HUMAN-COMPUTER INTERACTION THIRD EDITION

DIX FINLAY ABOWD BEALE

chapter 15

task models

extract for MSc/MRes AISD

What is Task Analysis?

Methods to analyse people's jobs:

- what people do
- what things they work with
- what they must know

An Example

- in order to clean the house
  - get the vacuum cleaner out
  - fix the appropriate attachments
  - clean the rooms
  - when the dust bag gets full, empty it
  - put the vacuum cleaner and tools away
- must know about:
  - vacuum cleaners, their attachments, dust bags, cupboards, rooms etc.

Approaches to task analysis

- Task decomposition
  - splitting task into (ordered) subtasks
- Knowledge based techniques
  - what the user knows about the task and how it is organised
- Entity/object based analysis
  - relationships between objects, actions and the people who perform them
- lots of different notations/techniques

general method

- observe
- collect unstructured lists of words and actions
- organize using notation or diagrams

Differences from other techniques

Systems analysis	**vs.**	**Task analysis**
system design	focus	the user

Cognitive models	**vs.**	**Task analysis**
internal mental state	focus	external actions
practiced `unit' task	focus	whole job

Task Decomposition

Aims:
- describe the actions people do
- structure them within task subtask hierarchy
- describe order of subtasks

Variants:
- Hierarchical Task Analysis (HTA)
  - most common
- CTT (CNUCE, Pisa)
  - uses LOTOS temporal operators

Textual HTA description

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
- 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

N.B. only the plans denote order

Generating the hierarchy

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

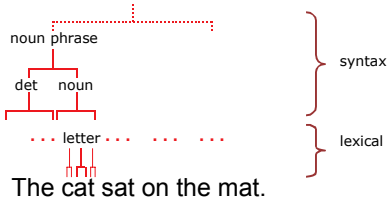
Stopping rules
- How do we know when to stop?
- Is "empty the dust bag" simple enough?
- Purpose: expand only relevant tasks
- Motor actions: lowest sensible level

Tasks as explanation

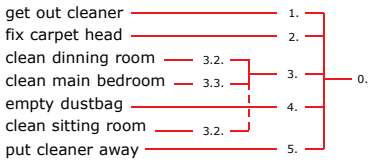
- imagine asking the user the question:
  what are you doing now?
- for the same action the answer may be:
  - typing ctrl-B
  - making a word bold
  - emphasising a word
  - editing a document
  - writing a letter
  - preparing a legal case

HTA as grammar

- can parse sentence into letters, nouns, noun phrase, etc.



parse scenario using HTA



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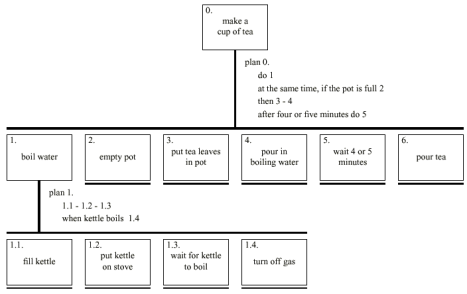
Diagrammatic HTA



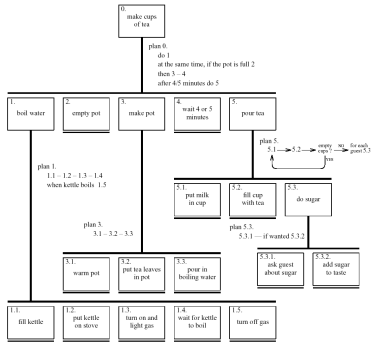
Refining the description

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?
generalise	e.g., make one cup ….. or more

Refined HTA for making tea

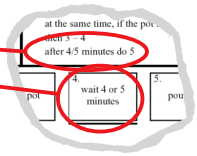


Types of plan

fixed sequence	- 1.1 then 1.2 then 1.3
optional tasks	- if the pot is full 2
wait for events	- when kettle boils 1.4
cycles	- do 5.1 5.2 while there are still empty cups
time-sharing	- do 1; at the same time ...
discretionary	- do any of 3.1, 3.2 or 3.3 in any order
mixtures	- most plans involve several of the above

waiting …

- is waiting part of a plan? … or a task?
- generally
  - task – if 'busy' wait
    - you are actively waiting
  - plan – if end of delay is the event
    - e.g. "when alarm rings", "when reply arrives"
- in this example …
  - perhaps a little redundant …
  - TA not an exact science



see chapter 19 for more on delays!