Tools for Effects Based Course of Action Development and Assessment

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**Problem:** Military strategists lack information tools and technology for developing and assessing effects based Courses of Action (COAs). While Commanders have always focused to some degree on the effects they would like to achieve, Effects Based Operations (EBO) was never before an institutionalized mindset. The current parallel evolution of the EBO process, technology, and doctrine poses a number of significant challenges to tool developers. The Air Force Research Lab’s Information Directorate is developing a suite of plan authoring and COA assessment tools for EBO. The goal is to provide decision aids to overcome the tedious and manual process of effects based planning and assessment.

**Relevance to C2:** Joint Publication 3-30 “Command and Control of Joint Air Operations” describes both the Joint Air Estimate and the Joint Air Tasking Order processes. The tools described in this paper focus on overlaying EBO on various phases of these processes. Specifically, they assist planners and assessors with effects based COA development, analysis, comparison, selection, and assessment. Together, the tools will provide a computerized method of developing and continually assessing the Joint Air Operations Plan. The perceived end-users are strategists and analysts on the Strategy Plans and Operational Assessment teams of the Air and Space Operation Center. The AFRL EBO tool suite is also contributing to a larger C2 goal focused on an integrated approach to effects based strategy development across the offensive, defensive, and information warfare domains. While the application domain has focused on the air component, the tools are general enough for use by other components, and at the Joint Force Command level.

**Approach:**
The Strategy Development Tool (SDT) supports development of an effects based COA by explicitly focusing on desired effects and actions. Center of gravity analysis is used to guide development of blue COAs. Target system analysis helps users populate an operational-level effects based COA with potential direct and indirect targets for achieving effects.

The Causal Analysis Tool (CAT) predicts the probability of achieving Commander’s intent for blue COAs developed by SDT. It does this by modeling the plan’s causal linkages, probabilities and effect relations over time using a Dynamic Bayes Net approach. Complimenting CAT is the EBO Wargaming Simulation (EBOWS), an attrition-based campaign level wargaming tool used for COA analysis. EBOWS examines the feasibility, risks and effectiveness of COAs based on available forces, logistics, command & control, and force deployment plans. Combined, the tools allow the Commander’s staff to reason over the various COAs and select the optimal one. COA assessment is done during both planning and execution. During execution, CAT will rely on the Fusion for EBO (FEBO) component. The objective of FEBO is to expand the causal model developed in CAT down to the level of actual ‘Intel’ requirements. FEBO then provides accrued and fused multi-intelligence evidence to help determine if the indicators defined by SDT are being met. CAT utilizes the evidence to conduct operational assessment.

**Result:** A toolset to build and assess effects based COA options. The capability described will be exercised in the Joint Expeditionary Force Experiment in August 2004.