilizing Effects
A-D-18 Destabilization Operations
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### 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, gangs, corruption, law enforcement and political leaders, criminal activities  
**Verbs:** mitigate, eliminate, reduce

### Parent of:
- E-P-01 Changes in Population Loyalty to Host Nation Government
- E-S-02 Quality of Life Perception
- A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation
- E-S-07 Migration
- A-L-06 Martial Law and Law Enforcement Operations
- A-I-15 Information Operations

### Child of:
- A-D-06 Diplomatic Actions to Prepare for Stability Operations
- A-E-20 Spending to Support Rule of Law
- E-P-06 Effects of Changes to Government Leadership
- E-P-07 Destabilizing Effects
- A-I-10 Intelligence Collection to Support Host Nation
- A-L-06 Martial Law and Law Enforcement Operations
- 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:
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
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.

Areas: -DML-PMESI Phases: 0, I, II, IV, V
Missions: COIN, FID, HA/DR, CMO, DS, EA, LE, SI
Nouns: multi-party, international resolutions, sanctions, resolutions
Verbs: enforce, negotiate

Parent of:
E-P-01 Changes in Population Loyalty to Host Nation Government
E-P-03 Changes in Government Structure or Functions
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
A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation
A-I-10 Intelligence Collection to Support Host Nation
E-E-10 Effects of Sanctions (Economic)
A-D-20 Advocacy Actions by US 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
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 accountabilty 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
The DIME/PMESII model suite will represent Improvement of Legal and Law Enforcement Ministries and associated effects across the PMESII elements.

Areas: -L-PES

Phases:
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 dereliction 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 levying taxes against political opponents, frequency searches or other police harassment within legal...

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

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-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
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-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 involvement (formation of political 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 sub-
group 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-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
Missions:
Nouns: HN government, leadership, regional government, political parties, societal groups
Verbs: change, interact, respond, perception, trust

Parent of:
E-S-02 Quality of Life Perception
A-M-09 Deterrence of Foreign/Proxy Attackers on Host Nation
E-P-07 Destabilizing Effects
A-L-05 Operations Against Criminal Syndicates
E-N-03 Changes in Host Nation Environment

Child of:
A-I-02 Intelligence Operations on Host Nation Government
E-P-01 Changes in Population Loyalty to Host Nation Government
A-L-08 Counter-Corruption Activities

Peer of:
E-P-02 Changes in Political Involvement of Host Nation Citizens
E-P-04 Effects of External Group Involvement in Host Nation Politics
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-16 Stability Operations (Economic)
A-D-20 Advocacy Actions by US Government
E-S-09 Effects of Discrimination in Host Nation
E-S-10 Impact of Terrorist/Insurgent Groups on Host Nation Population
A-I-14 Needs Assessments Supporting Decision-Making
E-E-12 Effects of Trade Agreements on Economy
A-M-11 War and Military Invasion
A-E-09 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

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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
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 organization, NGOs, UN, WTO, business
Verbs: respond, ignore, support, provide

Child of:
A-D-17 Multi-party Diplomatic Negotiations
A-D-19 Deterrence
E-E-10 Effects of Sanctions (Economic)
A-L-07 Enforcement of International Resolutions
A-M-10 Military and Naval Presence
E-E-12 Effects of Trade Agreements on Economy
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

Peer of:
A-M-05 Actions Supporting Host Nation Counter-Insurgency
A-D-16 Establishing Relations In Absence of State
A-D-12 Diplomatic-Like Interactions Between Organizations
E-S-09 Effects of Discrimination in Host Nation
E-P-10 Effects on Host Nation by Forward Bases
E-P-11 Effects of Third-Party External 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, HN government
Verbs:  respond, ignore, support, provide

Child of:
A-M-01  Response to WMD Attack
A-M-02  Response to Conventional Attack
A-D-17  Multi-party Diplomatic Negotiations
A-D-18  Destabilization Operations
A-D-19  Deterrence
E-E-10  Effects of Sanctions (Economic)
A-L-07  Enforcement of International Resolutions
A-M-10  Military and Naval Presence
E-E-12  Effects of Trade Agreements on Economy
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

Peer of:
A-M-05  Actions Supporting Host Nation Counter-Insurgency
A-D-16  Establishing Relations In Absence of State
A-D-12  Diplomatic-Like Interactions Between Organizations
E-S-09  Effects of Discrimination in Host Nation
E-P-10  Effects on Host Nation by Forward Bases
E-P-11  Effects of Third-Party External 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, HN citizens, society, regional stability and security, diplomatic relations
Verbs:  perception, support, attitudes, respond, deter, provoke
**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, alliances, military, law enforcement, insurgent groups, criminal organizations, NGOs
Verbs: support, influence, negotiate, demonstrate
Parent of:
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.

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
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.

Areas: -DML-PM   Phases:  0, I, II, III, IV, 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 requirement 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
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, goods/services, currency, HN population, wealth, HN financial institutions
**Verbs:** distribute, earn , provide, acquire

**Child of:**

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

Areas: E-DIEL-E
Phases: 0, I, II, III, IV, V
Missions: CW, UW, EA
Nouns: HN government, goods/services, HN population, quality of life, per capita income
Verbs: improve, support, perception

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

Child of:
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
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 capital, 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
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, capital 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 workforce, consumer markets, and investors on prospects must also be included.

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
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 middle 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 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.

Areas: -M-PMESIN Phases: III, IV
Missions: CW, UW, FID, HA/DR, EA
Nouns: HN economy, combat operations, infrastructure, military, trade, quality of life, goods, markets, trade, sanctions, perception
Verbs: disrupt, secure, destroy, conduct, damage, enhance, perceive, deny, restrict, operate, monitor, negotiate

Parent of:
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
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
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 capital, 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 economy, markets, investment capital, quality of life
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, & 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:
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:
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
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
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
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:  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-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

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.

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, non-political 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
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, insurgents, HN population, crime, security, HN government, military
Verbs: recruit, support, attacks, enforce, observe, protect

Parent of:
A-E-18 Spending in Support of Host Nation Ministry of Interior
A-E-02 Building and Securing Lines of 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 destructive; 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 enforcement), reduction in productivity, 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: LE
Missions: Nouns: impacts, results, event, protester, grievance, police
Verbs: congregate, collect, gather, protest, demonstrate, riot, attack, damage, destroy, kill, control, disperse, incite

Parent of:
E-E-09 Economic Response Rule of Law Enforcement
**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 activities. Internal collections include support for decision makers, regulator oversight, and law enforcement investigation.

*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
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 includes how the disseminated information changes the processes, procedures, plans, decision-making, or execution of current or future programs for the full range of government agencies at all levels (national, provincial, 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:
**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-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.

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
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 necessities, economic changes, information dissemination, demand on infrastructure, political legitimacy, military morale, etc.

Areas: -E-ESN  Phases: 0, IV, V
Missions: SSTR, SI
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:
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
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
A-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 (e.g. 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 (e.g. 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 anti-trafficking 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 border crossings to enhance security.*

The next section discusses the Measures of Force Effectiveness that support these high-level 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
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 counter-corruption 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 of broadcast media, internet communication, mail, and other modes of communication 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.

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, overseeing 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
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

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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 Express™ 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
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/
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
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 databases. 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

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

World Bank Benchmarking, Water & Sanitation,

Joint Monitoring Programme, World Health Organization-UNICEF,

World Health Organization,
http://www.who.int/en/

Water Utilities Partnerships (Africa)
http://www.wupafrique.org/spbnet/angl/waterf.html

International telecommunications Union
http://www.itu.int/home/index.html

ITU Regulatory Database

Universal Postal Union

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/fintrpt/

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,

Spending for / Development of Other Host Nation Ministries and Agencies

Department of State Combined Resource Summary for State Operations and Foreign Assistance
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,
Changes in the Flow of Capital

World Bank, Global Development Finance (GDF), International Official Net Transfers,
UN Conference on Trade and Development’s Foreign Direct Investment database
http://stats.unctad.org/fdi/
TradeStats Express.™ and Industry Trade Data and Analysis
http://tse.export.gov/

Changes in Host Nation Wealth/Income Distributions

World Bank Country Statistical Information Database,
Failed States Index,

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
http://data.bls.gov/PDQ/outside.jsp?survey=ei
New Zealand, Office for Statistics, Consumers Price Index,
Organisation for Economic Co-operation and Development (OECD) Consumer Price Indices
United Kingdom, Office for National Statistics,
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.

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 time-series, 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.

view&id=99&Itemid=140

Conflict Assessment System Tool (CAST)

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.


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&id=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/hraff/

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.

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.

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.

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.

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.

Quality of Life Perception

World Values Survey
http://www.worldvaluessurvey.org/

Epidemic Breakout

Global Response Database (GRD),
World Health Organization Statistical Information System (WHOSIS),
http://www.who.int/whosis/en/

Migration

Migration Research Institutes Database,

*ILO International Labour Migration Database*,

*Office of the United Nations High Commissioner for Refugees, Data on Refugees 1975-2007*

**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.


**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 following 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
Consistency of Multiple Sources of Qualitative Data

If public opinion is being measured in two ways (e.g., 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 known 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 difficulty 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 in 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 Muslims 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.
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 – e.g. 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

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**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 VIIa, 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 assets
• 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

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**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

*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


**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.
Figure 8: Notional Linkage between Requirements within HA/DR Mission

Figure 9: Notional Linkage of Requirements across Missions
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:

- O-E-04 Weather Impacts to Decision-making and Military Operations
- A-D-01 Support to the Ambassador
- A-D-05 Improvements to HN Diplomatic Capabilities
- A-D-08 Evacuation of Embassy Personnel and Affiliated Host Country Nationals
- A-M-03 Foreign NEO
- A-E-02 Building and Securing Lines of Communication
- A-L-03 ID, Disruption and Interdiction of Local Support for Destabilizing Actors
- E-P-02 Changes in Political Involvement of HN Citizens
- E-S-01 Effect of Foreign Presence on HN Norms and Behaviors
- E-S-05 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.
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<thead>
<tr>
<th>Descriptive Requirements</th>
<th>COMEX</th>
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<td>O-D-03 Social Process of Decision-making</td>
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# 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.

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<tr>
<td>1.1.1.</td>
<td>Definition of the analysis topic includes the following:</td>
</tr>
<tr>
<td>1.1.1.1.</td>
<td>The system shall address both causal reasoning and diagnostic reasoning analysis topics.</td>
</tr>
<tr>
<td>1.1.1.2.</td>
<td>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.</td>
</tr>
<tr>
<td>1.1.1.3.</td>
<td>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.</td>
</tr>
<tr>
<td>1.1.1.4.</td>
<td>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.</td>
</tr>
<tr>
<td>1.1.1.5.</td>
<td>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.</td>
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</tr>
<tr>
<td><strong>1.1.6.</strong></td>
<td>The system shall assist with outlining how to combine the results from each subcomponent to address the analysis topic</td>
</tr>
</tbody>
</table>
| **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 |
| **1.1.8** | 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. |
| **1.1.9.** | 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. |
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>1.1.2.5.</strong></td>
<td><strong>Display construction and interactions of collection of models.</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1.2.6.</strong></td>
<td><strong>Identify constraints.</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1.2.7.</strong></td>
<td><strong>Operator selection of models.</strong> The system shall provide the analyst the capability to edit and process the final composed simulation design.</td>
</tr>
<tr>
<td><strong>1.1.2.8.</strong></td>
<td><strong>Store system model configuration.</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1.3.</strong></td>
<td><strong>Scenario construction. The system shall assist in the creation of model scenarios to address the defined problem.</strong></td>
</tr>
<tr>
<td><strong>1.1.3.1.</strong></td>
<td><strong>Mapping problem definition to scenario content.</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1.3.2.</strong></td>
<td><strong>Scenario creation tools.</strong> The system shall provide a toolset to facilitate scenario development.</td>
</tr>
<tr>
<td><strong>1.1.3.3.</strong></td>
<td><strong>Store, retrieve and edit scenarios.</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1.4.</strong></td>
<td><strong>Initialization. The system shall automate the initialization of the models.</strong></td>
</tr>
</tbody>
</table>
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 ensure that all initialization data represents a consistent characterization of the world.
- The system shall provide for resolution of any conflicts in values for any world description data that has more than one possible source and the 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.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.6.1.</td>
<td>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).</td>
</tr>
<tr>
<td>1.1.6.2.</td>
<td>Level of consistency between simulations. The analyst shall be provided the capability of defining the level of consistency or randomness between execution runs.</td>
</tr>
<tr>
<td>1.1.7.</td>
<td><strong>Setup file. The system shall save all setup information in a single setup file.</strong></td>
</tr>
<tr>
<td>1.1.7.1.</td>
<td>Additional file identification. The analysts shall be provided the capability to add identifier information to any saved system setup file.</td>
</tr>
<tr>
<td>1.2.</td>
<td><strong>Operation. The system shall provide the analyst the capability to control the execution of the model runs.</strong></td>
</tr>
<tr>
<td>1.2.1.</td>
<td>Visibility into progress. The system shall provide insight into the evolution of the complete description of the world as model execution progresses.</td>
</tr>
<tr>
<td>1.2.1.1.</td>
<td>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.</td>
</tr>
<tr>
<td>1.2.1.2.</td>
<td>Tracking world description changes. The system shall provide a trace of what in the world description changes for each time step.</td>
</tr>
<tr>
<td>1.2.1.3.</td>
<td>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.</td>
</tr>
<tr>
<td>1.2.2.</td>
<td><strong>Operator intervention. The system shall provide the analyst the capability to control and intervene with operations at any point during execution.</strong></td>
</tr>
<tr>
<td>1.2.2.1.</td>
<td>Start, stop, pause, resume. The system shall provide the analyst the capability to start, pause, resume, or stop execution of the models.</td>
</tr>
<tr>
<td>1.2.2.2.</td>
<td>Conditions for termination. The system shall provide the analyst the capability to establish conditions for termination of scenario execution.</td>
</tr>
</tbody>
</table>
| 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 model suite used to represent the evolution of the world |
<p>| 1.2.3. | <strong>Performance monitoring.</strong> The system shall provide the analyst a means of monitoring the performance of the system during execution. |</p>
<table>
<thead>
<tr>
<th>1.2.3.1.</th>
<th>Current time interval. The system shall provide indication of the time interval currently being modeled.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.3.2.</td>
<td>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</td>
</tr>
<tr>
<td>1.2.3.3.</td>
<td>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.</td>
</tr>
<tr>
<td><strong>1.3.</strong></td>
<td><strong>Output. The system shall provide the analyst the capability to process and format the system output.</strong></td>
</tr>
<tr>
<td>1.3.1.</td>
<td>Display, edit, and print. The system shall provide for the display, editing, and printing of any system data file.</td>
</tr>
<tr>
<td>1.3.1.1.</td>
<td>Text. The system shall allow for text output of any system data and a tool to edit the data.</td>
</tr>
<tr>
<td>1.3.1.2.</td>
<td>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.</td>
</tr>
</tbody>
</table>
### 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. Data mining

The system shall provide tools that assist the analyst in discovering patterns and significance in the generated data.

#### 1.3.3.1. Search by keyword

The system shall provide the capability of searching all the data and metadata within the system by keyword
1.3.2. 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. 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 histograms, 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 between and among variables via linear, multiple linear, and non-linear regression, estimates on the strength of variable 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. |
<p>| 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. |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.3.4.7</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.8</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.9</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.10</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.11</td>
<td>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.</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
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</tr>
<tr>
<td>1.3.4.12</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.13</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.4.14</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.5.</td>
<td><strong>Distributed collaborative analysis.</strong> The system shall provide the capability for distributed collaborative analysis.</td>
</tr>
<tr>
<td>1.3.5.1.</td>
<td>Collaboration types. The system shall allow for sequential, parallel, and interactive collaboration.</td>
</tr>
<tr>
<td>1.3.5.2.</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.5.3.</td>
<td>Interface. The system shall provide a web-portal-like interface to allow for the transfer of data, application control, display, and inter-analyst communications.</td>
</tr>
<tr>
<td>1.3.6.</td>
<td><strong>Report preparation.</strong> The system shall support report preparation by the analyst.</td>
</tr>
<tr>
<td>1.3.6.1.</td>
<td>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.</td>
</tr>
<tr>
<td>1.3.6.2.</td>
<td>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).</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>1.4.1.</th>
<th>On data source. Metadata shall include the source of the data with which the system is initiated.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.1.1.</td>
<td>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.</td>
</tr>
<tr>
<td>1.4.1.2.</td>
<td>Header information. Metadata shall include header information that includes classifications and dissemination restrictions, analysis dates and keywords selected by the analyst.</td>
</tr>
<tr>
<td>1.4.1.3.</td>
<td>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.</td>
</tr>
<tr>
<td>1.4.1.4.</td>
<td>Analyst’s comments. The system shall provide the capability of saving analyst's comments as metadata.</td>
</tr>
<tr>
<td>1.4.1.5.</td>
<td>Timestamp. Metadata shall include time stamps indicating when data or metadata is updated.</td>
</tr>
<tr>
<td>1.4.1.6.</td>
<td>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.</td>
</tr>
</tbody>
</table>

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. |
| 1.5.1.2. | Glossary of terms. On-line help shall include access to a glossary of terms. |
| **1.5.2.** | Process assistance. The system shall provide process assistance to support the analyst with system operation. |
| 1.5.2.1. | Wizards. The system shall provide wizards for any distinct process. |
| 1.5.2.2. | User defined scripts. The system shall provide the capability for the analyst to define scripts of defined processes for any segment of system operation. |
| **1.5.3.** | Embedded training. The system shall incorporate embedded training for all aspects of system operation. |
| 1.5.3.1. | Generation of scripts. The embedded training application shall include logic that will allow for the generation of session scripts. |
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.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
<tr>
<td>2.1.3.</td>
<td><strong>Suspend.</strong> The system shall provide the capability to suspend a simulation run.</td>
</tr>
<tr>
<td>2.1.3.1.</td>
<td>Controlling</td>
</tr>
<tr>
<td>2.1.3.2.</td>
<td>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.</td>
</tr>
<tr>
<td>2.1.3.3.</td>
<td>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.</td>
</tr>
<tr>
<td>2.1.3.4.</td>
<td>Date time stamp</td>
</tr>
<tr>
<td>2.1.3.5.</td>
<td>Additional identifying information. The analysts shall be provided the capability to add identifier information to any saved file.</td>
</tr>
<tr>
<td>2.1.4.</td>
<td><strong>Timing control.</strong> The system shall control the execution timing of the models to ensure that they remain synchronized.</td>
</tr>
<tr>
<td>2.1.4.1.</td>
<td>Synchronization time step. The infrastructure shall be capable of executing any synchronization time step supported by any model.</td>
</tr>
<tr>
<td>2.1.5.</td>
<td><strong>Simulation termination.</strong> The system shall control the termination of the simulation run.</td>
</tr>
<tr>
<td>2.1.5.1.</td>
<td>When end conditions reached. The system shall determine when defined termination requirements have been met.</td>
</tr>
<tr>
<td>2.1.5.2.</td>
<td>The analyst shall be provided the capability to terminate the simulation.</td>
</tr>
<tr>
<td>2.1.5.3.</td>
<td>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.</td>
</tr>
<tr>
<td>2.2.</td>
<td><strong>Coordination.</strong> The system shall coordinate the flow of data between models.</td>
</tr>
<tr>
<td>2.2.1.</td>
<td>Track which models are participating. The system shall identify which models are participating in each simulation run.</td>
</tr>
<tr>
<td>2.2.2.</td>
<td>Model registration. The system shall ensure that all models participating in the simulation register with the control module.</td>
</tr>
<tr>
<td>2.2.3.</td>
<td>Track which models produce what data. The system shall maintain a record of which models are producing data that is required by other models.</td>
</tr>
<tr>
<td>2.2.4.</td>
<td>Track which models consume which data. The system shall maintain a record of which models require, as input, data generated by other models.</td>
</tr>
<tr>
<td>2.2.5.</td>
<td>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.</td>
</tr>
<tr>
<td>2.2.5.1.</td>
<td>Identification of potential data conflict. The system shall identify all state variables for which multiple models are generating a value.</td>
</tr>
<tr>
<td>2.2.5.2.</td>
<td>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.</td>
</tr>
<tr>
<td>2.2.5.3.</td>
<td>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.</td>
</tr>
<tr>
<td>2.2.5.4.</td>
<td>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.</td>
</tr>
<tr>
<td>2.2.6.</td>
<td>Ensure complete simulation cycles. The system shall ensure sufficient models are included in the composed simulation to execute complete simulation cycles.</td>
</tr>
<tr>
<td>2.2.6.1.</td>
<td>Map inputs to events. The system shall map required model inputs to the simulated events that generate them.</td>
</tr>
<tr>
<td>2.2.6.2.</td>
<td>Identification of simulated events. The system shall identify all events that will be simulated by the models included in the composed simulation design.</td>
</tr>
<tr>
<td>2.2.6.3.</td>
<td>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.</td>
</tr>
<tr>
<td>2.3.</td>
<td>Data exchange. The system shall ensure proper data exchange between all the models and the models and the complete description of the world.</td>
</tr>
<tr>
<td>2.3.1.</td>
<td>Data packaging. The system shall ensure that all data is packaged in the manner required by the receiving application.</td>
</tr>
<tr>
<td>2.3.2.</td>
<td>Data routing. The system data routing shall ensure that all models receive all needed input data generated by any other model.</td>
</tr>
</tbody>
</table>

<p>| 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. |</p>
<table>
<thead>
<tr>
<th>3.2.9.</th>
<th>Determine which data negotiation schemes are required for any needed data exchange between models. This includes:</th>
</tr>
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<tr>
<td>3.2.9.1.</td>
<td>Register data requirements and outputs for each model.</td>
</tr>
<tr>
<td>3.2.9.2.</td>
<td>Maintain a library of data negotiation services.</td>
</tr>
<tr>
<td>3.2.9.3.</td>
<td>Present to the analyst a list of negotiation services automatically selected and the logic for the selection.</td>
</tr>
<tr>
<td>3.2.9.4.</td>
<td>Present to the operator a description of all available data negotiation services.</td>
</tr>
<tr>
<td>3.2.9.5.</td>
<td>Provide the analyst the capability to override any automatically selected negotiation services with one manually selected.</td>
</tr>
<tr>
<td>3.2.9.6.</td>
<td>Provide the analyst the capability to save the configuration of selected negotiation services.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.2.10.</th>
<th>Track errors introduced by data conversions and:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.10.1.</td>
<td>Alert the analyst whenever the value of any conversion induced error exceeds a set limit.</td>
</tr>
<tr>
<td>3.2.10.2.</td>
<td>Recommend acceptable limits for each converted datum.</td>
</tr>
<tr>
<td>3.2.10.3.</td>
<td>Provide the analyst the capability to manually set the acceptable limit for any conversion induced datum error.</td>
</tr>
<tr>
<td>3.2.10.4.</td>
<td>Provide the analyst the capability to manually enter a conversion induced datum error.</td>
</tr>
<tr>
<td>3.2.10.5.</td>
<td>Provide the option for designating when exceeding the acceptable conversion induced error limit as a threshold for terminating the simulation run.</td>
</tr>
</tbody>
</table>

| 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 |

<p>| 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). |</p>
<table>
<thead>
<tr>
<th>4.1.1.1.</th>
<th>The system shall publish the details of all implemented negotiation schemes.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.1.2.</strong></td>
<td><strong>Definition of Required Model Information.</strong> The infrastructure shall provide model suppliers a definition of the information required about the models to ensure successful integration.</td>
</tr>
<tr>
<td>4.1.2.1.</td>
<td>Reverse Engineering Tools. Reverse engineering tools to estimate semantic content (tools to aid in compliance)</td>
</tr>
<tr>
<td>4.1.2.2.</td>
<td>Best Practices. The infrastructure shall supply development principles and best practices to developers of models to be specifically developed for inclusion in the system.</td>
</tr>
<tr>
<td><strong>4.1.3.</strong></td>
<td><strong>IDE for Integration Middleware.</strong> The system shall provide an Integrated Development Environment (IDE) for the development of all middleware required to integrate a model into the system.</td>
</tr>
<tr>
<td>4.1.3.1.</td>
<td>Middleware for Timing. The IDE shall provide tools for the development of timing translators for all the potential timing negotiations required by the system</td>
</tr>
<tr>
<td>4.1.3.2.</td>
<td>Middleware for Data. The IDE shall provide tools for the development of data translators for all the potential data negotiations required by the system</td>
</tr>
<tr>
<td>4.1.3.3.</td>
<td>Middleware for Protocols. The IDE shall provide tools for the development of protocol translators for all the potential protocol negotiations required by the system</td>
</tr>
<tr>
<td>4.1.3.4.</td>
<td>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</td>
</tr>
<tr>
<td>4.1.3.5.</td>
<td>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</td>
</tr>
<tr>
<td>4.1.3.6.</td>
<td>Initialization through system (infrastructure) interfaces. The IDE shall provide tools to adapt a model’s initialization to be provided through the system initialization interface</td>
</tr>
<tr>
<td>4.1.3.7.</td>
<td>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.</td>
</tr>
<tr>
<td>4.1.3.8.</td>
<td>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.</td>
</tr>
<tr>
<td>4.1.3.9.</td>
<td>Store model meta data. The system shall store all model descriptive meta data in a library to include: &lt;ul&gt;- unique identification of all models with a defined convention and version change identity&lt;/ul&gt;- 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</td>
</tr>
<tr>
<td>4.1.4.</td>
<td><strong>Compliance Testing</strong></td>
</tr>
<tr>
<td>4.1.4.1.</td>
<td>Standard Suites. The system shall provide standard sets of model suites and scenarios to support integration compliance testing. This should include: &lt;ul&gt;- recommend a test suite configuration for optimal efficiency of compliance testing&lt;/ul&gt;- 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</td>
</tr>
<tr>
<td>4.1.4.2.</td>
<td>Interface Verification. The system shall verify the interface of a model undergoing compliance testing. This should include: &lt;ul&gt;- automatically verify the inputs and outputs of models&lt;/ul&gt;- 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</td>
</tr>
<tr>
<td>4.1.4.3.</td>
<td>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.</td>
</tr>
<tr>
<td>4.2.</td>
<td><strong>Maintenance</strong></td>
</tr>
<tr>
<td>4.2.1.</td>
<td><strong>Performance Testing.</strong> The system shall provide for performance testing to ensure proper operation and isolate problems.</td>
</tr>
<tr>
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</tbody>
</table>

| 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 out-of-tolerance status, warning faults if the system is out-of-tolerance and this affects system performance and may damage the system or require immediate intervention, and system faults when 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 debug 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.
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
<table>
<thead>
<tr>
<th>5.6.1.</th>
<th>Routine Maintenance. The system shall allow for maintenance operations and analysis operations to be conducted simultaneously.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6.1.1.</td>
<td>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</td>
</tr>
<tr>
<td>5.7.</td>
<td>Security. The system shall provide security measures for the handling of sensitive information.</td>
</tr>
<tr>
<td>5.7.1.</td>
<td>Multi-level classification. The system shall be capable of operation at any level of classification</td>
</tr>
<tr>
<td>5.7.1.1.</td>
<td>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.</td>
</tr>
<tr>
<td>5.7.2.</td>
<td>Information Assurance (IA). The system shall comply with DoD information assurance policies and practices.</td>
</tr>
<tr>
<td>5.7.2.1.</td>
<td>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).</td>
</tr>
<tr>
<td>5.7.2.2.</td>
<td>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).</td>
</tr>
<tr>
<td>5.7.3.</td>
<td>Privacy. The system shall be IAW with DoD Instruction 5400.1 regarding the handling and management of privacy data.</td>
</tr>
<tr>
<td>5.7.4.</td>
<td>Releaseability. The system shall follow necessary guidelines regarding the releaseability of sensitive information.</td>
</tr>
<tr>
<td>5.7.4.1.</td>
<td>Security Guidance. The system shall be IAW OPNAVINST 5513.1E (DoN Security Classification Guides).</td>
</tr>
<tr>
<td>5.7.4.2.</td>
<td>Safeguards. The system shall accommodate DoD safeguards to ensure that US-only and sensitive information is not released to unauthorized users.</td>
</tr>
</tbody>
</table>

| 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 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.abramson@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)


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, iThink™, Vensim™, and NETICA™, 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 meso-modeling 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
- 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++


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 multi-
party 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
Quasi-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, mriegel@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 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-wrapped 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


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 social identity and resource mobilization; international relations 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.
SIAM™

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:
- 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 analysis-
synthesis 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 decision-
making 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 (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 Visio™ 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 STELLA™ 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®.
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Instructional Systems Development/Systems Approach to Training and Education

Manuals, Interactive Electronic Technical - General Content, Style, Format, and User Interaction Requirements


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