12th ICCRTS Abstract Submission
"Adapting C2 to the 21st Century"

Representing Meta-Information to Support C2 Decision Making

Cognitive and Social Issues, Modeling and Simulation, C2 Technologies and Systems

Jonathan Pfautz
Ann Bisantz
Emilie Roth
Adam Fouse
Michael Farry

Jonathan Pfautz
Charles River Analytics
625 Mt. Auburn Street, Cambridge, MA 02138
(617) 491-3474 / (617) 868-0780
jpfautz@cra.com

Abstract:

Aggregating, assimilating, and understanding the ever-larger amounts of heterogeneous information present in network-centric environments presents distinct cognitive challenges to the command and control staff. Under previous efforts (Pfautz, 2006), we have detailed our efforts to analyze how qualifiers of information, or *meta-information* (e.g., uncertainty, recency, pedigree), impact information processing and situational awareness in an already challenging decision-making environment. To date, few existing systems explicitly support the management and representation of meta-information. Here, we describe several specific efforts to develop methods for the representation of meta-information in C2 decision-support tools, including methods to support asset allocation (e.g., for air-based ISR, for addressing ground-based threats, for neutralizing near-space or space-based threats). These methods include techniques for the visual portrayal of meta-information in C2 decision-making systems as well as approaches to the computation, when necessary, of that meta-information. In this paper, we discuss these methods within example domains, and discuss lessons learned for the design of future C2 decision-support systems.

Outline:

I.   Introduction
   a. What is Meta-Information? Why is it important?
        i.   Working definitions
        ii. Examples and anecdotes
        iii. Experiences across programs and projects
   b. Summary of results of previous analyses

          i.   Overview of types of meta-information
         ii.   Context/situational sensitivity
       iii.   Implications from analysis
   c. Background
          i.   Uncertainty management
         ii.   Meta-data processing
       iii.   Uncertainty visualization
   d. Goals of paper – present examples of meta-information representations and future challenges

II.   Applications of Meta-Information to Specific Domains
   a. Approach for development of meta-information representation methods
          i.   Identifying sources of data and meta-data
         ii.   Identifying computational requirements
       iii.   Iterative design, development, and evaluation of visualization methods
   b. Meta-information representation methods
          i.   General approach
         ii.   Specific methods for visual representation of meta-information
       iii.   Examples in C2 asset allocation domain

III.   Implications and Discussion
   a. System design issues related to the representation of meta-information
   b. Human user issues related to the representation of meta-information
   c. Experimental validation of methods (and summary of initial experimental results)

References:

Pfautz, J., Roth, E., Bisantz, A., Thomas-Meyers, G., Llinas, J., & Fouse, A. 2006. "The Role of Meta-Information in C2 Decision-Support Systems," in *Proc. of the Command and Control Research and Technology Symposium*, June 20-22, 2006, San Diego, California.