The Analysis M&S Business Plan: 2010 Update

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Agenda

• Approach
• Strategy
• Cross-Cutting Recommendations, Summary
Scope

Current A M&S BP

Other M&S Communities
  - Research
  - Intellectual Capital
  - Data
  - Tools
  - Methodologies

Current Capabilities

Vision / Frameworks / Challenge Areas

Key Gaps

Proposed Solutions

Prioritization

Updated Analysis M&S BP*

(Living document, posted at JDS)

Analysis M&S Business Plan Methodology/Process

Repeat Regularly
Analysis Vision

A robust and inter-connected analytical community which supports the formulation, discussion, and assessment of

- National Security options
- Operational Commander actions across DoD through the use of M&S in an environment of evolving national security issues
<table>
<thead>
<tr>
<th>Area</th>
<th>Major Objectives</th>
</tr>
</thead>
</table>
| Methodology                      | • Develop, employ flexible, adaptable, robust methodologies focused on senior decision maker issues  
                                  • Illuminate: risks, uncertainties; effects, capabilities                                                                                                 |
| Tools                            | • Develop, employ a core set focused on senior decision maker needs  
                                  • Develop capability to create tools rapidly  
                                  • Ensure tools are credible, consistent, useful                                                                                                          |
| Data                             | • Acquire data needed by analysts  
                                  • Address all key PMESII factors  
                                  • Data must be available, accessible, traceable, trusted                                                                                                 |
| Intellectual Capital             | • Recruit, develop, retain multidisciplinary teams  
                                  • Ensure that analysts embark on “life long learning”, employ Codes of Best Practice                                                                 |
| Research                         | • Enhance composability of M&S  
                                  • Develop, employ effective, efficient VV&A processes, tools  
                                  • Enhance visualization capabilities                                                                                                                         |
| Other M&S Communities            | • Resource efforts that support multiple M&S communities                                                                                                                                                           |
Strategy

• Re-evaluate the twenty analysis challenge areas
• Focus on those challenge areas assessed as RED
• Develop recommendations to enhance those analysis challenge areas assessed as RED
• Develop cross-cutting recommendations to deal with highest priority needs
Challenge Area Description

Each challenge area employs the following format:

- Definition
- Some Questions We Need to Answer
- Analysis Vision for the Area
- Existing Capabilities
- Key Gaps
- Assessment of Current Capability
  - Red / Amber / Green ("stoplight") Scale
- Current Activities
- Potential Future Activities
### Assessment of 20 Analysis Challenge Areas

<table>
<thead>
<tr>
<th>Topic</th>
<th>Key Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational Focus Areas</strong></td>
<td>• Irregular Warfare (e.g., COIN, Counter-terrorism) <em>(RED)</em></td>
</tr>
<tr>
<td></td>
<td>• Stability, Security, Transition and Reconstruction (e.g., HA/DR) <em>(RED)</em></td>
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<tr>
<td></td>
<td>• Homeland Defense/Defense Support for Civil Authorities <em>(AMBER)</em></td>
</tr>
<tr>
<td></td>
<td>• Conventional Operations (e.g., Joint campaign analysis) <em>(GREEN-AMBER)</em></td>
</tr>
<tr>
<td><strong>Cross-cutting Missions / Functions</strong></td>
<td>• Deterrence <em>(RED)</em></td>
</tr>
<tr>
<td></td>
<td>• Representation of C4ISR <em>(AMBER)</em></td>
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<td></td>
<td>• Modeling Net-Centric Operations <em>(AMBER)</em></td>
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<tr>
<td></td>
<td>• Human, Social, Cultural Behavior (HSCB) <em>(RED)</em></td>
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<td></td>
<td>• Information Operations (IO) including cyber warfare <em>(RED)</em></td>
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<td></td>
<td>• CBRNE activities <em>(AMBER)</em></td>
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<tr>
<td></td>
<td>• Space operations <em>(AMBER)</em></td>
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<tr>
<td></td>
<td>• Logistics <em>(GREEN – AMBER)</em></td>
</tr>
<tr>
<td></td>
<td>• Joint, Interagency, Intergovernmental, Multinational (JIIM) operations <em>(RED)</em></td>
</tr>
<tr>
<td><strong>Management Issues</strong></td>
<td>• Education &amp; Training (analysts, decision makers) <em>(AMBER)</em></td>
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<td></td>
<td>• Ensuring credibility of M&amp;S (e.g., VV&amp;A) <em>(RED – AMBER)</em></td>
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<tr>
<td></td>
<td>• M&amp;S governance <em>(AMBER)</em></td>
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<td></td>
<td>• Outreach <em>(AMBER – GREEN)</em></td>
</tr>
<tr>
<td></td>
<td>• Management of key resources (e.g., data, tools) <em>(AMBER)</em></td>
</tr>
<tr>
<td><strong>Hot Topics</strong></td>
<td>• Representation of Complex Adaptive Systems <em>(RED)</em></td>
</tr>
<tr>
<td></td>
<td>• Portfolio management <em>(RED)</em></td>
</tr>
</tbody>
</table>
Agenda

- Approach
- Strategy
- Cross-Cutting Recommendations, Summary
Key Areas Assessed in Business Plan

Update

- Irregular Warfare and Related Activities
  - Irregular Warfare (IW)
  - Stability, Security, Transition, & Reconstruction (SSTR) Operations
  - JIIM factors
- Information Operations, including Cyberwar
- Deterrence
- Cultural - Social factors
- Portfolio Management
- Deferred: Wargaming and Complex Adaptive Systems
Vision for IW and Related Activities

- Support the formulation, discussion, and assessment of IW options across the whole-of-government in each IW area (e.g., counterinsurgency (COIN), counter-terrorism (CT))
- Provide comparable M&S support and analysis capabilities to combat operations, explicitly addressing and integrating SSTR operations across all DoD activities including DOTMLPF
- Note: DoD policy is that SSTR operations are a core US military mission that the DoD shall be prepared to conduct and support
## MG Flynn’s Questions for IW and Related Activities

<table>
<thead>
<tr>
<th>Area</th>
<th>Key Questions</th>
</tr>
</thead>
</table>
| **Social Attitudes**     | • How does the population interact as tribes?  
                            • How much of the population is affected, disaffected?  
                            • How does the population respond to strategic communication?  
                            • How is the population informed?  
                            • How do they like to be informed?  
                            • What are the preferences of people on a district level?  
                            • What efforts have historically been successful on a district level?  
                            • What kind of development do people prefer on a district level?  
                            • What part of the population is disaffected and why? What is the percentage?  
                            • How can we visualize/layer data from geography through population dynamics? |
| **Taliban-related**      | • How does the population relate to the Taliban as an organization, not as an insurgency? (e.g., how they operate and how people are affected by them as an organization)  
                            • How do we split the population away from the Taliban, especially in Helmand/Kandahar?  
                            • What narratives do the Taliban use to get popular support?  
                            • What tactics of intimidation do they use?                                                                                                   |
| **Rule of law**          | • How does the population define rule of law and justice?  
                            • How can we institute a sense of rule of law?  
                            • How can the central government more effectively dole out justice to be as swift as Sharia law?                                            |
| **Economics**            | • What is the importance of the poppy trade to the Afghan population?  
                            • How does the government corruption impact the Afghan population and its relation to drug trade?                                       |
| **Governance**           | • How does the population accept and see governance?  
                            • How is the population’s historical response to governance, not being governed, and warlordism?                        |
| **Security**             | • How will the population respond to the new Stryker brigade that is coming in?  
                            • How does the population respond to basic force maneuvering?  

Exemplar: IW and Related Activities

• **Strategic** IW and related issues
  – Addressed at NATO SAS-071, Ottobrun, March 2009
  – Working Group 6 formulated key findings, recommendations

• **Operational/Tactical** IW and related issues
  – IW Methods, modeling & Analysis Working Group (IW MmAWG) adopted a structured approach to the problem
  – Identified areas to focus on
    • “Low hanging fruit”
    • Long term investments
NATO SAS-071 WG 6: Major Findings

- **Methods** need to be addressed in prototypical efforts to understand their capabilities and limitations (e.g., theories of complexity, living systems, decision making, catastrophe)
- Steps must be taken to tailor, orchestrate, and develop selected **tools** to address specific IW issues
- Major voids in **data** exist in key areas (e.g., selection of: human, social, cultural behavior data; metadata; pedigree)
- In the area of **intellectual capital**, efforts are needed to
  - Enhance education and training of stakeholders
  - Implement reach-back capabilities
  - Address verification, validation, and accreditation (VV&A) seriously
  - Identify and evolve an IW analysis Community of Interest/Community of Practice (CoI/CoP)
- In the area of **research**, major voids exist in key social science areas that need to be addressed (e.g., treatment of “local legitimacy”; characterization of “trust”)
NATO SAS-071 WG 6: Major Recommendations

- Given the need for a “Whole of Government” approach to IW analysis, NATO Research & Technology Organization (RTO) should provide as much emphasis on social science research as it currently provides to operations research.

- It is vital that we create and sustain *multidisciplinary teams over an extended period of time* to address IW and related issues.

- If these ideas are to take hold, it is important that they be transitioned to the *operational user*.
## Risk Results from IW MmAWG Study

### Gaps Attributed to Data & Soft Science (SS)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Probability</th>
<th>Gaps</th>
<th>Data</th>
<th>SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible (1)</td>
<td>Unlikely (1)</td>
<td>2 Gaps</td>
<td>2 Data</td>
<td>1 SS</td>
</tr>
<tr>
<td></td>
<td>Seldom (2)</td>
<td>2 Gaps</td>
<td>2 Data</td>
<td>0 SS</td>
</tr>
<tr>
<td></td>
<td>Occasional (3)</td>
<td>2 Gaps</td>
<td>2 Data</td>
<td>0 SS</td>
</tr>
<tr>
<td></td>
<td>Likely (4)</td>
<td>1 Gap</td>
<td>1 Data</td>
<td>0 SS</td>
</tr>
<tr>
<td></td>
<td>Frequent (5)</td>
<td></td>
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</tbody>
</table>

### Severity Levels

- **Catastrophic**
- **Critical**
- **Marginal**
- **Negligible**

### Probability Levels

- **Unlikely**
- **Seldom**
- **Occasional**
- ** Likely**
- **Frequent**
## Selected Recommendations for IW and Related Activities

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Selected Recommendations</th>
</tr>
</thead>
</table>
| Near-Term     | • Establish, sustain Communities of Interest/Practice (COI/COP)  
• Establish, implement multidisciplinary analysis teams  
• Review, augment country data exchange agreements  
• Facilitate the exploitation of intellectual capital (e.g., academic)  
• Provide greater visibility for JDS Forum (e.g., harvest “low hanging fruit”, pursue highest risk challenges identified in IW MmAWG) |
| Longer-Term   | • Pursue new demand tasking for the Intelligence Community  
• Implement reach-back capabilities for the COCOMs  
• Create, sustain a SSTR Center of Excellence  
• Develop IW-analogue to the conventional warfare “pyramid” of M&S tools  
• Enhance data collected for the analysts  
• Enhance IW and related activity education and training for analysts, decision makers |
Agenda

- Approach
- Strategy

Cross-Cutting Recommendations, Summary
High Priority Recommendations

• Develop a **lexicon** to enhance multidisciplinary communication
• Evolve a **data repository** (focusing on cultural – social factors)
• Evolve a **methodology** that can be employed by analysts (e.g., wargame – M&S – wargame)
• Refine **tool** requirements (for analysis challenge areas assessed as RED)
• Employ an evolutionary acquisition process to develop an **operational testbed** to support the operational analyst
• Create, sustain a **Community of Interest/Community of Practice** (including the development of Whole of Government Lessons Learned)
• Create **reach-back** capabilities
• Enhance the **education and training** of all stakeholders (e.g., address social sciences, reach-back capability)
• Mandate credible **VV&A** activities
Summary

• Basic A M&S BP in place; community is developing a living document through Joint Data System (JDS) web page

• Priority issues of senior decision makers include challenges associated with:
  – IW and related activities (including SSTR operations, JIIM)
  – IO and Cyber Warfare
  – Deterrence
  – Cultural-social factors

• Next step is to coordinate draft update to the A M&S BP to refine and endorse priority actions to address these needs
Back-up Material

- Frameworks, gaps, and recommendations for
  - IW and Related Activities
  - IO and Cyber Warfare
  - Deterrence
  - HSCB
## Operational/Tactical IW

### “Low Hanging Fruit”

<table>
<thead>
<tr>
<th>Risk</th>
<th>Gap</th>
<th>Potential Solution</th>
</tr>
</thead>
</table>
| Occasional / Catastrophic | Adversary force protection -- Physical (K) -- Cyber (K, D, A) | • Research, through intel sources, to identify adversary force protection measures (physical, cyber)  
  • Develop a shared data base of these measures |
| Frequent / Marginal   | Effects of non-traditional weapons (D) (e.g., IEDs) | Develop effects data (on-going JIEDDO activity)                                      |
| Likely / Marginal     | Different illumination levels between sensor, target (D, A) | Perform experiments, research on different illumination levels                       |
| Likely / Marginal     | Different interoperability levels with coalition partners, indigenous forces (D) | • Identify modeling parameters, data to reflect interoperability challenges  
  • Establish, populate an interoperability data base |
### Operational/Tactical Analytic Capability Gaps: Frequent/Catastrophic

<table>
<thead>
<tr>
<th>Gap</th>
<th>Knowledge</th>
<th>Data</th>
<th>Algorithms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dealing with <strong>protracted operations</strong></td>
<td></td>
<td></td>
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<tr>
<td>Effects of <strong>influencers</strong> on attitudes/behavior of the civilian population</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Translate <strong>civilian attitudes</strong> into levels of cooperation with friendly forces</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Discriminate</strong> between civilian, adversary actors</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>How affiliations and support for other actors change based on <strong>application of influencers</strong></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>How <strong>PSYOP</strong> change target audience attitudes</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Adversary HUMINT</strong> networks</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Adversary PSYOP</strong> techniques and effect on target audience</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Effects of <strong>CMO</strong> on attitudes of civilian population</td>
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<td>+</td>
<td>+</td>
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</tbody>
</table>
# Operational/Tactical Analytic Capability Gaps: Frequent/Critical

<table>
<thead>
<tr>
<th>Gap</th>
<th>Knowledge</th>
<th>Data</th>
<th>Algorithms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Munitions effects</strong> on buildings, personnel within buildings</td>
<td></td>
<td>+</td>
<td>+</td>
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<tr>
<td><strong>Vehicle mobility</strong> within rubble urban areas</td>
<td></td>
<td>+</td>
<td>+</td>
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<tr>
<td>Effects of <strong>essential services</strong> on civilian population’s attitudes/behaviors</td>
<td></td>
<td>+</td>
<td></td>
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<tr>
<td>Effect of <strong>government corruption</strong> on government institutions, civilian population attitudes/behaviors</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Attitudes/behavior of actors based on state of <strong>physical infrastructure</strong> used by actors</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Accounting for <strong>heterogeneous groups</strong> of actors when group members have overlapping affiliations</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td><strong>Civilian support</strong> for physical, monetary resources to adversaries</td>
<td></td>
<td>+</td>
<td>+</td>
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<tr>
<td>Changes to <strong>adversary force structure and organization</strong> as network is degraded</td>
<td></td>
<td>+</td>
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<tr>
<td><strong>MoMs</strong> of actor organizations based on level of cooperation (e.g., USAID and HN)</td>
<td></td>
<td>+</td>
<td>+</td>
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Framework for IO, Cyber Issues

- Cyberspace
- Cyberpower
- Cyberstrategy
- Institutional Factors
# High Priority Cyber Actions

<table>
<thead>
<tr>
<th>Area</th>
<th>Key Priorities</th>
</tr>
</thead>
</table>
| Cyberstrategy | • Assess impact of offensive-defensive actions on deterrence strategies  
                 • VV&A of emerging societal models  
                 • Develop tools, procedures to formulate and implement lessons learned from real world events, exercises |
| Institutional Factors | • Instantiate tools to address legal issues rapidly  
                              • VV&A Critical Infrastructure Protection (CIP) tools |
| Cyberpower    | • Develop methods, tools to perform risk assessment (employing exploratory analyses)  
                              • Create a HSCB MTB to analyze, VV&A human responses |
| Cyberspace    | • Assemble, VV&A key data sources  
                              • Develop an integrated suite of tools to assess cyber security issues |
## Deterrence Framework

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Adversary Action that we are Deterring</th>
<th>Adversary Non-action (Restraint)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td></td>
<td></td>
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</tbody>
</table>

- **Benefits**
  - Adversary Action that we are Deterring: Decrease
  - Adversary Non-action (Restraint): Increase

- **Costs**
  - Adversary Action that we are Deterring: Increase
  - Adversary Non-action (Restraint): Decrease
Deterrence Recommendations

• Create a deterrence taxonomy
• Enhance community *diversity* with respect to the following
  – Create multidisciplinary teams
  – Broaden participation, methods and tools, SMEs, decision makers
• Foster a Community of Interest (COI)/ Community of Practice (COP) to address deterrence and policy analysis
• Undertake a rigorous research program including, *inter alia*,
  – Develop standards for VV&A of methods, tools, data, and SMEs
  – Enhance activities in game theory
Framework for HSCB Modeling

Drivers

Representative Questions
Methodology

Directly Implied Needs

Data
Definitions
Measures of Merit (MoMs)
Tools
Representations in Tools
“Possibility Space”
Design of Experiments

Social Sciences

Basic Research
Theories

Operations Research

Indirect Needs

Verification, Validation & Accreditation (VV&A)
Transition, Outreach
Education & Training

Drivers Directly Implied Needs Indirect Needs
# Strawman HSCB Priorities

<table>
<thead>
<tr>
<th>Risk</th>
<th>Key Actions</th>
<th>Resources</th>
</tr>
</thead>
</table>
| **“Red”**    | • Create multidisciplinary teams  
• Address data shortfalls  
• Establish credibility (VV&A)  
• Enhance transition  
• Perform basic social science research  
• Enhance exploration of “possibility space” | Medium    |
|              |                                                                             | High+     |
|              |                                                                             | High      |
|              |                                                                             | High+     |
|              |                                                                             | Medium    |
| **“Red - Amber”** | • Complete social science theories  
• Generate additional tools  
• Improve representation in tools  
• Enhance education and training | High+     |
|              |                                                                             | High+     |
|              |                                                                             | High+     |
|              |                                                                             | High      |
| **“Amber”**  | • Clarify definitions  
• Formulate useful MoMs  
• Employ effective Designs of Experiments | Medium    |
|              |                                                                             | High      |
|              |                                                                             | Medium    |