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USER DEFINED OPERATIONAL PICTURES FOR TAILORED SITUATION AWARENESS

Topic: C2 Technologies and Systems or Cognitive and Social Issues

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Extended Abstract

Emerging network-centric warfare (NCW) technologies will provide operators in military command centers with access to unprecedented amounts of real-time battlefield information, and they offer the potential to enable transformational C2 capabilities that improve mission effectiveness through shared situation awareness and self synchronization.

Effective, intuitive, agile decision support and visualization capabilities will be a key driver of the shared awareness that improves mission effectiveness. It will be insufficient just to get information to people; it must be synthesized, organized, and presented in a way that can improve decision-making and operational effectiveness at all echelons of C2, from theater commanders to national leadership. In particular, senior level decision-makers need tools that allow them to build a picture of the battlespace that is timely, driven by authoritative data sources, and organized in such a way that it can be used for briefing national leadership on the critical elements of information that will drive national decision-making.

Supporting such shared awareness in a distributed C2 setting relies on creating a suitable common operational picture (COP) of the battlespace. A COP facilitates collaborative planning and assists all command echelons in achieving consistent situation awareness. In this context, the term "picture" refers not so much to a graphical representation, but rather the data used to define the operational situation. As such, the creation and dissemination of the COP is as much an information management (IM) challenge as it is a visualization challenge. Today, a massive amount of "sausage making" is required to build such a picture. Large, cumbersome information products and data must be pushed, melded, and exploited to produce useful operational pictures. Much of this melding process is manual, in that it requires a considerable amount of human intervention to decipher data and information, extract the requisite information, build the desired representation, and disseminate it to the proper users. This process results in a considerable amount of information flowing through C2 information channels to support a desired product, when only portions of that product are actually needed to support a particular decision process.

This inefficiency and lack of agility has motivated the development of the concept of the user defined operational picture (UDOP), in which the information content is *tailored* to meet the needs of an individual or community of interest (rather than a bulk broadcast of all information that must be teased apart to extract the relevant pieces and create an effective narrative to support C2 decision processes). Making an operational picture *user defined* can entail many things:

- The user identifies the specific content to be included in and excluded from the picture. This can include bounding content by spatial region, temporal window, affiliation, and other such criteria. The user may want to focus on any particular areas of interest in the world, and assemble a picture of an evolving situation using data feeds from relevant regional and national assets
- The user specifies how the selected content should be formatted based on personal preference (2D, 3D, tabular views, unit aggregations, labels, and annotations). Multiple visualizations may be combined in a user-defined layout that can be re-used at the next login.
- The user derives added-value products based on his own domain knowledge to augment the data provided by systems of record.
- The user tailors a given set of contents to address the needs of a particular echelon of C2. For example, theater commanders may be interested in seeing and understanding specific airspace configurations, air tasking orders, sensor characteristics, and target numbers;

however, national leadership may be interested in broader questions of likelihood of mission success, population at risk, and world political response.

The purpose of the UDOP capability is to create, visualize, and share decision-focused views of the operational environment for decision-makers to support accurate situation awareness and timely decision-making in a distributed net-centric C2 environment. Net-centric C2 architectures will make available a considerable amount of information that can be injected into an operational picture; the purpose of the UDOP capability is to enable transformation of that universe of data into a decision-focused narrative of the battlespace. Several core pieces of functionality and business processes are proposed to enable such a UDOP capability:

- **Data access** mechanisms for building a UDOP from the outputs of systems of record using net-centric means
- **Visualization and presentation** mechanisms to provide the requisite historical, current, and anticipatory situation awareness
- Domain-specific **business logic** to create derived, added-value information products from the raw data inputs and displayed data and to extract insight based on the content therein
- **Sharing and collaboration** tools to enable shared situation awareness and collaborative decision-making based on the decision-focused view created through the UDOP. In the 21st net-centric C2 enterprise no user will be operating alone; how to use UDOP capabilities for collaborative analysis and planning must also be understood.
- The definition of **human roles and workflows** that support the transformation of theater or COCOM level battlespace views into decision-focused products consistent with the needs of national decision-makers

This paper will describe a set of operational concepts for user defined operational pictures presently under development, as well as technical architectures and prototype implementations for their realization.