

Sensor, Data & Information Processing & Fusion for Situational Understanding



S&T Campaign: Information Sciences
Sensing & Effecting

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Research Objective

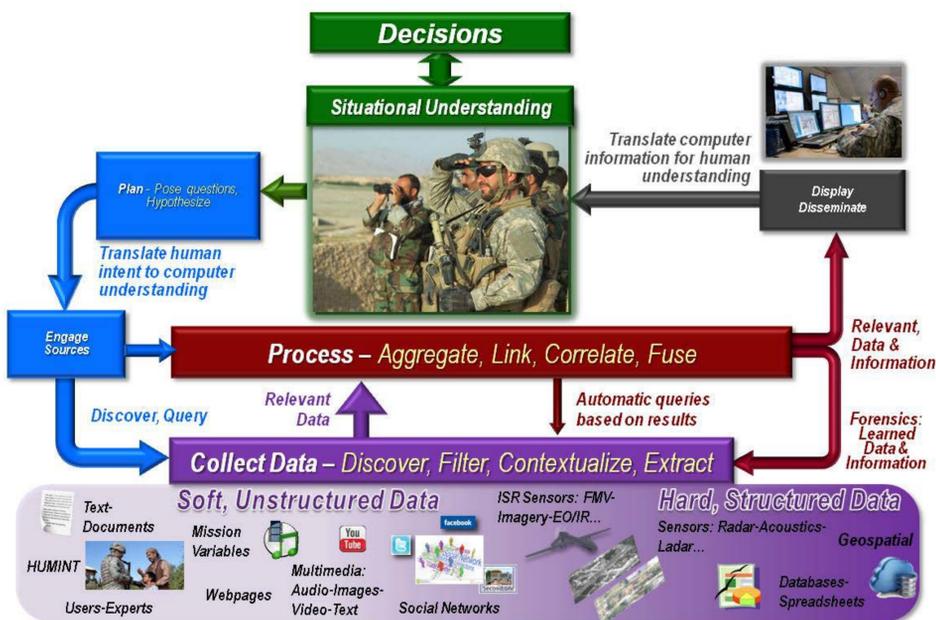
- Perform basic and applied research with a holistic view to sensor, data, information processing and fusion for linking the physical sensors and data/information sources to users at the tactical edge.
- Focus research on aspects such as distributed, disparate & multi-modal, dynamic, end-to-end information flow, constrained environment

ARL Facilities and Capabilities Available to Support Collaborative Research

- Network Science Research Laboratory (NSRL)
- Access to ITA Experimentation Facility
- Access Open Standards for Unattended Sensors (OSUS) – networked sensing sensor integration laboratory (SIL)

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Access multi-modal signature database and baseline signal processing & fusion for advanced algorithm development
- Access to fielded ISR sensor assets for testing and implementing algorithms
- Access to military SME's to develop relevant use cases and operational context for research
- Participation in networked sensing and fusion related field experiments and technology demonstrations



Data & Information Collection Process for Situational Understanding

Challenges

- Highly dynamic and complex tactical environment
- Situation understanding involving multiple interacting actors in many dimensions (military, coalition, economic, social, political, etc.)
- Rapid growth in the volume and complexity (variety, velocity and veracity) of information
- Downward trend in number of military personnel

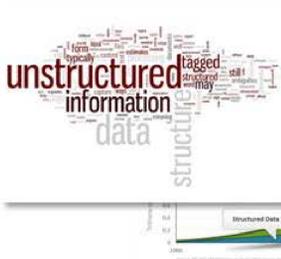
1 Obtain Fusion Requirements

- Extract relevant context
- Obtain specified or derived Quality of Information requirements



2 Collect & Extract Disparate Data

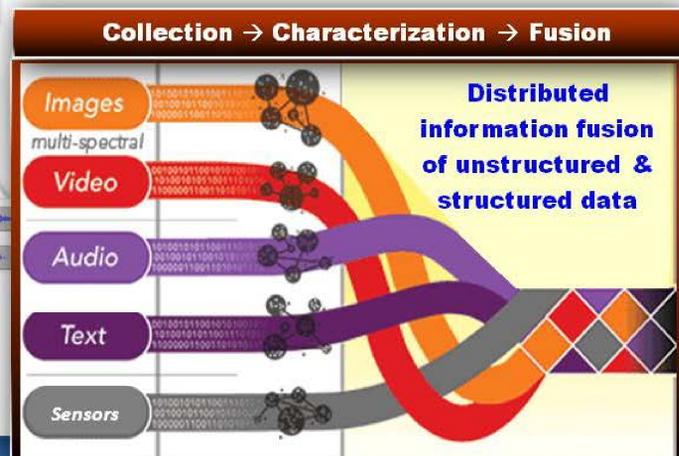
- Structured, hard sensor data
- Unstructured data



4 Uncertainty Management Inference in Uncertain Environments

Characterization of Uncertainties

- Based on context
- Composed with semantic information theory
- Throughout the distributed fusion process



Distributed Information Fusion: Knowledge Synthesis

3

Distributed Information Fusion of Structured & Unstructured Data