

# **DETERRENCE IN THE 21<sup>st</sup> CENTURY: AN EFFECTS-BASED APPROACH IN AN INTERCONNECTED WORLD**

## **VOLUME I**

**1 October 2007**

**Prepared for  
US Strategic Command Global Innovation and Strategy Center  
(USSTRATCOM/GISC)**

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## Executive Summary - Hriar Cabayan {DDR&E}

When Cols Harm, Fay, and Shannahan, Dr Astorino-Courtois, and I met with Lt Gen Elder to discuss this effort, he provided some broad perspectives:

- 1- How can I influence actors so that they choose to do what I want them to do
- 2- Don't look at them as Americans
- 3- Don't just evaluate military options, but look across the full USG spectrum of options

This report summarizes the results from a 120-day effort that was undertaken to meet these challenges. A scope of the effort is provided by Lt Col Shannahan in section 1; namely, decision makers, policy makers and commanders at all levels need to better understand deterrence theory applicable to the 21<sup>st</sup> century security environment. The USG requires a typology to understand the ways and means to deter a non-nation-state actor while simultaneously retaining the means to deter and compel nation-states.

The effort focused on the scientific underpinnings of deterrence. A broad viewpoint was adopted; namely actions that prevent an adversary from engaging in behaviors that threaten or oppose US national interests. For further elaborations please refer to the Glossary (Appendix B).

The effort, instead of focusing on an adversary's *capability* as the basis for planning, refocuses analysis and planning on the actor's *motivations* for action, his *intent*, and the structure of his decision problem *as he sees it*. Capability is not ignored, but actor's perspective, motive and intent is at the core of this effort and the role of social science is paramount. The results are actualized in the Deterrence Analysis and Planning Support Environment (DAPSE) which is a web application that captures the depth of current academic thought along with established military doctrine to advise planners and associated staff with the means to deter the adversary. A DAPSE overview and description are provided in sections 2 and 3 by Dr Chesser and Stu Schwark & Altaf Bahora respectively.

A primary task of the Deterrence Strategic Multi-layer Analysis (SMA) project was developing a typology that could characterize the information needed for understanding adversaries and other actors of interest. A typology was developed that is consistent with various social science disciplines, and that incorporates a thorough consideration of human and cultural factors necessary for understanding what people value and how to influence them; i.e., a systems hierarchical paradigm for analyzing any society. The systems hierarchical approach is based on several anthropological ontologies that relate the various aspects of society, and is also based on inputs from the numerous social scientists involved in this project. Key aspects of a society captured in the systems hierarchical approach include ideology and religion, culturally based values, social organization, culturally prescribed roles, demography, and the actor's decision making process, as well as capabilities.

These are described by Dr Larry Kuznar in section 4. While the DAPSE typology is one of the more complete and useful typologies for guiding analysis and planning, there are gaps. Two of the most obvious are a lack of consideration of language and history.

Drs Laurie Fenstermacher and Bob Popp discuss the role of modeling in section 5. Models, first and foremost, augment the ability of an analyst or planner, but do not in any way replace them. Models aren't turnkey... **they provide input to decisions, they don't make them!** They are good at producing a swath of forecasts (e.g., the range of probable locations for landfall of a hurricane), not good at producing point predictions (due to inherent uncertainty in the data or in

the model itself). In addition, models can compensate for limits in subject matter expert (SME) knowledge. Due to the inherent complexity and dynamic nature of the systems and problems of interest, it is extremely difficult for an expert, or group of experts, to account for the effects of all possible interactions, particularly those with a low probability of occurrence. A complete reliance on SMEs will result in a very subjective assessment devoid of empirical evidence!

Section 6 by Dr Allison Astorino-Courtois outlines the use of the DAPSE Typology to guide the user's information search and organization; "reconstruction" of the interest-based decision calculus from the deteree's perspective; and techniques for analyzing that decision calculus to discover the most effective "influence levers" for deterring an opponent's unacceptable activities. This is at the core of this deterrence effort and the reader is well advised to dwell on it.

Having identified the strategic context, deterrence objectives and decision calculus of actor(s) to be deterred, the analysis now turns to analyzing the truthfulness of the hypotheses (influence levers) emerging from the decision deterrent matrix, and also evaluating possible courses of action and their consequences under different conditions. These approaches are described in section 7 by Drs Bob Popp and Laurie Fenstermacher.

The final stage in the DAPSE process is a last check of the refined US deterrence option(s) identified and evaluated and tested. To do this the refined US deterrence option, now including actual US DIME (Diplomatic, Informational, Military, and Economic) actions, is "run" back through the Deterrence Decision Calculus (DDC) matrix. This is described in section 8 by Dr Allison Astorino-Courtois.

By now the reader should be aware that the approach taken focuses on the actor's intent instead of focusing primarily on adversary capability...a necessary change after a near monopoly on capability fixation in the Cold War. This shift is the holy grail of the intel community and an essential maxim of our new world order – the shift from physical space to cognitive space. This necessitates the need to expand use of non-traditional sources of information and application of non-traditional analyses (e.g., cognitive and behavioral modeling). These are described in section 9 by Drs Bert Davis and Brian Meadows.

In section 10, LCDR Wes Latchford discusses perspectives on deterrence provided by the private sector. In support of the SMA, the GISC Partnership Group was asked to leverage its unique network of non-traditional domestic and international civilian business and academia experts to explore how particular elements of private sector enterprises approach the concept of "deterrence," the indicators utilized to determine when deterrence is necessary, and the "ways and means" by which deterrence is accomplished. The private sector provides a "Second Set of Eyes" perspective outside of DoD.

In section 11, Dr Carl Hunt and CAPT(S) Todd Veazie address the very important topic of networks and connections in developing a deterrence strategy. Their theme is that deterrence in the Cyber Age will not work as it did in the Cold War, simply because we will find it far more difficult to apply it and to understand feedback from its use – we may not be able to understand what the adversary values and thus never understand how to place that value at risk. This will absolutely require more consistent use of multi-disciplinary thinking and decision-making. We must create a Cyber Power-based DIME incorporating interconnectivity and economic interdependencies already emerging: we must change thinking about the DIME to include

interconnectivity and shore up the economic, diplomatic and information components, while strengthening the potential of the military component.

Each of the sections in this report identifies, as appropriate, areas that need further work. In section 12, Dr Larry Kuznar identifies several key areas that clearly require more development. They include social neuroscience, global challenges, information age deterrence and strategic communication, and dynamism and complexity. Related to these is the potential for the development of a dynamic approach to deterrence that would incorporate feedback from on-going US COAs (courses of action) and re-evaluation of deterrence strategies, operations and tactics.

Having developed the methodology and a set of procedures, the effort turned next to several potential notional scenarios to assess whether or not they worked together to produce a viable result. In section 13, Dr Sue Numrich, explores one of the test scenarios in some depth. The scenario selected is based on a current problem – the influx of foreign fighters into Iraq. Although the DAPSE process is intended to be exercised over a longer time period, the analysts who developed this scenario worked over a period of only four days relying on their accumulated experience. The section summarizes a set of possible deterrence options based on this analysis.

Products resulting from efforts like this with heavy reliance on social science can atrophy rather fast. Col Tim Fay in section 14 discusses transition options being contemplated.

As the effort neared completion, the team applied the DAPSE to several NOTIONAL scenarios primarily to identify and rectify gaps/deficiencies. These are being published separately. The first three are classified and will be forwarded in appropriate channels:

- Scenario 1: Non-state
- Scenario 2: State – PACOM
- Scenario 3: State – CENTCOM
- Scenario 4: Sudan (multiple actors)

Many thanks are due to all who worked on this effort (see Appendix F), to the contributors to this report and finally to Dr. Nancy Chesser who patiently edited the report.

Dr H. Cabayan

## **1 Introduction – Lt Col Mike Shannahan {USSTRATCOM/GISC}**

Our adversaries have become an assortment of nation states, non-nation states and transnational terrorist organizations. These 21<sup>st</sup> century actors have had a significant impact on the United States Government's (USG's) security and our evolution of post Cold War deterrence theory. We now require a more agile and tailored deterrence approach that can be interlaced across all the instruments of national power, not just the Military. In accordance with the Deterrence Operations Joint Operating Concept (DO JOC), it should be based on an adversary's perception and focus on imposing costs, denying benefits and encouraging restraint given a particular action or ideology an adversary intends to levy against US national security interests. Although extensive work has been done to transition from an outdated legacy deterrence policy, much work remains. At the request of Lt Gen Robert Elder, Commander, Joint Force Component Command, Global Strike and Integration, the USSTRATCOM Global Innovation and Strategy Center (GISC) initiated a 120-day effort to advance deterrence theory and to assist analysts and planners in the development of strategic and operational plans.

Decision makers, policy makers and commanders at all levels need to better understand deterrence theory applicable to the 21<sup>st</sup> century security environment. The USG requires a typology to understand the ways and means to deter a non-nation state actor while simultaneously retaining the means to deter and compel nation-states. The DoD, synthesized with the rest of the USG, must be able to influence the decision calculus of a potential enemy so he perceives an attack against the US as both doomed to failure and antithetical to his core interests. In addition, we must understand a host of adversaries with widely differing and complex perceptions of their actions and of the actions of the United States.

The DO JOC is the foundation of the deterrence theory project. Participants were encouraged to 'not think like Americans and try to look at the issue as the adversary sees the world' while considering all elements of national power to develop a next step in deterrence. With that in mind, we've tried to develop, in this next step a project that incorporates a typology to better understand what we need to know about an adversary, whether state or non-state. Using the effects based paradigm of current DoD planning efforts, the team has developed a web-based analytical planning environment in order to guide the user to better develop feasible courses of action to achieve USG-desired deterrent effects.

Contributors to the deterrence theory project included a large and diverse group of well over 100 individuals from government, industry and academia who participated in numerous workshops, working groups and developmental activities over the course of the effort. The team consisted of nine Communities of Interests (COI) to include: Non-state, State, Information Age, Social Science, Modeling, Collection and Analysis, Taxonomy/Database, Private Sector, and Strategic Red Team. The COIs provide specialized expertise, depth in their respective disciplines, and a multi-disciplinary approach with the ability to reach back into several other organizations. Next, the Subject Matter Expert (SME) team provided rigor to the process and were responsible for the bulk of the intellectual work. These individuals are highly regarded in fields related to deterrence and have resources for reach back to several other organizations as well. Finally, the Senior Review Group (SRG) was responsible for validating and endorsing the overall effort.

This effort was never intended to develop new concepts or policy, but rather to emphasize new and innovative approaches to synthesize concepts. The emphasis was on conducting analysis at the generalized level and identifying gaps in existing approaches. We don't currently have the

luxury of having a group of experts gathered to plan. To that end, we've attempted to provide a framework to guide users with different backgrounds and levels of experience. This framework is the Deterrence Analysis and Planning Support Environment (DAPSE). The intent of DAPSE is to encourage a "pattern of thought and habit of mind" to ensure day-to-day users are asking the right questions to effectively deter an adversary. Structure and rigor are key to this effort. Effective deterrence planning takes months and must be accomplished in the deliberate vice crisis action planning mode. Deliberate planning is most successful using collaboration (J2, J3, J5, etc). We expect the DAPSE process will identify influence levers as well as gaps that will generate requirements for information that is essential for building a deterrence plan. It is essential to understand the DAPSE is not an input/output tool that automatically produces answers to complex questions. It is a dynamic application that requires a SME and/or planner in the loop. The DAPSE is embedded in an effects-based paradigm that begins with the deterrent effect the user is seeking. To summarize, the DAPSE can offer opportunities to:

- Contribute to Deliberate Planning process
- Use a typology that ensures a broad consideration of all relevant social and situational factors (all systems, all instruments of power)
- Scope the breadth and depth of analysis and planning as defined by the user
- Use a decision calculus that encourages a broad consideration of an adversary's intentions, capabilities, and courses of actions (all effects)
- Clearly identify effects-based goals and likely effects of proposed actions
- Seek input from the user and reach back information to research sources
- Provide an opportunity for the user to define what they know as well as what they don't know and guide the user to seek more information on things that may not be intuitive and require specialized non-traditional expertise
- Provide documentation and source data that could be easily refined or passed to other and/or new users
- Exercise a model-based risk management approach to notionally quantify uncertainty in planning, assess robustness of DIME (Diplomatic, Information, Military, Economic) actions, and gain key insights to unintended consequences, tipping points and 2<sup>nd</sup>/3<sup>rd</sup> order effects
- Begin with a clear objective to achieve (deter action X by adversary Y in situation Z) that ends with identification of primary and nth order effects
- Provide a vector/trade offs for choosing the best deterrence option

Conversely, the DAPSE does not provide:

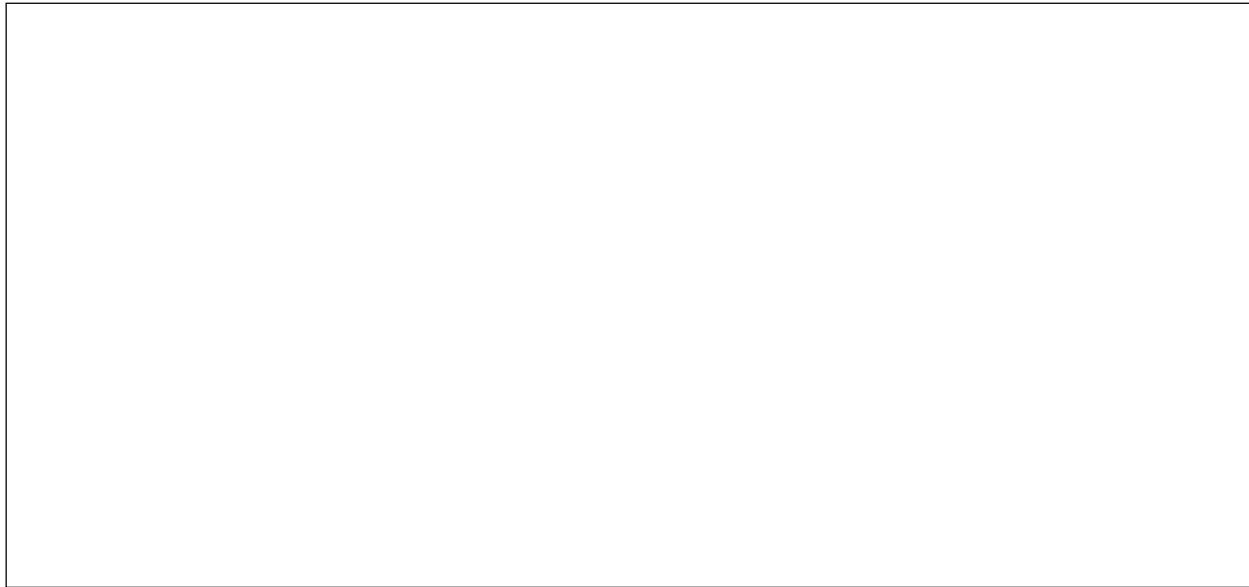
- The opportunity to accomplish Crisis Action Planning (constrained by time)
- An automated output – requires a human in the loop for input and judgment
- Single integrated model output (at least not in the 120 day scope of the effort)
- A collaborative planning enterprise (not within 120 day scope)

Each of the core concepts will be illuminated in the subsequent sections of the report.



## 2 DAPSE Overview – Nancy Chesser {J3 DDGO}

The process adopted by this deterrence effort is depicted in Figure 2-1. The process begins with guidance from the Combatant Commander, specifying the action to be deterred. The planner and/or analyst then collect data and identify experts to assist in understanding the adversary and his decision calculus. Models, especially qualitative/computational social science (Q/CSS) models, can be used to assist in understanding the adversary and exploring adversary actions and US response options.



**Figure 2-1 The DAPSE Process**

The analyst/planner can then begin using the DAPSE to capture information available and guide him through a series of questions to explore the actor's Deterrence Decision Calculus (DDC). This process encourages the user to consider the actor's situation and interests from the actor's perception. The potential influence levers can then be tested with the assistance of models, SMEs, and all-source data. Potential combinations of US DIME (Diplomatic, Informational, Military, and Economic) options can then be explored. These options can then be re-evaluated in the actor's DDC to consider whether the selected options will have the desired impact when viewed from the actor's perspective. The end result is actionable recommendations.

The 6 steps of the DAPSE process are listed in Figure 2-2. The first three steps are instantiated in the DAPSE software. They are based on typologies developed to be applicable to both state and non-state actors. Step 1 leads the user to consider the details of the guidance provided. He is then asked to identify the decision-maker(s), either an individual or group, the actor who can commit the resources of the focal political entity without reversal. For groups the DAPSE poses questions on how the group is defined. The DAPSE then explores the capabilities of the actor and the context in which he operates. In Step 2 the user identifies the interests of the actor. In Step 3 the DDC explores how the actions of the actor and potential US responses, support or detract from each key interest of the actor. This is explored first for US options as perceived by the actor and then for US responses as perceived by the US.

Steps 4 and 5 are currently performed off-line using models, SMEs and all source information. In Step 6 the results of previous steps are re-evaluated using the DAPSE.

- |  |
|--|
| <p>Step 1: Specify deterrence objective &amp; strategic context</p> <ul style="list-style-type: none"><li>• Guidance typology &amp; actor identification</li><li>• Decision making typology for each actor</li><li>• Capabilities typology for each actor</li><li>• Context typology for each actor</li></ul> <p>Step 2: Assess decision calculus of actor decision maker</p> <ul style="list-style-type: none"><li>• Interests typology for each actor</li></ul> <p>Step 3: Identify desired deterrence effects on actor decision calculus</p> <ul style="list-style-type: none"><li>• Deterrence Decision Calculus (DDC) matrixes for each actor</li><li>• Identify testable influence levers</li></ul> <p>Step 4: Test influence levers using Models, SMEs, other sources</p> <p>Step 5: DIME Evaluation</p> <p>Step 6: Reevaluate in DDC</p> |
|--|

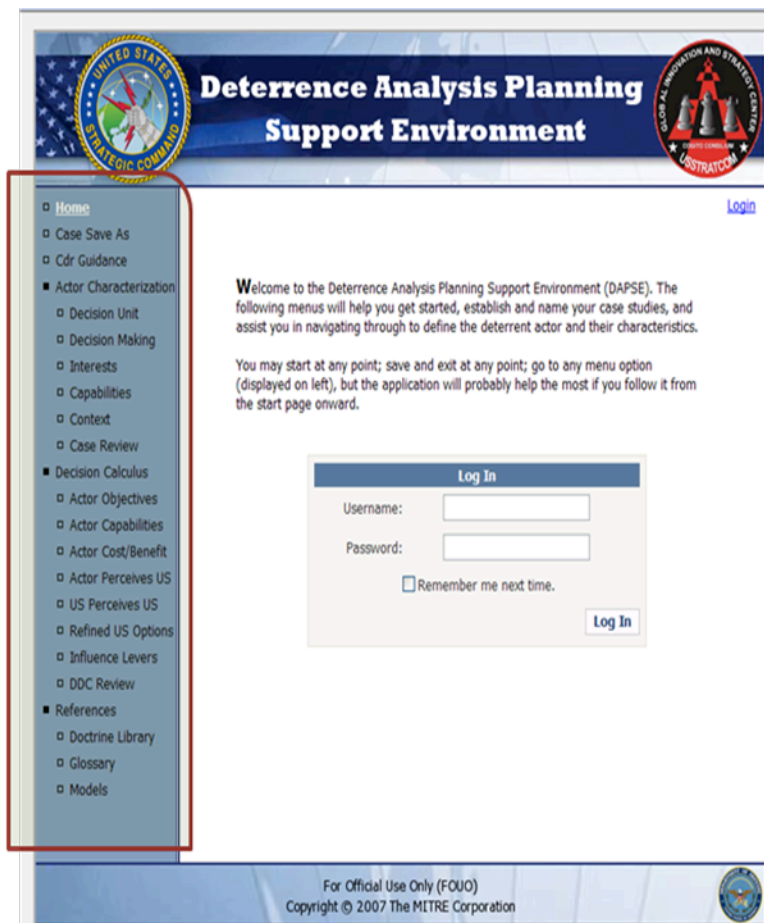
**Figure 2-2 DAPSE Steps**

The following sections explore in greater detail the typologies that underlie the DAPSE, the role of modeling and the six steps of the DAPSE.

### 3 DAPSE Software Package – Stu Schwark {MITRE} and Altaf Bahora {MITRE}

The Deterrence Analysis Planning Support Environment (DAPSE) is a web application that captures the depth of current academic thought along with established military doctrine to advise planners and associated staff on the means to deter the adversary.

The DAPSE uses established standard software that is readily available and known to the information technology management base. The web application utilizes Microsoft's ASP .NET framework with a Microsoft SQL Server database to build a comfortable cross-browser compatible user environment. Additionally, features such as user authentication and limited auditing, a flexible dataset structure for dynamic web pages, cognitive clues for additional needed information and readily embedded references aid the deterrence planner in knowledge discovery. The user can enter the DAPSE at any point, save at any point, review and print the results at any point, and share the information easily.



The DAPSE gives known and accepted visual clues of what the deterrence worker needs, the logical progression of the environment, and references to aid in knowledge discovery. With 17 linked pages to navigate through, the DAPSE builds user knowledge through focusing on building understanding of the right questions to ask, the insights to apply, along with established military doctrine and academic thought.

The consistent look and feel of the DAPSE, with familiar user options (radio buttons, check boxes, and free text insertion points) allows the user to enter the maximum information throughout. All information is saved and can be reviewed and printed at any point.

The DAPSE also provides ready visual references that assist the user in understanding “where you are” and “what questions to ask”. These clues are both menu-driven and color coded to ease understanding, along with pop-up dialogue boxes that amplify definitions of phrases and terms so the DAPSE user is clear on the context in use.

Note the use of the color-coded menu along the left and color bar on the top. Both are intended to give ready reference to the stage of the DAPSE the user is currently in. The user interface is familiar: check boxes, radio buttons, and text fields – established and known user interfaces.

The mouse-over dialogue boxes are either expandable or hyperlinked to additional data and holdings. This assists the user beyond the attached reference and glossary section in understanding the terms in use throughout the environment.

The DAPSE logically progresses from the Commander’s guidance to a characterization of the actor’s decision making, interests, capabilities and contexts. Following this portion of

knowledge discovery the user is prompted to review (and may print) any information. The universal save and change feature allows simple changes to previous information, and could be used for branch or sequel planning.

Following the actor characterization, the DAPSE then moves into the Deterrence Decision Calculus or DDC. The DDC is a series of linked dialogues and text fields that are aimed at giving the user the information to understand the actor's objectives, the capabilities to pursue those objectives, their associated costs and benefits, and their perspective of what they believe the US Government can do to limit them. The DAPSE then allows the planner to enter in US options, and judge which of the options seems most effective on the actor's outlook and motivation. The DDC also guides the planner to appreciate which of the Diplomatic, Informational, Military, or Economic (DIME) approaches are most indicated. This approach allows the planner to integrate increasing depth of knowledge against adversary motivation and capability to help discern the most effective means to impact the adversary in the desired manner.

Below is a view of one page from the Deterrence Decision Calculus.

**Deterrence Analysis Planning Support Environment**

**CASE: DEMO**

**Costs and Benefits that Accrue from Actions (What Actor Wants)**

Actor's Actions	Relevant Context	Benefits to Actor	Costs to Actor	Benefits to Actor of Not Acting	Costs to Actor of Not Acting
<a href="#">Edit</a> <a href="#">Delete</a> Demo action 1	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elitof Restraint	Lorem ipsum dolor sit amet, consectetur adipiscing elit
<a href="#">Edit</a> <a href="#">Delete</a> Demo action 2	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elit	Lorem ipsum dolor sit amet, consectetur adipiscing elitof Restraint	Lorem ipsum dolor sit amet, consectetur adipiscing elit

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The DAPSE also incorporates references and built-in guides to assist the new or journey-man user in the process. These references include a library of current policy and doctrine (including national military strategy documents, the Joint Staff Officer's Guide, and appropriate top-level

Joint Publications on intelligence, operations, planning, and JOPES). This section could also hold appropriate theater OPLANs and CONPLANs, as needed by the users.

The DAPSE reference library also includes a Glossary of the terms in use (which amplifies the information in the Joint Dictionary or Joint Pub 1-02 in the reference section) to clarify the social scientists' phrases and usages. It also includes a listing of social science tools and models for the planner to consider. This listing gives primary reference data so the user has information on what tools may apply, what domain they are used within, and a means to contact or get more information from the "tool owner".

## 4 Typologies – Lawrence Kuznar {Indiana University – Purdue Univ., Fort Wayne}

A primary task of the Deterrence project was developing a typology that could characterize the information needed for understanding adversaries and other actors of interest (see full typology in Appendix G). A typology was developed that is consistent with various social science disciplines, and that incorporates a thorough consideration of human and cultural factors necessary for understanding what people value and how to influence them. Developing a valid typology is a daunting task, since the social sciences are fragmented into many specialties, and even within those specialties there is never agreement as to what variables adequately characterize a society or culture. This section covers the method used to generate the typology, the scholarly background for the typology, the DAPSE typology, the DAPSE glossary, and recommendations for future development.

### 4.1 Summary

The Deterrence effort **leveraged current social science expertise** by:

- Dividing participants into communities of interest (COIs) based on several interest areas
- COIs brainstormed to develop a nascent typology
- Current literature on social science typology was used to structure the COI typologies
- Result – the DAPSE merged typology

The **DAPSE typology is grounded in the scholarship** of participants and a century of research findings on what an appropriate social typology should contain. In order to capture the most relevant aspects of an actor's decision making, the **DAPSE Typology** covers an actor's:

- Capabilities
- Relevant Context (opportunities and constraints on actor's thinking and behavior)
- Interests
- Decision making process

A **glossary** was developed to insure accurate and consistent definition of terms.

Recommendations for future DAPSE typology include incorporating language and history.

### 4.2 Generating the DAPSE Typology

Originally, the Deterrence team involved 80 experts from academia, national laboratories, industry and the DoD. In an effort to leverage so much expertise, no constraints were placed upon their original brainstorming activities, other than tasking participants with collaboratively generating a social typology. Several key communities of interest (COIs) were formed, including social science, state society, non-state group, decision theory, information, and collections and analysis (C&A) experts. Each group brainstormed what appropriate categories should be included in a typology that concerned their area of expertise. Furthermore, participants were not shy about suggesting what the general typology should look like or even what experts in other COIs should consider. This process generated a wealth of ideas and several separate typologies, namely state, non-state and decision making (Figure 4-1).



#### **Figure 4-1 Generation of DAPSE Typology**

In order to structure and integrate these separate typologies, an overarching social typology was first adopted from the discipline of anthropology. An augmented form of the systems hierarchical model, developed by David Wilson (1999), was proposed. The aim was to provide a structure that would unite the valuable insights from the various COIs without losing any information. COIs further debated and refined this typology, rearranging some categories and redefining other categories so that the overall social typology accurately reflected their relevant expertise (Figure 4-2).



#### **Figure 4-2 Relationship of Typologies**



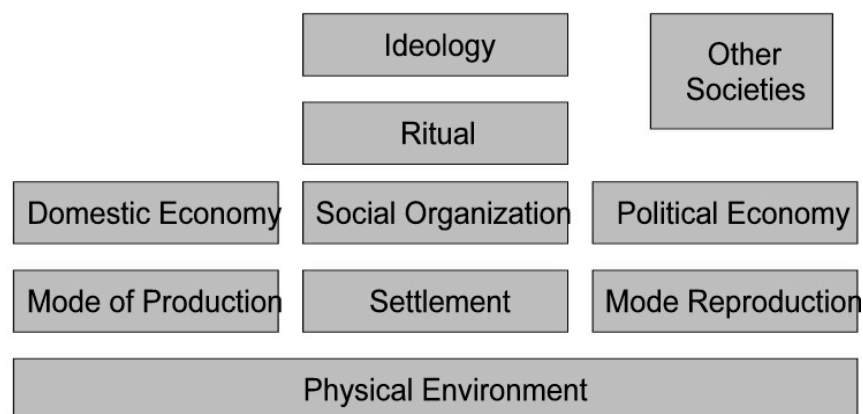
### 4.3 Scholarly Background of the DAPSE Typology

The scholarly background of the DAPSE is rooted in the bottom-up process of leveraging the expertise of participating psychologists, political scientists, game theorists, decision theorists, anthropologists, and defense analysts and planners, as well as in a century of anthropological research regarding what variables are necessary to characterize a society. Some background on this historical background is provided here.

Ever since Lewis Henry Morgan struggled to describe Iroquoian culture in 1851 (Morgan 1851), and E.B. Tyler characterized culture as “that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society (Tylor 1958[1871]:1),” anthropologists have struggled to create a typology that would contain the essential variables for describing a culture or society. Early anthropologists such as Bronislaw Malinowski (1944) and A.R. Radcliffe-Brown (1965) proposed outlines of what elements (economic, religious, kin-based and political) were necessary for characterizing a society. They were in turn influenced by great sociologists such as Emile Durkheim (1950[1895]) and Max Weber (1958[1904-05]). Between the 1930s and 1950s, Julian Steward united much of this work under a paradigm known as multi-linear evolution or culture core theory (Steward 1955). This provided a typology of society that included basic categories for physical environment, technology, behavior, social organization and ideology.

Later, anthropologists such as Roy Rappaport and Kent Flannery introduced systems theory concepts that stressed the mutually reinforcing influences various social phenomena have on one another (Flannery 1972, Rappaport 1984[1964]). Marvin Harris refined this framework into his Cultural Materialist paradigm, primarily by stressing the role of population pressure and dynamics on the evolution of social forms (Harris 1979). At the close of the 20th century, David Wilson augmented and refined Harris’ typology by adding the importance of settlement type and the influence of other societies on a particular culture (Wilson 1999); Wilson’s typology is the framework that initially structured the DAPSE typology (Figure 4-3). It was further refined so as to be more consistent with various social science disciplines and DAPSE COIs.

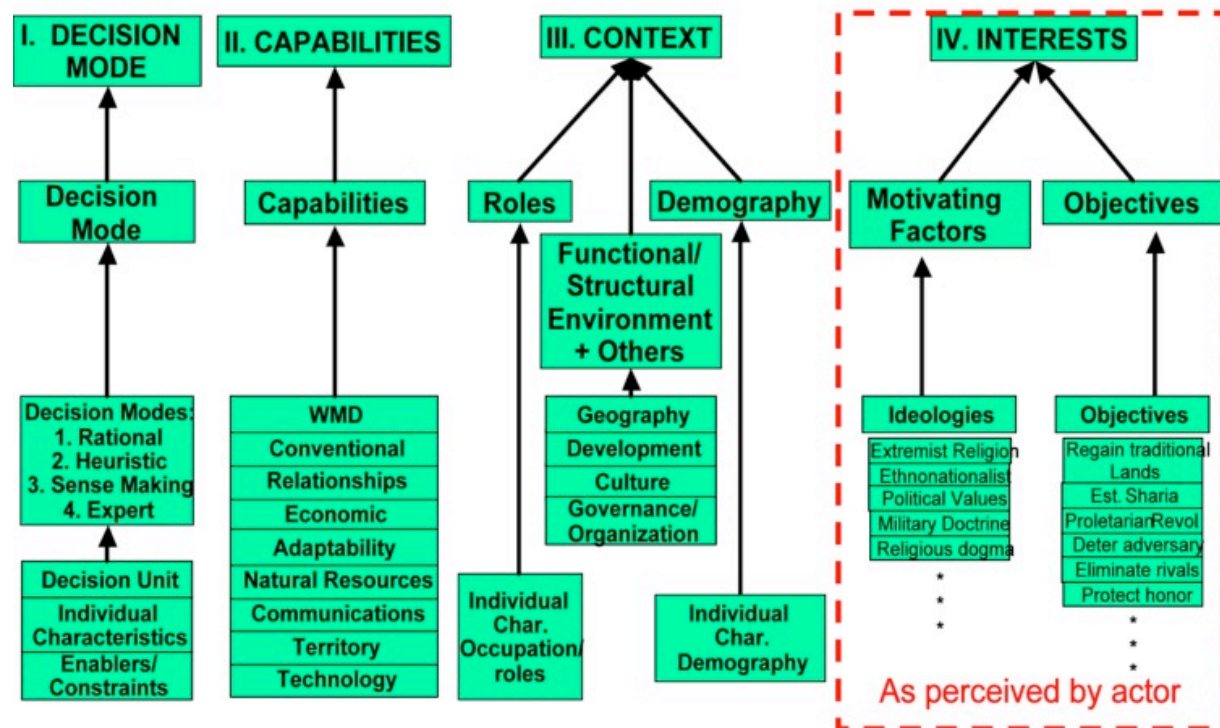
#### Wilson’s Systems Hierarchical Model: Ten Essential Variables



**Figure 4-3 David Wilson's Systems Hierarchical Model of Society**

#### 4.4 The DAPSE Typology

The DAPSE typology (Figure 4-4) resulted from the combined efforts of participants and structuring concepts from literature, as described. What follows is an explanation of why the categories of the DAPSE typology were chosen and what they represent.



**Figure 4-4 DAPSE State and Non-State Actor Typology**

Based on the collective thinking of participants and the larger social science literature, the basic categories necessary for understanding an actor's decision calculus include: decision mode, capabilities, context, and interests. It is important to note that, given the extremely diverse threats the US faces in the 21<sup>st</sup> century, an adequate typology must cover both state and non-state actors, and the team strived to achieve this end.

**Decision mode** refers to the manner in which an actor (individual or group) makes decisions. In some cases, actors rationally deliberate, considering their full range of options and the resources they have to exercise their options in a way to gain maximal value (Cowell 1986, von Neumann and Morgenstern 1944). In other cases, actors follow ready-made heuristics, which might include simply copying what others do or following traditions (Gigerenzer and Selten 2001, Gigerenzer, Todd, and Grop 1999, Heuer 1999, Kahneman and Tversky 2000). Sense-making is a mode of decision making in which an actor, usually in a position of ignorance, acts and judges the outcomes of his actions, then revises strategy (Kurtz and Snowden 2003, McNamara and Trucano 2005, Snowden 2005). Websites such as [www.cynefin.net](http://www.cynefin.net) or [www.cognitive-edge.com](http://www.cognitive-edge.com) provide source material on sense-making. This is often the case in crisis situations, or in situations where the general situation is fluid and unpredictable. Finally, some decision makers simply consult other experts and more or less blindly follow their guidance.

**Capabilities** formed a separate category due to DoD analysis and planning needs. In short, a threat does not exist unless an actor has both intent and capability. Therefore it is important that capabilities be focused upon for DoD analysis. All possible types of capabilities (from WMD to economic potential for control of territory, to basic transportation and technology) should be considered under this category. In many ways, this corresponds to the technology category in Steward's culture core and the mode of production category from Wilson (see Scholarly Background section).

**Context** is a very broad category that incorporates the many possible influences that may affect an actor. These range from the social roles actors play (dictator, protector, freedom fighter, husband, wife, citizen, etc.) to the functional/structural environment that both constrains and enables an actor (type of social organization, economy, political organization, family structure, terrain, climate, individual characteristics such as age, education, etc.) to demography (age/sex breakdown of a population, fertility rates, health). While all of these factors may not be relevant in every situation, all must be considered because, depending on circumstances, these variables are often salient to an adversary's decision making.

**Interests** refer to the values, motives and objectives held by an actor. Once again, a threat does not exist without an actor's *intent* and capability. Here, the analyst/planner is urged to consider the full range of interests an actor may have, from the perspective of the actor *through the actor's own cultural perspective*. This is essential, because an actor does not make decisions through our cultural and personal lens, but through his own. Planners and analysts must consider what the actor is thinking and not mirror image his behavior as some version of our own. Some motives may be relatively abstract and grandiose, such as a belief in a god that sanctions imperial expansion, a notion of justice, or an apocalyptic vision of how the world should end; these sorts of motives are referred to as **motivating factors** in the DAPSE. They are difficult to measure and hold at risk because of their abstract nature. In contrast, **objectives** refer to more concrete goals an actor may have, including achieving political representation, gaining territory, exacting revenge, surviving genocide, etc.); objectives are things that one could influence by enhancing or holding at risk.

In sum, by considering the full range of culturally-specific interests and capabilities an actor may have, the context that constrains or enables the actor, and the actor's most likely decision making approach, a relatively full picture of an actor operating in his cultural context can be achieved. An analyst or planner who has gathered information on this broad range of information is now in a position to understand what an actor wants, how the actor is going to go about achieving a goal, and what values the US can influence to insure his behavior is within US interests. The Deterrence Decision Calculus (DDC) framework of the DAPSE makes this transition for the planner (see Section 6).

#### 4.5 DAPSE Glossary

Many terms used in the DAPSE are standard common use or military terms. However, reflecting the incorporation of the latest concepts from the academic social science community and the broad social and cultural approach of this project, terms not likely to be in an analyst or planner's lexicon have been incorporated into the DAPSE. Therefore, we have provided a glossary of terms to insure that terms are used as intended with the DAPSE (see Appendix B).

In addition to defining terms introduced from the academic community, we also attempted to bring our definitions in line with on-going efforts in DoD to create glossaries of social science

terms. To that end, we consulted other works on deterrence (Bonoan et al. 2002, Davis and Jenkins 2002:10, Special Task Force on Terrorism and Deterrence 2002:6, USSTRATCOM 2006:7), other DoD glossaries (GISC 2007, NASIC 2007), and other SMA projects.

#### **4.6 Recommendations for Further Development**

While the team feels that the DAPSE typology is one of the more complete and useful typologies for guiding analysis and planning, we recognize several gaps. Two most obvious gaps include a lack of consideration of language and history. **Language** can be a facilitator (when shared) or a barrier. Especially in ethnic conflicts, cultural attributes such as language or dialect are used to discriminate friend from enemy. Also, in many contexts people are multi-lingual and understanding the breadth of their linguistic capabilities would be potentially important for considering their context and capability. Many historical factors could be considered in the DAPSE. However, a more explicit focus on **historical factors** may aid analysts and planners in considering the full range of historical factors that may impact an actor's decision making.

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## **5 Role of Modeling in DAPSE - Laurie Fenstermacher {AFRL} & Bob Popp {NSI}**

Models, first and foremost, augment the ability of analysts or planners, but do not in any way replace them. Model is defined as a “schematic description of a system, theory, or phenomenon that accounts for its known or inferred properties and may be used for further study of its characteristics: (e.g., a model of generative grammar; a model of an atom; an economic model.)” Models can and should be used throughout the process outlined in the Deterrence Operations Joint Operating Concept (DO JOC). They serve a variety of uses including validation of assumptions, providing the analyst or planner information about the dynamics of the social system and associated behaviors, identification of potential “surprises” or unintended consequences (e.g., emergent behaviors or tipping points), enabling the analyst or planner to answer the question “what if?” and manage risk associated with possible futures. Modeling approaches offer systematic methods, tools and metrics for data gathering, classification and analysis as well as for evaluation of findings within and across various situations and over time. Model types include, but are not limited to, game theory, cognitive models, network models, process models, econometric models, stability models, agent-based models, and system dynamic models. No one model is a “silver bullet” in terms of providing all the right answers/insights to an analyst or planner.

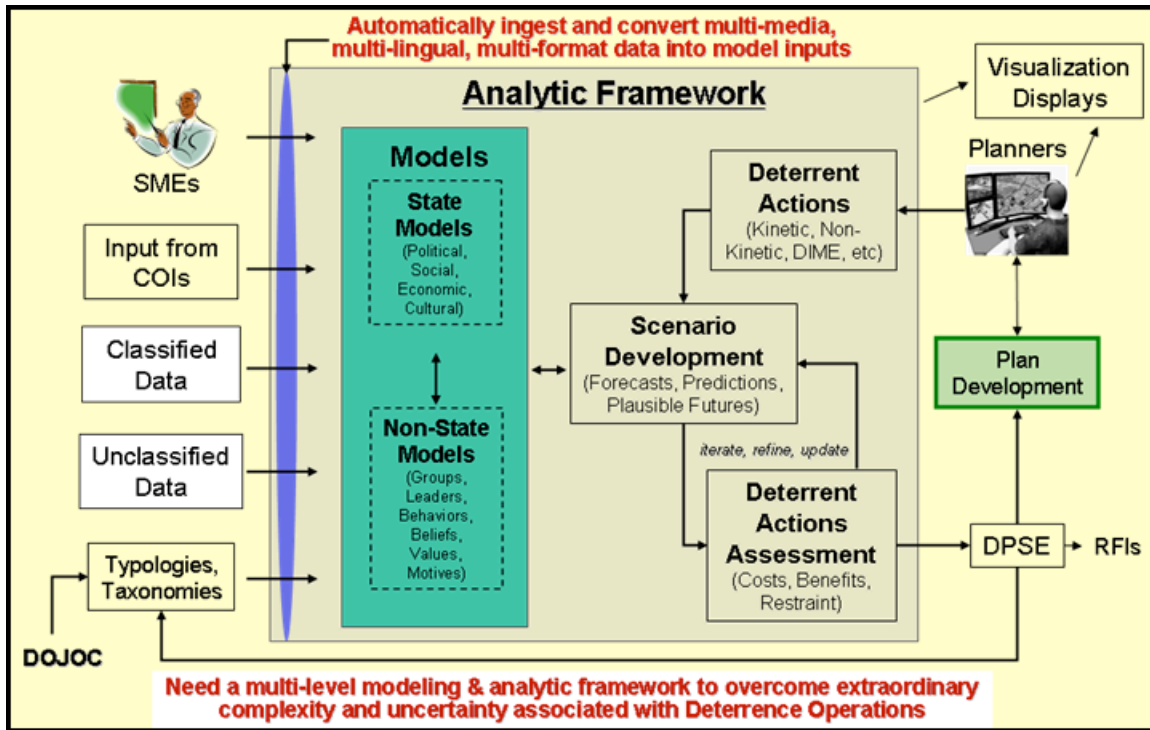
### **5.1 Why Use Models in Deterrence Planning?**

Models are an important part of the DAPSE process because they assist an analyst and planner to more effectively deal with complexity and uncertainty. The DO JOC emphasizes that “future Joint Force will operate in a complex and uncertain global security environment characterized by asymmetric threats from international organizations, nation states, rogue states, and terrorist organizations. A shift in the Joint Force’s role and employment is required to respond in this new security environment” (p. 1). To support this shift, models provide dynamic multi-level analytic frameworks for developing and evaluating plausible deterrence scenarios, actions and assessments. As important, models also compensate for inherent limitations of human information processing and decision making, including helping an analyst or planner avoid common mistakes (e.g., confirmation bias) while supporting efficient analysis of multi-media, multi-lingual, multi-format data. Figure 5-1 illustrates such use and role of models in Deterrence Planning

#### **5.1.1 How Models Help Deal with Complexity and Uncertainty**

Models are exceedingly important in the DAPSE process because of two main factors: the complexity and uncertainty inherent in the planning process itself as well as associated uncertainty and complexity of the objects of analysis and planning (whether state or non-state). Complexity in social systems is a frequent occurrence, arising through feedback, nonlinear dynamics, uncertainty, hierarchy, and developmental processes. Models can compensate for limits in SME knowledge. Due to the inherent complexity and dynamic nature of the systems and problems of interest, it is extremely difficult for an expert, or group of experts, to account for the effects of all possible interactions, particularly those with a low probability of occurrence.

Models can also be key in identifying indirect effect and unintended consequences.



**Figure 5-1 Role of Models in Deterrence Planning.**

**State and Non-State Models Span Multiple Levels of Analysis from Individual/Cognitive to Group, Network, Organization, State, Regional and Global**

In addition, models can assist a person in understanding the impacts of their assumptions and/or uncertainty in terms of the overall output. Uncertainty arises from two major sources: uncertainties in the data (quantity or quality) used as input in the models and uncertainty due to lack of knowledge about the thing/system/person/organization/nation being modeled. For example, supply chains can be characterized by their complexity and by the inherent uncertainty in their operations. A model of the supply chain operations can account for the uncertainty of key system attributes (e.g., lead time and cost) by including stochastic/random variables, thereby representing the inherent uncertainty and enabling analysis and planning for implementing system changes to improve overall system performance.

### 5.1.2 How Models Can Compensate for Common Decision Errors

All humans are subject to limitations and to making certain errors in information processing and decision making (see, e.g., Kahneman & Tversky 1979; March & Simon, Radner, etc. on decision-making heuristics, biases and bounded rationality). Models can help an analyst or planner avoid some of these errors by providing alternative interpretations/hypotheses/forecasts (i.e., “have you thought about x?”). For example, consider the error of confirmation bias in which a person selectively filters information to confirm a theory/model. *Confirmation bias*, as the term is typically used in the psychological literature, connotes the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand. Examples of confirmation bias are found in a wide variety of real world contexts from witch hunting in 16<sup>th</sup> and 17<sup>th</sup> centuries to medical diagnoses to rationalization of policy regarding Vietnam.

### 5.1.3 Other Roles and Uses of Models in Deterrence Planning

Models also serve a variety of other functions. Generally, modeling approaches enable systematic analysis of particular situations as well as across situations, multiple levels of analysis and over time. Depending on the nature of the problem, available data and applicable methods, models can help map possible states of the world (toward strategic and situation awareness), assess COA costs, benefits and consequences, and generate actionable insights (e.g., predictive indicators of impending behavior of interest, emergent properties, etc.). Models can also help assess the available data (e.g., by triangulation methods to determine what data sources may be unreliable given knowledge of underlying phenomena or dynamics that data purport to reflect) and past as well as likely future performance. By providing systematic measures, observation categories, methods and tools, models can assist analysts and planners not only in understanding problems at hand but also in codifying knowledge and facilitating knowledge transfer (e.g., among various analysts/departments and over time).

## 5.2 Models Apply Throughout the Deterrence Planning Process

Models can and should be used throughout the process outlined in the Deterrence Operations Joint Operating Concept (DO JOC). In the early stages, they can be used to validate assumptions, understand the impact due to gaps in data/information, provide insights into underlying dynamics, and perform sensitivity analysis to identify key factors underlying the adversary decision calculus. In Steps 4 and 5, models can provide possible futures, identify tipping points/unintended consequences, and support sensitivity analyses on the impact of individual and combinations of DIME actions. In Step 6, models can provide additional, non-traditional assessment information on changes in adversary behaviors/rhetoric. Because deterrence planning involves phenomena at all levels of social complexity—from cognitive networks to the world system, a hierarchy of models is needed and models can play many roles in the deterrence process (Figure 5-2).

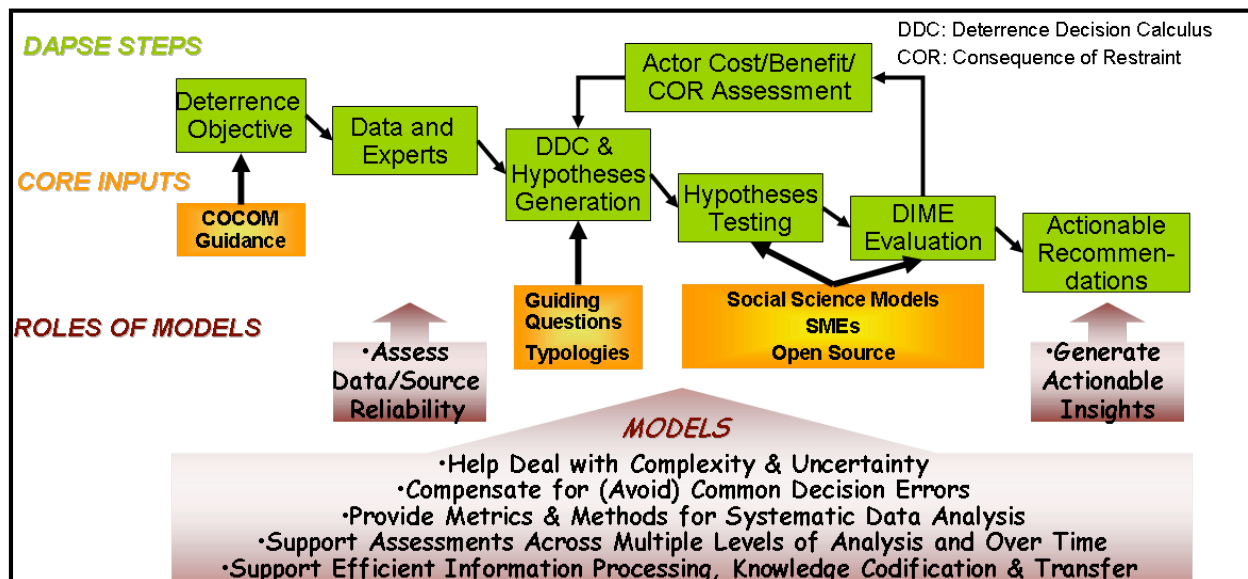


Figure 5-2 Modeling Role & Applications Throughout DAPSE Deterrence Planning Process



The Deterrence Effort considered a number of existing deterrence-relevant models and developed new models to address particular DAPSE needs (Figure 5-4 and Figure 5-4).

<b>Model Name</b>	<b>Deterrence Issues and Questions Addressed</b>	<b>Level of Analysis</b>	<b>Inputs</b>	<b>Outputs</b>
Collier Model (Econometric Model)	What factors generate regional conflict?	State; Regional	Population cultural identities, demographics, socio-political and economic development indicators; outside forces and history of violence	Probability of regional civil war; probability of other types of regional conflict
CARs – Model Uncertainty Analysis	Estimating long-term consequences of actions and policies under uncertainty	Global; State; Organization; Group; Network; Individual	Various models, assumptions and conditions to be tested over time	Predicted long-term outcomes, sensitivity analysis, plausible future scenario comparisons
DyNet	What are the capabilities and vulnerabilities of adversary nets/groups/org? Developing a 'flight simulator' for reasoning about dynamic networked organizations	Network; Group; Organization	Description of adversary organizations and past actions; demographics and societal context	Indices and indicators of adversary organization capabilities, vulnerabilities, dynamics
Foreign Jihadi Fighters Model*	Under what conditions will US capture foreign fighters affect their activity (volume, attacks, etc.) and how? What are likely effects of alternative counteractions?	Group; Organization	Number of jihadi captured, overall number estimates in area of interest; foreign fighter places of origin	Jihadi organization types & dynamics under different conditions; COA analysis; data source reliability analysis
North Korea Provocations Model*	What is the relationship between Western diplomatic concessions and NK provocations? What are the implications for deterring North Korea?	State	North Korean provocations; US/International concessions	Time-lag correlation between NK & US/Int's actions; behavior patterns; economic/political implications
PRIAS	What factors affect political instability in a given region?	State; Regional; Global	News reports and blogs	Structured evidence for hypothesis evaluation
ABA – Applied Behavior Analysis	How will an individual or a group behave in a given situation?	Individual; Network; Group	Behavior antecedents and consequences	Automated behavior analysis and behavior predictions

\* indicates the model was developed as part of the Deterrence Effort

Continues Next Page

**Figure 5-3 Example Models Considered & Developed for Deterrence Analysis & DAPSE Use**

<b>Model Name</b>	<b>Deterrence Issues and Questions Addressed</b>	<b>Level of Analysis</b>	<b>Inputs</b>	<b>Outputs</b>
POFED	What factors affect state fragility? How would a potential intervention affect state fragility?	State; Regional; Global	Demographics; economic and political development indicators	Estimated political capacity/unrest; instability indicators
S3DM – System Dynamics Model	What factors affect regime resilience?	State	Dissident, violent groups & incidents; behavior rates of change; state development indicators	Predicted sources and manifestations of violence; regime stability indicators
FORECITE – Events Analysis Model	What factors affect state stability or vulnerability to conflict?	State	Demographics and measures of socio-political contentiousness	Analysis and early warning signals of state instability, conflict & violence
FactionSim	How will a leader, follower and/or group behave? What conditions and decision-making processes drive their behaviors?	Individual; Group	Individual cognitive, physiological and emotional parameters	Leader/follower decision, action simulations, group dynamics
PMFserv	How can modeling realistic socially intelligent agents help us understand impact of stress, values, emotion on individual & group decision-making?	Cognitive; Individual	Individual cognitive, physiological and emotional parameters	Simulated decision cycles; action choices; group dynamics; threshold indicators, coping

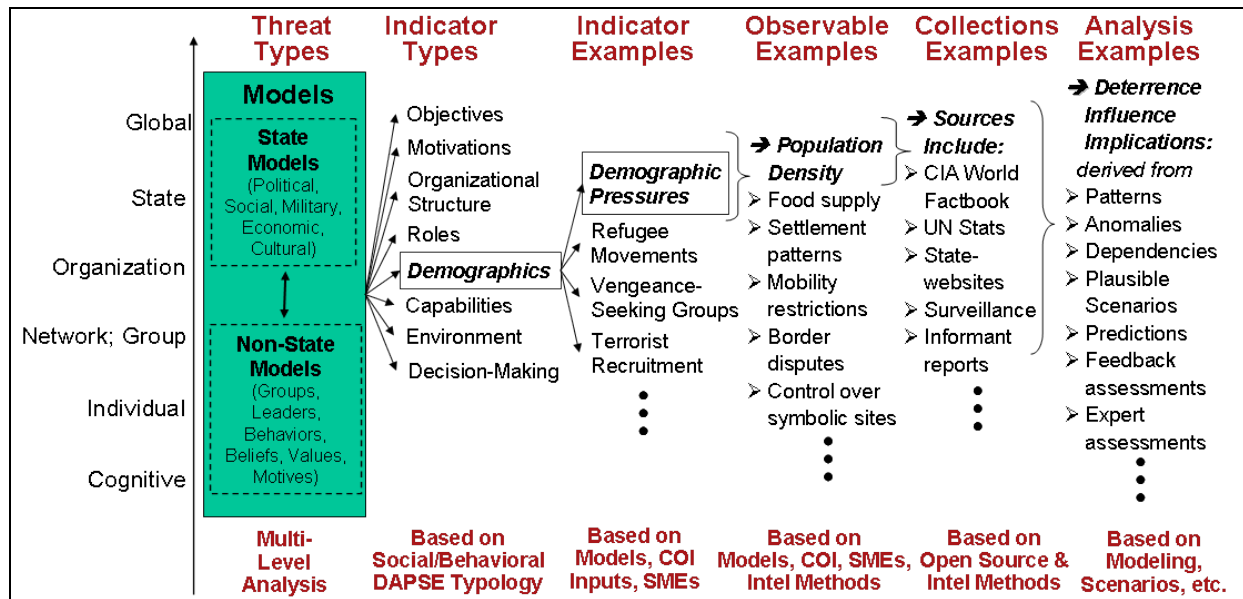
\* indicates the model was developed as part of the Deterrence Effort

**Figure 5-4 Example Models Considered & Developed for Deterrence Analysis & DAPSE Use (continued)**

### **5.2.1 Model Support for Steps 1, 2 and 3: Objectives, Context and Understanding Adversary Decision Calculus**

Models can provide several purposes in this stage of deterrence planning. There may be models of the decision makers and influencers being characterized by the typology. The models can be used to validate the information about actor behaviors. It may assist the analyst or planner in making appropriate choices in the typology, but illustrating/simulating the behaviors/result/impact of a choice. Additionally, models can be used for a sensitivity analysis to understanding the underlying dynamics of the social system and identify salient factors (e.g., key motivations, interests). Models can also help evaluate the available data as well as fill data gaps by identifying emergent behaviors.

In addition, modeling approaches and existing models provide sets of quantifiable measurements and tools for systematically collecting and coding observations (model inputs) as well as various outputs and indicators that analysts can use and adapt for measuring and encoding the knowledge they collect when following steps one through three. Having established, systematic categories helps insure inter-analyst reliability and validity of observations, improving reliability and quality of downstream analysis and insights. Toward these goals, the Deterrence Effort surveyed a number of relevant model inputs, outputs and observations identifying links and concrete measures for use across DAPSE typologies and analysis steps. Figure 5-5 provides examples.



**Figure 5-5 Operationalizing DAPSE typologies with a repository of model-based measurable/ quantifiable observables, metrics, and indicators**

### 5.2.2 Model Support for Steps 4 and 5: Analysis of DIME Options and Adversary Responses

See Section 7.

### 5.2.3 Model Support for Step 6: DIME Consequence Evaluation

See Section 7.

## 5.3 Recommendations for Further Development

Models aren't turnkey. Many of them are complex and take some experience to understand the data needs, how to change model parameter values, etc. They are best used by someone with some context about the problem/situation/individual/environment/system being modeled. They are good at producing a swath of forecasts (e.g., the range of probable locations for landfall of a hurricane), not good at producing point predictions (due to inherent uncertainty in the data or in the model itself). An analytical support capability will need to be developed that includes people familiar with the suite of models and their data needs as well as technologies capable of efficiently and effectively supporting iterations, refinement and updates to data and analysis as situations, strategic context and commander guidance may evolve.

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## 6 DAPSE Steps 1-3 – Allison Astorino-Courtois {NSI}

### 6.1 Introduction

This section outlines the “nuts and bolts” application of the first three steps in the Deterrence Planning and Analysis Support Environment (DAPSE) process: use of the DAPSE Typology to guide the user’s information search and organization; “reconstruction” of the interest-based decision calculus from the deteree’s perspective; and techniques for analyzing that decision calculus to discover the most effective “influence levers” for deterring an opponent’s unacceptable activities.

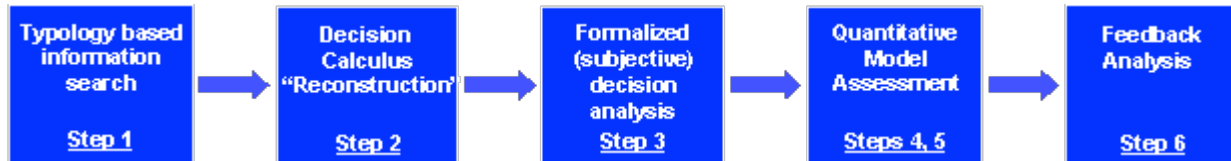


Figure 6-1 DAPSE Iterative Process Steps

It is axiomatic that in all of politics, but perhaps especially in the area of strategic decision making, there are few simple decisions. Rather, leaders who are, to varying degrees, beholden to some constituency, typically face choices that involve multiple alternatives and that impact a variety of interests, or values. The Deterrence Operations Joint Operating Concept (DO JOC) re-approved by the Secretary of Defense in 2007, calls for deterrence analysis and planning to be based on an understanding of the adversary’s decision calculus relative to the perceived costs and benefits of his actions. The DAPSE process outlined in Figure 6-1 and discussed in this section, represents a new way of orienting deterrence analysts and planners to their task. Namely, instead of focusing on an adversary’s *capability* as the basis for planning, it refocuses analysis and planning on the actor’s *motivations* for action, his *intent*, and the structure of his decision problem *as he sees it*.

### 6.2 DAPSE Step 1- Typology-based Information Search

The DAPSE user’s Step 1 Objectives are to:

- Specify and clarify the deterrence objective as delivered by the commander’s guidance
- Specify the strategic context
- Identify the adversary or opponent decision maker/decision unit responsible for the actions the US seeks to deter

As described in the previous section, the DAPSE Typology and embedded guiding questions are divided into a series of sub-typologies to aid the user in conducting both the most fruitful and the most time efficient information search. The first sub-typology, based on the initial mission assessment phase of the Military Decision Making Process (MDMP), guides the user to organize task information contained in the Commander’s guidance. An illustrative portion of this “Guidance Typology” is shown in Figure 6-2 below. A complete set of the DAPSE Typologies, Guiding Questions, and Matrices is provided in Appendix H – The DAPSE Offline and an illustrative example is provided in Appendix I.

Commander's Guidance	User Input
What is the Commander's Mission Statement?	
What is the Commander's Intent?	
• Purpose	
• Method	
• Risk	
• Endstate	
What is the desired deterrence effect?	
What is the current situation?	
Staff Estimate Analysis	
• Assigned Tasks	
• Specified Tasks	
• Implied Tasks	
• Mission Essential Tasks	
• Assumptions	

**Figure 6-2 Portion of DAPSE Guidance Typology**

Note that as in each of the DAPSE sub-typologies discussed below, the user input section is open-ended and can be expanded to contain as much information, comment and source material as the user desires. Input cells left blank can also provide a quick visual clue as to where the user's information or understanding may be lacking. In addition to guiding effective information search and integration, the DAPSE typology-based search facilitates systemization of deterrence analyses, and thus makes possible comparative analyses of cases involving different actors, decision units, decision settings and deterrence goals.

Three additional sub-typologies direct the user to query classified and unclassified, and traditional and non-traditional sources of information in order to identify the **Decision Unit**, specifically the principal decision makers and/or decision unit responsible for the actor's behavior; the actor's military, economic and communications **Capabilities**; and the geographical and cultural **Context** within which the actor operates.

**Decision Unit** – How a decision is contemplated, and by whom, can critically affect the choices made. The DAPSE Decision Unit sub-typology guides the user in identifying and characterizing the actor unit – whether group or individual, formal or informal, authoritarian ruled or democratic – responsible for decisions regarding the US deterrence planning or analysis task. A sample from the Decision Unit typology is shown below. The first of several “guiding questions” is shown in the first cell of Figure 6-3. Throughout the sub-typologies cells following guiding questions offer example responses, again along with input cells for a user to elaborate on, refine, add source material and/or identify uncertainties and unknowns.

<b>Decision Unit</b>	<b>User Input</b>
For the issue in the Commander's Guidance, who is the relevant decision maker? (i.e., who can commit the resources of the focal political entity without reversal)	
<ul style="list-style-type: none"> <li>Individual as Primary Relevant Decision Maker</li> </ul>	
<ul style="list-style-type: none"> <li>Group as Primary Relevant Decision Unit - Who are the dominant members? (e.g., opinion leaders, experts, high status, etc.)</li> </ul>	
<ul style="list-style-type: none"> <li>Coalition - Who are the dominant members within Coalition groups? (e.g., opinion leaders, experts, high status, etc.)</li> </ul>	
<b>If Individual Chosen:</b>	
For each relevant individual identified above (committer of resources, decision maker influencer, etc.), is s/he:	
<ul style="list-style-type: none"> <li>A formal leader (i.e., his/her authority derives from an official position)?</li> </ul>	

**Figure 6-3 Portion of DAPSE Decision Unit (sub) Typology**

**Strategic Context** – The DAPSE contains two addition sub-typologies to assist the user in defining the strategic context within which the deteree decision makers operate. These are shown in Figure 6-4 and Figure 6-5.

<b>Capabilities</b>	<b>User Input</b>
Describe the actor's nuclear capabilities (including make, buy, steal)?	
<ul style="list-style-type: none"> <li>Large capability</li> </ul>	
<ul style="list-style-type: none"> <li>Small capability</li> </ul>	
<ul style="list-style-type: none"> <li>Could probably acquire</li> </ul>	
<ul style="list-style-type: none"> <li>No capability</li> </ul>	
<ul style="list-style-type: none"> <li>Don't know</li> </ul>	
Are these nuclear capabilities:	
<ul style="list-style-type: none"> <li>Overt</li> </ul>	
<ul style="list-style-type: none"> <li>Covert</li> </ul>	
<ul style="list-style-type: none"> <li>Don't know</li> </ul>	

**Figure 6-4 Portion of DAPSE Capabilities (sub) Typology**

<b>Context</b>	<b>User Input</b>
<b>Geographic Factors</b>	
How abundant are key geographic resources (including oil wells, mineral deposits, water wells, pastures, arable land, and key transportation routes)?	
<ul style="list-style-type: none"> <li>Abundant</li> </ul>	
<ul style="list-style-type: none"> <li>Sufficient to support constituents/economy</li> </ul>	
<ul style="list-style-type: none"> <li>Sparse</li> </ul>	
<ul style="list-style-type: none"> <li>Insufficient to support constituents/economy</li> </ul>	
<ul style="list-style-type: none"> <li>Nonexistent/Unavailable</li> </ul>	
<ul style="list-style-type: none"> <li>Don't know</li> </ul>	
What is the strategic value of the physical terrain?	
<ul style="list-style-type: none"> <li>Military advantage</li> </ul>	
<ul style="list-style-type: none"> <li>Economic advantage</li> </ul>	
<ul style="list-style-type: none"> <li>Access to water/water routes, etc.</li> </ul>	
<ul style="list-style-type: none"> <li>Other:</li> </ul>	

**Figure 6-5 Portion of DAPSE Context (sub) Typology**

### 6.3 DAPSE Step 2 – Reconstructing the Actor’s Decision Calculus

Generally speaking, four sorts of data are needed to assess an individual’s or a decision unit’s subjective decision calculus. The first – who decides, and what is the process by which decisions are made – involves information that is essentially “objective” in nature, i.e., it is evident to all as points of “fact”. The remaining data are perceptual; they identify the *decision maker’s perceptions* of his own decision problem and setting. These are the goals or interests a particular action serves for the decision maker; what the decision maker believes to be feasible and acceptable ways to pursue these goals; and, who else is involved and what they are likely to do.

The DAPSE user’s Step 2 Objectives are therefore to:

- Determine the primary values (i.e., interests) the decision maker considers in evaluating his choice alternatives;
- Identify what the actor believes are *his own* options regarding the deterrent issue;
- Identify what the opponent actor believes the US/others are likely to do, i.e., the likely behaviors attributed by the actor to others he believes are involved;
- Identify the perceived threats to the actor interests identified.

**Interests** - The DAPSE user employs the Interests sub-typology (shown below) to characterize and assess the actor’s motivations and objectives. Because the DAPSE was designed as a deliberate planning aid, completion of this typology in particular (along with the embedded guiding questions), is intended as a relatively time-consuming, iterative and in-depth process. It should also include input from a variety of sources and, in particular, subject matter experts (SMEs) on the actor to be deterred. Once this process is underway however, the user can begin organizing this information into matrixes containing the actor’s behavior options and key interests identified in the source materials. These matrixes will form the backbone of the Deterrence Decision Calculus (DDC) that is at the very core of the DAPSE.

Interests	User Input
<b>What are the primary interests or objectives (decision dimensions) as perceived by the relevant decision making unit for the issue or behavior the US wishes to deter?</b>	
Enhance political control, authority, or legitimacy (domestic security)	
• Enhance political control, authority, or legitimacy (domestic security)	
• Increase group membership or state population	
• Eliminate/ neutralize internal threats to regime or leadership	
• Seek territory (e.g., as a buffer zone)	
• Tighten internal security and control	
• Create a crisis to divert domestic attention from other issues	

**Figure 6-6 Portion of DAPSE Interests (sub) Typology**

### 6.4 DAPSE Step 3 – Subjective Decision Analysis

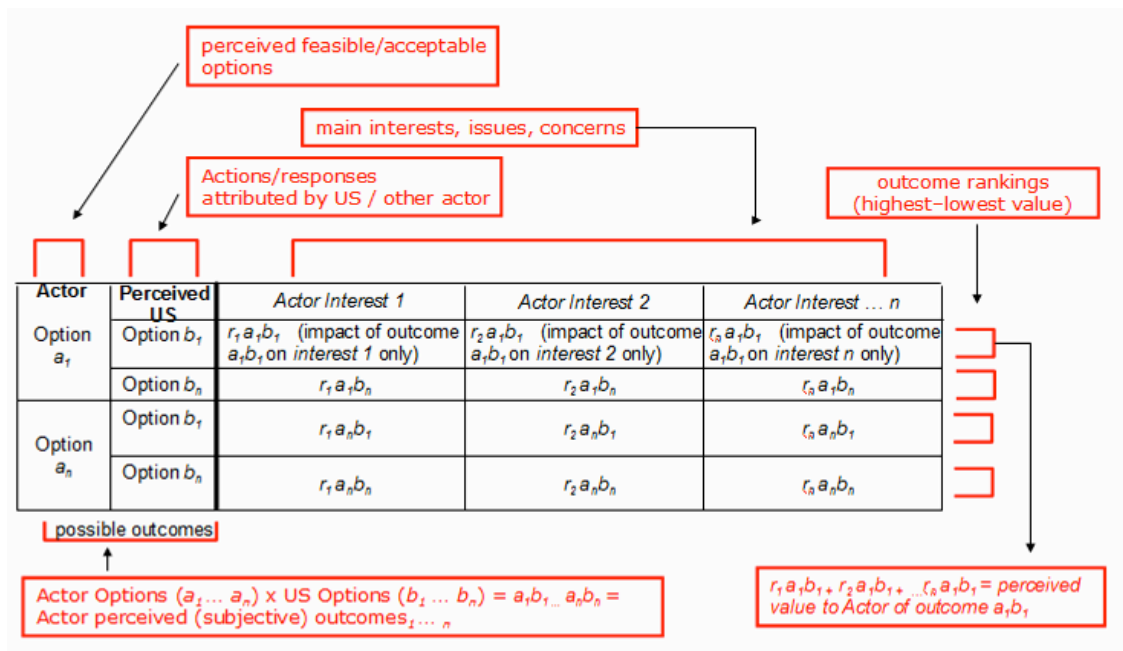
The data entered into the completed DAPSE Interest typology is used to formulate a Deterrence Decision Calculus (DDC) matrix following the decision analytic framework developed by Maoz (1990) and applied in Maoz and Astorino (1992), Astorino-Courtois (1998), and poli-heuristic decision analyses by Mintz (1993) and Mintz *et al* (2002). In the simplest terms, the DDC is a series of matrixes that identify which actions an actor is most likely to pursue *based on the array of his own interests and motivations*. It answers the question: “How can I influence this actor so



that he chooses to do what I want him to do?” That is, it provides the deterrence planner or analyst with a transparent and repeatable means of assessing which “influence levers” might be manipulated to deter unwanted actions.

The user’s Step 3 Objectives are to:

- “Reconstruct” the actor’s decision calculus, i.e., the choice problem from the actor’s perspective;
- Identify, within the actor’s own decision calculus, the factors that both incentivize (benefits) and disincentivize (costs) the actor’s deterrable behaviors, as well as those factors incentivizing and disincentivizing behaviors preferred by US;
- Identify most potent deterrence “influence levers”.



**Figure 6-7 Deterrence Decision Calculus (DDC) Matrix**

**“Reconstructing” the Calculus** - The DDC process and analyses rely on three basic assumptions: 1) decision makers are capable of and engage in strategic, versus purely myopic or temporally-constrained, thought; 2) self-interest is a constant behavioral rule; but, 3) actors are interest-maximizers within the bounds of their own reality. As depicted in Figure 6-7, the DDC matrix is a graphic representation of a multi-dimensional decision process. It contains the decision outcomes perceived by the decision maker/unit (in rows) judged across the key interests the actor perceived to be relevant, and would consider, in making the decision to pursue one of the options. Each “outcome” is the joint result of the actor’s own (acceptable and feasible) behavior options in combination with what he believes to be possible US actions.

The dimensions of the DDC matrix are determined by the number of outcomes and the number of interests. Thus, the DDC framework in Figure 6-7 is a 4 x 3 matrix: two actor options with two possible US actions produce four rows, by three interest columns (one for each of the actor’s interests impacted.) Remember that the reconstructed decision calculus reflects the *actor’s* version of reality. Thus, it may or may not contain the options actually open to (and acceptable to) the US. In fact, in some cases the deteree may not perceive that the US has any interest or impact on his choice of actions.

The DAPSE user builds the DDC matrix frame with the data (e.g., actor options, those attributed by the actor to the US and the actor's interest) captured in the Interest typology. In addition, he relies on Interest typology responses to input text in each DDC matrix cell. This input describes the actor's understandings of the unique effect of each outcome (in the row) on satisfaction of each of his interests (columns). Each cell then, answers three questions:

- How does the actor perceive this **option** (row) to affect his satisfaction of this interest (in column)?
- How does the actor perceive the impact of this **US option** on this interest?
- How **likely** does the actor believe is this **US action**?

See Appendix I: "Stealing Peaches", for an illustration of DDC matrix generation and analysis.

**Analyzing the Matrix** – Decision makers make decisions based on what they expect the outcomes of their choices to be. Once the DDC matrix is built and filled out, the DAPSE user evaluates each outcome by interest and assigns ordinal ranks according to the degree to which it satisfies (or represents a cost to) that interest. These "single-interest" ranks are then aggregated for each outcome across the actor's entire set of interests. This produces a multi-interest (overall) rank for each outcome in the outcome set.

Especially in the case of policy decision making, leaders seek to satisfy multiple concerns often in the face of highly complex arrays of competing interests. In these complex situations arriving at a choice often involves prioritization of competing interests, and pursuit of one or two primary interests. That is, trade-offs are made where satisfaction of an important interest is exchanged for satisfaction of other, less pressing interests. However, while decision makers likely do assign different weights to some of their interests, given the dearth of reliable information on the relative importance of interests in a decision setting (to the extent that a decision maker even calculates these), interests in the DDC matrix are initially considered as equally weighted. This allows for later assessment of the relative importance of the dimensions in the reconstructed decision calculation, and in fact to set up a stricter test for the decision analyses. Moreover, analyzing the Interest typology data in this way yields a subjective (i.e., from the actor's point-of-view) effect-based ranking of the actor's alternatives and outcomes. These scores are then summed across the interests for each outcome to produce an overall (additive) preference ranking.

**Influence Levers** - Which combinations of interests and value pay-offs drive, or incentivize the actor to choose one option over another? On which interest would the decision maker suffer (disincentivizing) costs if he were to pursue those actions the US seeks to deter? These types of questions can now be addressed with reference to the actor's decision calculus as represented in the completed DDC matrix. Having identified the costs and benefits the actor expects to derive from various outcomes, the DDC matrix is used to identify specific ways to manipulate the actor's decision calculus in order to make the action the US seeks to deter (e.g., WMD proliferation) appear more costly than those actions it seeks to promote (not proliferating). These manipulations are the "influence levers" around which potential US deterrence actions might revolve.

## 6.5 Conclusion

Maoz (1990: 370) has argued that in order to advance our ability to understand, explain and eventually predict the behaviors of international actors, researchers must undertake "multi-method approaches" to the analysis of policy problems. He argues that "if qualitative or

quantitative case studies and aggregate data analyses yield convergent findings, the specific limitations of any given empirical approach are greatly reduced.” We agree. For precisely this reason, the DAPSE process does not stop here at the initial suggestion of influence levers – what appear to be the most effective targets among the deteree’s interests for influencing his choices of behaviors. Rather, it prompts the user to continue with critical tests of the validity and robustness of these results of the decision analyses. DAPSE Steps 4, 5 and 6 are the subjects of the following sections.

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## **7 DAPSE Steps 4-5 – Bob Popp {NSI} and Laurie Fenstermacher {AFRL}**

Having identified the strategic context, deterrence objectives and decision calculus of actor(s) to be deterred, the analysis now turns to analyzing the truthfulness of the hypotheses (influence levers) emerging from the decision deterrent matrix, and also evaluating possible courses of action and their consequences under different conditions. Because the deterrence problem domain involves much complexity and uncertainty—and because each model typically has its own related advantages and limitations—Steps 4 and 5 suggest a systematic, methodological analytic approach well accepted by analysts in the intelligence community.

In Step 4, the approach involves using an analytical framework based on Heuer’s Analysis of Competing Hypotheses (ACH) – an approach that provides an ability to measure “truthfulness” of each hypothesis (influence lever) being tested as a function of: (1) strength of disconfirming or confirming evidence; and (2) evidence veracity. It combines model output, SME findings, and other data into one common analytic framework, measuring: (i) the veracity of each evidence node with regard to source reliability and information credibility, (ii) the truthfulness of the evidence in terms of its confirming or disconfirming strength with respect to the hypothesis (influence lever) being tested, and (iii) the diagnosticity of the evidence which is a measure of the influence each piece of evidence (contained in the evidence set) has on each competing hypothesis (influence lever) being tested. Using an ACH approach in Step 4 has many benefits, including: (i) a traceable and transparent way to holistically interpret the truthfulness of each hypothesis (influence lever) being tested; (ii) a way to separate, measure, and derive the drivers most influencing the truthfulness of each hypothesis (influence lever); (iii) a way to analytically measure the evidence set in terms of its veracity; and (iv) documented rationales and narratives for the evidence set supporting all modeler and SME findings, inferences, and judgments.

Understanding how COAs can be used to deter state and non-state actors is an inherently complex and deeply uncertain exercise, and is not easily reduced or amenable to classical analytical methods. Because of the inherent complexity and deep uncertainty, no one theory or model is sufficient. An ensemble of models—containing more information than any single model— must be integrated within a single decision support framework, to generate a range of plausible futures. Robust adaptive strategies, vice optimal ones, that hedge across these plausible futures will provide practical options for consideration.

Step 5 conducts the sensitivity and uncertainty analysis of the models, robustness analysis of DIME deterrent actions, and identifies plausible future outcomes with their associated costs, benefits and consequences of restraint. Models are critical in Step 5 because they provide the means to generate the range (or ensemble) of forecasts (plausible futures) which the user needs to consider. Step 5 essentially supports the DAPSE process by doing risk management – instead of seeking a point prediction about what’s going to happen in the future, Step 5 identifies robust hedging strategies in terms of DIME deterrent actions over all model projections, and also identifies mitigation strategies for clusters of futures with severe consequences.

There are a number of other ways models can be used to assess whether an adversary has been deterred as well as determine the effectiveness of various deterrent DIME options. For example, cognitive models can be used to assess shifts in rhetoric over time (and then correlated with the timing of deterrence actions). Overall, empirically driven models enable analysts and planners to trace out and evaluate new data and, by comparison to earlier findings and projections, to draw conclusions about progress of deterrent actions over time. The models’ systematic metrics and

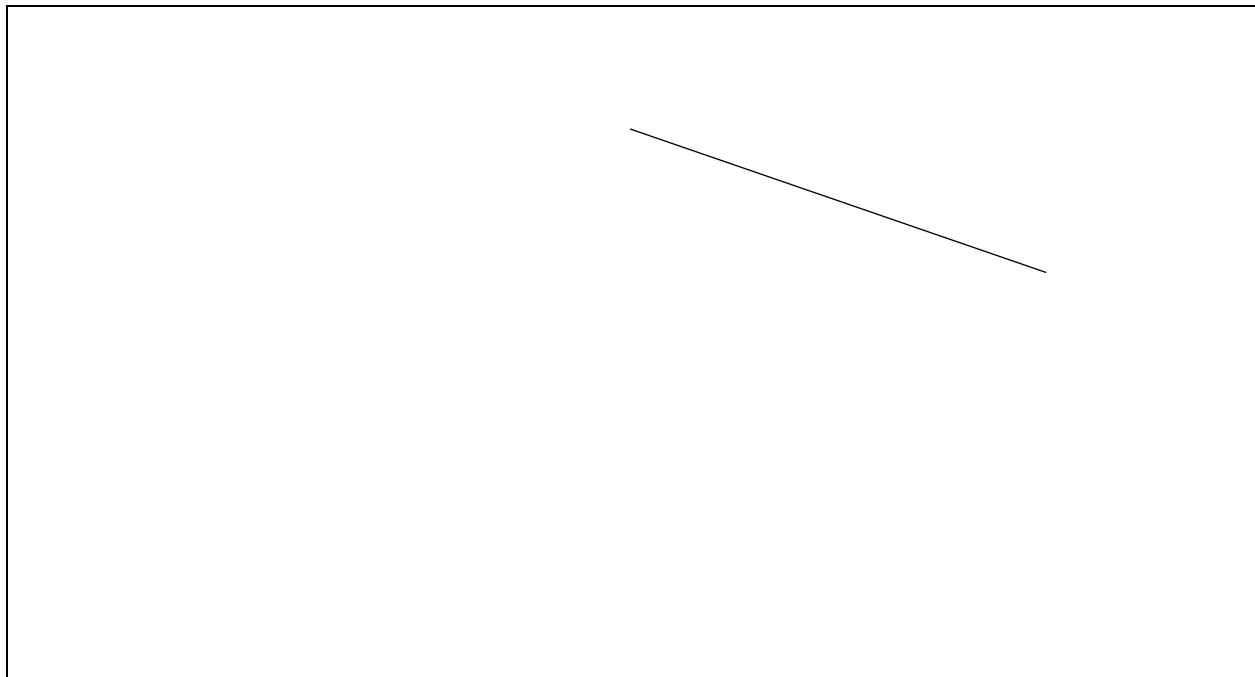
procedures support consistent analysis across different individual analysts and over time while helping codify, preserve and share organizational knowledge about ongoing and historical deterrent operations.

## **7.1 Example Non-State Actor Model: Deterring Foreign Jihad Fighters**

The team considered a number of deterrence problems including the problem of jihad fighters (terrorists/insurgents) coming to their chosen ‘battlefield’ from abroad.

### **7.1.1 Counter-Foreign Fighters DIME Hypotheses and Adversary Response Analysis**

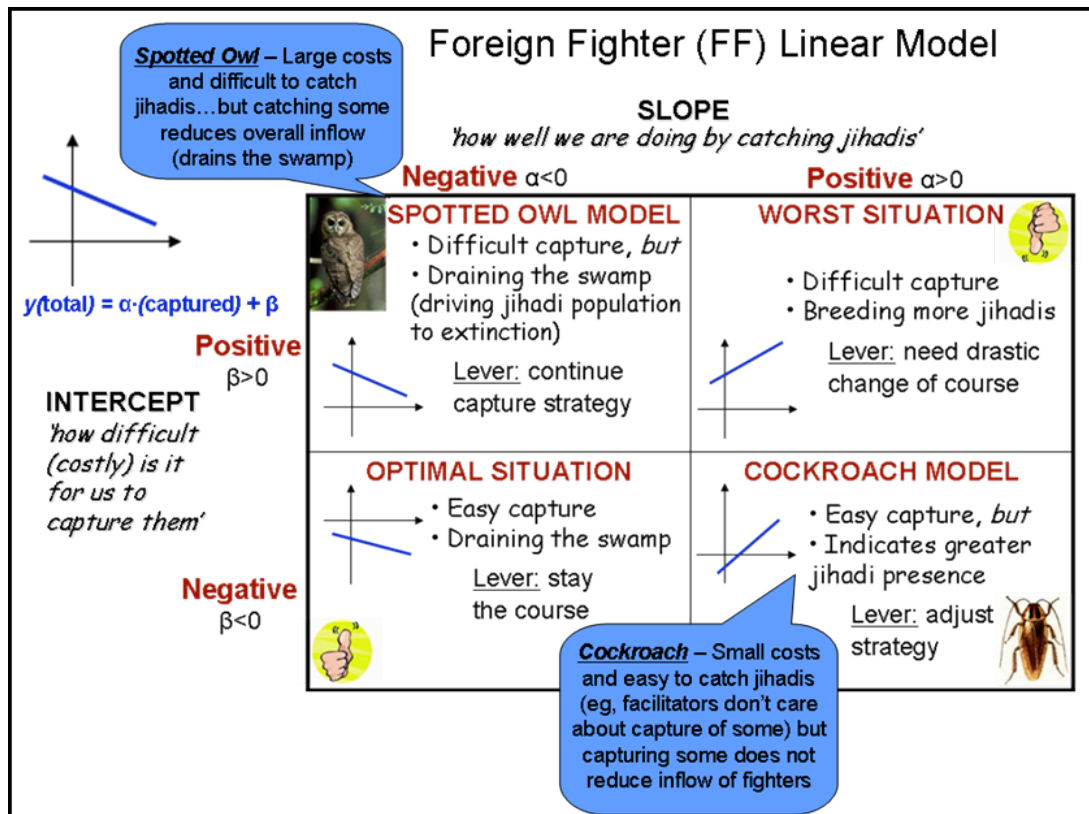
Hypotheses generated by DAPSE Steps 1-3 inquired about the effects of: (i) information operations on countering jihadi leaders’ (“director’s”) recruiting behaviors; (ii) aid programs for Ummah youth; and (iii) personally targeting “directors” (Figure 7-1).



**Figure 7-1 DIME Action Hypotheses for Deterring Foreign Jihad Fighters**

Addressing such specific hypotheses requires the understanding of the underlying dynamics of jihadi organizations. The Foreign Fighter Linear Model (Figure 7-2) was developed to facilitate such understanding by mapping jihadi organization types according to their survival/behavior patterns affecting difficulty of capture (and other types of influence). Various models were considered including, for example, Foreign Fighter Capture-ability Linear Model

The model analyzes the relationship between flows of captured and total foreign jihadis in a country of interest, where number of captured is logically a fraction of total presence (hence, linear model, see Figure 7-2) Initial analysis was based on data on foreign fighters in Iraq originating in Algeria, Bahrain, Djibouti, Egypt, Iran, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, UAE, West Bank/Gaza, and Yemen.



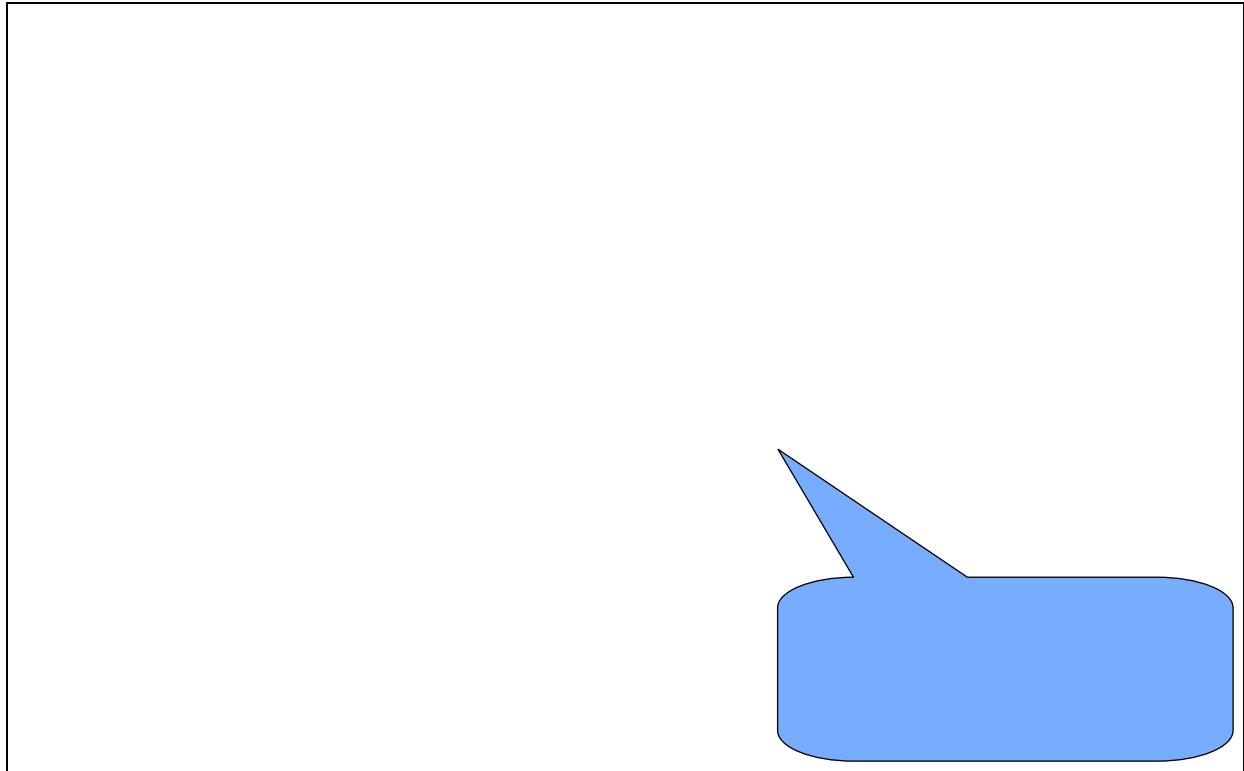
**Figure 7-2 Foreign Fighter Linear Model maps the space of alternative adversary types for evaluating DIME/COA effectiveness under different conditions**

The method easily applies to any group or country. All the analyst or planner would need is data on captured fighters (this data is typically gathered when captured individuals are being processed into detention centers) and estimates of total fighter presence (which are also typically produced by the military and other sources). More fine-grained data by country of origin and other such characteristics as well as by activity over time would enable more detailed insights into jihadi activity and optimal counteractions.

Although based on straightforward (linear data modeling) concepts, this approach enables non-trivial, actionable insights and easy-to-use tools for real-time analysis. For instance, programs for ummah youth will be more effective than countering directors if we are dealing with a “spotted owl” ummah and “cockroach” directors organization. Using full DIME capabilities to personally target the “directors” will increase jihad supported if dealing with “cockroach” jihadi types, and not supported otherwise.

### 7.1.2 Comparative Sensitivity Analysis of Plausible Future Outcomes

The CARs model (Evolving Logic) enables assessing possible long-term developments of each of these four types of jihadi behaviors toward identifying possible deterrent DIME actions and their consequences over time and under different plausible conditions (Figure 7-3).



**Figure 7-3 Counter-Foreign Fighter DIME Action Evaluation using CARS model**

## **7.2 Example State Actor Model: Deterring North Korea**

The team also considered a scenario involving North Korea and missile testing.

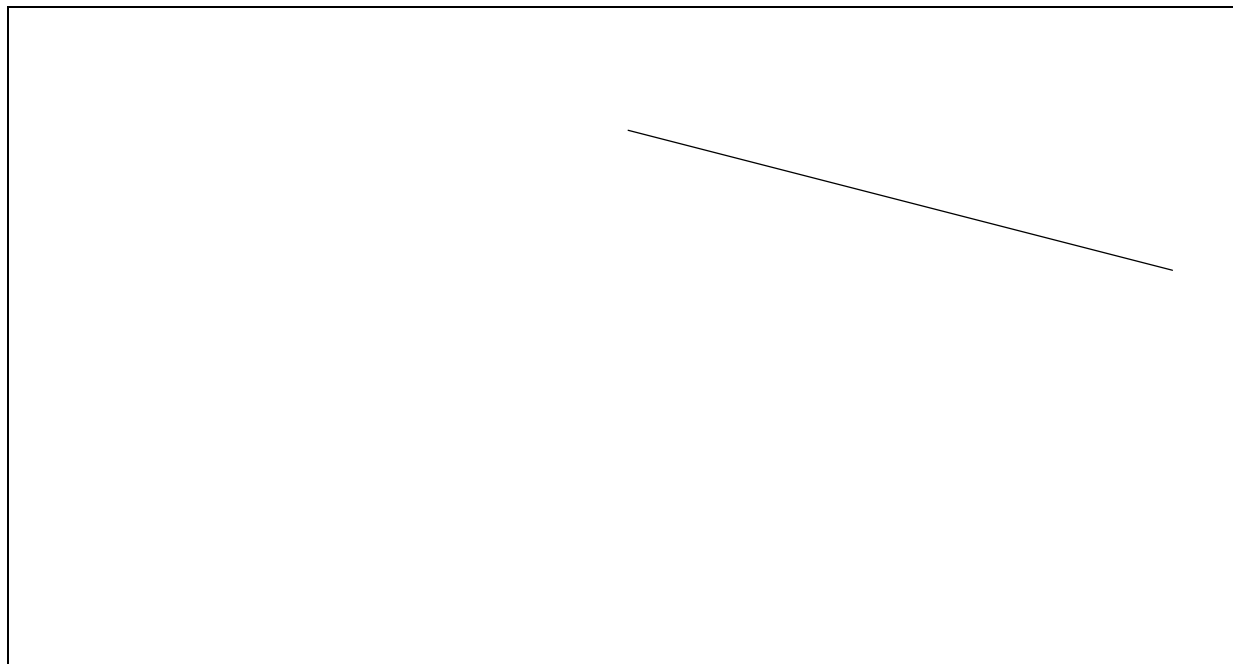
### **7.2.1 DIME and Adversary Response Analysis**

Example state-actor analysis involved several hypotheses about COAs aimed at deterring North Korea from missile testing (Figure 7-4).

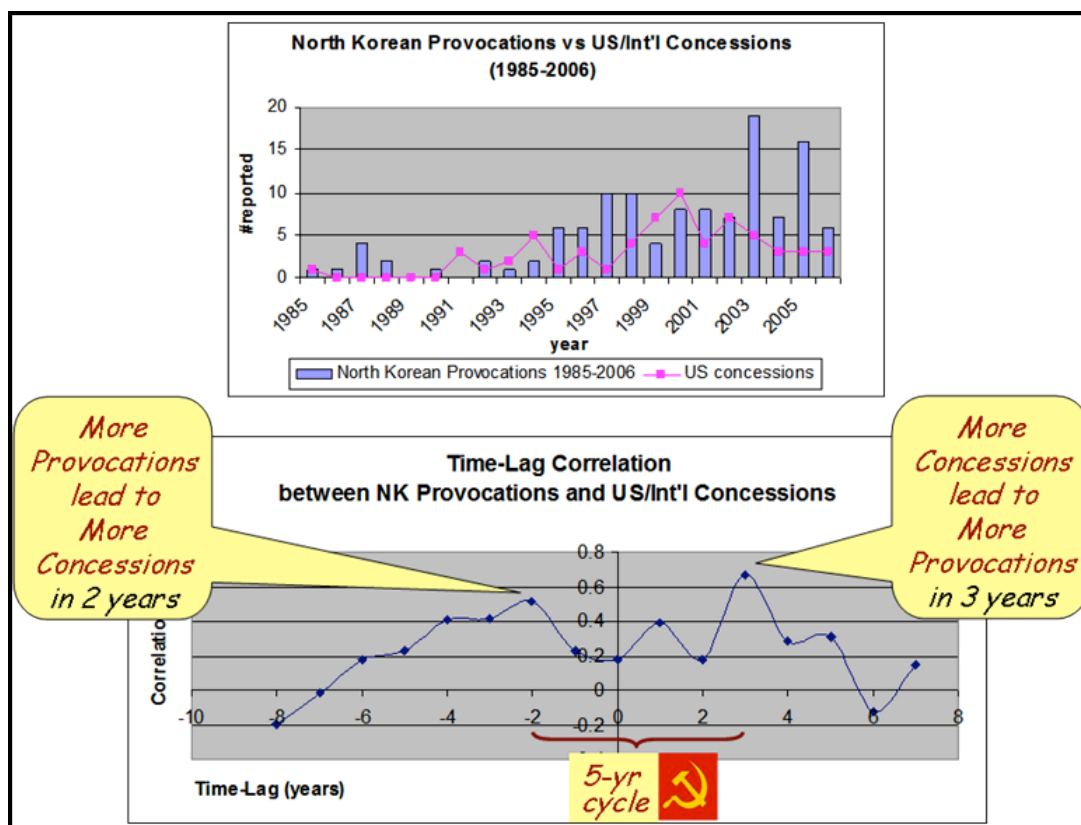
Whereas the COAs represented by sub-hypotheses (H2-1, H2-2, H2-3 and H2-4 in the figure) were quite specific, they represented types of consequences that may (or may not) result from Western concessions to North Korea. Having a general model for understanding the relationship between Western concessions and North Korea's behavior would enable insights into specific actions, and hence such a model was developed (Figure 7-5). The chosen approach was general enough to be readily adaptable to various countries using available data. For North Korea, data sources included: (1) "North Korean Provocative Actions, 1950 – 2007" Congressional Research Service (Apr 2007) including ballistic missiles & nuclear weapons tests, actions to impede negotiations, border violations, infiltration of armed saboteurs and spies, bombing, threats, etc. and (2) "US-North Korean Nuclear and Missile Diplomacy" Chronologies and Reports (1985-2006) describing various US and international concessions such as agreements, ease of sanctions, promise/delivery of money, goods, equipment, etc.

The findings show a cyclical relationship where Western concessions to North Korea consistently follow and lead to more provocations (mirroring a communist economy's 5-year planning cycles) suggesting that North Korea has no incentive to abandon its provocations, and hence—based on the evidence assessed—such COAs are not likely to be effective deterrents.

The CARs model can again be used, among others, to project possible alternative COAs into the future and asses DIME actions with best plausible outcomes under different conditions.



**Figure 7-4 Example Hypotheses Regarding DIME Actions to Deter North Korea**



**Figure 7-5 Time-Lag Correlation Model of Relationship Between Western Concessions and North Korea's Provocations: Data, Analysis and Findings**



### 7.3 Recommendations for Further Development

These fairly simple models are readily amenable to use in different situations (e.g., modeling various nations, jihadi fighters of any origin in any country, etc.) as well as easy to use because they are based on standard and assessable statistical principles. As such, they also offer actionable insights and can be further calibrated (e.g., with more and finer-grained data, etc. to build on the initial approaches) and integrated into the DAPSE process.

Other developments may consider exploring more in-depth the possible applications of other standalone models considered here to the deterrence problem. Additionally, whereas hypothesis testing is a standard analytical method, it requires stringent assumptions that may be difficult to meet under some real-time uncertain conditions. Many other methods are available (e.g., pattern recognition, data mining, information entropy analysis, etc.) that may provide useful alternative ways for evidence evaluation/aggregation as well as for development of new actionable insights.

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## 8 DAPSE Step 6 – Allison Astorino-Courtois {NSI}

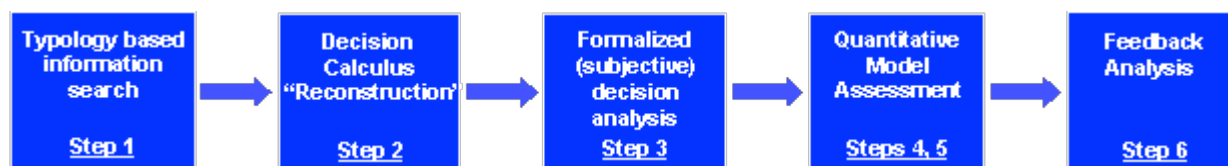


Figure 8-1 DAPSE Iterative Process Steps

### 8.1 DAPSE Step 6 – Feedback Analysis

The final stage in the DAPSE process is a last check of the refined US deterrence option(s) identified in Step 3 and evaluated and tested in Steps 4 and 5. To do this the refined US deterrence option now including actual US DIME actions (either as suggested in the original Commander's Guidance or discovered by the analyst/planner) is "run" back through the DDC matrix completed in Step 3.

<ul style="list-style-type: none"> <li>Optimal DIME Actions for COA</li> </ul>					
<div> <span>D<sub>3</sub></span> + <span>I<sub>1</sub></span> + <span>M<sub>3</sub></span> + <span>E<sub>4</sub></span> </div>					
<ul style="list-style-type: none"> <li>Reevaluated in DDC</li> </ul>					
Actor's Actions	US options	Actor's Motivations/Interests			Rank
		Increase DPRK Global Stature	Maintain his power in DPRK	Complicate US defense planning for NE Asia	
Test Long-Range Missiles	Issue demarche in advance of suspected test (D)				
	Issue declaratory policy (D)				
	Negotiate in advance to avoid test - provide inducement* (E)				
	Conduct show of force exercises prior to test (M)				
	Optimized DIME				
* grain, oil, nuclear power assistance, etc.					

Figure 8-2 DAPSE Step 6 Re-evaluation of US Action

Having studied the world and what he seeks to gain from it from the actor's perspective and, assuming the US communicates the potential US action to the actor to be deterred, the DAPSE user now reassesses whether that action will have the anticipated (i.e., deterrent) effect on the actor's interests and pay-offs. In other words, what does the analysis suggest will be the effect of the US communicating its changes in what is the actor's previously held view of his own decision problem (e.g., by adding a previously unconsidered US option and set of outcomes). The same process used to "fill in" the matrix cells and aggregate outcome preferences employed in Steps 2 and 3 is used here to add the new US option into the actor's calculus. If the re-check of the considered US action continues to support that action as an effective deterrent, the final DAPSE output is a single or a set of actionable recommendations that should serve as the basis of more detailed plans and COAs a planner would recommend.

## **9 Uncertainty Transformed--The Role of Intelligence Collection and Analysis in Support of Deterrence Operations – Bert Davis {ERDC} and Brian Meadows {SPAWAR}**

National security in the 21st century requires perfecting deterrence operations against adversaries who have one essential trait in common, that of enormous will. At times the entire resources of a state are available to express its will, and in other instances will commands only the faithful.

Because America is the master of short intensive warfare, its adversaries work to master Protracted War. First articulated by Mao Zedong, practitioners of the Protracted War follow Mao's first law "to preserve oneself and destroy the enemy." Mao understood that the will of an adversary is a critical vulnerability in a protracted conflict and could neutralize superior economic and military power. Protracted War conscientiously targets will, for years, perhaps decades, with attacks focusing on the political aspects of the struggle. Amplifying the effectiveness of this strategy today is a world wide transportation network providing freedom of movement; instantaneous global communications providing command, control, and intelligence; the diffusion of technology placing sophisticated tools and weapons at the disposal of the individual; and a national economic "just in time" supply chain with inventories too small to withstand disruption.

A generation ago national defense was synonymous with national security. The Department of Defense, the State Department, and the Central Intelligence Agency stood as the centerpieces of national security. The traditional intelligence studies of a state's military power and the will of its leadership to exercise that power provided the insight necessary to craft a deterrence strategy.

Today national defense is only a part of national security and national power. Adversaries and enemies alike, whether acting as proxies or independently, no longer require the resources of a state, including citizenship, to conduct a Protracted War against the United States. Recognizing that adversaries have and will attack non-military targets using any means available, national security responsibilities now fall upon the departments of Homeland Security, Treasury, Commerce, Transportation, Health and Human Services, Agriculture, and Interior. Key challenges arise:

- How then does this change the role of American intelligence collection and analysis?
- What implications does it have for conducting strategic intelligence, the mainstay of determining the intent of an adversary?
- How will the Intelligence Community's collection and analysis support deterrence planning against stateless enemies?

This section begins to address these questions.

### **9.1 Collection and Analysis in Deterrence Planning – Coordination, Uncertainty and Information Pre-Processing**

In executing the DAPSE process (see Figure 2-1), users will accomplish successive refinement of key and guiding questions leading to the development of deterrence options and associated Measures of Effectiveness. Notably from the start, data, information and knowledge will come from sources and methods outside the traditional military and national intelligence community (See Figure 5-5). As discussed in Section 4, the course of developing the DAPSE typology depended on scholarly input and brainstorming, with the aim to capture nascent concepts in

characterizing adversary actor's characteristics, particularly focused on the decision making process. Closely related, came the effort to consider examples of indicators, associated observables and suggested collections and analysis. Following the overarching framework of the DAPSE typology, these originated from much the same process, capturing the collective input from subject matter experts from workshops and related activities (see Volume II, Appendix G – Typologies). While some of the information lies well within traditional context, such as the adversary materiel capability and its associated enablers and constraints (e.g., Joint Pub. 2-01.3, 2000 and see Figure 6-3 and Figure 6-4), much of the focus of modern deterrence planning and analyses actualized in the DAPSE inherently will rely on information producers different from traditional sources, and analyses departing from what we have done over decades. Use of the DAPSE may lead to the necessary prerequisite for the planning process and associated collection and analysis to consider cross-agency (e.g., State, Treasury, etc.) coordination at the initial stages of deterrence planning. This increases the need for automated aids for data preprocessing, uncertainty tracking and information vetting.

The DAPSE emphasizes the use of models and subject matter experts throughout the process, also committing to estimate and track uncertainty. As Lt Col Shannahan comments in Section 1, the DAPSE will offer opportunities to carry out risk management, using models to help quantify uncertainty along the deterrence planning steps. In the DAPSE context, the need to deal with ambiguous or conflicting information particularly pertains to assessment of the intentions of adversary decision makers. As Fenstermacher and Popp suggest in Section 5, confidence in a key piece of information in this regard could decrease proportional to the number of SMEs providing an assessment. They point out that models can provide insight to the assessment of available data using their integrated knowledge of underlying phenomenology (see for example, Santos and Zhao, 2006). Giles (2004) points out that a range of approaches might apply, which include Delphi processes that challenge a range of SMEs to achieve consensus, 3-D cognitive analysis, a semi-quantitative technique of weighting certainty, maintaining integrity of intelligence sourcing as it moves from the source, and a matrix for competing hypotheses to contrast evidence and uncertainty across the dimensions of explanation and planning horizon. We can add to this by including automated analytic problem-solving approaches and the process of accomplishing competing hypotheses by reducing the problem set into discreet, documented steps, and through subject-matter expert opinion pooling. Multi-Sensor Context Aided Detection (MS-CAD) integrates functions and tools depended upon by analysts currently working in the operational environment, to include data searching (software agent technology), data manipulation and warehousing (user interface and database tool), visualization (mapping and link analysis tools), and a production-building tool (to include a mechanism for distribution). MS-CAD introduces three new capabilities beyond the integration of existing tools—a mission-specific workflow interface for applying best-practice processes and procedures, a mechanism for accomplishing competing hypotheses (hypothesis-building and voting schema), and the capability to apply Bayesian processing to information collected during competing hypotheses (processing and output from processing).

## **9.2 Collection and Analysis in Deterrence Planning – Baselines, Detection and Change in Adversary Intent**

The shift from assessing capability space to cognitive space constitutes a major thread of the DAPSE. Whereas traditional collection associated with deterrence planning involved traditional units of measure, time, area, category, and condition in considering capability, collection in

cognitive space involves memes, a unit of human cultural evolution, and structure, organization, feedback and connectivity in cyber dimensions. Joint Publication 2-01.3 (2000) touches on this, describing the need to “assess to what degree the values, beliefs, and motivations of key adversary population groups and military forces coincide or conflict with those of political leaders or may influence decision making” and analyzing the Battlespace with respect to “The formal and informal political, economic, and social power structure”. However, it tends toward describing these in the context of adversary organizations with developed and accessible doctrine. Hunt and Veazie describe in section 11 the considerations of DIME in cyberspace, extending them to propose new considerations for elements of National Power. It seems evident that information providers to DAPSE users will require means of searching, discovering, confirming and tracking variables associated with an adversary’s motivations and intent, and modeling this in the context of determining diagnostic evidence.

Research coming to bear on the challenges of assessing motivation and intent points to the potential contributions to the knowledge base from a variety of disciplines. Hayden (2007) suggests that we have “barely tapped” the resource base with respect to evaluating the relevant databases with new approaches, integrating considerations of sacred values, culture, history, social psychology, and group dynamics. Indeed, Popp and Fenstermacher (Section 7) describe how one could use ensembles of models to understand the range of possible outcomes in testing potential deterrence options. They point out that a system of models support consistency in analysis and can facilitate prioritization of collection efforts.

## **Recommendations**

1. Spatio-temporal surveillance of particular observables in cognitive space requires new techniques and persistent monitoring over potentially long timelines from a variety of information sources.
2. Modeling human behavior is immature and a long term, multidisciplinary activity. We need techniques to quantify, and automate ingestion of, variables characterizing motivation and behavior.
  - In the near term, this largely relates to providing input data for existing and emerging modeling and simulations, and evaluating their forecasts.
  - In the farther term, we need to consider how to build a framework (e.g., generalized actor utility function) for automatically collectable observations.
3. We need to open the discussion of achieving a common data model, representing individual, group, and organization behaviors to expand and extend the Merged Typology – attaining digital representation and suitable collection and analysis processes to drive modeling and simulation and establish measures of effectiveness of DIME options.
4. Research to establish approaches to discover, characterize and track unknown adversarial groups, from delineating cyberspaces to narrow searching, to specific search techniques for establishing and exploiting groups’ signatures, to methods for confirming and tracking groups that may seek to avoid detection. The enabling technologies and analytic methods have emerged to make this possible (Cybenko, *pers. comm.*; Berk and Cybenko, 2007). Associated with this, we need to improve how we can use ISR in either the physical or cognitive domains to cue in the other domain.

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## 10 Private Sector Insights – LCDR Wesley Latchford {STRATCOM/GISC}

### 10.1 Introduction

The 2006 Quadrennial Defense Review (QDR) reflects senior Department of Defense (DoD) civilian and military leaders' thinking, that the forces and capabilities of the United States need to shift "from 'one size fits all' deterrence – to tailored deterrence for rogue powers, terrorist networks and near-peer competitors."<sup>1</sup> This represents a shift away from deterrence theory based mainly upon actions and reactions of state actors.

At the direction of Commander, Joint Functional Component Command-Global Strike and Integration (JFCC-GSI), the Global Innovation and Strategy Center (GISC)<sup>2</sup> conducted a comprehensive analysis to “develop a next step in deterrence; a project that incorporates a typology to understand what we need to know about an adversary, whether state or non-state, in order to effect the adversary’s perception of the US and/or deter an adversary from acting in contrast to our national security interests.”<sup>3</sup>

### 10.2 Background

The GISC Strategic Multilayer Assessment (SMA) team was tasked to develop an aid for deterrence planners addressing 21<sup>st</sup> century adversaries.

In support of the SMA, the GISC Partnership Group was asked to leverage its unique network of non-traditional domestic and international civilian business and academia experts to explore how particular elements of private sector enterprises approach the concept of "deterrence," the indicators utilized to determine when deterrence is necessary, and the "ways and means" by which deterrence is accomplished. This report provides private sector insights into deterrence theory.

For the purpose of defining deterrence with the private sector participants, this report used the definition put forward by Dr. Branislav L. Slantchev. Deterrence is "the absence of war between two opponents and involves an effort to persuade at least one of the opponents not to take an action contrary to the interests of the other by convincing that opponent that doing so would not be worth the effort."<sup>4</sup>

### 10.3 Methodology

A two part investigative method was employed: interview-based case studies of deterrence theory application at major firms from different sectors; and a limited literature search outlining examples of deterrence in the private sector.

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<sup>1</sup> Department of Defense. (2006). Quadrennial Defense Review Report. Washington, DC: Government Printing Office. Retrieved July 6, 2007 from <http://www.defenselink.mil/pubs/pdfs/QDR20060203.pdf>

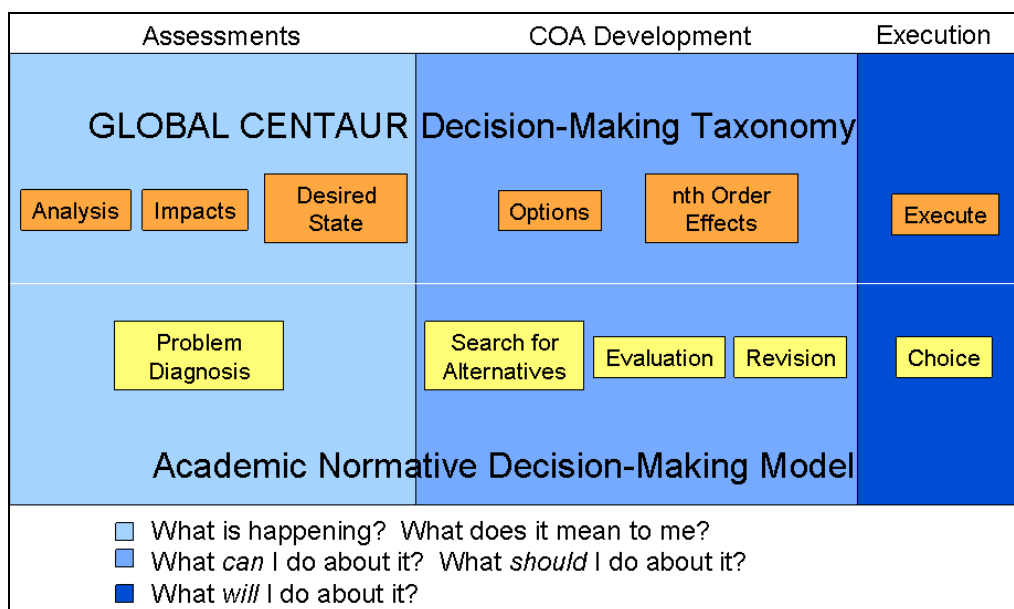
<sup>2</sup> For more information on the Global Innovation and Strategy Center (GISC), see US Strategic Command's Fact Sheet on the GISC at [http://www.stratcom.mil/fact\\_sheets/fact\\_gisc.html](http://www.stratcom.mil/fact_sheets/fact_gisc.html) and a recent article in *Joint Forces Quarterly*, Issue 46, Third Quarter 2007 at [http://www.ndu.edu/inss/Press/jfq\\_pages/editions/i46/13.pdf](http://www.ndu.edu/inss/Press/jfq_pages/editions/i46/13.pdf)

<sup>3</sup> See the complete text of LtGen Elder's letter defining the Deterrence Theory project.

<sup>4</sup> Slantchev, B.L. (2003). *Deterrence and Compellence*. Introduction to International Relations (Poli 12). University of California, San Diego. Retrieved July 6, 2007 from <http://www.polisci.ucsd.edu/~bslantch/courses/ir/lectures/notes-10.pdf>

Senior executives from nine major sectors of the US business industry were interviewed. Specifically, academia, criminology and terrorism, general aviation security, journalism, maritime shipping, market research and consulting services, public health and human services, retail gaming, and retail sales. These sectors were chosen because of their intrinsic need to deter peer competitors, individuals, or organizations from taking certain actions as part of their typical daily business activities. For business confidentiality, firms are identified only by industry sector.

Interview responses were overlaid on the GISC's Global Centaur decision-making taxonomy (Figure 10-1).<sup>5</sup> Private sector deterrence strategies are focused primarily on the "Assessments" and "COA Development" portions of the taxonomy.

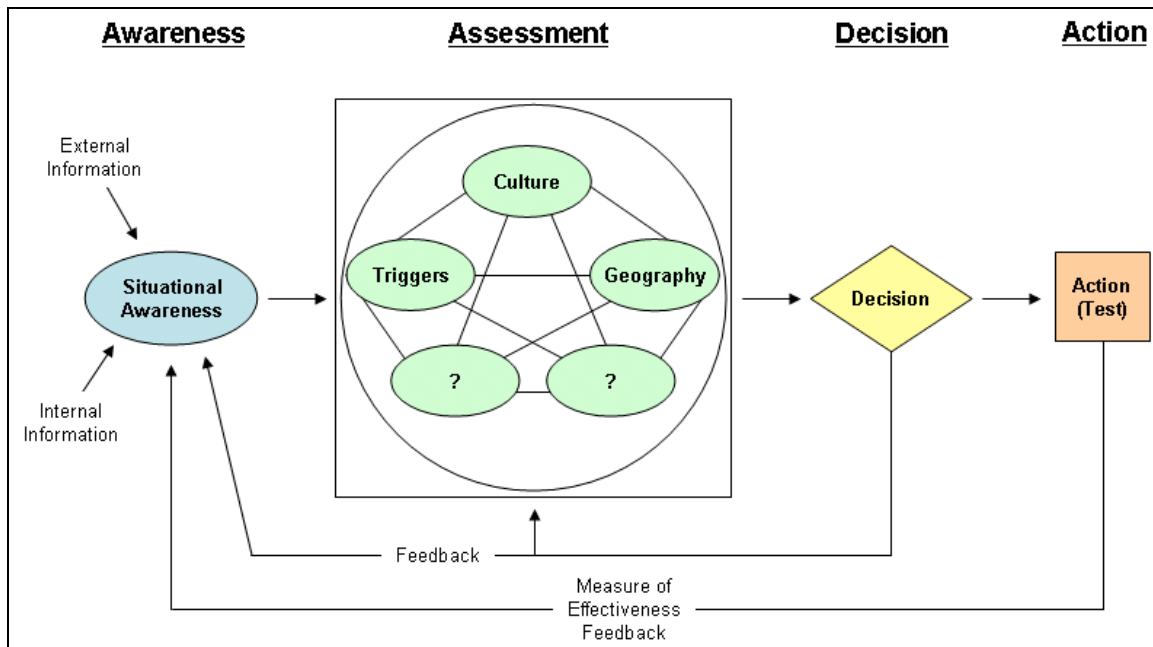


**Figure 10-1 Decisionmaking Framework Comparison**

Analysis of the interview responses concluded they can be characterized as a Generic Private Sector Deterrence Cycle (Figure 10-2). The cycle is based on the premise that the private sector is continuously maintaining situational awareness, assessing activities for threats, and taking action as appropriate.

<sup>5</sup> Global Innovation and Strategy Center. (2007). *Private Sector Crisis Decision-Making Practices*. Partnership Group. Unpublished US Government report.





**Awareness** - Scan the environment and gather information, looking for indicators that deterrent actions may be required.

**Assessments** - Use the information to form a mental image of the circumstances. Assess whether indicators may drive actions to deter unwanted activity by others.

**Decision** - Determine whether competitor has crossed a line or triggered a plan that would justify considering options. Select a subsequent course of action.

**Figure 10-2 Generic Private Sector Deterrence Cycle**

The following questions, associated with the decision making taxonomy, were presented to private sector experts:

- **Awareness** – What indicators are used when considering whether to act to deter some activity (for example, deter a competitor from entering a market of interest)?
- **Assessment** – Are there specific lines a competitor must cross in order to consider taking action to deter the undesirable activity? Are there differentiations in the approach based on cultural or geographic factors?
- **Decision** – Is there an existing deterrence plan or model used when considering an action? What specific actions might be valuable to consider if one was intending to deter a competitor from taking a certain action?
- **Action** – If action is taken, how are the effects of the actions measured?

#### 10.4 Key Findings

1. While there was no evidence of a single deterrence tool or process, most members of the private sector employed common deterrence techniques to obtain desired employee, customer, and competitor responses.
2. The private sector considers various aspects of the situation and target audience (example: demographics, experience, location, motives and goals of central actors), then develops a message and means of delivery to obtain desired results. Once that message is

transmitted, various methods are used to assess success, and follow-on actions are developed and implemented if needed

3. The private sector considers impacts of their deterrent actions across all aspects of their organization and their industry sector (similar to the Department of Defense's Diplomatic, Information, Military, Economic, Financial, Intelligence and Law Enforcement (DIMEFIL) construct).

### **10.5 Recommendations**

1. The Global Innovation and Strategy Center (GISC) Strategic Multilayer Analysis team should incorporate private sector deterrence paradigms into the Deterrence Analysis and Planning Support Environment (DAPSE) model being constructed for USSTRATCOM Joint Functional Component Command-Global Strike and Integration (JFCC-GSI).
2. The Commander, JFCC-GSI, should cultivate a broader, informal network of senior CEOs and academic advisors (domestic and international) beyond the scope of private sector members of the Global Strike Strategic Advisory Group (SAG) to provide continuing insight into deterrence, with the goal of developing a comprehensive deterrence strategy in Phase 0 of future conflicts.

## 11 CyberDIME – National Power, Networks and Connections in the Information Age – Carl Hunt {IDA} & CDR Todd Veazie {J3 DDGO}

*CyberDIME* is a proposed transition concept upon which we may build strategy for future relationships within the global environment. It extends the ideas of leading thinkers such as Thomas Barnett and his theory of connection within the “Functioning Core,” while updating the traditional pillars of American power. In CyberDIME, the term *cyber* represents all things, technology and “non-technology,” that connects and communicates with other people, systems or objects. Information and knowledge are keys within CyberDIME which suggests an obvious and close parallel to, if not intersection with, the meaning of Information in the traditional sense of the DIME (Diplomatic, Information, Military and Economic).

CyberDIME is about the emergent, interactive phenomenon of information and knowledge within a collective (or network). It is not just technology; it’s also organization and connectivity. Technology, as a part of the cyber environment, is only an enabling component. Structure, organization, feedback and connectivity (often manifested in a dynamic environment) are crucial to understanding power and interaction in the CyberDIME...organization really matters, as Mark Buchanan notes in his new book *The Social Atom*.<sup>6</sup>

In the context of CyberDIME, Cyber Power is an Information Age enhancement to National Power. Cyber Power accounts for two critical, but heretofore unaccounted for components of all of the pillars of national power: the capability to connect and the insights to understand those connections. The capability to connect is built on *connected collectivity*, rooted in the concept of openness and opportunities to connect (at least within the US and western nations) as empowered by dramatic growth in global Internet connectivity and an ever-expanding structure for connecting. The insights to understand connections reflect advances in computational power to help visualize new structure and organization through modeling and simulation. Cyber Power is not so much a power in the sense of other components of the DIME as it is a historically unparalleled capability to better understand our world and how Deterrence in the Cyber Age may play out.

As a conceptual model, the DIME has been used by the DoD and the Department of State for some time, and is well documented in books and publications. The DIME, particularly the non-military sources of power, highlights the essence of Joseph Nye’s *The Paradox of American Power*, in which he discusses how the United States is no longer a hegemon in some elements of what modern countries consider the components of national power. Nye describes a 3-D chess game environment where the US has tended to focus on only the military component of power resulting in various nations (and even non-nations) being able to move pieces on other layers of the board we have not been watching. The theme of Nye’s book is related to the use of *soft power*, which includes the non-military forms of power. As Nye alludes, this is now augmented by Cyber Power, the thesis of the CyberDIME construct. Clearly the DIME in 2007-2008 requires the US military, the State Department and indeed all of the Interagency players to look across all forms of power and the interconnecting relationships among them.

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<sup>6</sup> Abstracted from *The Social Atom*. In the CyberDIME construct, organization really matters, as *The Social Atom* author Mark Buchanan notes in his new book about the importance of structure and linkage between and within organizations.

As an initial point of departure from the traditional DIME, the Information component of the existing DIME does not reflect the sciences at work behind connectivity, networks and information access. The current *I* in DIME primarily refers to providing or withholding information, an antiquated notion in the dynamics of the networked Information Age. The addition of Cyber Power as an element of national power begins to account for these new dynamics. The world has qualitatively changed since the DIME first showed up in the literature. We very much need a new paradigm for the consideration and application of national power.

Even in a world that is not as interconnected as the West, Barnett's so-called "Non-integrating Gap" that includes much of the southern hemisphere and Southeast Asia, a "re-minted DIME" will help inform the future US geo-strategic footing around the globe. A DIME that is based on a full understanding of the dynamics of interconnectivity and the latent capacity to connect within the collective will give way to new means of leveraging the traditional components of national power in ways that improve the US role in global communications, economic development and diplomatic relationships. This is Cyber Power.

The connected collectivity features of Cyber Power also speak to their contributions to shaping the environment through relevant network connections (people and organizational networks as well as computer networks). Advanced simulation techniques, such as agent-based models, help us discover and infer details about emergent collective structures and the use of *niche power*. Niche power speaks to the mixing of various power sources (some of which the US may not have or be willing to use), leveraging the powers of others (including adversaries), and exploiting chinks in the armor of the adversary.

An important idea behind Cyber Power is its ability to tune the use of the other powers. Not only may Cyber Power eventually be used as a stand-alone capability, but it can also blend with the other powers in ways that amplify or dampen their effect. An example of amplification would be where diplomatic power is augmented through an underlying influence network that is optimized to focus public diplomacy and psychological operations efforts through an easily accessible media outlet. Using Cyber Power to amplify the concept of *hirabah* (Unholy War against society and innocents) rather than *jihad* (Holy War) as a concept of terrorism is a further expansion of this application of power.<sup>7</sup> In the same way, one could also seek to dampen the idea of *jihad* as used by fundamentalists leveraging Cyber Power.

Given there may be occasions where it's advisable to dampen a friendly use of power, the following Cyber Power dampening example speaks to hampering an adversary use of powers. This example uses friendly Cyber Power to shut down or corrupt propaganda efforts of Al Qaeda through IO tools that misdirect the message or counters it through friendly media channels with messages that demonstrate the futility of the extremist narrative (or exposes it against the facts of more acceptable mainstream messages). This might include calling into question the validity of the adversary message-sender to speak for his group or for fundamental Islamic principles. In this case, Cyber Power would synergize with Information Power to shape perceptions.<sup>8</sup>

There are likely to be many connections and nodes involved in the application of national power. The ability to understand the connections will require computational models to better

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<sup>7</sup> See Waller, J. M., *Fighting the War of Ideas Like a Real War*, 2007.

<sup>8</sup> Ibid.

comprehend the rules that govern them and understand their dynamic evolution so that we might influence that direction. A second facet of Cyber Power as a part of the CyberDIME construct is its ability to harness these models in ways that connections and the evolutionary nature of these connections (their organization and structure) may be visualized in time for intervention or even strengthening. Inference of intents and motivations may also be possible by observing the inner workings of these simulations. The nature of the organization and structure of an entity is often more important than its composition, particularly in dynamic situations where original intents and motivations are denied and the adversary takes some action it did not intend to take. Understanding structure and organization of the adversary, as well as its communication media, helps deduce limitations or capabilities.

Feedback is critically important to the effective use of Cyber Power. Feedback not only helps to control the inner dynamics of a power system, but also gives it inputs from the target to which the power is applied. Feedback in this context is more like economic or financial market feedback where perception and cognition are as significant factors in the power output messages as the “physical reality” of the environment. Feedback is paramount to understanding how effectively power is being applied; this also applies to denying the adversary feedback on his use of power. Advanced simulations (such as described above) allow for visualizations of these connections and feedback loops.

The CyberDIME approach reflects connectivity of all the elements of national power, leveraging the information- and interconnectivity-based assets to the hilt. Connected people and information, even though distributed across a wide area, are the essence of Cyber Power. The former DIME does not cut it as a prescriptive and encompassing description of the components of National Power in the Cyber Age – it ignores far too much of the network dynamics of the Internet, global interconnectivity, and the niches of power formed by smaller, non-state groups (and even modernizing state entities). The DIME fails to consider openness and structure as critical data points, even within the contemporary Information component of the DIME. The advent of Internet collective connectivity and exploitation of information and knowledge have resulted in social and cultural dynamics that are very difficult to predict and even to explain.

The DIME also does not account for the development and expansion of niche power, some forms of which are not even alluded to in the context of the DIME due to their highly dynamic, non-linear nature. In fact, niche power often exerts asymmetric, non-linear effects resulting in small groups “forcing” much more powerful groups (even nations) to do things they would not have previously considered. Failure to forecast the emergence and consequences of these situations not only results in surprises but further disconnects the US from implementing global solutions that could have mitigated or avoided the surprise in the first place. “Black Swans” may not be predictable, but perhaps we can observe their ripples in the water as they approach, discovering the niches they would exploit.<sup>9</sup>

Deterrence in the Cyber Age will not work as it did in the Cold War, simply because we will find it far more difficult to apply it and to understand feedback from its use – we may not be able to understand what the adversary values and thus never understand how to place that value at risk. The advances the DAPSE offers us in understanding the use of deterrence and other forms of

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<sup>9</sup> See Anderson, C., *The Long Tail*, Hyperion, 2006; and Taleb, N., *The Black Swan*, Random House, 2007.

coercive power will be critical to appreciating our potential as a global power. This will absolutely require more consistent use of multi-discipline thinking and decision-making.

We must create a Cyber Power-based DIME incorporating interconnectivity and economic interdependencies already emerging. We must change our thinking about the DIME to include interconnectivity and shore up the economic, diplomatic and information components, while strengthening the potential of the military component. In other words we must recognize there is a CyberDIME approach to wielding National Power. In this new interconnected world, we should consider that we may need to ***Re-Mint the DIME!***

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## **12 Deterrence in a Global Context – Ways Ahead - Lawrence Kuznar {Indiana University – Purdue University, Fort Wayne}**

The Deterrence SMA project accomplished many milestones on the way toward operationalizing a new approach to deterrence, including development of a social typology, integration of modeling and development of an adversary deterrence decision calculus. The team also identified areas that need further work and integration into a broad concept of and method for deterrence. We expect this list to grow as we further develop deterrence methodologies. However, four ways ahead were identified that clearly require more development. They include social neuroscience, global challenges, information age deterrence and strategic communication, and dynamism and complexity. Related to these is the potential for the development of a dynamic approach to deterrence that would incorporate feedback from on-going US COAs and re-evaluation of deterrence strategies, operations and tactics.

### **12.1 Social Neuroscience**

Social neuroscience, the study of the relationship between neural and social processes (Cacioppo and Berntson 2002:3), situates mental phenomena in a physical brain and explores the dynamic interplay between our social lives and neural activity. Key areas of inquiry include theory of mind (TOM), attention/perception, memory, emotion, and economic decision making and value. Each of these topics is relevant to understanding an adversary's decision calculus. Since the central component of the DO-JOC is an adversary's decision calculus, social neuroscience has the potential to inform us about how an adversary's mental functions operate and may be influenced. Given the dynamic interaction between social setting and brain development/activity, social neuroscience has the potential for revealing the influence of cultural differences in setting, social organization, values and beliefs on brain activity and decision making.

Social neuroscientists understand the development of our uniquely human brain activity as a result of the manipulation of information to inform, deceive, defend and outwit fellow humans; "intragroup and intergroup competition among early hominids fueled a need to anticipate and predict others' behavior. Both tactical deception ... and social cooperativity are behavioral consequences of such a mechanism (Adolphs 2006:270)." There have been several key compilations of seminal works in social neuroscience that have been published in recent years (Cacioppo and Berntsen 2004; Cacioppo, et al. 2006; Cacioppo, et al. 2002), along with several key books (Baron-Cohen 1997; Calne 1999; Damasio 1994).

Social neuroscience is a newly emergent field with much promise for illuminating how neural activity is related to the kinds of cognitive functioning related to social interaction. Since adversaries make decisions in social contexts, and since the relationship between USG and an adversary is itself a social relationship, research findings in social neuroscience will be relevant to studies and applications of deterrence. However, it is also important to recognize the nascent character of the field of social neuroscience. Empirical findings are just beginning to emerge, methods are newly developed, the precise meaning of metrics are still being determined, and there is no single guiding theory in the field. Therefore, direct application of neurological research on adversary behavior is unlikely to be effective at this time. However, to the extent to which models of decision making and social interaction imply corresponding brain activity, the field of social neuroscience will likely play a pivotal role in validating (and invalidating) these models.

## 12.2 Global Challenges

During the cold war, the primary terrorist threat faced by Western powers was thought to be state-sponsored terror supported by a Soviet adversary (Combs 2003; O'Neill 2000). Today, “new terrorists” tend to be diffused across sparse networks, unattached to any particular state, culturally diverse and decidedly global in location and outreach (Lesser 1999a; Propst 2002; Richardson 2004). Threats (non-state and state) emanate from a wide variety of societies, and therefore greater sensitivity to what matters to people in different societies is essential if we are to correctly identify what adversaries value or what grievances they claim. The lack of a clear base of operation makes identifying a terrorist organization’s center of gravity extremely difficult and targeting seemingly futile. The lack of geographical rootedness and the dispersed nature of terror networks provide them with flexibility and adaptability as they face challenges from the established states they threaten (Hoffman 1999, see Carl Hunt and Todd Veazie, previous chapter). Al Qaeda is a prime example. Fully understanding what they value and why requires familiarity with the historical background of Islam in general and of the Salafist movement in particular (Habeck 2006). After losing their safe haven in Afghanistan, al Qaeda was able to maintain focus on their Salafist values and objectives by dispersing across the globe and ensconcing itself in the Federally Administered Areas of western Pakistan (Stern 2003). Furthermore, al Qaeda’s command and control capabilities are unclear and bin Laden’s and Zawahiri’s prime roles at this point may be more as inspirational figures. Confronting such a “protean enemy” will certainly require new strategies and tactics, such as novel applications of air power for ISR and precision targeting of terrorist nodes (Lesser 1999b), and the development of international terrorism statutes to enhance law enforcement and prosecution, increased intelligence and counter-terrorism combat training (Alexander 2002:391).

Another aspect of the “new terrorism’s” global character is the growing networking of terrorist groups who share technology and information. A recent RAND report detailed cross-training and sharing of materiel between Islamist and nationalist groups in the Philippines, between IRA and the FARC in Columbia, and between Shia Hezbollah and Sunni Hamas in Palestine (Cragin, et al. 2007). Related to this is the increasing nexus between criminal (drug and arms traffickers, forgers, smugglers, pirates) and terrorist organizations, especially in ungoverned spaces such as areas of central Asia and the Tri-border region of South America (Cornell 2005; Curtis and Karacan 2002; Jameison 2001; Makarenko 2005; McCaffrey and Basso 2004; Stanislawski 2005).

## 12.3 Information Age Terrorism

The unprecedented ability of people to communicate is another global challenge for deterrence. Information in the information age goes beyond the traditional concept of information as an instrument of state power, and now must embrace the idea of highly networked cyber-information (see Carl Hunt and Todd Veazie, previous chapter). Given the plethora of images and messages available to people through modern communications (especially the Internet), a more thorough consideration of the cultural meaning of these messages and symbols to global audiences is necessary for anticipating their effects.

Not only are satellite communications and cell phone services providing adversaries with communications capabilities unheard of 20 years ago, but the Internet has become a major force multiplier for terrorist organizations (Arquilla, et al. 1999, although they note that old fashioned methods are still viable). Conway (2004:276) provides a useful typology of uses that terrorists



make of the Internet. These uses range from: simple use for communication and propaganda, to “hacking” to disrupt services, to “cracking” to steal data, to cyberterrorism in which the Internet is used to commit serious damage (e.g. an attack on the NY Stock Exchange). She notes that groups such as Hezbollah, Tamil Tigers (LTTE), Hamas, the FARC and MRTA have all effectively used the Internet in some fashion.

Gruen (2004) finds that White supremacists and Islamic terrorists use the Internet for the same 5 primary purposes, propaganda, recruitment, indoctrinization, fundraising, and psychological warfare. She notes that these groups target disaffected and alienated young males by appealing to their sense of frustration and adventure, leveraging entertainment and gaming, and using deception and infiltration. Terrorists will infiltrate moderate chat rooms and subtly shift the frame of discussion over time, literally taking over blogs (Gruen 2004:294). White supremacists have created a genre of heavy metal music (White Power Music) that has created a large following (Gruen 2004:293). Both types of groups have developed online computer games that desensitize players to violence and direct hatred to particular groups. The white supremacist games include “Nigger-hunt,” “Racial Holy War,” “Concentration Camp,” and Islamist games include Hezbollah’s “Special Force,” which features operations against Israeli forces in Lebanon and target practice sessions on Ariel Sharon. The suicide bombing game “Kaboom!,” in which players earn points by blowing themselves up and killing a maximum number of civilians, is recommended on a white supremacist website (Gruen 2004:296).

Research on European Jihadists confirms that the Internet has become a key means for disaffected, young Muslim males to interface (Atran and Stern 2005). Both second and third generation Muslims who have not integrated into mainstream European society and recent immigrants who often innocently seek contact with fellow immigrants are drawn to these websites.

Terrorist use of images and rhetoric to recruit, deceive, and influence populations constitutes a form of psychological operation that is gaining in sophistication (Conway 2004; Gruen 2004). This has led some analysts to advocate renewed efforts at strategic communication (Gruen 2004:299). Strategic communication includes public diplomacy efforts (communications with people of other nations), public affairs (informing media and public about government policy), and information operations (PSYOP, use of information to influence others) (Waller 2007:15). With regard to Salafist Jihadist radicals, Waller argues that the US government should more aggressively send messages that support friends and allies, disrupt and divide terrorist groups, appeal to non-violent Muslims, use Islamic concepts to de-legitimize extremist actions, and ridicule terrorists when they act foolishly or stupidly from the perspective of the cultures they are trying to influence (Waller 2007:Chapter 6). All of this requires increased sensitivity to the symbols, sentiments and practical concerns of the people from which the US wishes to isolate terrorist groups.

## **12.4 Complexity and the Dynamic of Global Terrorism**

Terrorism analysts are increasingly stressing the complexity of modern terrorism and its dynamics. Terrorism analysts use the term in the mathematical sense of a dynamically evolving system whose parts are causally related in non-linear ways. These analysts point out how inherently unpredictable and adaptive such systems are and relate these features to the ever-changing landscape of terrorism (Ellis 2004; Fellman and Wright 2004; Hayden 2007). The concern with complexity and dynamism is often focused on the network structures of terrorist

organizations, as discussed in the previous chapter by Carl Hunt and Todd Veazie. Dispersed cell-like organizations easily recover from the removal of a node or even a cell because of the redundancy of the network (Barabasi 2003; Carley, et al. 2003), although terrorist organizations often must adopt a more visible and hierarchical structure when they engage in operations (Drozdova, et al. 2006). Terrorist organizations with dispersed structures have been resilient against attacks (Stern 2003), and they also have adroitly shifted relationships with other terrorist groups (Cragin, et al. 2007) and criminal organizations (McCaffrey and Basso 2004, and others cited above).

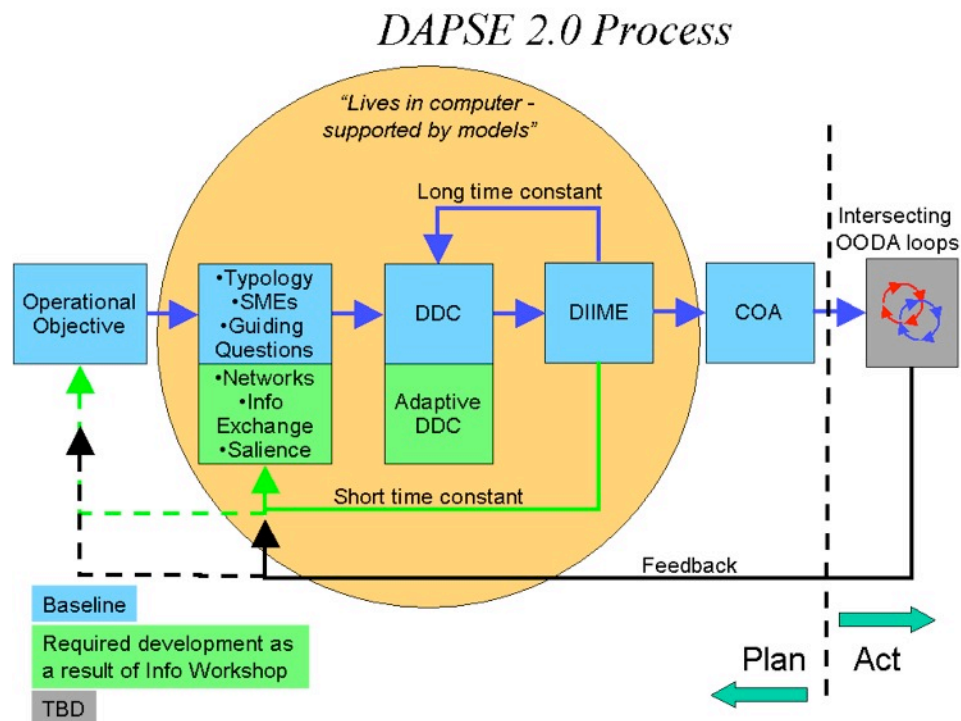
Another aspect of dynamism in today's global terrorism that was discussed as part of this SMA project was the unprecedented speed with which people can communicate. In 20<sup>th</sup> century terrorism, communications were constrained by land travel, less accessible air travel, and less accessible communications. Much communication necessarily occurred face-to-face. Such slow and personal communications necessarily slowed the pace of information and materiel exchange, organizational development and planning of terrorist organizations and for that matter, states. The near real-time reporting (and spinning of truth) made possible by satellite communications and the Internet make possible communication around the globe in nanoseconds. Therefore the impact of a terrorist attack or some state's action can be felt immediately by millions of people around the world. The reactions of those affects likewise can have a near instantaneous effect on terrorists. Such immediacy of communication creates the potential for incredibly rapid reactions, over-reactions, and subsequent actions, which can produce wildly fluctuating shifts in support for terrorism recruitment or even attacks, or international support/condemnation of some state's action. The potentials of the 21<sup>st</sup> century, we believe, demand a new approach to deterrence that itself is dynamic, complex and adaptive.

## **12.5 Dynamic Deterrence**

Given the rapid dynamic shifts in political and military affairs typical of today's world, OPLANs that take months or years to develop will be of decreasing use. Following recommendations for re-minting the DIME (previous chapter), we recommend that deterrence take on a more proactive and responsive character, allowing rapid assessment of threats, responses to those threats, and evaluation of the effectiveness of our responses. The OODA-Loop (Bodnar 2003) of Observe – Orient – Decide – Act is a good model for a new model of deterrence. Furthermore, this character will have to take greater pains to understand the unique perspectives, cultures and values of an adversary if we are to anticipate the adversary's decision calculus correctly. The deterrence system will need to be able to iterate a culturally attuned OODA-Loop rapidly in near real time to be effective in today's dynamic, changing world (see Figure 12-1).

Since the OODA-Loop is primarily focused on perception and mental processes, understanding the role information plays in adversary decision calculus is essential. Because information now comes to people through varied connections, being able to model how networked influences impact an adversary's decision calculus will be key. The dynamism of adversarial behavior requires being able to track the feedback between new information, altered decision calculus and behavior, and the influence of even newer information in both long and short time frames. These changes alter the networks and state variables adversaries consider. Rapidly changing adversarial behavior feeds back to US operational objectives. Leveraging findings in social neuroscience, revising our understanding of how information is used in today's world (including cyber-information) and what it means to varied audiences, and increasing our capability to track

and understand complex and networked influences on adversaries are future developments we anticipate for deterrence in order to meet the novel global challenges analysts and planners face.



**Figure 12-1 A Dynamic Deterrence Process**

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### **13 Application of DAPSE to Non-State Actor – Sue Numrich {IDA}**

After several months of work, we had the theory, the typologies, the guiding questions and the critical need to test them against potential scenarios to assess whether or not they worked together to produce a viable result. The purpose of this section is to explore one of the test scenarios in some depth without replicating all the tables and matrices.

The scenario selected is based on a current problem – the influx of foreign fighters into Iraq. These fighters are recruited from a number of Middle Eastern, European and North African nations to engage in “jihad” in Iraq where they find themselves used as suicide bombers. Examining the foreign fighter issue in the context of the DAPSE created a number of challenges, the foremost of which is that the individual to be deterred was neither a nation state nor a non-state organization. The problem forced us to work with an individual as an archetype. The large cultural differences among the recruits from the various nations drove the analysis to select only one nation. We chose Saudi Arabia, historically the nation that is judged to have been the single largest contributor to the pool of foreign fighters. Although the DAPSE process is intended to be exercised over a longer time period, the analysts who developed this scenario worked over a period of only four days relying on their accumulated experience. They had no prior experience with the typologies or the process. The sources they used for the analysis included captured documents, interviews with detainees and open source literature on radical Islamic groups, jihad and the writings of Islamic leaders (all translated). An off-line version of the DAPSE was used to give the developers needed time to incorporate final changes just prior to delivery.

The process began with specifying the commander’s intent, the desired end state and the desired deterrence effect.

- Commanders Intent: Stem the flow of foreign fighters arriving in Iraq
- Desired End state: Significantly reduce the number of foreign fighters producing lethal and destabilizing effects in Iraq
- Desired Deterrence Effect: Dissuade Saudi Ummah youth from joining Al Qaeda and Associated Movements (AQAM)

The next step was to identify the decision maker, his characteristics and who influences him. The recruit is the decision maker in this case and as a Saudi youth (15-30 years of age), he is likely to have had a religious education that immersed him in Wahhabi thought from early childhood. As a young male, he is not likely to have a wife and children and may have had difficulty finding an appropriate job. He would be influenced by his parents, his religious leaders, his extended family and his friends. Depending upon his access to communications media, his attitudes might be affected by media messages. His identity would be bound up in his family and he would think of himself as an Arab, a Wahhabi, a Saudi Arabian and a member of the nation of Islam. Because his culture emphasizes family honor, he would tend to be less a risk taker than the comparable American individualist and he would often weigh alternatives in terms of the afterlife. He would operate within the social norms imposed by his family, extended family and tribe, but if he accepted the leadership of a strong, radical Islamist leader, he would discredit other sources of authority, even family. Personal triggers that would move him to join the foreign fighters in Iraq might include the guidance of an inspirational leader, stories from veterans, media reports and collective decisions among close friends and family members. As a decision maker, he would be most inclined to be heuristic, taking cognitive short-cuts (norms,

rules of thumb) rather than studying a situation and working out a strong, logical plan. He would accept the rhetoric of an inspirational leader as his rule of thumb.

The above provides a general description, but it does not and cannot define any specific individual. There was no data to shed light on the segment of Saudi society most vulnerable to recruitment. Here fore, the problem was hard, but not intractable and assumptions had to be made. When developing the final assessment, the analysts would not permit any conclusion or rationale that could not be backed up by references.

The next step was to understand motivation and here the assumption has to be made that one who is inclined to accept the challenge of jihad must have a strong religious orientation. Thus the motivations ascribed to the individual included:

- Be a good Muslim, follow religious guidance, attain paradise (martyrdom is a direct path to paradise)
- Maintain and strengthen family honor
- Experience a good, well-ordered life, e.g., secure a good job, marry well, have children – all ways of being a good Muslim
- Maintain personal safety and security, in particular, avoid incarceration and torture particularly in a Saudi jail
- Ensure welfare of family and relatives, at a minimum, avoid endangering them
- Satisfy need for adventure
- Satisfy desire to belong to a respected group
- Respond to the Muslim mandate to defend the faith (defend the Arab nation, the Nation of Islam)

Given the identity of the decision maker, his motivating factors, and the deterrence objective, we had then to determine what actions on the part of the Saudi youth we wanted to consider as part of the decision calculus. The most obvious action would be his joining the foreign fighters in Iraq. But we also wanted to consider explicitly several other options that would also satisfy the Commander's guidance by deflecting the potential recruit from entering Iraq. For example, if he could be induced to join jihad somewhere else, such action would satisfy the Commander's guidance by keeping the recruit out of Iraq, even though it might create a problem for the US on a different front. Similarly, if the Saudi youth could be convinced to join a radical movement within Saudi Arabia, he would not be a problem in the Iraqi theatre. We also felt that we should consider expressly what we would like him to do – decide not to join the jihad at all. Thus we had four actions to explore as part of the decision calculus.

The capabilities needed by the prospective recruit focused on geography, language, access, wealth and special skills. The recruit needs to have geographic access or a way to get to the location of the jihad. He needs language capability and the ability to blend into the Iraqi milieu. This is made easier if he has access to facilitators who can provide travel documents, routes and safe houses. Wealth is an advantage as it can buy access or, for other action options, the ability to get to a more distant location. Finally, having advanced education or special skills (chemical engineering useful in bomb-making, language or medical skills) might remove him from the ranks of suicide bomber, make him otherwise useful to the leadership, or create opportunity for him outside Saudi Arabia. We thus found ourselves breaking down the archetype and individualizing the recruit so that we could consider a wider variety of options.



We assumed that the Saudi youth was relatively unsophisticated in his knowledge and understanding of the range of US options and that he would assume the US would probably only have four alternatives:

- Attempt to prevent him from arriving in Iraq and kill him in the process
- Attempt to prevent him from arriving in Iraq and imprison him or hand him over to Saudi authorities
- US acts but fails to capture or kill him or US chooses not to impede transit
- US chooses to do nothing

When these details were used as the components of the Deterrence Decision Calculus (DDC) Matrix (shown in Figure 6-7), sixteen “Saudi youth action” – “US option” pairs emerged. These were evaluated from the perspective of the potential recruit to yield best and worst Action-Option pairs. The best three Action-Option pairs from the Saudi youth’s perspective were:

- Action: choosing jihad in Iraq with US Option to not interfere with transit
- Action: choosing jihad elsewhere with US Option to not interfere with transit
- Action: choosing jihad in Iraq with US Option to imprison him (preferably in a US detention camp and not in a Saudi jail)

The worst sets were:

- Action: join AQAM in Saudi Arabia with US Option to kill him anyway (probably not considered martyr, not on jihad)
- Action: join AQAM in Saudi Arabia with US Option to imprison him, particularly if the prison were a Saudi jail (Saudi prisons are infamous and his imprisonment could also endanger his family)
- Action: join jihad elsewhere and US Option to kill him in transit (does not reach jihad, likely not considered martyr, little honor)

The above analysis attempts to capture how the potential recruit might be thinking about the problem. The action of the US is not constrained by the recruit’s imagination. Thus, we constructed a second version of the DDC Matrix, but this time considered a broader range of kinetic and non-kinetic options that could be employed unilaterally or in conjunction with Saudi Arabia or other allied agents. There are also opportunities to influence by enticement, not just punishment. Among the measures considered was the option of improving the socio-economic conditions for the most susceptible youth sectors – those without the ability to get good jobs or make good marriages and who have little to lose and much to gain by joining jihad. Finally, there is considerable difference of opinion among Islamic authority as to the legitimacy of a “jihad” where innocent Muslims including women and children are victims of the violence. The intent of a holy war is to defend the nation of Islam against the infidel – not to kill Muslims. Increasing the profile of the arguments against the jihad in Iraq and labeling AQAM as “takfir” or an abomination for killing Muslims would likely be the best deterrence, but this would have to come from the Islamic community, not from the US.

The new DCC Matrix included twelve Action-Option pairs that were once again analyzed from the perspective of the potential recruit. This analysis yielded the “levers” open to the US in attempting to slow or halt the recruitment. Levers are those US options that appeal to the prospective recruit, satisfy his needs, interests or motivations and yet keep him from choosing options objectionable or dangerous to the US.

From the perspective of the US, no Action-Option pairs that include joining jihad in Iraq are acceptable. If the actor chooses to join jihad in Iraq and the US kills him in transit, the Commander's guidance is satisfied. However, it would take very little for AQAM to turn this into a recruitment tool and thus the short term success of killing one recruit could lead to the long term problem of increasing the flow of recruits. We tried to keep in mind the longer term goals as we evaluated the levers.

The Action-Options pairs that seemed to provide the US the greatest leverage included the following:

- Against joining jihad elsewhere: improve regional security operations including working with tribes to turn over foreigners to security forces
- Encouraging the option of not choosing jihad: engage in overt cooperation with Saudi Arabia in promoting the economic development of poorer sectors and increasing the penetration of Western goods consistent with Muslim culture
- Encouraging the option of not choosing jihad: Do nothing. Rely on the growing discomfort on the part of Islamic leaders with a battle that kills Muslim women and children.

In general, non-kinetic options were better than kinetic options. While options that involved surrogates rated reasonably well, we considered them to be fraught with the danger of having the US exposed as being at the root of the action. Uncovering the US hiding behind an action can often be a trigger for the individual who sees this as the infidel undermining the honor and integrity of the Islamic nation. The choice to do nothing appeared strange at first; however, past experience has shown that the potential for unintended consequences, particularly in a foreign culture, can be huge. The most satisfying immediate actions were those most likely to produce long term problems. The most effective measures to deter the potential recruit would require consistent, long term action in collaboration with Saudi Arabia.

Viewed from the perspective of a test of the methodology, the foreign fighter scenario provided gratifying results. While the methodology with the underlying typologies was not developed to treat the Saudi youth as an actor, using it proved to be useful and constructive. Developing the matrices created the kind of discussion and search for additional information that was the goal of the process. Careful consideration of the mindset of the other actor led to specification for collection that was substantially different from the current collection methodology. On the other hand, it was clear that the DAPSE process is intended to create a mindset; therefore, training with both the tool and the process is advisable before it can be used effectively. Finally, the exercise was artificial in several ways. The analysts, while most had military backgrounds, were not planners or intelligence analysts and the time frame was far too compressed. The guidance was inferred and the scenario was completed without fully specifying the decision calculus for the recruiters, the facilitators, the Kingdom of Saudi Arabia and the nations along the transit paths. A full analysis would have to include all these factors.

## 14 Transition Discussion – Col Tim Fay {USSTRATCOM/GISC}

*'We will: Pursue a comprehensive approach to deterrence. Put in place a new concept of deterrence for the 21st Century in terms of training, equipping, theory, and practice appropriate to a range of state and non-traditional threats in both nuclear and conventional realms.'*

Admiral Mullen, CJCS, 1 October 2007

**SUMMARY:** A formal transition of the DAPSE methodology and software to operations or support activities is premature. However, the DAPSE output and demonstrated potential to improve the nation's capability to understand, influence, and deter state and non-state actors merits continued development, socialization, improvement, transition, and deployment sometime in the next 6 months to 2 years. The USSTRATCOM Global Innovation and Strategy Center (GISC) will oversee transition efforts in the near-term. In the long-term, the SMA team believes that a 'Deterrence Center of Excellence' at a professional military education venue best serves as the long-term transition mechanism for the warfighter and the nation.

### 14.1 BOTTOM LINE

The web-based DAPSE software program remains developmental. Significant work remains before it matures to a technology readiness level sufficient to enable a transition to a sustainable program of record. The demonstrated potential of the DAPSE methodology and initial software version, however, justify the continued development, refinement, and improvement of both the methodology and the software. This should be accomplished along both user and developer/educator lines of operations.

The GISC assesses the HQ elements of USSTRATCOM as a (doctrinally) logical organization for the long-term development, refinement, and transition of the DAPSE methodology and software from a DAPSE users' perspective. The HQ USSTRATCOM J2 has expressed initial interest in evaluating the DAPSE methodology and software as part of a proposed HQ USSTRATCOM J2 Strategic Net Assessment (SNA) activity. There has been no interest or intent expressed by any other HQ element to participate in the refinement or improvement of the DAPSE. The GISC believes the HQ USSTRATCOM J5 Strategic Deterrence Assessment Lab (SDAL) is best-suited for DAPSE long-term transition from a users' perspective.

From a developmental/educators' perspective, it has been suggested that a deterrence center of excellence might be established as part of the National Defense University. This Center would be responsible for exploring new operational concepts, finding and vetting new tools, and educating senior professional military education students from across the interagency on the DAPSE methodology and software.

### 14.2 TRANSITION 'ENDS'

The desired end state for a DAPSE transition is a programmed, sustainable, and standardized support methodology and software for use by analysts and planners tasked to apply the instruments of national power to deter actors in an asymmetric and interconnected 21st Century world. The DAPSE will be a force-multiplier that creates cross-functional synergy by allowing planners and analysts to leverage and apply the significant intellectual capital of many of the nation's leading thinkers. This rigorous and insightful applied intellect is the underpinning of the

DAPSE; and analysts and planners will be able to apply DAPSE without the need for extensive studies, research, or a PhD education. DAPSE will allow commanders to know our enemies.

### **14.3 TRANSITION 'WAYS'**

The DAPSE has multiple transition 'ways' that will be applied by the SMA team.

**DEVELOP:** To accelerate the ultimate transition of the DAPSE, the OSD DDR&E and USSTRATCOM GISC sponsored Strategic Multi-layer Assessment (SMA) team will further develop, refine, and improve the DAPSE methodology and software in the near-term. The SMA team will do this while conducting SMA efforts for other Combatant Commands. For successful DAPSE transition to users, the software must become more automated, user-friendly, and "rugged." In the longer-term, initial discussion and exploration of a possible Deterrence Center of Excellence at a professional military education venue is underway.

**SOCIALIZE:** The DAPSE methodology and tools will be socialized by the SMA team to potential contributors and transition partners to include professional military education institutions, the Joint Staff, Combatant Commands, the labs, and other organizations. Currently, efforts include intent to brief the AFRICOM Senior Leadership, the Military Operations Research Society, a cyber deterrence effort, a social-science tools and visualization conference planned for December 2007, and the SMA annual conference for COCOMs in November 2007.

**EDUCATE:** SMA will use appropriate educational forums like the SMA world-wide annual conference and other professional gatherings to teach the DAPSE methodology. Initial discussion of a role for the National Defense University and incorporating DAPSE methodology and software into professional military education is underway.

**PROVIDE:** SMA will provide DAPSE tools, models, and methodology to any requestor that can benefit from their appropriate use and application. Currently, three models have been provided and adopted by CENTCOM for net assessment, and other models have been provided and incorporated into a Human Terrain Joint Concepts Technology Demonstrator.

**ENDORSE:** SMA will endorse use of DAPSE methodology and software when requested.

**SUPPORT:** SMA will support other organizations that are developing DAPSE-like methodologies and tools. Among these are an independent lab-funded research and development project, and a 3-year pilot effort by the Intelligence Advanced Research Projects Activity (IARPA).

### **14.4 TRANSITION 'MEANS':**

The DAPSE transition 'means' will include multiple resource streams.

The SMA team will leverage OSD DDR&E and USSTRATCOM GISC resources while executing COCOM requested SMA efforts to improve DAPSE methodology and software.

Additionally, the SMA team is incorporating DAPSE methodology and software into a proposed pilot cell for STRATCOM and SOCOM. USSTRATCOM J8 is executing budget change activity to provide resources and manning for this effort across the FYDP, although the mission area of focus will be on just one specific mission set.

SMA intends to support efforts underway with resources from other organizations that closely mirror the DAPSE methodology to include an independent lab-funded research and development

project, and a 3-year pilot effort by the Intelligence Advanced Research Projects Activity (IARPA).

In sum, DAPSE is a maturing concept and technology that requires further refinement and development. Transition efforts will focus on both potential users and developers/educators. The USSTRATCOM GISC and OSD/DDR&E SMA team will continue to develop DAPSE methodology and tools in the near-term via work on projects for other COCOMs. In the longer-term, multiple lines of operations for transition will be supported and endorsed, as described above. Movement towards partial transition has begun on several fronts, but a center of excellence at a professional military education venue would produce the desired long-term effect on both the users and the developers in order to achieve the desired end state.

## Appendix A: Acronym List

ACH	Analysis of Competing Hypotheses
AFRL	Air Force Research Laboratory
COA	Course of Action
COCOM	Combatant Commander (e.g., CENTCOM, PACOM, ...)
COI	Community of Interest
COR	Consequences of Restraint
DAPSE	Deterrence Analysis and Planning Support Environment
DDC	Deterrence Decision Calculus
DDR&E	Director, Defense Research and Engineering (OSD)
DIME	Diplomatic, Informational, Military and Economic
DO JOC	Deterrence Operations Joint Operating Concept – available at: <a href="http://www.dtic.mil/futurejointwarfare/concepts/do_joc_v20.doc">www.dtic.mil/futurejointwarfare/concepts/do_joc_v20.doc</a>
ERDC	Engineering Research and Development Center (US Army)
GISC	Global Innovation and Strategy Center (USSTRATCOM)
HQ	Headquarters
IDA	Institute for Defense Analysis
ISR	Intelligence, Surveillance, and Reconnaissance
J3 DDGO	Joint Staff, J3 Deputy Director Global Operations
MDMP	Military Decision Making Process
MS-CAD	Multi-Sensor Context Aided Detection
NSI	National Security Innovations
OODA	Observe – Orient – Decide - Act
SDAL	Strategic Deterrence Assessment Lab (STRATCOM J5)
SMA	Strategic Multi-layer Analysis
SME	Subject Matter Expert
SOCOM	Special Operations Command
SPAWAR	Space and Naval Warfare System Center (US Navy)
SRG	Senior Review Group
STRATCOM	Strategic Command
USG	US Government

## Appendix B: Glossary

As a quick guide to the most key terms for understanding the DAPSE, the user is encouraged to look up key terms relating to:

- Deterrence, dissuasion, persuasion
- Key DAPSE Typology terms: motivating factors, objectives, interests, context, social organization, roles, demography, capabilities, functional environment and other actors, decision making approaches

### TERMS

**Actor** – Individual or group the USG seeks to influence.

**Adaptability** – the ability of an individual or organization to adjust to environmental stimuli; example the ability of a terrorist organization to shift resources and restructure in response to deterrence operations or attacks

**Adversary** - a placeholder or metaphor for an armed opponent, competitor, neutral actor, population group in distress, etc. (NASIC 2007)

**Apocalyptic ideology** (Definition: ideology seeking the end of the world or a destruction of the existing world order and its replacement by a new one)

**Attitudes** – feelings and *beliefs* that predispose an individual or *group* to decide or act (behave) in certain ways (NASIC 2007)

**Axiology** – the study of values

**Behavior** – *decisions* or actions in response to a situation or stimulus, resulting from the interplay of internal *motivations* and external *influences* (NASIC 2007)

**Beliefs** – ideas, relationships, or situations that an individual or *group* accepts as true or real (NASIC 2007)

**Capabilities** – individual (knowledge, skills, abilities), technological, and social organizational characteristics that enable action; the DAPSE typology primarily uses this term to describe technologies relevant to state actors, e.g., those that enable hostile action (WMD, conventional arms, C2). More broadly, capabilities can also include:

- Knowledge, skills, and abilities PLUS technologies that people use (tools, weapons, implements) – indicators of capability; often involve how people make a living and how they protect themselves.
- Settlement/transportation/communications: “Where people live and how they get around/communicate” types and availability of housing, rural vs. urban settlement, road systems, communications
- Economic System: “How production/exchange is organized at the social level” Includes: markets, barter systems, social division of labor, industrial sectors, distribution of wealth

**Coalition** – an alliance of various groups to achieve specific objectives; members of the coalition have their own power bases and financial resources, and can operate independently outside the

coalition; can last for indeterminate time and for various purposes (e.g., political, military, economic, social)

**Cohesiveness** – the bonding together of members of an organization or group that sustains their will and commitment to each other; (Note: Cohesive groups tend to be homogenous, have a single or small number of issues that define the group, have experienced recent threatening events together; depend on each other or the group for important needs like survival, access to important resources (e.g., mates, jobs, land), and identity.

**COI** – see community of interest

**Communications** – any means by which individuals or groups exchange information; includes gossip networks, word-of-mouth, signaling, telecommunications, cyber-communications

**Community of Interest (COI)** – any community, scholarly or otherwise, with a common topical focus

**Context** – factors that create the setting in which an actor exists and functions; includes roles, demography, functional environment, geography, other actors, current circumstances, etc.

**Consensus** – a form of group decision-making characterized discussion/negotiation, with the aim of getting all parties to agree; voting is typically absent.

**Conventional military capabilities** – non-WMD weaponry and C3

**Culture** – this concept escapes easy definition and is used in many different ways. An anthropological definition holds culture to be “that complex whole which includes knowledge, belief, art, law, morals, customs, and any other capabilities and habits acquired by man as a member of society (Tylor 1958[1871]:1).” Often, people consider culture to pertain more to ethnic customs and ideas, but culture also includes social organization and behavior.

**Cultural factors** – as used in DAPSE typology, refers to culture-specific beliefs, attitudes, norms, and traditions.

**Cyber** – pertaining to computation and web/internet communications

**DDC** – see Deterrence Decision Calculus

**Decision** – a deliberate choice of a course of action from alternatives perceived as available, by an individual or *group* with authority (NASIC 2007)

**Deterrence Decision Calculus (DDC)** – refers to the decision making process attributed to an actor in determining his/her course of action; it considers the actor’s perception of his own interests, courses of action and his perception of US/US allies courses of action. It incorporates the actor’s capabilities, the larger context in which the actor is making decisions and the actor’s decision-making approach relevant to the issue.

In the DAPSE DDC, actor courses of action are ranked according to their desirability to the actor, and indicate what the actor is most likely to do and what DIME levers may be effective in altering an actor’s behavior. In the DAPSE, the DDC is represented as a matrix of actor interests, courses of action and perceptions of US courses of action.

**Decision making approach** – refers to general categories of decision making; includes rational choice, heuristic decision making, sense making and expert decision making

**Decision unit** – the key decision maker(s); may be an individual or a group



**Democracy** – a system of governance characterized by explicit voting

**Demography** – characteristics of individuals (age, sex, health status, fertility, fecundity) and groups (age/sex structure, mortality rates, growth rates, availability of mates, marriage types (monogamy, polygamy)) that relate to reproduction and death.

**Deterrence** is action that prevents an adversary from engaging in behaviors that threaten or oppose US national interests; direct response to known intent + capability to take a certain behavior. Deterrence can involve positive inducement, **persuasion**, **dissuasion**, threat, holding an adversary's values at risk, punishment, denying opportunity, denial of resources/capabilities, punishment, and defeat. Involves an effort to persuade at least one of the opponents not to take an action contrary to the interests of the other by convincing that opponent that doing so would not be worth the effort; One way to differentiate the two concepts is to consider **dissuasion** to be focused on preventing the acquisition of a capability, and **deterrence** by denial that precludes its use (GISC 2007:4). Deterrence in the DAPSE reflects the definition in the DO JOC, and is consistent with emergent contemporary USG conceptions of deterrence (Bonoan et al. 2002, Davis and Jenkins 2002:10, Special Task Force on Terrorism and Deterrence 2002:6, USSTRATCOM 2006:7).

**DIME** – refers to diplomatic, informational, military and economic levers that may influence an actor

**Dissuasion** – convincing an adversary to change behavior/interest by convincing him that an action/interest is not in adversary's interest - to advise (a person) against something, to advise against (an action), or to turn from something by persuasion.

**Distributed networks** – connections among individuals that are non-hierarchical and may be geographically or socially dispersed.

**DO JOC** – Deterrence Operations Joint Operating Concept

**Elites** – sets of high status individuals in a society; there can be multiple sets of elites based on different social dimensions and often have overlapping memberships

**Ethnic group** – a group whose members' identities focus on shared cultural attributes, which usually include language, customs, and traditional use of a territory.

**Ethno-Nationalist ideology** - an ideology that justifies demands for political autonomy or independence for a particular ethnic group (the ethnic group may be distinguished on the basis of language, religion or sect, race, or other cultural attributes)

**Ethno-religious group** – a group whose members' identities focus on a combination of ethnic and religious identity

**Expert decision-making** – an approach to decision making in which the decision maker follows the advice of recognized experts or authority figures

**External threat** – threat from outside of one's group

**Extremist religious ideology** - an ideology justified by reference to one or more deities that justifies violence to change the social order in accordance with its values

**Framing** – refers to the perceptual structure from which observation occurs; in Prospect Theory risk averse people tend to structure their observations in terms of potential gains, and risk takers structure their observations as potential losses

**Functional environment and other factors** – contextual factors that provide the physical and social setting in which decision makers think and act; includes geography, terrain, C3 (command, control, communications), political system, other actors and groups that influence a decision maker

**Geographic factors** – physical terrain, hydrology, environment, transport (rail, road, water, air), and political boundaries

**Global** – affecting the entire world system or a large portion of it.

**Globalization** – increase in global/worldwide connectivity, integration, and interdependence in economic, social, technological, and political spheres (Wikipedia); the ‘process by which the experience of everyday life....is becoming standardized around the world’ (Encyclopedia Britannica). Globalization often brings free market capitalism and more Western forms of governance to Third World countries, displacing traditional leadership, altering the business practices and work patterns of people, challenging traditional beliefs and practices, and re-distributing wealth in non-traditional ways.

**Group** – two or more individuals exhibiting reciprocal roles, status, standards of judgment, *beliefs* and a common awareness of these features, carrying definable properties and comprised of multiple features. Features of a group are: (1) Coming into existence with more than one member; (2) Having a common relationship between the members based on common aims and/or interests; (3) Continuation of this relationship; (4) Members' *perception*/feeling of being members of a *group* (NASIC 2007)

**Heuristic decision-making** – a decision mode in which a decision maker relies on cognitive shortcuts (norms, rules of thumb), instead of rational choice decision-making

**Ideology** – a set of beliefs or collection of ideas; may be political and/or religious, but is generally normative.

For example, Leftist ideology is founded on a belief that laborers are inherently exploited and that the only just economic arrangement is for laborers, or most often a centralized government, to control economic production to insure that laborers are not exploited. Global salafist Jihadist ideology is a set of beliefs that include demonization of the non-Islamic world, desire to establish a global caliphate, and the obligation of all Muslims to wage a holy war against non-Muslims.

**Influences** – actions or information, used as incentives or inhibitors, to affect actual or contemplated [future] *behavior* (NASIC 2007)

**Infrastructure** – the physical and organization underpinnings of a society; includes physical elements such as roads, water treatment, oil pipelines, etc., and organizational elements such as corporate organization, political organization, and kin organization (nuclear family, patrilineal extended family, etc.).

**Intention** – the purpose or desired result of a course of action; the *motivational* basis of planned *behavior* for an individual or *group* (NASIC 2007)

**Interests** – motivating factors and objectives

**Internal threat** – threat from inside of one's group (rivals, social schism)

**Kin group** – a social group whose members identify through relatedness; this relatedness can be biological, or more social such as in patrilineal societies where affiliation is only through father's line or matrilineal where affiliation is only through mother's line.

**Leftist/Communist** - an ideology that claims to defend the working class against other classes, and prescribes government ownership over large parts of the economy

**Legitimacy** – the acceptance of leadership/governance as justified in a social system; can be based on established law or accepted rules and standards

**Local** – refers to a territory within a nation, can range from a neighborhood to a segment of a large state.

**Loss aversion** – In Prospect Theory, the tendency to feel that a loss of a certain amount outweighs the gain of that amount; manifest as risk taking to avoid losses (Kahneman and Tversky 2000[1984])

**Materialist** - (amass wealth) - economic growth for a state, profit for an organized crime group, desire for material goods for an individual

**Meritocracy** – a social system in which personal advancement is based on an individual's abilities alone.

**MIDLIFE** – Military, Intelligence, Diplomatic, Law enforcement, Information, Financial and Economic levers of power. Suggested in US Army field manual FMI 3-07.22, Counterinsurgency Operations, page vi.

**Mirror Imaging** – the tendency of states, cultures, societies, and people, in competitive interaction, to perceive each other similarly, i.e. to see their *adversary* as reacting the same way as they would in similar circumstances (NASIC 2007)

**Motivating factors** – those things which energize, direct, and sustain behavior, including decision making; can be ideologically, religiously, metaphysically, or value-based; strong motivating factors can be persistent while weak ones may be temporary in their effects.

**Motivating factors** are notions that guide decision making, including: Good/evil, Afterlife, moral principles such as honesty, Golden Rule, beliefs about proper place in social or natural world and cosmology and blends into more concrete principles such as principles of leadership, political values (democracy, autocracy, communism), legal principles, military doctrine, religious dogma that are similar to concrete **objectives**.

Example: Osama bin Laden and his al Qaeda cadre appear to have been heavily influenced by an ancient Islamic perspective on urban corruptness vs. rural/pastoral virtue in their pre-911 expectations of attacking the West. This ancient view holds that urban societies are inherently luxuriant, effete, effeminate and weak, and genuinely moral, manly and robust societies worthy of rule are found in rural and pastoral settings. An excellent ancient source of this ideology is found in the Medieval scholar Ibn Khaldun's Muqqadimah (Ibn Khaldun 1967[1381]). This dichotomy is still taught in the Islamic world, especially in more fundamentalist sectors. It is clear that the al Qaeda leadership a) expected that less devastating effects of the 911 attacks would paralyze the U.S., and b) did not anticipate the robust US response in toppling the Taliban and occupying Afghanistan. The al Qaeda failure to anticipate this was based on rather abstract notions of urban decay/rural virtue that proved unfounded.

**National chauvinist** - An ideology that emphasizes claims of national superiority over other nations while dehumanizing other groups

**Objectives** – concrete goals desired by decision maker; these may be ideological and long term – e.g., establish a democracy or Islamic state, or proximate – e.g., drive Americans out of Iraq. Concrete, proximate objectives are more predictive of behavior than abstract ideals, which may be invoked after-the-fact to justify actions.

Example: Saddam Hussein was by all accounts a secular Muslim. Nonetheless, he invoked ideological **motivating factors** such as by building elaborate Mosques and utilizing Islamic rhetoric to justify his opposition to Western powers. In reality, his concrete **objective** was stabilizing his political control over Iraq.

**Opinion** – a judgment or firmly held view about what appears as likely true; an individual or *group* perspective of truth or reality (NASIC 2007)

**Organizational structure** – see **social organization**

**Other actors** – Individuals and groups who are able to influence the focal actor; adversary who influence adversary. Often, relations with and influences from other societies are key factors influencing variables within a society. Influences can be political (interference Iran in Lebanon; immigrant Turks in Germany), social (refugee populations, e.g., Darfurian in Chad, Iraqis in Jordan), economic (Western capital intrusion into Third world societies), or cultural (spread of Western values and behaviors through globalization, spread of global salafist Jihadism). Note also important when considering potential deception by third parties.

**Patronage** – a system of influence in which powerful and wealthy individuals buy the allegiance of others

**Perception** – awareness and interpretation of physical and social information; the result of filtering and interpretation of sensory information; interpretation of sensory input that represents reality for the individual (NASIC 2007)

**Persuasion** – the ability to change another's beliefs, positions, or behavior through argument, entreaty, or assertion of truth

**PMESII** – Political, Military, Economic, Social, Infrastructural, and Informational effects; often thought of as the effects from DIME actions.

**Power** - ability to compel others to do your will

**Prestige** – the attribution of high status or honor by others

**Prospect theory** – scientific field that recognizes biases in human decision making processes, which include loss aversion, framing, probability weighting, and other heuristics (Kahneman 2000)

**Rational actor** – a decision maker who employs rational choice; GICS Private Sector perspective is broader; “Rational actor theory does not assume that choices are "right", only that relative to a specific set of values and preferences the actor chooses among the available alternatives”; but assumes maximization of expected utility; also allows for irrationality and bounded rationality/misperception (GISC 2007:8).

**Rational choice** decision making– decision mode/paradigm that assumes that decision makers weigh costs and benefits of actions, seek to maximize satisfaction, and do so with complete knowledge of their resources, with complete understanding of their preferences, and the cognitive capability to execute cost/benefit calculations

**Region/Regional** – a geographical unit that includes a nation state and its surrounding states

**Relevant Context** (in DDC) – factors having significant bearing on an actor’s cognitions and behaviors (e.g., personal characteristics; interests; political, social, economic, etc. conditions/circumstances)

**Resources** – natural, material goods useful to an individual or group (e.g., water, land, pasture, crops, oil, diamonds)

**Rightist** – typically associated with conservative notions of autocratic exercise of power and inherent privilege (e.g. fascism, Nazism)

**Risk averse** – characteristic attributed to humans exhibiting a tendency to minimize losses by accepting a course of action only when its long-term expected utility is more than the cost one is prepared to pay to engage in the action

**Risk taker** – one who accepts a course of action whose long-term expected utility is less than the cost one is prepared to pay to engage in the action

**Roles** – socially defined functions carried out by individuals or specific groups; for example political roles (tribal chief, president), economic roles (trader, producer, consumer), domestic roles (husband/wife); answers question “What functions and positions people do play in groups?” Classic definition: **Role** "is the dynamic aspect of a **status**.... When [a person] puts the rights and duties which constitute the status into effect, he is performing a role (Linton 1936).

**Security** – safety from physical harm

**Sense-making** decision-making – a decision mode that involves trying to understand a situation or environment by probing it (actions/decisions) and making adjustments on the basis of the response received

**Single-issue ideology** – an ideology focused on a single, narrow issue (e.g. animals rights, environmentalism)

**SME** – see subject matter expert

**Social Network Analysis (SNA)** – the study of the structure, relations, and interactions of a group of individuals; uses elements of sociology, graph theory, statistics, and links and nodes analysis to map the connections and flows of information/influence, between individuals, within and between cells, sub-groups, and larger networks; employs underlying algorithms to discover relationships in large networks that might otherwise not be visible to human analysts (NASIC 2007)

**Social neuroscience** – scientific field that investigates the neural activity associated with social interaction

**Social organization** – the structure of social (interpersonal) interactions; includes formal organizations such as governments, commercial businesses, institutions; informal organizations such as kin-based tribes, a circle of friends, work colleagues, etc., and emergent structures such as gossip networks, mobs, or internet chat groups; answers question “How are people in a society organized?” Also includes:

- Kinship (bilateral, patrilineal, matrilineal descent, kinship terminology) Influences how families are organized - often key primary alliances

- Sodalities: non-kin based social organization, county clubs, Rotary, etc.
- Political Parties
- Religious Organizations
- Military organizations

**Stage of development** – degree to which modern social organization, including rule of law, and technology is present in a society; **emerging** refers to a society lacking in modern infrastructure and political/industrial/business organization; **developing** refers to a society in which modern infrastructure and political/industrial/business organization are being introduced and established; **developed** refers to a society with established modern infrastructure and political/industrial/business organization; **failing** refers to a society that had developing or developed infrastructure, but (often due to civil war) these structures are breaking down and ceasing to function

**Status** – A socially recognized collection of rights and duties associated with a role or position, usually specifically designated (example rank of Colonel, President, housewife, chief, warrior); **Ascribed status** is inherited or otherwise granted to an individual; **Achieved status** is earned by ability; statuses can be hierarchically valued; Classic definition: "A **status**, as distinct from the individual who may occupy it, is simply a collection of rights and duties (Linton 1936)."

**Status quo** – a current state of affairs

**Subject Matter Expert (SME)** – an individual with expertise in a particular domain; this could include a region, ethnic group, scholarly topic, military experience/knowledge, diplomatic experience, etc.; SMEs called in to advise developers of DAPSE and planners when working a commander's request

**Susceptibility** – the ease of which an individual or group can be influenced; the capacity of a *vulnerable* target individual or *group* to behave in a manner we suggest or prefer, or make possible for the target (NASIC 2007)

**Technology** – material means of accomplishing tasks; tools, weapons, transportation devices, housing

**Tribe/Tribal** – refers to a form of social and political organization in which several kin groups (lineages) ally to form a political unit; often their common interest in defense of a territory. These units are most obvious when threatened by outsiders; in the absence of threat tribes often fragment as units within the tribe compete for resources. Material and social support flow along kinship lines within a tribal society.

**TTP** – tactics, techniques and procedures

**Values** – A hierarchical order of ideas, things, and relations held by an individual or group as most important; Term used in two ways in DAPSE; 1) culturally specific ethical/moral concepts; 2) the goods, relationships, and ideas an individual perceives positively; accepted and internalized principles, judgments about importance, and standards of individual or *group* conduct (NASIC 2007)

**Vulnerability** – something exploitable by another; an existing grievance, animosity, unmet need, or other condition, which may be exploitable by other individuals or *groups* (NASIC 2007)

**WMD** – weapons of mass destruction (nuclear, radiological, chemical, biological)

**Worldview** – the perceived position, role and status of a regime and its military with respect to the international community; also used in psychology, sociology, and anthropology to characterize the enduring perspectives of individuals, *groups*, and ethno-nationalist societies on the external aspects of life and on others

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## **Appendix C: Process Evaluation – Maj Gen (ret) William Usher {USAF}**

PROCESS: The SMA Deterrence Analysis and Planning Support Environment (DAPSE) process has demonstrable utility for deterrence planners, but:

- Needs further refinement and evolution
  - Analysis needs to play a much bigger role.
    - DAPSE should be recognized as a further evolution of IPB: fundamentally, it is the same. No substitute for solid analysis.
  - DAPSE acceptance would benefit from putting process into terms/processes already familiar to planners, operators, intelligence analysts where possible
    - Utility depends on integrated collaboration by J-2, J-3 and J-5
    - Within COCOMs, JIOCS (or similar organization) should be “preferred home” to promote adoption, acceptance.
    - Process more useful for some applications than others
  - In applying DAPSE, strategy needs to be established before picking actions
  - Greater emphasis needs to be placed on understanding adversary's value structure, not just objectives; should emphasize effects and illuminate prioritizing/sequencing of actions
  - Decision matrix needs continued refinement; steps 1-3 need improved connectivity to steps 4 & 5
  - Complexity and cost of process limits application to major deterrent applications, at least initially
    - Process more useful for some applications than others
  - DAPSE utility needs to be improved by being capable of handling dynamic deterrent situations
  - In evolving DAPSE, care must be taken to enhance both utility (appeal to users) while demonstrating validity

IMPLEMENTATION: Continues to entail many challenges

- Who's in charge? USSTRATCOM? COCOMs? Everyone (adopted DoD process), supported by doctrine? Suggest COCOMs (they own most OPLANs)
- What is application scope? Major OPLANs? Selected COCOMs, adversaries?
- Who supplies, maintains requisite supporting resources? Each COCOM? Reach back? (Suggest study: perhaps a combination)
- Who trains planners, others? Traditionally, Service/Joint schools (doctrine). Service buy-in, ownership critical. JWAC, NPS likely to produce COCOM rejection
- Limited scope, pilot program advisable to provide basis for evolution
- While models have promise, not ready for operational applications: invest in R&D



## **Appendix D: Planner Evaluation - Grant Hammond {Air War College}**

Gen Elder was briefed on 27 August regarding the DAPSE Workshop #3 held from 14-16 August in Omaha at the GISC. I began by telling him that the team developing the DAPSE should be commended for rather extraordinary effort in its development in a short time frame and that much had been accomplished in the 10 days since the workshop. My “snapshot” was only of the tri-level workshop (SMEs, Modelers/developers, and planners and analysts). This was still very much a work in progress and a “test” of a premature product still in development. That said, we learned a lot and made some important adjustments.

The workshop consisted of overview briefings of the DAPSE and a test run of a non-state and a state actor to be deterred. I stated and Gen Elder concurred that what was desired was not only a typology but a set of analytical/planning tools that would move beyond the DOJOC. Phases 1-3 of the DAPSE model and the Deterrence Decision Calculus matrices were in good shape. Phases 4-6 required much more work before being ready for prime time. Producing a quality product using the DAPSE requires a level of granularity, a concept of operations for analysts and planners and a constantly refined expertise. The habit of mind and patterns of thought of the people using the model are as difficult and important as its development.

We need to guard against the impression that this provides a tool which will produce answers to complex problems. It is rather, a set of questions and procedures for arriving at a sort of TTP for analysts and planners working together to address specific desired effects. The key to success lies in getting people to think like the adversary and employ behavioral influence analysis. We develop blue COAs based on a deterrent objective that is occasioned by effects which present options for Red and our ability to have him select the best available behavior which is consonant with our deterrent effect. It is about 2<sup>nd</sup>, 3<sup>rd</sup> and “n” order consequences over time based on assumptions (made explicit), asking relevant questions of the strategic environment, and in depth knowledge of our adversaries interests and objectives.

The long pole in the tent is how to transition this so it is useful in an operational setting. This could be done through reach-back to a cell at the GISC, PME courses and wargames, or A-2 initiated J-2/J-3 training. But it’s utility must be demonstrated, the thought processes required in using the system developed, exercised and refined, and the benefits worth the time and effort.

This is a major undertaking and amounts to nothing less than a major refinement of JOPES and the development of a strategy and a deterrent campaign plan, similar to an air campaign. The reality is, to design and implement such a system is much more difficult, requires different expertise to operationalize and is a long term, dynamic process. This is a great start but how it is transitioned is as important as the development of the typology and the model environment.

## **Appendix E: SRG Feedback – Charles Perkins {OSD}**

MEMORANDUM TO: Joint Staff J3 DDGO, OSD/DDR&E RRTO and USSTRATCOM/GISC  
FROM: Senior Review Group, Dr. Charles W. Perkins, Chair  
SUBJECT: Deterrence Effort Senior Review Group held 14 September 2007

The Senior Review Group (SRG) met on 14 September 2007 for final review of the Deterrence Project undertaken in support of USSTRATCOM. The meeting was held as a video-teleconference on 14 September. SRG members participating are listed at the end of this Appendix.

USSTRATCOM (Lt Gen Elder) requested an effort to “establish a typology to aid deterrence planners in identifying the information about an adversary, whether state or non-state, needed to produce greatest confidence options for deterring the adversary from acting in contravention to US national interests.” The Deterrence Operations Joint Operating Concept (DO JOC) is to serve as the anchor for the project. The final product is the Deterrence Analysis and Planning Support Environment (DAPSE).

Key points made by the SRG at this meeting and previous meetings are listed below; detailed comments are listed beginning on the next page of this Appendix.

- This effort has brought a look at deterrence that wasn't available before.
- This is an embryonic capability. It could be tested with a real planning effort. Need to turn the crank one more time.
- There are two parallel paths to be pursued for transition – practitioners and developers. Focus in discussion seems to be on practitioners.
- Perhaps we need an Institute for Deterrence at NDU that works development (Lin Wells possible contact at NDU). There are places that address parts of the development problem, e.g. Bob Foster in OSD, but no one to address the whole process.
- In the long term, probably need a background investment in data collection to populate the first steps of the DAPSE, then when anxiety level rises can go forward more quickly.
- Need to figure out how practitioners get access to SMEs: 1) identify them, 2) get them under contract if necessary, and 3) get multiple opinions to identify bias.

Signed by//  
Dr. Charles W. Perkins  
OUSD (AT&L)  
Chair, Senior Review Group

## **Detailed Feedback from individual SRG Members on 14 Sept**

### **Overall Comments:**

Harm: This effort has brought a look at deterrence that wasn't available before.

Perkins: This is an embryonic capability. It could be tested with a real planning effort. Need to turn the crank one more time.

Perkins: Need to figure out how practitioners get access to SMEs: 1) identify them, 2) get them under contract if necessary, and 3) Get multiple opinions to identify bias

### **Regarding Role of DAPSE:**

Hulcher: You say DAPSE can do deliberate planning and not crisis planning – but crisis action planning can be helped by the thought process.

Sakaldasis: This process could set a foundation on which crisis planning could build.

### **Regarding Deterrence in the Information Age:**

Harm: The access provided by Information Age technology not only provides information at greater speed but also to lower levels of command. Thus decision-making can move to lower levels.

Harm: Does deterrence capitalize on transparency or become more transparent. Response: Capitalize. But transparency also means that all messages must be consistent.

Harm: You suggest adding a second "I" for Interconnectivity to DIME. But interconnectivity is a property of the state, not an element of power like the other 4 elements.

### **Regarding Transition:**

Harm: Apple markets iPod to people they know will be receptive and then let it grow on its own to include others. We may need to follow that model and expose DAPSE to people who haven't been doing deterrence for 40 years and thus believe they already know everything necessary.

Sakaldasis: Agree, if young planners and analysts accept it, it may not matter if more senior people do so.

Perkins: There are two parallel paths to be pursued for transition – practitioners and developers. Focus in discussion seems to be on practitioners. Perhaps we need an Institute for Deterrence at NDU that works development (Lin Wells possible contact at NDU). There are places that address parts of the development problem, e.g. Bob Foster in OSD, but no one to address the whole process.

Perkins/Hulcher: Should this be presented to the STRATCOM SSG, perhaps the Policy Panel?

### **Regarding Scenario 1 Example:**

Hulcher: The idea of stereotyping/archetyping an individual raises the question of how you evaluate sensitivity – does this description apply to 60% of the class, or is it 30% or 90%?

Perkins: But in this type of description you know there are error bars. When it is a specific individual, how do you measure unintended bias arising from sources of data (SMEs, models, etc.) or other sources?

## Senior Review Group Members

### Participating 14 September

Chuck Perkins, OSD AS&C (chair)  
Col Craig Harm, NASIC  
CAPT Mike Hewitt, J3 DDGO  
Greg Hulcher, OSD  
George Sakaldasis for Ron Lehman, LLNL

### Unable to participate

Deborah Barger, DNI  
Mike Elliot, STRATCOM  
Bob Giesler, USDI  
Maj Gen (Ret) Scott Gration, USAF  
John Harvey, DOE  
Andy Marshall, DoD Net Assessment  
RADM (Ret) T. McCreary, SOCOM  
Col Matt Molloy, JWAC (Bob Podlesny)  
Ben Riley, OSD AT&L  
Cheryl Roby, OSD NII  
Jim Tegnalia, DTRA (Pete Nanos)  
Tony Tether, DARPA (Ron Kurjanowicz)  
Laura Voelker, OSD/NII  
Art Zuehlke, DIA

## Appendix F: List of Participants

WS1 – Workshop 1 at JHU Applied Physics Laboratory 22-24 May - Typologies

WS2 – Workshop 2 at SPAWAR 12-14 June – Collection and Analysis

WS3 – Workshop 3 at GISC 14-16 August 2007 – Planner Review of DAPSE

WS4 – Workshop 4 at Directed Technologies, Inc 5-7 Sept 2007 - Information Age

	Name	Organization	WS1	WS2	WS3	WS4
1.	Aanestad, Kevin LCDR	JS-J5			X	
2.	Altman, Neal	CASOS - Carnegie Mellon Univ.	X			
3.	Arsic, Antoinette	The MITRE Corporation	X			
4.	Asal, Dr. Victor	SUNY, Albany	X			
5.	Astorino-Courtois, Dr. Allison	National Security Innovations, Inc	X		X	
6.	Bahora, Altaf	The MITRE Corporation	X	X	X	
7.	Ball, Dr. Debbie Yarsike	Lawrence Livermore National Lab	X	X	X	
8.	Ballard, John	FGM		X		
9.	Bankes, Steve	Evolving Logic Inc.			X	
10.	Bartolomei, Jason	Joint Warfare Analysis Center			X	
11.	Bateman, Greg	ATV Manager, Microsoft	X			
12.	Bennett, Bruce	Rand			X	
13.	Brams, Steven	NYU	X			
14.	Brumer, Dr. Yisroel	OSD/PA&E	X			
15.	Brunasky, Richard	OSD		X		
16.	Bunn, Elaine	Future Strategic Concepts Program, NDU	X			
17.	Burnete, Gary	SPAWAR Systems Center		X		
18.	Cabayan, Dr Hriar (Doc)	OSD/DDR&E/RRTO	X	X	X	X
19.	Cares, Jeffrey	Alidade, Inc				X
20.	Carley, Prof. Kathleen	Carnegie Mellon University	X			
21.	Chesser, Dr. Nancy	J3 DDGO	X		X	X
22.	Cogle, Jerry	The MITRE Corporation		X		
23.	Costa, Barry	The MITRE Corporation	X		X	
24.	Costa, Lisa	The MITRE Corporation			X	X
25.	Crown, Mark	SAIC	X			
26.	Cybenko, Dr George	Dartmouth	X			
27.	Dallas, Andrew Dallas	Soar Technology, Inc	X			
28.	Dang, Garon	STRATCOM/J2			X	
29.	Davis, Dr. Bert	US Army Engineer Research & Development Ctr	X	X		X
30.	Davis, Paul	Rand	X			
31.	Dean, Walter	Committee of Concerned Journalists	X			X
32.	Dewing, Martin	DIA		X		
33.	Diaz, Julio	CAPS/LLNL		X		
34.	Drozдова, Katya	National Security Innovations, Inc	X			
35.	Duchoslav-Mote, Sondra	Dragon Research		X		

	<b>Name</b>	<b>Organization</b>	<b>WS1</b>	<b>WS2</b>	<b>WS3</b>	<b>WS4</b>
36.	Eash, Joe	Consultant				X
37.	Farrel, Kevin	ONI		X		
38.	Fay, Col Tim	STRATCOM/GISC	X			
39.	Fearey, Brian	Los Alamos National Laboratory		X		
40.	Fenstermacher, Laurie	AFRL/HECS	X	X	X	X
41.	Flynn, Dan	NIC			X	
42.	Fogarty Owen, Erin	Fogarty Photography	X			
43.	Fulton, Blaine	STRATCOM / GISC	X	X	X	
44.	Gallagher, James	STRAT/JFCC-GSI/J2			X	
45.	Gerot, Jeremy T.	STRATCOM/J39			X	
46.	Glaser, Dr. Charles	University of Chicago	X			
47.	Goolsby, Dr. Rebecca	Office of Naval Research	X			
48.	Gratton Maj Gen (ret) Scott	The Gratton Group	X			
49.	Hamilton, Bart	STRATCOM/GISC			X	
50.	Hammond, Grant	Air War College			X	
51.	Hasselstrom, Georgianna	J3 DDGO	X			
52.	Hensley, Alan	STRAT/JFCC-GSI/J2Z			X	
53.	Hermann, Dr Margaret (Peg)	Maxwell School, Syracuse Univ	X			
54.	Hesford Laura M GGX3	STRAT/JFCC-GSI/J2Z			X	
55.	Heuring, Terry	IDA			X	X
56.	Huckabey, Jessica	IDA			X	
57.	Hudson, John	STRATCOM	X			
58.	Huggins, Peter Lt Col	USAF AETC SAASS/AS			X	
59.	Hunt, Carl	IDA				X
60.	Jackson, Dr. Gary	SAIC	X	X		
61.	Jackson, LtCol Rick	STRATCOM/GISC	X		X	
62.	Jannarone, August G	USAF AETC SAASS/AS			X	
63.	Kapur, Dr. S. Paul	US Naval War College	X	X		
64.	Kaufman, Stuart	Univ Delaware		X		
65.	Kramer, LTC Steven	US Special Operations Command	X	X	X	
66.	Kugler, Dr Jacek	Claremont Graduate University	X			
67.	Kuznar, Dr. Larry	Indiana University - Purdue University, Fort Wayne	X		X	X
68.	Labombard Jim NMI Col	STRAT/J53			X	
69.	Lea, Djuana	AFRL/Sensors Directorate	X			
70.	Lord, Dr. Robert	University of Akron	X			
71.	Makino, Valorie	PACOM/J2			X	
72.	Marshall, Robert	The MITRE Corporation	X	X		
73.	Meadows, Dr. Brian	SPAWAR Systems Center	X	X		
74.	Morgan, Dr. Patrick	University of California, Irvine	X			
75.	Morris, Robert	8th AF				X
76.	Morrison, Rick	BAH		X		
77.	Moulton, Mark	STRATCOM/GISC-LLNL	X			

	<b>Name</b>	<b>Organization</b>	<b>WS1</b>	<b>WS2</b>	<b>WS3</b>	<b>WS4</b>
78.	Neely, Mike	NuTech Solutions, Inc.	X			X
79.	Numrich, Dr. Sue	IDA	X	X	X	X
80.	Ohassig, Katy	IDA			X	
81.	Olds, Jim	Krasnow Institute				X
82.	Palowitch, Dr. Andrew	SAIC	X			
83.	Pattipati, Dr. Krishna	University of Connecticut	X			
84.	Pease, Mike	IDA			X	
85.	Perdue, Riley	DNI			X	
86.	Pettit, CAPT Steve	STRAT/J53			X	
87.	Podlesny, Robert	Joint Warfare Analysis Center	X			
88.	Popp, Robert	National Security Innovations, Inc	X	X	X	
89.	Prescott, John	STRATCOM	X			
90.	Renfro, Maj Rob	CENTCOM		X		
91.	Riley, Shane	Dragon Research	X	X		
92.	Rodden, Kevin	NSA		X		
93.	Ross, Jeffrey Ian	University of Baltimore	X	X		
94.	Rowe, Catherine	Joint Warfare Analysis Center	X			
95.	Scheber, Tom	National Institute for Public Policy	X			
96.	Schroeder, Robert	STRATCOM J2		X		
97.	Schryver, Dr Jack	Oak Ridge National Laboratory	X			
98.	Schwark, Stuart	The MITRE Corporation	X	X	X	
99.	Scott, Maj Gerald (Scotty)	J3 DDGO	X			
100.	Shannahan, Lt Col Mike	STRATCOM/GISC	X	X	X	X
101.	Sharfman, Dr. Peter	The MITRE Corporation	X	X		
102.	Shaw, Brian	NSSO		X		
103.	Silverman, Dr. Barry	University of Pennsylvania	X			
104.	Sitler, Ken	STRATCOM/GISC			X	
105.	Smith, Jim	STRATCOM		X		
106.	Snell, John LCDR	Joint Warfare Analysis Center			X	
107.	Sobel, Dr. Annie Sobel	Sandia National Labs, NM	X			
108.	Solti, LtCol James Solti	Joint Warfare Analysis Center	X			
109.	Sotirin, Barbara	Army Corp of Engineers				X
110.	Speed, Ann	Sandia National Labs, NM	X	X		
111.	Stanford, Doug CDR	STRATCOM/GISC			X	
112.	Stech, Dr Frank	The MITRE Corporation	X			
113.	Stokely, John	JFCC GSI J5X6			X	
114.	Sundberg, Eric	NSSO		X		
115.	Teitelbaum, Daniel	Alion S&T				X
116.	Timms, LCDR Rick	STRAT/J5			X	
117.	Tindale, Dr. Scott	Loyola University Chicago	X			
118.	Tonon, Dr Joe	Joint Warfare Analysis Center	X			
119.	Turano, Dr Edward	Lawrence Livermore National Lab	X			
120.	Tweedale, James	Joint Warfare Analysis Center				X
121.	Usher, Maj Gen (Ret) Bill	OSD/DDR&E/RRTO	X	X	X	X

	<b>Name</b>	<b>Organization</b>	<b>WS1</b>	<b>WS2</b>	<b>WS3</b>	<b>WS4</b>
122.	Veazie, CDR Todd	J3 DDGO	X		X	X
123.	Vorce, LCDR Jeff	J3 DDGO	X		X	X
124.	Waldrop, M. Mitchell	MMW Communications LLC				X
125.	Waller, Mike	Inst of World Politics				X
126.	Weiss, Mark	Nat'l Science Foundation				X
127.	Widseth Chris C	STRATCOM/J53X			X	
128.	Wylar, Brenda	Engineers		X		
129.	Zagare, Dr. Frank	University at Buffalo	X			
130.	Zalesny Dr. Mary	J3 DDGO and PNNL	X	X	X	
131.	Zuehlke, Sheila	Dragon Research		X		
		TOTAL	72	40	48	25