Working Minds Questions

IE 599, Human Factors Engineering II
Discussion Questions for Working Minds


Chapter 1. Introduction
1. In your own words, what is the goal or purpose of Cognitive Task Analysis (CTA)?
2. In your own words, define CTA by “unpacking” these three words: Cognitive, Task, and Analysis.
3. In your own words, what is the purpose of this book?
4. (Optional) Why is “Working Minds” a good title for this book?

Chapter 2. Overview of Cognitive Task Analysis Methods
1. Think of a potential problem-solving domain where CTA might be applied to advantage. Ideally it should be in a domain related to the problem-solving domain you chose for the discussion questions for the Introduction to Thinking, Fast and Slow, but it need not be, and it need not be the domain which you finally choose for your HFE II CTA project.
   a. What is the domain (e.g., medical diagnosis)?
   b. What problem might CTA help understand (e.g., diagnosing infectious diseases merely from signs and symptoms and without the benefit of a modern medical lab)?
   c. What kinds of solutions might a CTA suggest (e.g., clinician selection and training, a meaningful way to display clinical data, a decision aid)?
2. (Optional) Explain knowledge elicitation, analysis, and representation in the context of this domain (see previous question).
3. What are the main data collection methods used in CTA and how might they be applied in your domain?
4. (Optional) Where could you look for CTA data for your domain in time, realism, difficulty, and generality?
5. (Optional) What types of data analysis and representation might your CTA yield?
6. Briefly (i.e., in one or two sentences) describe one or two more potential domains for your HFE II CTA project.

I. Tools For Exploring Cognition In Context

Chapter 3. Preparation and Framing

Choose a problem-solving domain for your HFE II CTA project (not necessarily the one you chose for Chapter 2) and answer the Framing Questions from Crandall et al (2006) pp. 30 – 40:
1. What issue or need do you plan to address?
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2. What will you deliver at the end of the project?
3. What sorts of people can tell you about this issue?
4. What aspects of expertise or types of cognition do you need to know about?
5. What type(s) of situation(s) will tell you the most about the issue your are exploring?

Chapter 4. Using Concept Maps for Knowledge Elicitation and Representation

1. What is a concept map?
2. What is the purpose of a concept map?
3. What are the elements (syntax) of a concept map and what do they mean (semantics)?
4. What is a knowledge model?
5. Using your own knowledge for now, create a simple, preliminary concept map of the domain of your HFE II CTA project. You may use CmapTools (http://cmap.ihmc.us/) or draw it by hand, but bring a legible diagram to class for the instructor to copy and distribute for discussion.

Chapter 5. Incident-Based CTA: Helping Practitioners “Tell Stories”

1. What kind of knowledge can one get by interviewing an expert about a specific incident?
2. Summarize the stages of the Critical Decision Method (CDM) using a hypothetical example from your CTA project domain.
3. What are some limitations of CDM? What challenges to CDM or open questions do you have about CDM?

Chapter 6. CTA Methods and Experiment-Like Tasks

1. Describe an experiment-like task you might have your expert perform to probe his/her knowledge for your CTA project.
2. How would you elicit your expert's knowledge in your investigation?
3. How might you analyze the data you obtained?
4. How might your findings be used?

Chapter 7. Analysis and Representation

The purpose of the following questions is to examine your CTA project in light of the phases of CTA analysis described in this chapter

1. Preparation.
   a. What is the purpose of your CTA project?
   b. Is your data complete for this purpose? What gaps are there?
   c. In light of the time remaining for the completion of your project, should you consider narrowing its purpose and scope such that a complete and useful result can be obtained?
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d. Given the (possibly narrowed) purpose and scope of your project, what data do you still need?

2. Data structuring.
   a. Besides a Concept Map (if you are developing one), how have you recorded and organized your data?
   b. Stepping away from the Concept Map, what categories can you see in your data? See p. 115 in the book for examples.
   c. What general (high-level) relationships exist in your data?

3. Discovering meaning.
   a. What is the story emerging from your data?

4. Representing findings.
   a. How are you representing – or how do you plan to represent – your findings?
   b. Is your current or planned representation (e.g., a Concept Map) able to tell the story that you are discovering in the data? If not, how is it deficient?
   c. What other representations might you use to make up for any deficiencies? See the tables and figures on pp. 120 – 124, but note that they are just examples and other methods are possible.

II. Finding Cognition

Chapter 10. Information Technology

1. Why do the authors refer to FMSs, UAVs, and infusion devices as IT?

2. What are some cognitive challenges of
   a. FMSs,
   b. UAVs, and
   c. infusion devices?

3. Why does IT pose such challenges?

4. Why may traditional, “behavioral” task analysis be inadequate to meet such challenges in designing and operating IT systems?

5. What, potentially, can CTA help us discover about IT design and use?

III. Putting CTA Findings to Use

Chapter 11. The Role of Cognitive Requirements in System Development

1. What is Cognitive Systems Engineering (CSE) and what does Decision-Centered Design (DCD) have to do with it?

2. What is a Decision Requirements Table (DRT), what information does it contain, and how
does it relate analysis to design?

3. What is the rationale for using tough cases, rather than routine cases, in DCD?

4. Relate the DCD process to the Human Machine Systems Engineering (HMSE) process used in IE 545. What are the similarities and differences?

5. Develop your own summary of the DCD process, being sure to include a synopsis of the Critical Decision Method (CDM, pp. 73-83) in it.

6. What do you see as the main strengths and weaknesses of DCD?