12TH ICCRTS
"Adapting C2 to the 21st Century"

Performance Assessment of the C2ISR Enterprise

T6: S2 Metrics and Assessment,
T3: Modeling and Simulation,
T2: Networks and Networking

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Abstract[1]:

The heavy investment in sensor technology by the Armed Forces, coupled with the emergence of network services to connect consumers and producers, has resulted in a data glut. The military's command, control, intelligence, surveillance, and reconnaissance (C2ISR) community have rushed to acquire standards-based information enterprises to more efficiently manage this data, extract information, and select decisions to achieve mission objectives. These acquisition processes are occurring with very little theoretical or practical understanding of how to assess the performance of these large distributed enterprises. This paper presents the results of a study that developed a conceptual model and an analytical framework for the assessment of the C2ISR enterprise, with probability theory, information theory and utility theory providing quantitative measures of performance and effectiveness. A simple simulation of the development of a common operational picture by a multi-sensor enterprise was written to demonstrate the value of information theoretic measures for performance assessment. The simulation was used to assess different data communications architectures by comparing the correctness, confidence, and consistency of the pictures. Although the analysis was limited to assessing different communications architectures, the framework provides unified measures that can support trade-off studies between any set of disparate components in the C2ISR enterprise.

Outline:

Motivation of study
Literature Review – Assessment Techniques for Information Enterprises
The Conceptual Model
    First order model – the Black Box
    Second order model – the Simple Decision System
    Third order model – the Enterprise Decision System
Mathematical foundations
    Probability Theory
    Information Theory
    Utility Theory
Simulation of the Multi-Sensor Enterprise
    Simulation Description
    Evaluation of Data Communications for the Multi-Sensor Enterprise
Conclusions

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