

# Applied Use of Socio- Cultural Behavior Modeling

ICCRT Presentation

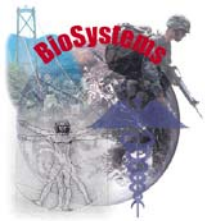




# Changing DoD role demands new capabilities

- ▶ Department of Defense (DoD) has gone beyond its traditional role, and capabilities
- ▶ Current and future operations demand the capability to understand the social and cultural terrain
- ▶ Command and control require a knowledge and shared understanding of not only an elusive adversary, but the socio-cultural layer in which the adversary lives and enjoys a support structure





# Overview/Outline

- ▶ The changing DoD role's demand for new capabilities for command and control
- ▶ New complex space: modeling and simulation are critical tools
- ▶ Significant technical challenges for leveraging HSCB M&S for C2
  - Strategies & methods for assessing models, integrating them, and using them to support “option awareness”
  - Programmatic challenges
- ▶ The HSCB Modeling Program



# Need for human, social, cultural and behavioral capabilities spans all operational environments

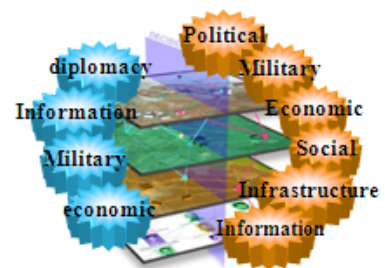
### Analysis



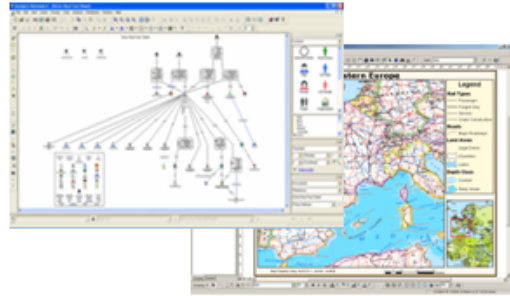
### Influence Operations



### Experimentation

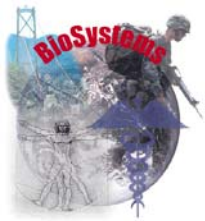


### Operations Planning

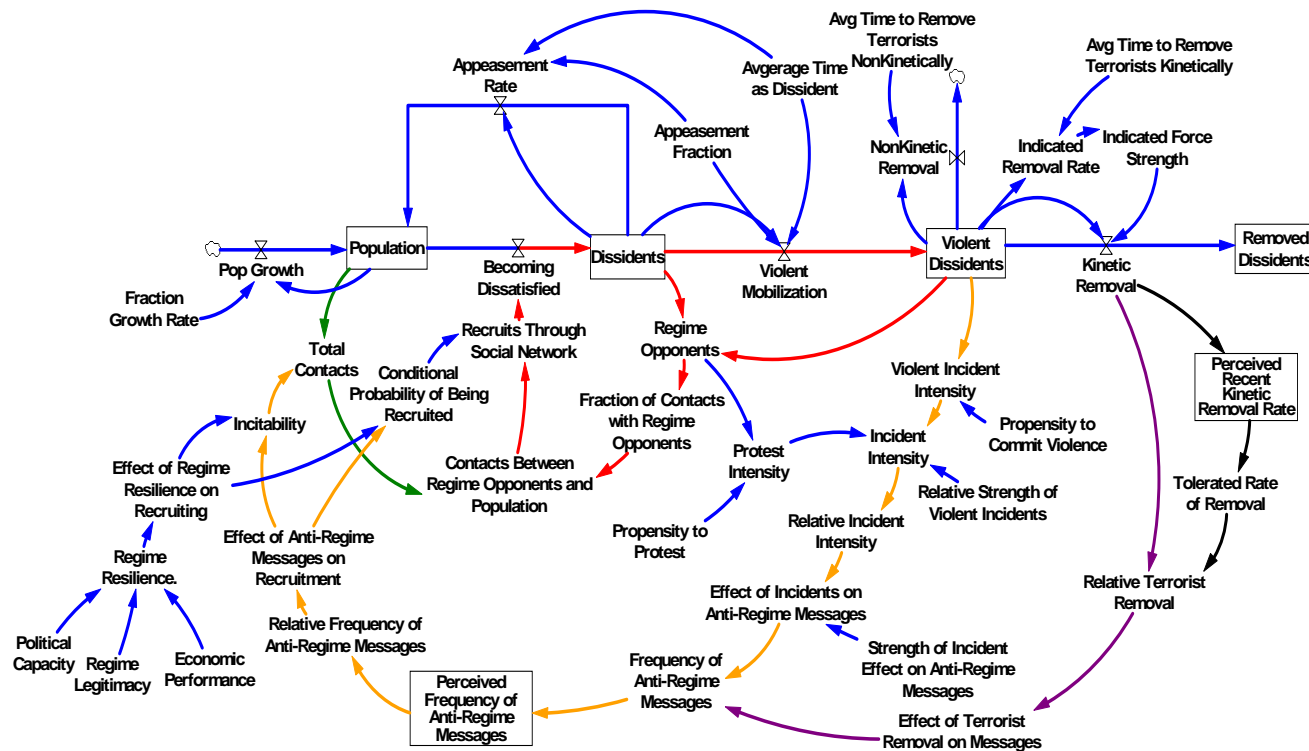


### Training & Mission Rehearsal

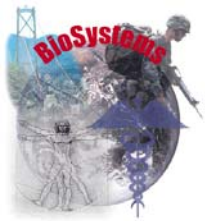




# Modeling and simulation



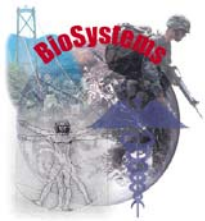
- ▶ Computational modeling, including simulation techniques, offers some capability for dealing with this complexity.
- ▶ Enables the user to leverage large amounts of data and explore cause-effect relationships without the time and resource costs associated with laboratory experiments.
- ▶ Alternatively, results from the model's application can be used to design and refine lab or field experiments to make them more effective.



# Challenge of leveraging HSCB M&S for C2



- ▶ C2 must take advantage of exploratory modeling tools that can elucidate the complex aspects of the environment and human interaction, but which embody “deep uncertainty”
- ▶ Understanding how best to use these M&S tools is a challenge, as these techniques can vary widely in their complexity and granularity
- ▶ Socio-cultural behavior questions often require the use of many different M&S tools of different resolutions and levels of verisimilitude



# Technical assessment challenges

- ▶ Government users need confidence in socio-cultural behavior tools to make them a regular part of their decision-making process.
- ▶ Traditional V&V is extremely difficult with respect to socio-cultural behavior models (due to lack of availability of data, theory, and measurement precision...)
- ▶ However an analytical technical assessment of the construction of the tools is possible, albeit nontrivial, requiring multidisciplinary perspective.
  - Descriptions of all theories that underlie the model,
  - Descriptions of all modeling techniques used, and
  - Explanations of why the chosen modeling techniques are appropriate to use with the theories and how apply to the problem space



# Usage challenges

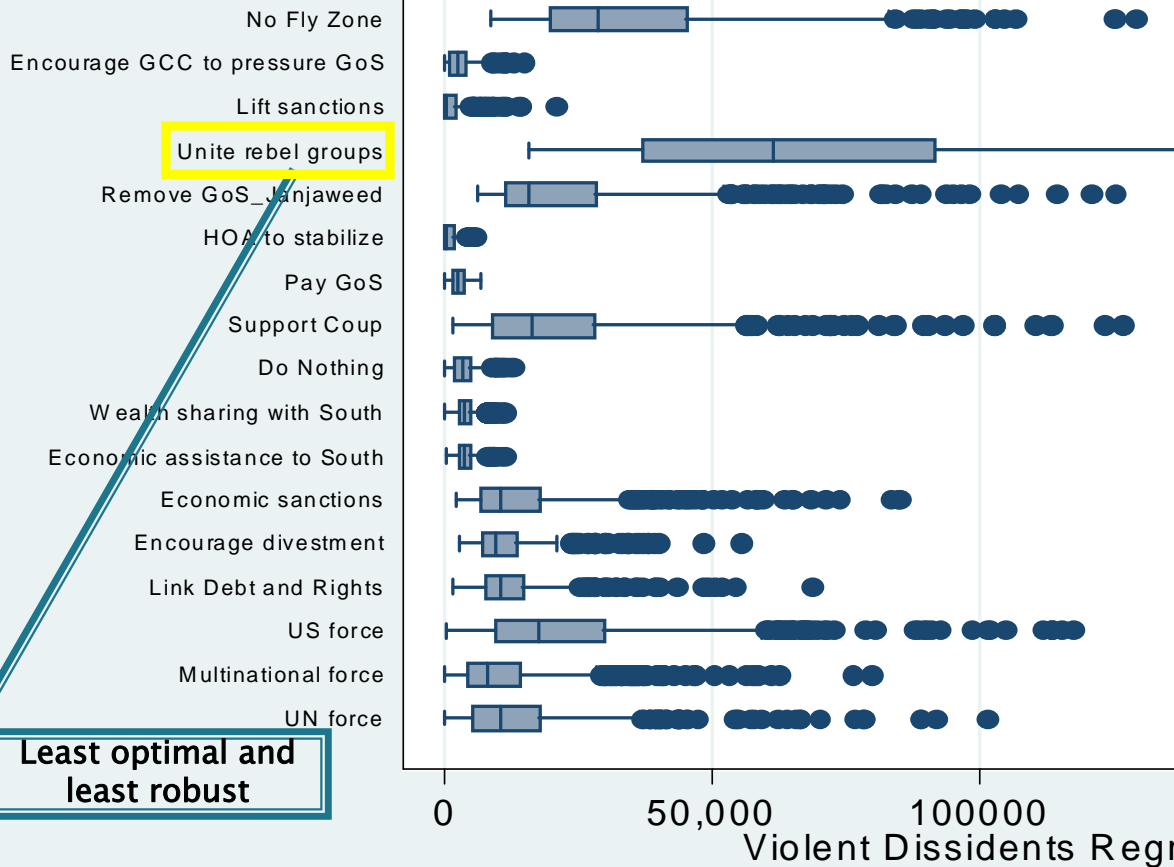
- ▶ “Deep uncertainty” is endemic
  - No social science model can account for all human behavior
  - Translation of real-world data into model parameters and values is also an uncertain and ultimately a subjective process
- ▶ Therefore, these models cannot be used for predictive purposes in the same way a e.g., projectile trajectory model is used.
- ▶ They can be used to bound the space of plausible futures
  - Under deep uncertainty, optimal strategies are brittle if they are sensitive to the modeling uncertainties
  - However, we can forecast behaviors under various courses of action or policies.
  - This exploratory use can help identify the most “robust” policy or operational plan that works for a landscape of plausible futures.





# An example from a Sudan SMA

## S3DM - Violent Dissidents



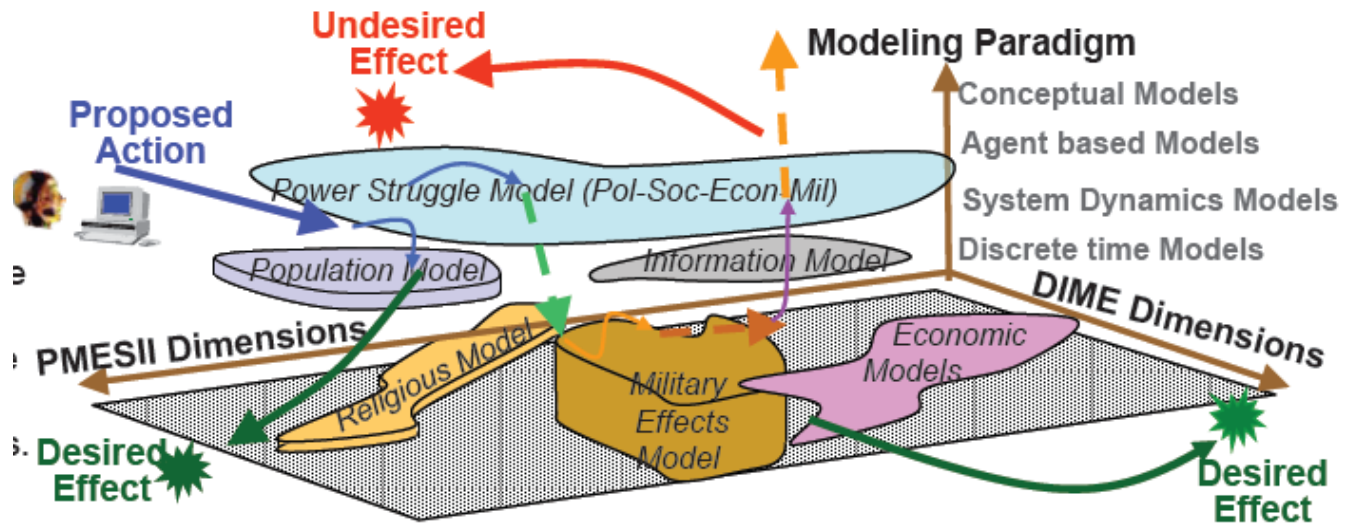
- COAs translated into model parameter values
- Values systematically varied across multiple executions of the model.
- Hyperspace of outcomes summarized graphically

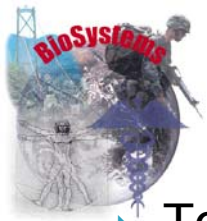
Least optimal and least robust



# Integration challenges

- ▶ Core challenge in social science modeling: how to translate and integrate disparate model outputs, and their interactions, into human decision space.

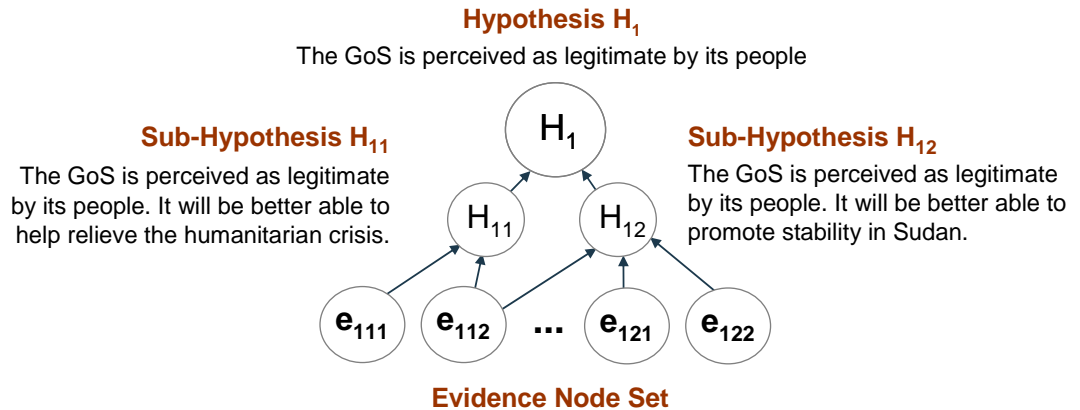




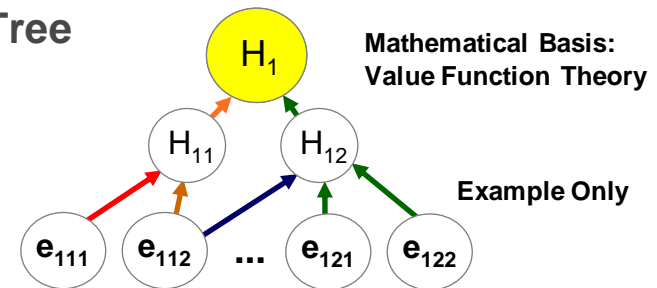
# An integration example

- To integrate and synthesize findings across many different social science model requires normalizing data and model outputs

**1** Define the Evidence-to-Hypothesis Tree



**2** Score Each Evidence Node in the Tree by it's Strength in Confirming or Disconfirming the Hypothesis



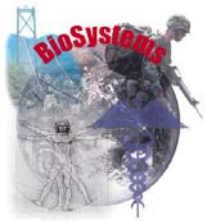
**3** Document Rationales

**Source:** Social Science Model

e.g., **POFED**

**Evidence Statement:** This evidence node is about "xyz" and relates to this hypothesis because of these reasons ...

**Basis for Assessment (BOA):** The basis for this color rating assessment stems from the following reasons ...

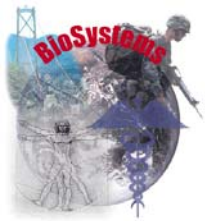


# Programmatic challenges

- ▶ Lack of a military technical socio-cultural behavior core capability
  - Currently drawn from academia, government labs, or industry
- ▶ Growing investment in tools has been primarily ad hoc
  - Unorganized demand for work in this area.
  - Over-focus on near term deliverables that support current operations
  - Support for a relatively narrow customer base.
- ▶ Transferability: limited 'reuse' of data and software and no life-cycle management plan for products.
  - No DoD investment in resources needed to port and/or extend relevant data, knowledge and tools from one system to another.
  - Not developing the kind of deeper cultural understanding that would make tools and models generalize (e.g. to new regions, or new tribal/societal structures).



# The HSCB Modeling Program

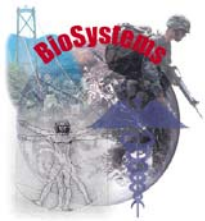


# The HSCB Modeling Program

- ▶ The Human Social Culture Behavior (HSCB) Modeling Program started in FY2008, sponsored by the OSD
- ▶ Being executed in conjunction with the Military Services, relevant organizations of the Office of the Secretary of Defense (OSD), and in coordination with work across other Federal agencies



The HSCB Program supports cutting edge research to develop computational models of social, cultural, and behavioral factors, and supports design of model-driven tools that can be transitioned to DoD user communities in intelligence analysis, operations analysis/planning, training, and joint experimentation.



## Application Pillars

Intel  
Analysis

Intel/  
IO

Training/Mission  
Rehearsal

Ops  
Planning

Joint  
Experimentation

### Anticipated Program Products

#### Data Technology

- Near real-time on-the-ground collection of information
- Decision support tool for use in unit transitions (RIP/TOA)
- Socio-cultural data modeling
- Modeling integration architectures

#### Models and Software

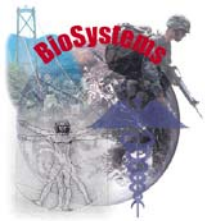
- Ethnographically-valid socio-cultural behavior models
- Forecasting aids
- COA planning/analysis tools
- Computational models of societies in transition (strategic analyses for DIME)

#### Visualization Tools

- Visualization of HSCB terrain
- Option Awareness and Situation Awareness
- Common architecture for visualizing DIME-PMESII factors on battlefield or during SSTR

#### Mission Rehearsal Tools

- Automated scenario generation for experimentation
- Validated mission rehearsal content
- Interactive multi-cultural interpersonal skills trainer/bilateral negotiation
- Distributed learning environments



# HSCB program development: three guiding principles

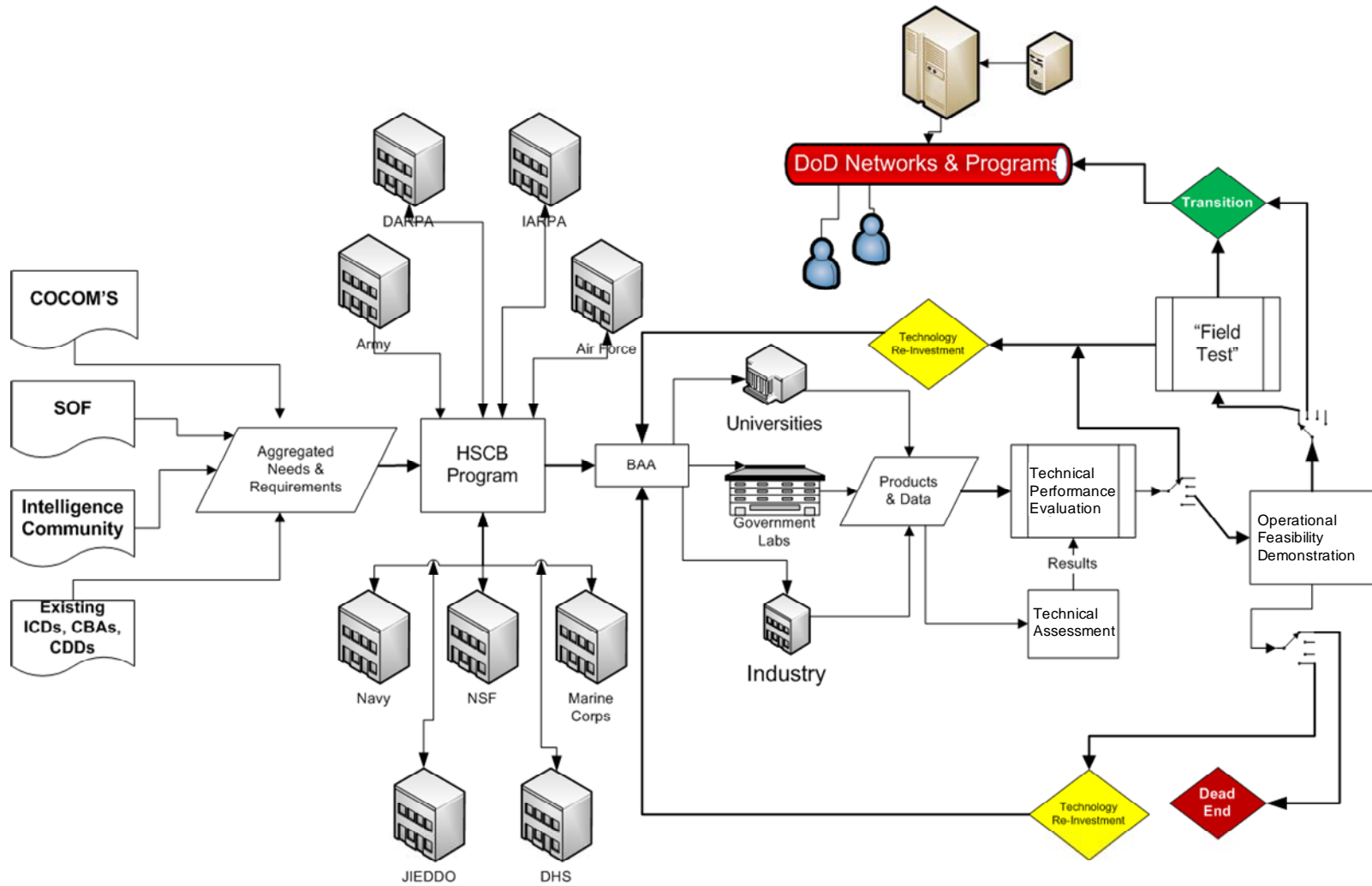


- ▶ Build and maintain a solid scientific foundation.
  - Seek and support work that builds on established (e.g. peer reviewed) social science theory and methodology, and that leverages leading edge computational techniques.
  - Implement a rigorous, competitive environment to ensure that innovative and sophisticated work is done.
  - Institute a carefully-specified process for assessment and testing.
- ▶ Keep the end user always in mind.
  - Support will flow to development of data, models, tools, and capabilities that will be valued by a DoD user community and that can be transitioned to a program of record.
- ▶ Evolve an integrated portfolio of research and development, so that resulting products inter-relate and offer transferable capability.





# HSCB Modeling Program Cycle



**Systems Engineering**



# Conclusions

- ▶ Conscientious operational usage will require development of policies, procedures, information systems, and requisite training to guide people in this endeavor and to ensure that their activities are audited and documented.
- ▶ Doctrine and mission rehearsal venues will need to be developed to ensure decision makers are sensitive to the capabilities and limits of using such models of operational planning and policy development.
- ▶ The movement from “optimal” to “robust” decision making is critical, representing a shift in perspective that enables the most effective use of socio-cultural behavior models.