Sensors, Plans and Situations

Collaborative Situational Awareness in Network-Centric Warfare

LDRD
LABORATORY DIRECTED RESEARCH & DEVELOPMENT

Sandia National Laboratories
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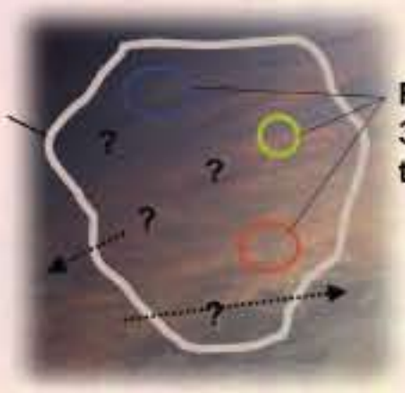
Problem

Advanced sensors detect more-ambiguous, fleeting energy sources than can be fully sampled

Broad surveillance: 1 resource, 4 new hits



Focused reconnaissance: 3 sensor resources of 3 types

How do you choose when:
- Your team controls only one resource
- Each team speaks a different technical language
- You have an unknown time to act, probably minutes

Most sensor systems are designed to execute independent, a priori plans, not adapt to ambiguous situations at the **speed of need**

Approach

Empirically study live, cross-cultural sensor operations to understand collaborative situational awareness and reasoning

Different spectra
Different systems
Different concepts
Different jargons
Different priorities

Informal Dialogues
Face-to-Face
Voice loops
Text chat
Conferencing

Hypothesis

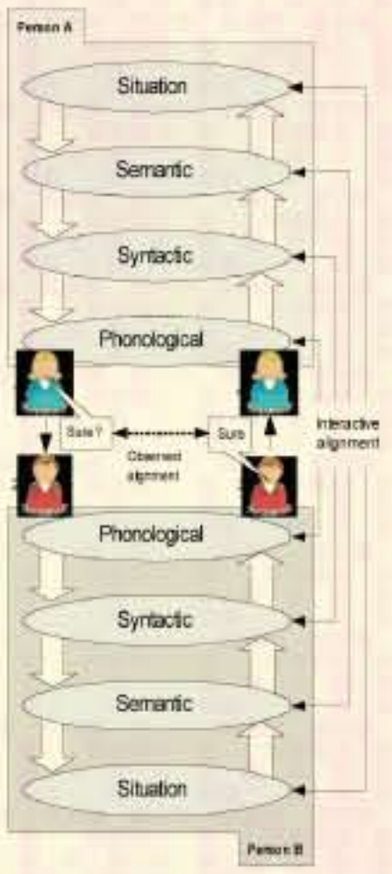
Ops dialogue is a psycholinguistic computation and control mechanism for sensor systems

What it does for sensor systems:

- Dynamically adapts sensitivity and selectivity to context
- Avoids algorithmically correct but situationally inappropriate system states

How the mechanism works:

- Crews create linguistic common ground between cultures that is sociable and non-hierarchical
- Exploits "meaningful imprecision" of natural languages, particularly prepositional phrases: near, during, with, etc.
- Thinking aloud, opinions, hedging generates reasoning about ambiguous situations and collective options



Based on Garrod & Pickering, Figure 1 (p. 10).

Results

Psycholinguistic mechanisms have been observed, analyzed, and documented, laying a foundation for improved sensor decision-support systems

We created analytical case studies that are scientific yet accessible to crews, mission leaders, managers, engineers, and policy-makers

Significance

Studies have been widely read, discussed, and debated inside the work domain

Known applications:

- Crew training and Concept of Operation (CONOP) development
- Operations floor design teams
- Operationally Responsive Space (ORS) program: training in cross-cultural operations
- Office of the Director of National Intelligence (ODNI): collaboration training and policy development

Selected References

- Garrod, S., & Pickering, M. J. (2004). Why is conversation so easy? *Trends in Cognitive Sciences*, 8(1), 8-11.
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