Task Analysis Guide

Materials created by Prof. Jamie Ruiz
Task Analysis

• Contextual inquiry is all about understanding and redesigning a set of *tasks*

• Task analysis = a view of people interacting with technology to achieve change in an application domain

• Application domain = abstraction of real world
  – E.g. a database system, the cloud

• Definition of a *task*:
  – A goal together with some ordered set of actions
Goals

• A goal is a state of the application domain that a work system wishes to achieve. Goals are specified at particular levels of abstraction

• Work system = people plus technologies
  – E.g. a smartphone user and his or her phone

• Note:
  – Goals can be achieved in a variety of ways
  – Individual users can have goals, but so can groups, organizations, or even work systems (e.g. autonomous agents)
Tasks and Actions

• A task is a set of actions

• A task is typically an abstraction of the actions that are required to complete a task
  – i.e. a task has a level of abstraction associated with it
  – Examples
    • Get a cup of tea
    • Schedule a meeting

• An action is a low-level task
  – No problem solving
  – No control structure
User Modeling/Task Analysis

• Challenging issue due to wide variety of user tasks

• Many techniques for modeling user using a specific piece of software

• Two different alternative views
  – Action-centric, i.e. those concerned with the steps involved in completing a task
    • Hierarchical Task Analysis
  – Cognition-centric, i.e. how users think, solve problems, learn, remember, and visualize/model/understand to accomplish the task
    • Goals, Operators, Methods, Selection (GOMS)
Starting Work Redesign

• Need to pick a specific task that you want to redesign
  – You don’t want to solve every problem a subject has
  – You may have some idea of the problem you want to solve already

• Need to find the correct level of task
  – Not adding name to a form
  – Not providing the SAP version of pharmacy management tools
  – Somewhere in between
Task Decomposition

• Aims:
  – describe the actions people do
  – structure them within task subtask hierarchy

• Hierarchical Task Analysis (HTA)
  – text and diagrams to show hierarchy
  – plans to describe order
Textual HTA descriptions

• Hierarchy description ...
  0. in order to clean the house
     1. get the vacuum cleaner out
     2. get the appropriate attachment
     3. clean the rooms
        3.1. clean the hall
        3.2. clean the living rooms
        3.3. clean the bedrooms
     4. empty the dust bag
     5. put vacuum cleaner and attachments away
• ... and plans -- only the plans denote order
  Plan 0: do 1 - 2 - 3 - 5 in that order. when the dust bag gets full do 4

Plan 3: do any of 3.1, 3.2 or 3.3 in any order depending on which rooms need cleaning
Generating the hierarchy

1. get list of tasks
2. group tasks into higher level tasks
3. decompose lowest level tasks further

Stopping rules - How do we know when to stop?

- Is “empty the dust bag” simple enough?
- Purpose: expand only relevant tasks
- Motor actions: lowest sensible level
Diagrammatic HTA

0. make a cup of tea

plan 0.
do 1
at the same time, if the pot is full 2
then 3 - 4
after four or five minutes do 5

1. boil water
2. empty pot
3. put tea leaves in pot
4. pour in boiling water
5. wait 4 or 5 minutes
6. pour tea

plan 1.
1.1 - 1.2 - 1.3
when kettle boils 1.4

1.1. fill kettle
1.2. put kettle on stove
1.3. wait for kettle to boil
1.4. turn off gas
Refining the description

Given initial HTA (textual or diagram)
   – How to check/improve it?

• Some heuristics:
   – paired actions
     • e.g., where is `turn on gas'
   – restructure
     • e.g., generate task `make pot'
   – balance
     • e.g., is `pour tea' simpler than making pot?
   – generalize
     • e.g., make one cup or two ..... or more
Using HTA

• Need a task at high enough level that it can be redesigned
  – But not too high

• Very domain dependent
  – If it feels difficult to re-engineer how something is done, move up
  – If it feels that your system is pervasive in work practice, move down