Introduction

Cognitive systems engineering is a design discipline that addresses the way we interact with technology and the way we use technologies to interact with each other. Drawing on contemporary insights from cognitive, social and organizational psychology, cognitive systems engineers seek to design systems that are more effective and more robust. The focus is on amplifying (rather than substituting for) the human capability to perform cognitive work by integrating technical functions with the human cognitive processes they need to support and on making that cognitive work more robust.

Cognitive systems engineers assist with the design of human interfaces, communication systems, training systems, management systems and teams. They employ principles and methods that bear on the design of procedures, processes, training and technology.

Theme

Cognitive systems engineering is allied with Cognitive Ergonomics, in that it is concerned with mental processes, such as perception, memory, reasoning, and action as they affect interactions among humans and other elements of a system.

Objective

This one-day workshop introduces the fundamental concepts of cognitive systems engineering and offers an in-depth treatment of selected and relatively straightforward methods of cognitive analysis and design.

Having completed this workshop, delegates will understand the nature of naturalistic cognition and will have developed entry-level skill with basic techniques of analysis and design; specifically, critical decision analysis, incident-based cognitive analysis, cognition-centered design and cognitive performance assessment.

Training Methods and Materials

The workshop is delivered primarily in an interactive presentation format with participatory exercises. An experiential information-management exercise undertaken early in the day provides a basis for delegates to develop a situational appreciation of the central ideas. The experiences gained by delegates during that exercise, together with a documentary video of the recovery of Apollo 13, are used throughout the day as source material for collaborative analysis and design activities.

Delegates will develop a structured overview of how to use a small set of the tools of cognitive systems engineering and, in particular, how to use information derived from Knowledge Elicitation activities for the design of an information system. Much of what delegates will learn in this workshop will help them structure a systematic approach to cognitive systems engineering within their own project work.

Workshop structure

I will introduce each topic with a brief presentation. I will then clarify the use of a basic tool or concept with a demonstration exercise. Workshop teams will then engage in an exercise to build skill with that tool.

Requisite education/background
The explanations and exercises will be pitched at a level suitable for participants with a prior interest in some area of cognitive engineering, human factors or ergonomics. Those with at least an undergraduate level knowledge in cognitive science, anthropology, product design or engineering will be able to benefit from the workshop.

**Workshop duration**: all day (7 hrs)

1. **Introduction**
   - Workshop Overview (15 mins)
   - Introductions (15 mins)

2. **Information Management Exercise**
   - Team Cognition (small groups exercise) (40 mins)
   - Team Cognition (exercise debrief) (20 mins)

   **Break** (15 mins)

3. **Incident Based Decision Analysis & Design**
   - Naturalistic Decisions (lecture) (15 mins)
   - Find the Decision: Critical Decision Method (demonstration) (15 mins)
   - Find & Analyse the Decisions (exercise & debrief) (30 mins)
   - Decision Requirements Table (demonstration) (15 mins)
   - Decision-Centered Design (exercise & debrief) (45 mins)

   **Lunch** (45 mins)

4. **Naturalistic Cognition**
   - Macro-Cognition (lecture) (15 mins)
   - Find the cognition (demonstration, exercise & debrief) (20 mins)
   - Cognition-Centered Design (demonstration) (10 mins)
   - Cognitive Requirements Table (exercise & debrief) (45 mins)
   - Cognitive Performance Assessment (lecture & exercise) (30 mins)

   **Break** (15 mins)

5. **Find the cognition**
   - Movie: Houston, we have a problem! (40 mins)
   - Cognitive Requirements Table (exercise & debrief) (20 mins)

6. **Summary**
   - Summary Review of Workshop (15 mins)
   - Workshop Evaluation (15 mins)
Materials to be provided:

- Projector and screen (computer provided by workshop facilitator)
- Whiteboard and pens
- Flipchart and pens