



Integrated Battle Command Experimentation

Evaluating Transformational Concepts and
Cutting Edge Technology In An Operational
Environment



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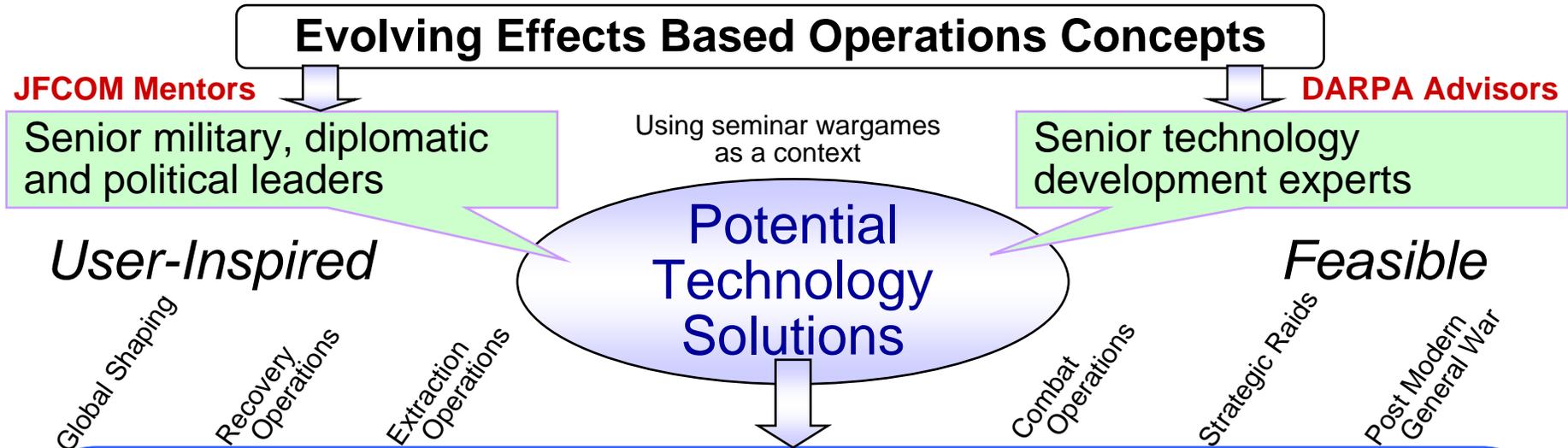
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Genesis of the Integrated Battle Command Program



Tools to help command center personnel (military and civilian) to:

- **Visualize Options, Collaborate, Visualize Options, Collaborate, ...**
 - **Plan and manage entire campaigns (~1,000 days)**
 - **Explore and assess all plausible actions and effects**
 - **Synchronize multiple parallel strategies/lines of operations**
 - Visualize and Understand the total operational picture
 - Collaborate among joint, interagency, multinational teams
- Current Program

Technology solutions can help transform the decision making process

IBC: A DARPA, JFCOM Partnership

- A DARPA and JFCOM sponsored effort (MOA signed 25 July 2004)
- Objective: **decision aids to support leaders** in conducting future, complex, multi-dimensional, coalition-oriented, integrated, effects-based campaigns
- *The decision aids do not make decisions;
they enhance the human's ability to make decisions*
- Focus: Unified Campaign Planning and Crisis Action Planning in Complex Contingencies

JFCOM provides:

- Concepts for campaigning and tool usage
- Subject matter expertise for domains and processes
- Experimentation facilities and personnel

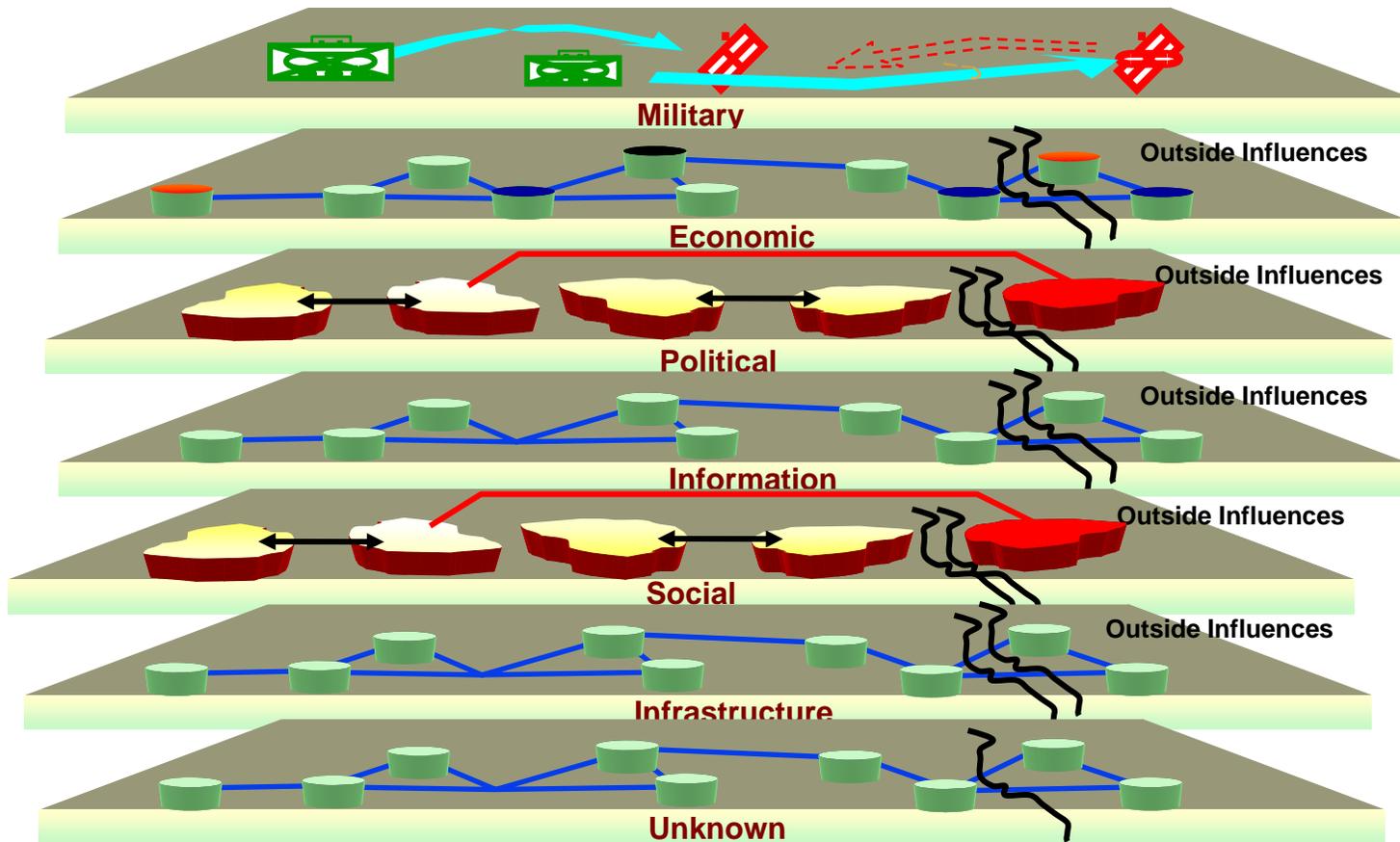
DARPA provides:

- User oriented tools that support decision making
- Baseline knowledge bases and models
- Drop-in software that fit current environments

- Periodic experimentation and extreme user interaction guides technology development
- JFCOM and Services sponsor transitions

Current Operational Environment

Understanding each dimension of the operational environment; Military, Economic, Political, Social, Religious, Information and others: their interrelationships and impact of outside influences: and employing or influencing the employment of all elements of Power; Military, Economic, Diplomatic and Informational, to achieve the desired effects



Understanding of PMESII Environments and DIME Actions

Key Elements of Integrated Battle Command



**Focus
Leaders at the Strategic and
Operational Levels**

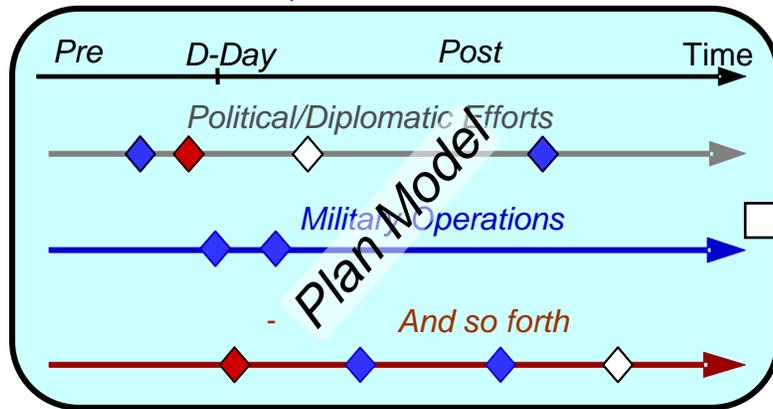


**Tools to plan the
integration of efforts**

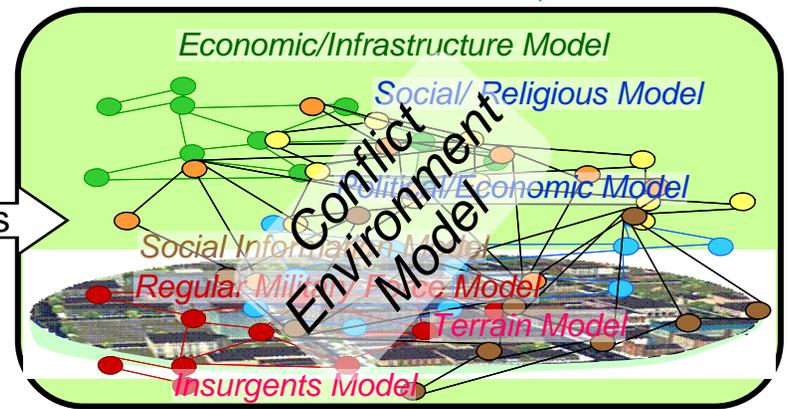


**Tools to explore options
and consequences**

Capability to visualize plans and options

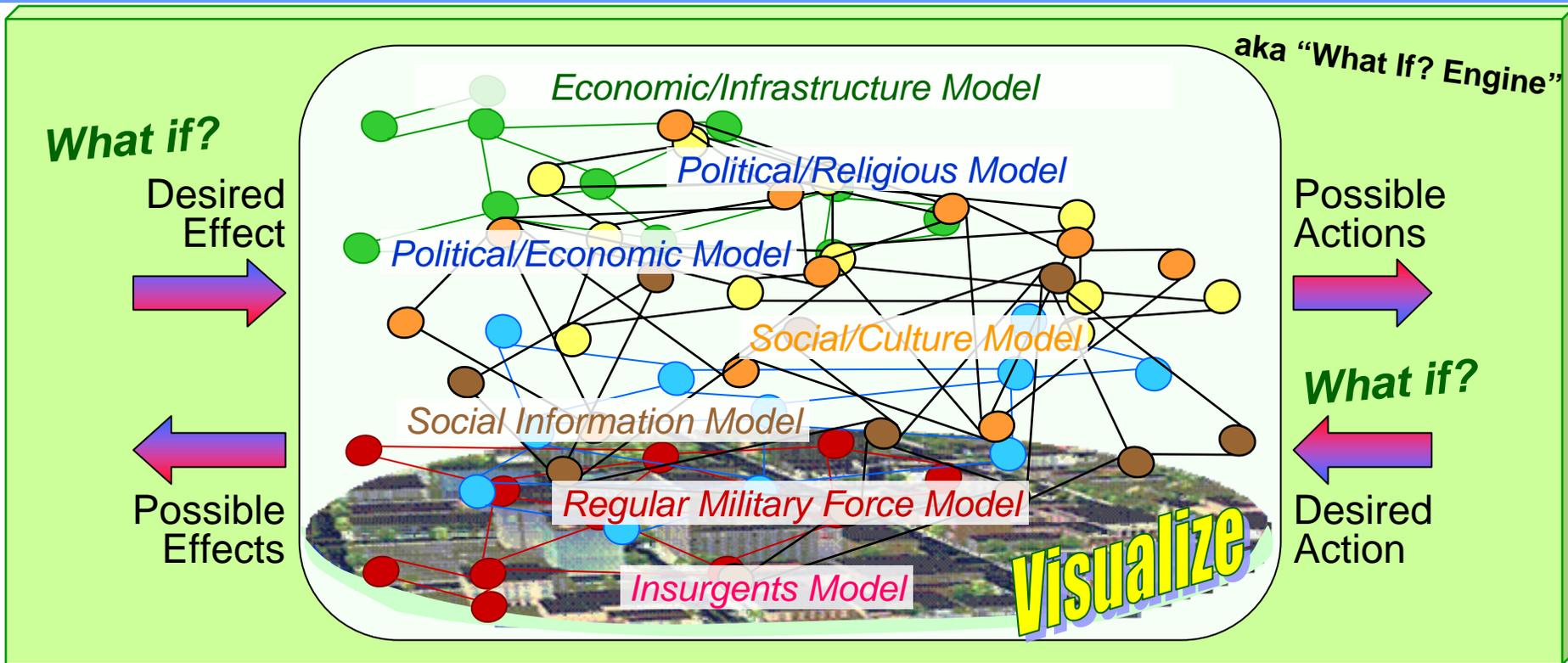


Drives



Tool Box for unified campaign planning in complex contingencies

Option Exploration Tool



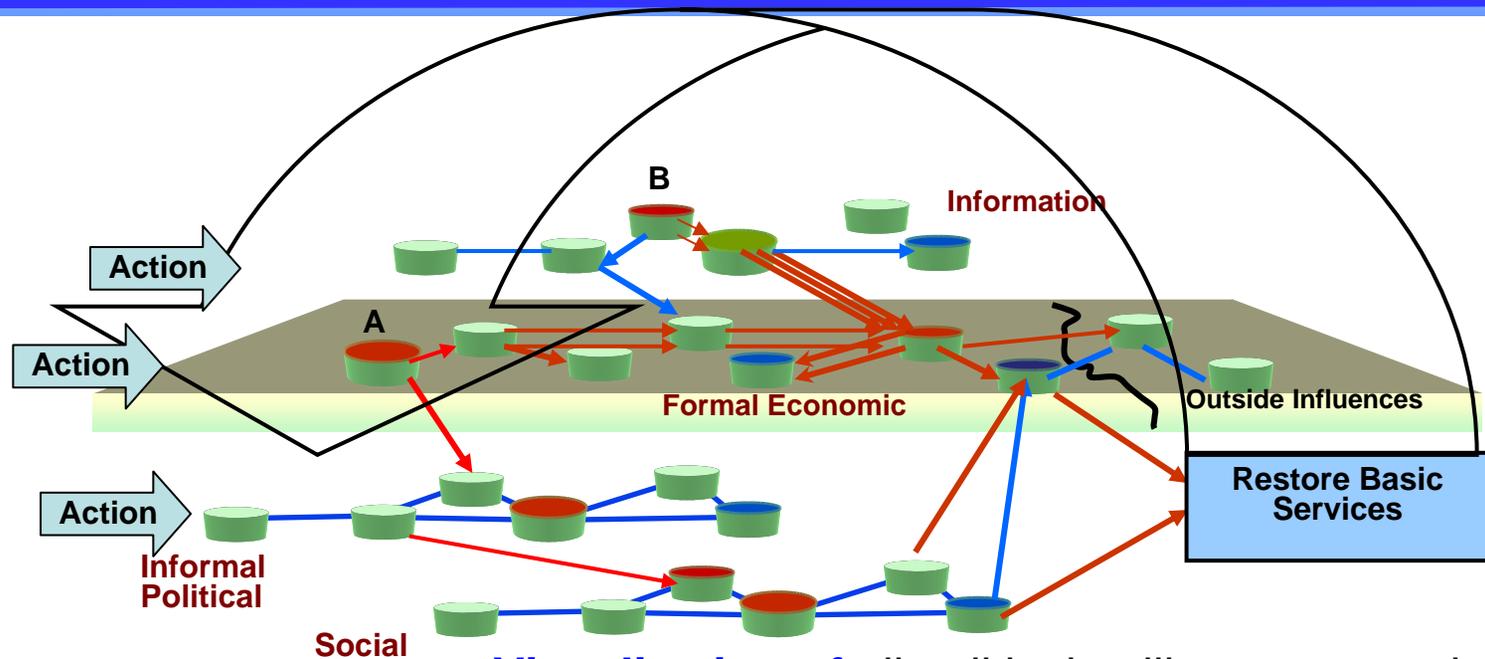
Wanted: Not a precise prediction, but the "distribution of all plausible outcomes"

- Provide a family of models spanning the relevant DIME/PMESII domain
- Automatically force models to interact to suggest plausible activities and outcomes
- Allow bi-directional and multi-sided analysis

What if? Engine

Integrated planning requires tools to explore all options and consequences

Visualization



Wanted: A shared understanding through visualization

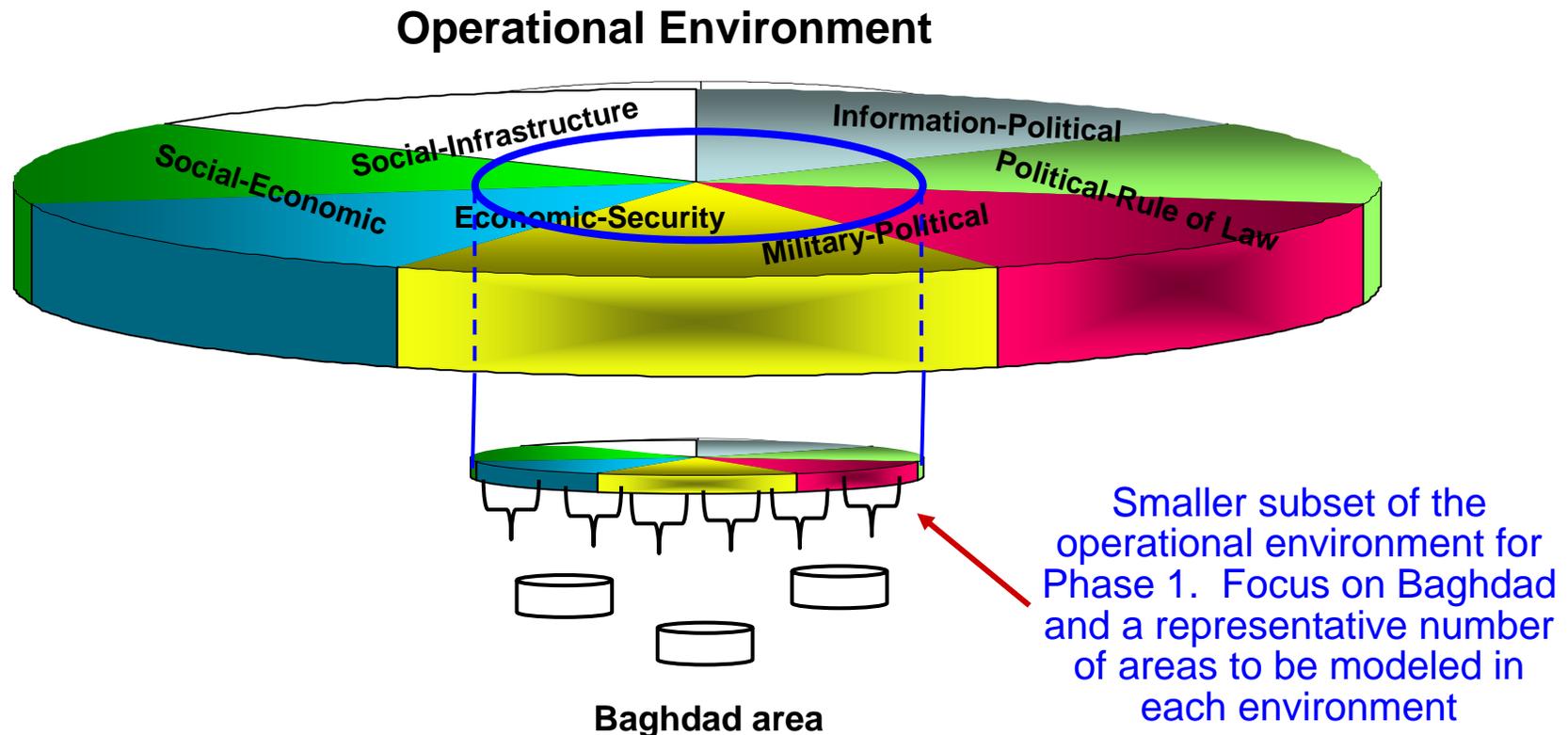
- **Visualization of** all political, military, economic, social, information, infrastructure, etc. systems and the **environments**
- Display **modeled outcomes** - most likely, most advantages and most dangerous
- Tools ability to be **bi-directional** (action-to-effects or effect-to-actions) and **multi-sided** (model the adversary coalition and partners plus the US coalition)

Information Model

Integrated planning requires tools to synchronize and deconflict actions

Phase 1 Experiment Focus

The operational environment is a very broad and complex. In Phase 1 we will use a sub-set of each element of the operational environment to focus our effort. This smaller description of the environment will have fully instantiated models and the supporting data to populate the models.



Phase 1 Experiments

2005

2006

Sept

Oct

Nov

Dec

Jan

Feb

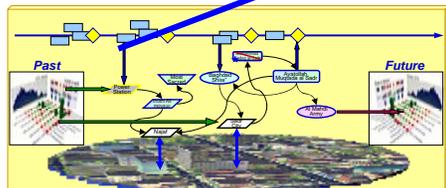
Mar

Apr

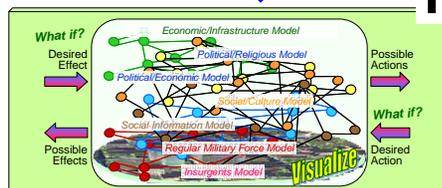
May

Jun

Visualization Tool



**Option
Exploration
Tool**



**Model
Importation
and
Modification**

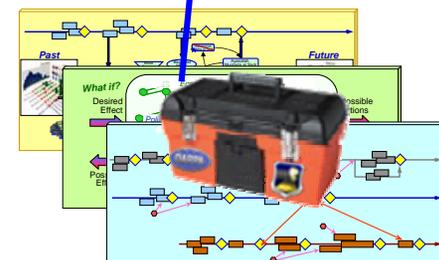
**Basal
Capability**

Limited Objective Experiments

Series of small, limited objective experiments

- Each builds on the previous LOE
- Utilize common adversary, environments, information, database
- Same key individuals in the LOEs

**Go/No-Go
Test**



Limited Objective Experiment 1 Visualization

Experienced Leaders and Staff provided feedback on the two contractor's implementation of visualization of the operation environment as described in Integrated Battle Command Visualization and IBC Concept papers

LOE Objective

- **Competing contractors demonstrated very different approaches**
- **Leaders and Staff have significantly different needs and operations to perform with the IBC tools.**
 - **Senior Leaders focused on understanding the situation, links and influences between groups and broad actions to achieve objectives**
 - **Operational Staff focused on specific effects, nodes, actions**
- **Overall**
 - **Require the flexibility to modify views to meet the Senior Leader, Operational Staff requirements**
 - **Need to focus the visualization on the user needs and not on the models and databases. Human Engineering is important**

Observations

**Very Different Leaders And Operational Staff Needs Required
That Clear Guidance Was Provided To The Contractors**

Limited Objective Experiment 2

Option Exploration

Provide an in depth examination of the Option Exploration tool and visualization capabilities. Focused on the exploration of possible actions, the range of plausible outcomes and the modification of underlying assumptions and model parameters

LOE Objective

- Demonstrated progress on the visualization development
- Option Exploration provided an initial capability to model the Political, Military, Economic, Social, Information, Infrastructure (PMESII) environments
 - Contractors development were not nearly as far along as expected
 - Demonstrated individual models operations and several models linked together
- Overall
 - Most models required much more detailed
 - Linking multiple models needs to be greatly expanded
 - Range of possible outcomes needs to be increased and clearly presented

Observations

Continual Leaders And Operational Staff Feedback Enabled The Technical Development To Meet Operational Needs

Limited Objective Experiment 3

Tool Importation and Modification Objectives

Evaluate the ability of the contractor's Integrated Battle Command suite to accept and integrate other models. Provide an in depth examination of a trained staff's ability to operate the IBC suite of tools

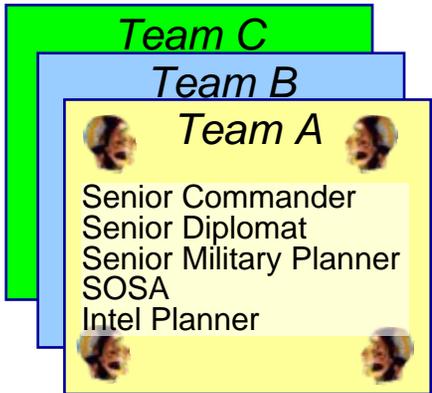
LOE Objective

- **Contractors demonstrated that a new model can be integrated into the family of models**
 - Solution was not elegant, but functional
 - Required expert knowledge
- **Operational staff was able to operate the tools with contractor assistance**
 - Tools operation was not intuitive for the staff
 - Significant effort needed to translate operational actions into model inputs
- **Overall**
 - New model can be integrated but not easily
 - Tools not ready for users to operate the models

Observations

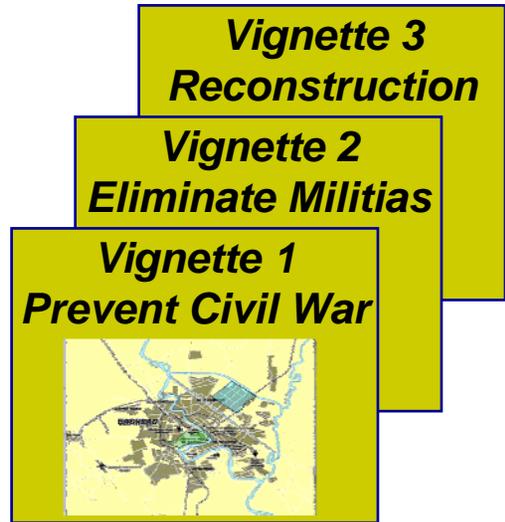
Demonstrated A Proof Of Concept

Go/No-Go Experiment



- White/Red Cell**
- National Command Authority
 - State, USAID, Other Government Agencies
 - Non-Government Agencies
 - SOSA Analysts

Three teams operate three different tool configurations in three vignettes = nine trials

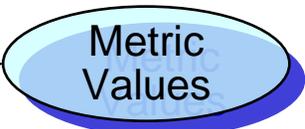
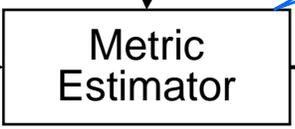
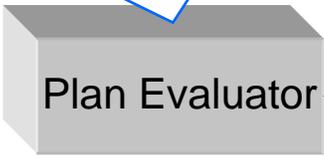


Constructive simulation to propagate decisions forward

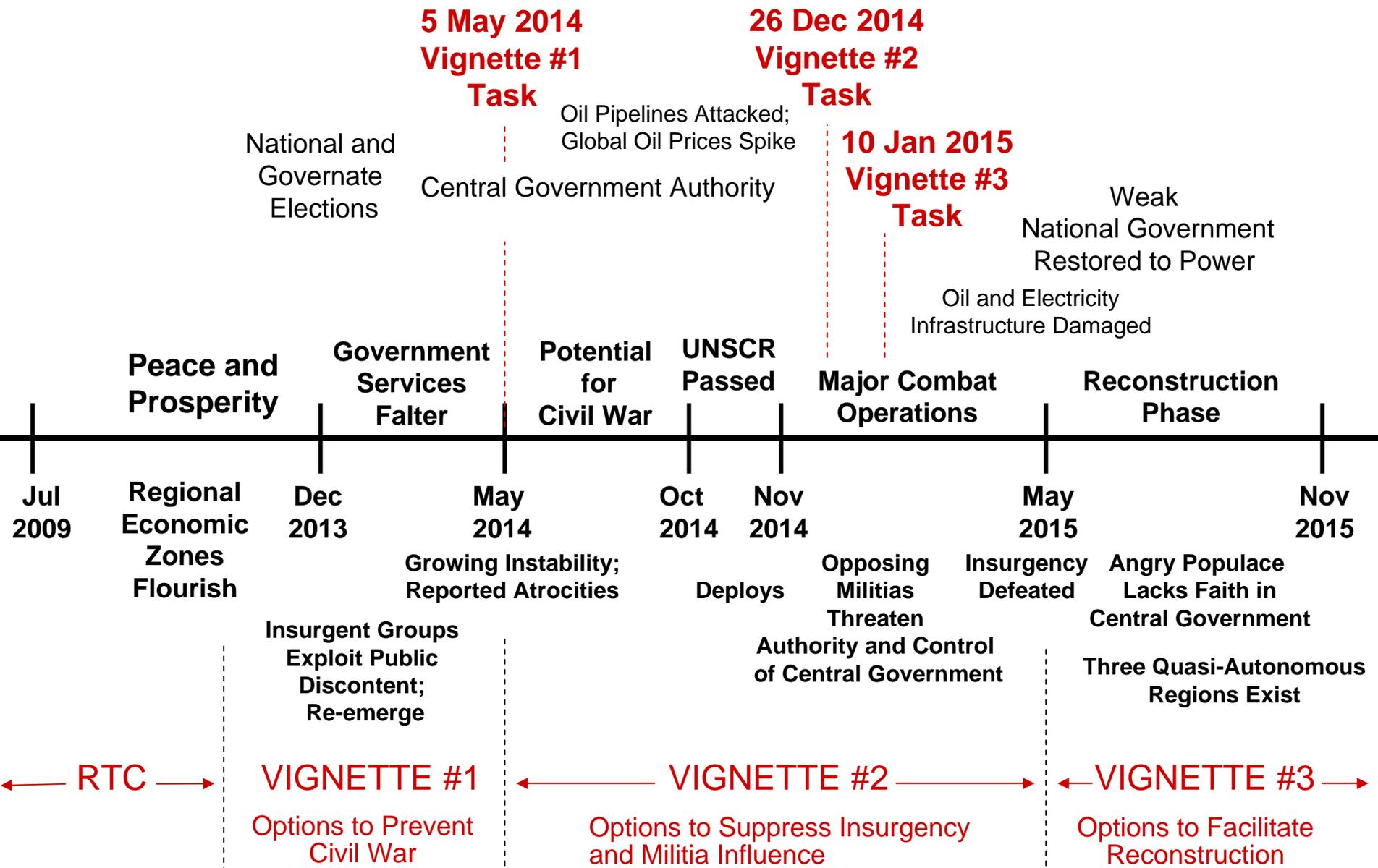
Observations
Surveys
Questions



Subject Matter Experts provide the Gold Standard



Scenario and Vignettes



Vignette Objectives

- **Measure contribution of IBC tools to planning**
 - Multiple planning teams and vignettes employed to determine efficacy
- **Scope: Senior level contingency planning and analysis**
- **Vignette situations not intended to be linked or be in sequence**
 - Designed to minimize learning from previous vignettes
- **Evaluate full range of options, including;**
 - Actions against different nodes
 - Modification of the strength of the action
 - Changes to the timing and sequence of action(s)
 - Multiple and combined actions
- **Challenge assumptions**
 - Modify... or even reverse underlying assumptions to determine impact
- **Course of Action Briefing**
 - Use IBC tools
 - Describe What, Why, and Expected impact of the actions selected
 - Plan as in-depth as possible

Data Collection

BAE SYSTEMS

- Actions
- Favorable Outcomes
- Unfavorable Outcomes



- Actions
- Favorable Outcomes
- Unfavorable Outcomes

Baseline

- Actions
- Favorable Outcomes
- Unfavorable Outcomes

Data Collection Sources

- User Logs
 - Actions, Outcomes, Assessment
- Preliminary Course of Action Outbrief
 - Use Tools available
 - What, Why, Impact
 - Planning is as in-depth as possible
- Post Vignette Evaluation
 - Individual Surveys
 - Leader Led AAR
 - Leader Interviews

Emerging Results

- **Close working relationship between the operational user and technical developer works**
 - User-in-the-loop develop-test-develop methodology significantly enhanced the technical development
- **Technical development impacted on concepts**
 - Use of the new planning tools had a significant impact on the planning process
 - This demonstration of how the tools changed and improved the quality of the plan greatly enhanced support for the new technology
- **Use of Limited Objective Experiments enhanced the effectiveness of the Capstone Experiment**
 - Enabled the evaluation of individual components
 - Identified experimentation gaps
- **Experiment developers must be closely linked with the technical and concept development.**
 - Enables development of scenarios and supporting information and data to stimulate the tools and evaluate their impact

QUESTIONS?