Collaborative Systems Thinking:
The role of culture and process in promoting higher-level systems thinking within aerospace teams

Motivation

Systems thinking skills are in short supply.
Experience is important in skill development.
Experienced employees are retiring. Younger employees are finding fewer learning opportunities.
Concentrating on teams offers way to leverage aggregate experience and knowledge.

Existing Theory

Team Thinking (Salas and Fiore 2004)
1. Group processing of information through recall and interpretation
2. Dealing with collective knowledge as opposed to shared knowledge

Design Thinking (Dym et al 2005)
1. Design as a social process
2. Think and communicate using design languages
3. Utilize divergent and convergent thinking styles

Collaborative Systems Thinking

A framework for systems with four basic ideas: emergence, hierarchy, communication and control. Human activity concerns all four elements. Natural and designed systems are dominated by emergence. (Checkland 1999)

Team Thinking (Salas and Fiore 2004)
A method of placing the systems in its context and observing its role within the whole.

A method of placing the systems in its context and observing its role within the whole. (Sterman 2000)

A method and framework for describing and understanding the interrelationships and forces that shape system behavior. (Senge 2006)

1. Group processing of information through recall and interpretation
A skill to see the world as a complex system and understanding its interconnectedness.

A method of placing the systems in its context and observing its role within the whole.

Collaborative systems thinking is an emergent behavior of teams results from the interactions of team members and utilizing a variety of thinking styles, design processes, tools and communication media to consider the system, its components, interrelationships, context, and dynamics toward executing systems design.

What aspects of an organization’s culture and standard technical process enable team-level, or collaborative, systems thinking?

Research Framework

Organizational culture and technical process are recurring themes in the literature. Both impact team interactions and group information processing.

Pilot Interview Results

Pilot interview validated the key research themes and added more detailed direction towards exploring each construct.

Research Contribution:
Strategies for improving engineering processes and efficiently leveraging social assets.

Publications:

Expected Outcomes
1. An operation definition of collaborative systems thinking
2. Heuristics for enabling collaborative systems thinking
3. Descriptive theory of collaborative systems thinking
4. Knowledge to improve workforce development initiatives, process tailoring and team composition

Ongoing Case Studies

Lean Advancement Initiative
Massachusetts Institute of Technology

Research Timeline
