Information, Decision, & Complex Networks
AFOSR/RTC Overview

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Information Decision and Complex Networks AFOSR/RTC

Supported Key Air Force Technology Areas Include: Air and Space Situational Awareness/ISR, Autonomy, Cyber/C2

Technical Questions Addressed:
- How well modeled and structured is data in the problem?
- How inter-dependent, heterogeneous, and dynamic is the problem?
AFOSR/RTC: Information

Information: Problem has strong models such as from EM propagation and data characterized accordingly

Example AF Problem: Sensor Resource Management Air and Space ISR Situational Awareness
AFOSR/RTC: Decision

Decision: Problems have less well defined model – requires human intervention/analysis

Example Problem: Human/Machine Behavior Modeling and Risk Characterization – (Autonomy)

- Partially Autonomous Infrastructure
- Real Time Data Analytics
- Human Modeling & Sensing
  - Natural Language
  - User Applications
  - Physical Environ.
  - Resource Const.
  - Cultural Influence
  - Social Media
  - Social Network

- Machine Lower Mission Risk
- Online Mission Risk Analysis
- Human Lower Mission Risk

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AFOSR/RTC: Complex Networks

Complex Networks uses measured information to assure, manage, predict, and design distributed networks, systems, and architectures.
Complex Networks/Foundations of Information Systems – Robert Bonneau
- mathematically represent networks of all kinds including communications and computational at all levels including content, protocol, and architecture/verify validate critical infrastructure performance

Computational and Machine Intelligence/Mathematical Computational Cognition – Jay Myung
- objective is to maximize the ability of machines to conduct higher level cognitive activities with quantifiable risk and accurate models of human decision makers

Dynamic Data Driven Application Systems – Frederica Darema
- enables analysis of the interplay between physical systems such as fluid dynamical systems and software systems and architectures as in the case of aircraft flight systems

Information Operations and Security – Robert Herklotz
- looks at fundamental issues for assessing systems in terms of secure operations and mission assurance
Science of Information Computation and Fusion – Tristan Nguyen
- enables the ability to collect, disseminate and integrate information in such a way as to mathematically characterize and assess the most appropriate information for a range of mission critical tasks

Sensing Surveillance and Navigation – Tristan Nguyen
- develops algorithms to collect and decompose critical sensing information and enables techniques that interface between the physical domains such as electromagnetics and methods in navigation and geo-location

Systems and Software – Kathleen Kaplan
- assesses these systems from a verification and validation standpoint to guarantee operations under a variety resource constraints

Trust and Influence – Joe Lyons
- seeks to model and measure the way collections of individuals make decisions and are influenced both in small groups and culturally