

Improving Analytical Support to the Warfighter:
Campaign Assessments, Operational Analysis,
and Data Management

Working Group 5
*Current Operations Analysis – Strategic &
Operational Level*

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Working Group 5 was established to address current operations analysis at the strategic and operational level.

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WG 5 Goals

- Enhance the capability of OR analysts at combatant commands, JTF headquarters, the armed services, and the national defense department/ ministry level
- Share *best practices* and information regarding models that have proven useful at the *strategic or operational level*
- *Address gaps* in modeling and analysis capability through an examination of which models analysts are using and what kinds of problems analysts are asked to solve

The aim of our group was to enhance the capabilities of analysts at strategic and operational levels, including but not limited to analysts at the levels shown here. We discussed best practices at those levels to share successes and challenges. Our main focus was to identify gaps in capabilities.

WG 5 Approach (1/2)

- WG framework based on 4 questions:
 - What questions do analysts address?
 - What techniques, tools & models do analysts use?
 - What questions have analysts been unable to answer with currently available tools, models and resources?
 - Do other tools, models, or resources exist that could be used to answer those questions?

Our approach utilized four key questions to determine what types of analysis we in the OR community have been able to address to date and what techniques, tools and models were needed to accomplish these analyses. We then tried to determine if there are classes of questions that the OR community has not been able to address, and to determine the challenges and gaps that exist as barriers to moving our work forward.

WG 5 Approach (2/2)

- Briefings to share Operational and Strategic level analyses
 - Support to ISAF through CENTCOM: Multi-Model Analysis – Dr. Brian Efird, NDU
 - History of Center for Army Analysis Irregular Warfare Database & Applications – LTC Dave Sanders, CAA
 - Using Wargaming & Empirical Data to Address Strategic Issues – LTC Dave Sanders, CAA
 - IW Analysis in UK Defence Community – Mr. Luke Huxtable, Defence Science and Technology Laboratory, UK
 - Campaign Assessments, Ops Analysis & Data Management – LTC(P) Clark Heidelbaugh, JIEDDO COIC
 - Casualty Estimate For USCENTCOM, Patterns-of-Operations Basis (Benchmark Rate Structure) – Mr. George Kuhn, LMI
 - Adaptive Forecasting Methods to Predict Enemy Actions – Maj Brad Young, USCENTCOM J8

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Dr. Brian Efird from NDU discussed his work modeling how either ISAF or Taliban actions would influence popular sentiment regarding those groups in districts in Afghanistan. Two briefings from CAA related to use of historical data on irregular wars in order to address strategic issues, particularly force sizing and probability of campaign success. Luke Huxtable gave an overview of IW analysis and its impacts on UK policy decisions. LTC Clark Heidelbaugh presented ongoing work at the JEIDO COIC, particularly highlighting several data related techniques and challenges. George Kuhn focused on using structured empirical data to inform casualty estimates based on projected patterns of operations. Finally Maj Brad Young presented an adaptive time series model that could be used to predict levels of enemy activity.

WG 5 Findings (1/7)

- What questions do analysts address?
 - Force Structure/Force Development
 - Required size & mix of Coalition Forces / National Security Forces*
 - National Security Force development capability
 - Coalition Force drawdown analyses
 - Size, nature, composition, & objectives of insurgent groups
 - Campaign analysis
 - COA Analysis
 - Durations
 - Probability of success*
 - Casualty estimation*

*WG presentation topic

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Strategic and operational analysis addresses a wide variety of issues in support of our senior leadership. These topics apply to US, coalition and the indigenous National Security Forces (army and police), host nation governments and even to non-governmental organizations (NGOs) and private organizations (PVOs).

1. Force structure and force development issues are prevalent throughout all phases of operations. Numerous studies have been done to inform decisions on the requirements for forces, in terms of size and mix, for both Coalition and the National Security Forces (NSF), to include such issues as required rate of growth and possible rate of reduction, where additional forces are needed, how fast NSF can be developed, what key enablers are needed, and when areas can be turned over to NSF.

2. Group participants mentioned that several organizations are using analysis techniques to gain a better understanding of the insurgency. While predictive analysis has been used to look at the size and capability of the insurgency over time, techniques such as social network analysis and Bayesian analysis have been used to get a better understanding of their composition, connectivity and even their objectives.

3. Campaign Analysis is key to informing Army decisions. While used extensively for informing decisions related to phases 2 and 3, it has been shown to have ongoing value for phase 4 and 5 stability operations, to include evaluations of course of actions for planned operations, estimations of their duration and intensity, casualty estimation and requirements for key enablers.

WG 5 Findings (2/7)

- What questions do analysts address?
 - Predicted impact on popular sentiment of coalition force growth / reduction*
 - Threats:
 - Trend analysis & impact on operations
 - Understand & defeat the network*
 - Effect of stabilisation operations on: *
 - Governance / essential services
 - Changing security environment
 - Economic / Employment
 - Rule of Law / Security Sector Reform
 - Strategic Communications
 - Information Operations

*WG presentation topic

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4. Additional discussion centered on the need to address the impact that force growth and reduction, and the actions those forces take, have on the local population's sentiment toward coalition and the NSF.

5. Examination of the threat includes not only characterizations and predictions of enemy actions, effects on local population, the Coalition and NSF, but also on understanding the insurgents, how they operate and identification of ways in which their efforts can be influenced, attacked and defeated.

6. An area that generated a great deal of discussion centered around the non-kinetic effects and requirements of stabilisation operations. Particularly, we discussed the need to determine the effect that military operations have on campaign objectives that are not explicitly security-related such as governance, economic, rule of law, and development.

- What techniques, tools & models do analysts use?

Techniques:

Game Theory
 War Gaming
 Optimization
 Influence Diagrams
 Field Anomaly Relaxation
 Survey Analysis
 Social Network Analysis
 Computational Linguistics
 Multi-attribute Utility Theory
 Nodal Network Analysis
 Systems Dynamics
 Geospatial Analysis
 Pattern & Cluster Analyses
 Risk Analysis
 Statistical Analysis
 Forecasting
 Statistical Process Control
 Agent Based models

Tools:

Bayesian Networks
 MS Excel / Access
 Statistical tools
 GIS Tools
 Stella
 SABERS
 Computer Algebra Systems
 Scripting / Programming Languages

Models:

PSOM (Peace Support Operations Model)
 STOAT (Stabilisation Operations Analysis Tool)
 IWQAD (IW Quantitative Analysis of Database)
 MEESSEE (Modeling Effects of Essential Sves,
 Security, Economics & Employment)
 Senturion
 Cultural Geography
 ICAF (Interagency Conflict Assessment Framework)

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The next question that we addressed throughout our discussions was “What techniques, tools, & models do analysts use?” when focused on analyses at the strategic & operational levels. We attempted to **categorize these as illustrated above**. The techniques range from the seemingly “low-tech” **approaches** such as traditional war-gaming to more traditional OR, statistical, & industrial engineering techniques like optimization & statistical process control to more recent developments such as field anomaly relaxation, computational linguistics & social network analysis.

The tools & models employed in the analysis range from readily available COTS products to custom tools & models developed within the analysis organizations.

- What questions have analysts been unable to answer with currently available tools, models and resources?
 - Analysts provide the best answer possible given time, resources and expertise.
 - Reachback/external support is critical for success.
 - Resource challenges:
 - Getting the right tools on the right network when needed
 - J2 – ORSA integration
 - Getting Data

Our intent for this question was to find out **which** important questions we are **unable** to answer. What we rediscovered was one of the strengths of our analysts in that we always give the best answer possible, and we bring to bear all available resources in order to do so.

We recognize that we don't always have what we need to answer the question, but we are generally aware of where to find it – reachback and external support is a huge part of that.

We identified **the** three resource challenges **listed above** – the first is primarily procedural and can be addressed through resourcing within organizations. The second is primarily cultural. **For example, we found that while deployed, intelligence analysts and OR analysts are often in contact and work closely together, but on returning from theater, these connections are often difficult to maintain.**

We'll address data in more depth on the next slide.

WG 5 Findings (5/7)

- Do other tools, models, or resources exist that could be used to answer those questions?
 - Social network analysis
 - Interdisciplinary/interagency interactions
 - Data – challenges to overcome:
 - Data availability, transfer and authoritative data repository
 - Data sharing with Coalition partners
 - Data Aggregation/Disaggregation
 - Data Context (e.g., blue force activity)
 - Coalition data at the tactical level (who, what, when, where, why and how)
 - Variable resolution; nesting; scaling
 - Vertical and horizontal integration
 - Civilian, socio-economic, corruption data

While we said that there aren't questions we don't answer, we did identify areas where we as a community should improve. **The following areas have great potential to allow us to address new topic areas and to improve current approaches.**

Social network analysis was mentioned several times. We need to improve familiarization on potential uses as well as provide education on underlying assumptions to ensure correct application.

Interdisciplinary/interagency interactions became an enduring theme of our discussions since we all recognize that IW goes beyond traditional military actions & roles.

Data continues to be a challenge. Transparency and consistency is hindered by issues precluding sharing among coalition partners, transfer between networks and classification challenges. Blue data issues include a lack of context stemming from lost coalition data below the tactical level. Data is lost due to the rotational nature of our own force flow (and individual analysts), so we don't know what our own forces were doing at lower levels even though we may have data on red actions and casualties.

Additionally, we need improved non-military data sources to include HSCB data.

WG 5 Findings (6/7)

- What are the questions that need to be answered by the analysis community regarding your specific focus area in analytical support to the warfighter?
 - How do we account for interrelationships, influence, and 2nd & 3rd order effects of non-military issues (e.g., socio-economics, corruption) with regard to campaign objectives?
 - How do we improve access to in-theater data?
 - How do we use data, information and analysis from the tactical level to inform operational and strategic support to decision makers?

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Above are the questions that the working group agreed need to be addressed by the analysis community.

The first deals with expanding our focus as analysts yet remaining focused on providing input to the decision makers responsible for achieving our campaign objectives.

In providing access to in-theater data, we want to be able to inform our analyses to the best extent possible while balancing that with not increasing the burden on the analysts in theater and with security considerations

Third, we talked about tactical level data, actions, plans, information, and analysis and how it can be used to inform higher level analyses. It gets back to the issue raised on the first day of the workshop regarding the need for an overarching structure for managing and integrating not only data but also information, models, analyses, and assessments at multiple levels. We discussed issues related to capturing, aggregating, scoping, & retaining tactical level information.

WG 5 Findings (7/7)

- What types of analysis and what tools/models are required to help the community answer the questions regarding your focus areas, and do they currently exist?
 - Multi-resolution modeling
 - Tools to collect, process, manage and interrogate data
 - Coalition data at the tactical level
 - Creating structured data from unstructured data
 - Need to integrate civil/economic/institutional modeling and military modeling
 - Analysis of Phase 0 COAs – e.g., assisting with economic, water, and energy interests to prevent need for future engagement

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•We identified the need for models that can be scoped at multiple levels, changing fidelity based on information needs and using the appropriate level for the appropriate piece of the analysis. This could involve nested models, integrated architectures, modular approaches, and hierarchical decomposition.

•The second need highlights the need to create structured data from unstructured data over distributed distances. Much of the blue force data regarding tactical operations exists in free text documents such as plans and orders, and we need tools to be able to mine those sources for the useful data that exists in them.

•To improve our IW modeling capability, we need to augment our military models with other models that capture the government, economic, and development aspects of our campaigns.

•Finally, we need to be able to analyze phase 0 courses of action so that we don't end up in combat phases.

WG 5 Recommendations (1/2)

- Educate analysts on:
 - Importance & process of defining the problem up front with the customer (objectives, background, scope, resources, timeframe, methodology, product, etc.)
 - Importance of developing & maintaining contacts within the organization (planners, intel analysts, data sources)
 - Core Competencies, best practices
 - How to be a super user in EXCEL, ACCESS, VBA, GIS
- Determine procedures, guidance & agreements for access to in-theater data
- Define requirements for data tools (collect, process, manage and interrogate)

Our recommendations include areas to focus on in developing our analysts – not only focusing on tools and techniques but also on interactions as part of a staff. We further need to address how we get access to data, and the need for agreements, policies and procedures to do so in a timely manner. Lastly, we need to define requirements for the tools we need to create structured data from unstructured data.

- Formalize Integrated Knowledge Management
 - Staff function, responsibility, resourcing
 - SOPs, Battle Rhythm
 - Networks – cross domain security policy
- Develop and socialize ORSApedia
- Focus efforts on developing models incorporating the P_ESII aspects/impacts in IW
- Broaden analysts' focus:
 - Interdisciplinary
 - Interagency
 - Improve integration with theater planners & other experts (e.g., intelligence)
- Utilize and communicate analysis plans.

The group developed several recommendations to assist in improving our ability to address strategic and operational issues.

1. The DOD needs to formalize integrated knowledge management in order to address the challenge of synchronizing data, assessments, analysis, and models at multiple levels. We realize that this is a resource issue. It requires dedicated personnel as well as definite authority and responsibility within staffs to do this right.

2. The OR community needs to develop models related to Political, Economic, Social Infrastructure and Information systems.

3. As discussed in other groups, the community would benefit from ORSA information sharing tools.

4. Military OR has been historically based in the kinetic. There is a need for an interdisciplinary and interagency focus, in include the social science approaches.

5. The OR community needs to institutionalize the focus on developing analysis plans to ensure we meet decision-maker needs from problem definition through delivery of the findings and recommendations.

WG 5 Summary

- Great diversity of experience and perspective in WG 5.
- Little emphasis on traditional M&S. Identified a breadth of other tools and methods in use.
- Data, data, data.
 - Always want more
 - Need to develop methods to do without
(Lack of data, sparse data, messy data)
- Interagency, intergovernmental, multidisciplinary approaches

In summary, we had a great group with contributions from four Coalition nations, many staffs (from the COCOMs to OSD), four services, contract support and academia. There was surprisingly little emphasis on traditional modeling and simulation. Instead, we found a reliance on a breadth of analytical techniques and methods from multiple disciplines.

Two overarching themes emerged. First, there was a universal desire for more data, complete data, accessibility to data, archiving of data, etc. Finally, the need for more comprehensive approaches integrating interagency and intergovernmental expertise and utilizing multidisciplinary approaches.

WG 5 Quotes

- Torture the data until it confesses.
- Get all the information you can, we'll think of a use for it later.
- That seems really simple.
- 3 of the 4 countries represented here agree...
- There are no pocket protectors here.