PROBABILISTIC ONTOLOGIES: THE NEXT STEP FOR NET-CENTRIC OPERATIONS

Suggested Tracks:
Track 8 – C2 Technologies and Systems (most suitable)
Track 2 – Networks and Networking
Track 3 – Modeling and Simulation

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Abstract

In order to meet the demands envisioned for the battlefield of the 21st century, the DoD is pressing for rapid adoption of the Global Information Grid (GIG), a centerpiece of its transformation towards network-centric operations. Among the enabling technologies being leveraged by GIG-related efforts is the widespread adoption of a Service Oriented Architecture (SOA), a powerful new framework for mediating exchanges between consumers and providers of information and data processing resources. However, implementing SOA in the GIG context is a major challenge that requires semantic interoperability among service descriptions. To achieve semantic interoperability, it is necessary to establish mappings between vocabularies of independently developed resources from both providers and consumers. Many research efforts have relied on ontologies as a possible solution to this problem, but with limited success to date. We argue that in such an environment, a principled means for representing uncertainty is needed, something not found in common ontologies. This paper proposes the combined use of probabilistic ontologies and SOA for a Net-Centric framework, and presents a conceptual scheme for battlefield information exchange systems with different levels of service descriptions (including legacy and probabilistic enabled descriptions).

Preliminary Outline

In section 1 we provide background information on SOA, ontologies, and their respective use within the GIG framework. Then, we address the major issues preventing semantic interoperability among service providers and requesters. In section three, we present the concepts of Probabilistic Ontologies and their use in support of service discovery, brokering and binding processes. Finally, we present an example use case of the technology being applied within the domain of military C2 systems.