

Analysis for Non-Traditional Security Challenges: Methods & Tools

**Military Operations Research
Society (MORS) Workshop**

**WG 1, “GWOT/Irregular”
Outbrief**

WG 1 - “GWOT/Irregular

- **Complex topic**
 - **Focused on:**
 - ◆ **Action -> Effect -> Results**
 - ◆ “Hard” problems involving:
 - Human factors, media, influence, populations
 - DIME/PMESII
 - Analysis in support of Headquarters, Combatants, not training etc.
 - ◆ Understanding the problem and existing techniques
 - ◆ Identifying new approaches that would work
 - **Structured results as process**
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WG1 - "Its a process"

- The question
 - The data
 - The analysis
 - The tools
 - New ideas
 - Recommendations
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WG 1 – "Get the Question Right"

- Goals and questions are often unclear
 - ◆ We may lack basic frameworks for understanding the problem
 - Use frameworks where they exist
 - You can model anything, but it may not be ultimately very helpful
 - The question is very important
 - ◆ Because soft issue models often need to be customized for the question
 - ◆ And the data may not exist, or may be complicated and difficult to collect
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WG 1 – “We need data”

- **Lack of data poses a significant problem**
 - **Discussed polling as an example**
 - ◆ Legal constraints
 - ◆ Political constraints
 - ◆ Methodological constraints
 - **Much of the data we need involves “human” data that is difficult, messy, and controversial to collect**
 - **Simulations can only go so far when compared to real world data**
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WG 1 – “The Analysis”

- **Operations research is the application of “scientific” methods to operational problems**
 - ◆ We may have to admit that some things do not fall into the category of physical science
 - ◆ This means managing the risk associated with decisions in new ways
 - **We may want to explore:**
 - ◆ New decision-making models and processes
 - ◆ Tools that may not be capable of being validated
 - ◆ New techniques, such as multiple instances of models and theories
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WG 1 – “The Tools”

- No new or revolutionary tools
- But considerable skepticism about any one model’s ability to solve a problem
- All the existing tools tend to be
 - ◆ Specialized
 - ◆ Expert intensive

WG 1 - “Existing Models”

Core IW Missions	MORS Workshop Issue Areas	Traditional M&S Tools
Counter – Proliferation		Not Directly Applicable
Counter Terrorism	Counter-terrorism Terrorist Networks Critical Infrastructure Protection Maritime Domain Awareness Partnering/Shaping Distributed Operations Small Unit Operations	Not Directly Applicable
Unconventional Warfare	Small Unit Operations Distributed Operations	JICM, JWARS? (during latter phases of the UW Campaign Only)
Special Reconnaissance		JICM, ITEM, THUNDER, JTLS, JWARS, COSMOS*
Direct Action	Small Unit Operations Riverine Operations	JICM, ITEM, THUNDER, JWARS, AMP, JTLS
Psychological Operations		JICM
Civil Affairs Operations		JTLS
Foreign Internal Defense	Foreign Internal Defense Counter-insurgency Partner Shaping Distributed Operations Small unit Operations Riverine Operations	JICM, JWARS, JTLS
Information Operations		ITEM, THUNDER

WG 1 - “Unconventional Tools”



Core IW Missions	IW M&S Tools	Traditional M&S Tools
Counter – Proliferation	Direct Combat Model (JCATS)	Not Directly Applicable
Counter Terrorism	PMESII (SEAS – VIS, IGS/EBW) Direct Combat Model (JCATS)	JICM, JWARS, JTLS Not Directly Applicable
Foreign Internal Defense	PMESII (SEAS – VIS, ERIS, MIT System Dynamics Model, Agile, IGS/EBW, PSOM, MASON, CASS, Forewarn, SIAM, ERIS, IBC, Diamond-US) Direct Combat Model (JCATS)	JICM, JWARS, JTLS
Special Reconnaissance	Direct Combat Model (JCATS) Pythagoras	JICM, ITEM, THUNDER, JTLS, JWARS, COSMOS*
Direct Action	Direct Combat Model (JCATS)	JICM, ITEM, THUNDER, JWARS, AMP, JTLS
Psychological Operations	PMESII- (SEAS – VIS, Advertising, Psychological, Political, etc) SOF Behavioral Analysis Tool (Pythagoras)	JICM
Civil Affairs Operations	PMESII-TBD	JTLS
Unconventional Warfare	PMESII (SEAS – VIS, MIT System Dynamics Model, Agile, IGS/EBW, PSOM, MASON, CASS, Forewarn, A Force More Powerful, SIAM, ERIS, IBC) Direct Combat Model (JCATS) Commercial Wargame Derivative (IRIS-COINS) Diamond-US Pythagoras Interim Semi-static Stability Model	JICM, JWARS? (during latter phases of the UW Campaign Only)
Information Operations	PMESII-TBD (SEAS – VIS, Advertising, Psychological, Political, etc) SOF Behavioral Analysis Tool (Pythagoras)	ITEM, THUNDER

Tools:

- Green = On hand Tool
- Blue = Potential Tool
- Orange = Tool requiring validation and development effort
- Purple = Candidate Tool requiring further assessment
- Red = Future capability

* COSMOS is a mission level ISR model

WG 1 - “What needs to be done”



- ◆ Frameworks/paradigms for Irregular Warfare Analysis
- ◆ Irregular Warfare M&S Evaluation Criteria
- ◆ Test Cases
- ◆ Irregular Warfare Scenarios
- ◆ MOEs
- ◆ Data
- ◆ Irregular Warfare M&S at the Campaign Level
- ◆ VV&A
- ◆ Analyst (and Consumer?) training
- ◆ Prototype cross-cutting studies
- ◆ Best of breed approach to model improvement

WG 1 – “New Stuff”

- **Games as tools**
 - ◆ What makes a game helpful?
 - ◆ Scenario-based planning? Seminar wargames? MMOGs?

 - **Learn from other communities**
 - ◆ Computational social science
 - ◆ Commercial
 - Interface
 - Usability, flexibility, agility
 - Focus

 - **Data mining tools**
 - ◆ Figure out what they’re good for?
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WG 1 – “A few suggestions”

- **Change in the *consumption* of the analysis may be the “killer app”**
 - ◆ Develop ways to deal with uncertainty in the inputs and results
 - ◆ Develop ways to account for and balance risk involved in different experimental approaches and outcomes

 - **Consider expanding the role of wargames as tools that support decision-making**
 - ◆ But they have to be done right
 - ◆ And you have to balance them with models

 - **Learn to use range of outcomes provided by multiple independent analytical approaches**
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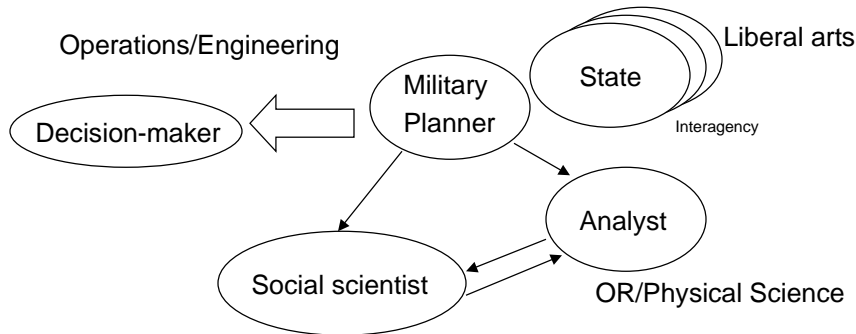
WG 1 – “Recommendations”

- **Getting the question and the framework right is important - and relatively inexpensive**
 - ◆ But it can take time, and iteration
 - **Examine the possibility of collecting real-world data to support decisions**
 - **Examine ensembles of models**
 - **Research the use of games/scenario planning/commercial techniques to support decision-making**
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WG 1 - “Recommendations”

- **Examine new ways to validate models, and find ways to deal with what traditionally cannot be validated**
 - ◆ Any model that deals with human decision-making?
 - ◆ While they can't be “validated” they can be used to inform and support decision-making
 - ◆ Traditional assumptions of reproducibility and traceability may need to be replaced with transparency and acceptance of judgment
 - **Examine thinking about the role of modeling, and the need for “scientific” answers for questions that may have no basis in physical science**
 - ◆ May need to accept more risk in this area
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SWG 1-1 “Worlds collide”



- ◆ What are the right ingredients to turn the social science into a campaign level analysis?
- ◆ Each is uncomfortable in the others world
- ◆ Need to begin to merge disciplines

“ICAN’T STAND THIS”



SCENARIO—KAZAKHSTAN, RADICAL ISLAMIC INSURGENTS, RUSSIANS ON THE GROUND WITH A HEAVY HAND ON THE LOCAL POPULATION

OBJECTIVE: “WORK WITH RUSSIAN COUNTERPARTS TO DEVELOP COORDINATED ELEMENTS OF A PUBLIC DIPLOMACY, INFORMATION OPERATIONS AND TSC CAMPAIGN TO THWART BURGEONING SPREAD OF RADICAL ISLAM TO THE STANS”

“ICAN’T STAND THIS”



CUSTOMER—COCOM, WITH POTENTIAL DIPLOMATIC OVERLAP

TIME HORIZON—UNDEFINED, BUT NOT IMMEDIATE

PROBLEM DEFINITION—PROVIDE ANALYTIC SUPPORT TO COCOM STAFF TO HELP PLAN A VARIETY OF FLEXIBLE DETERRENT OPTIONS (FDOS) COVERING THE GROWING RADICALIZATION OF THE STANS

CPB

NETWORK OF RELATIONSHIPS
MODEL – NOT SIMULATOR
POLITICAL MAP, CULTURAL MAP

“ICAN’T STAND THIS”



WARGAME

TRANSPARENCY
COMMUNICATION
ANALYTICAL CHALLENGE
ALTERNATIVE THEORIES

ASSESSMENT

POLLING
SELECTED INTERVIEWS

CONTINGENCY

TRADITIONAL MODELS
CPB & WARGAME BASED ASSUMPTIONS

“C’EST LA VIE!” - *Hard Issues*



- **Will the violence continue to escalate?**
 - ◆ Trend analysis of web text searches such as Blacklight; Public poll analysis could also be useful
- **Can we predict the population dynamics prior to mass insurgency**
 - ◆ Could gain insights into dense recruitment pools/areas by combining multiple data sets (age demographics, unemployment levels, crime rates, perceived inequalities, income levels, education levels, election results, culture)
 - Combine these data sets using map overlays or GIS tools to create visual recruitment landscape
 - Landscape could prove useful for Operation planning (Focus IO on dense populations of potential recruits)
- **Is it possible to model COIN in a Western nation?**
 - ◆ PSOM with changes (Increase resolution in urban areas)

“C’EST LA VIE!” - *Less Hard Issues*



- **Are there models of border flows**
 - ◆ Traffic/Transportation/Immigration authorities could potentially provide insights/models
 - ◆ Terrain analysis could also be very useful
- **What aid could the US provide if asked?**
 - ◆ Waterway/Critical infrastructure protection
 - Modeled using conventional kinetic models and network models of the power grid
 - ◆ Border protection/Arms interdiction
 - ISR Models, Kinetic models
- **Historical models of Ireland, Kosovo, and 1980 Quebec insurgencies could prove useful**

“C’EST LA VIE!” - Insights



- **Modeling COIN in Western nations is significantly different than doing so in other areas**
 - ◆ Availability and credibility of data allows for better analysis of current news sources
- **True simulations seem to fall short, but there exists value in methodologies that combine relatively simple algorithms with strong data resultant of free speech**
- **Multiple tools that provide varying insights are more valuable than the search for one tool that claims to determine an optimal solution**
- **US action could potentially free Canadian forces for use on operations where they possess a competitive advantage (OPS requiring local knowledge; Troops in the streets)**
 - ◆ This could allow the US to maintain a low profile and prevent potential Canadian civilian backlash

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Other Insights & Random Thoughts



- **DARPA PCAS program seems promising**
 - ◆ Concern that program is terminating or receiving low level of funding
- **Use of low-complexity vs. high-complexity modeling in DoD**
 - ◆ Are we using high-definition modeling because we have them and know how to run them, instead of directing analyses toward the tough issues DoD decision-makers face
 - ◆ Cease and desist! Set our analytical talent on addressing the key issues and let them figure out how to do
- **Are we tapping the vast world of analysis of social science phenomena in academia and business? When we do, can the techniques that we find create useable tools for our decision-makers?**
- **Should the analytic community shift some of its resources toward problem definition?**
 - ◆ Many questions may be amenable to qualitative analysis and/or simple analytic techniques vice complex modeling
- **Is MORS the problem? Is our discipline built too much around classical OR (the WW-II legacy)? Need more analysts trained in Social Science modeling. Find ways to bring the work that is being done into the decision- and policy-making levels. Tap into fields like anthropology that are not well-represented in our analytical community.**
- **We ought to be doing OA studies at the inter-agency level. Encourage MORS participation by non-DoD agencies**

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Backup

WG1 - Charter and Approach

- **GWOT and Irregular Warfare**

- ◆ A large set of topics
- ◆ The largest session (80 people)

- **Approach**

- ◆ Baseline with stakeholders
- ◆ Critically examine existing models
- ◆ Search for new ideas in the best places
 - Academia, FFRDC's, gamers
- ◆ Involve everyone in small groups
 - Using a scenario-based approach
- ◆ We have interesting speakers, plan to introduce stimulating ideas

Details



- **Baseline participants**

- ◆ Session overview, common set of questions
- ◆ “How do we account for what we currently don’t account for?”

- **Scenarios**

- ◆ Designed to stimulate discussion, provide interest
- ◆ Will be facilitated discussion
- ◆ 10 Scenarios - will modify according to number of participants to keep 7-10 people/group
- ◆ Scenarios range from planning and resourcing to execution
- ◆ All are focused on addressing the “hard problems”

WG1 - Final Schedule



- **Day 1: Stakeholder Briefings and Round Table**

- ◆ *OSD PA&E* *Mr. Preston Dunlap* -- *US Air Force* *No Representative*
- ◆ *US Army* *No Representative* -- *SOCOM* *Mr. Ed Cardenas*
- ◆ *US Navy* *Captain Andy King* -- *EUCOM* *No Representative*
- ◆ *US Marine Corps* *Mr. Steve Stephens* -- *CENTCOM* *No Representative*

- **Day 2:**

- ◆ **DoD Large-Scale Model Briefings and Roundtable**

- *Larry Budge* *Allion* *SEAS*
- *Ed Cardenas* *NG/SOCOM* *SOFBAT*
- *Tom Couture* *Group W* *MOOTW FAST Toolbox (ISSM, JCATS, Diamond US)*
- *Nicola Stewart* *UK MOD* *PSOM Peace Support Operations Model*
- *John Shepherd* *US Army CAA* *ERIS (JOES CI)*
- *Larry Budge* *Allion* *The Sentient World*

- ◆ **Novel Approaches Briefings and Roundtable**

- *Mr. Martin Lidy* *IDA* *Interdepartmental Analytical Framework*
- *Dr. Robert Popp* *DARPA* *Quantitative Computational Social Sciences*
- *Douglas Whatley* *Breakaway* *A Force More Powerful*
- *Mr Aaron Frank* *BAE* *Quantitative Computational Social Sciences*
- *Ken Comer* *OSD PA&E* *VV&A: Agent Based Models*
- *Dr. Alok Chataverdi* *SIMULEX* *VV&A: Agent Based Models*

WG1 - Draft Schedule (Concluded)

● Day 2:

◆ Sub Working Group Scenario Discussions during Lunch

→ Dr. Ed McGrady	CNA	1. Economics 101
→ Mr. Ed Cardenas	SOCOM	2. Up the River
→ Dr. Cy Stanic	NG	3. You Must Be On Drugs?
→ Mr. Steve Stephens	USMC	4. I can't stand this?
→ LTC Steve Knight	J8 WAD	5. I Wanna go back to the Islands
→ CMDR Tom Mc Nerney	USN	6. Pirates are Cool
→ Mr. John Collier	OSD PA&E	7. C'est La Vie!
→ Mr. Mike Williams	OSD PA&E	8. A Dispute of Long Standing
→ Mike Ottenberg	OSD PA&E	9. A Place in the Sun
→ Mr. John Snevely	OSD PA&E	11. MOUT + Terrorists =?
→ Mr. Mike Fitzsimmons	IDA	
→ Dr. Royce Kneece	IDA	

● Day 3

- ◆ Core focus out-brief prepared
- ◆ Working groups prepare out-briefs on scenarios