
Human Computer Interaction

Task Analysis

Lecture # 12

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Task Analysis

- Process of analyzing the way people perform their jobs
 - What they do?
 - What things they work with?
 - What they must know?

Task Analysis – 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 need to know about the task and how this knowledge is organized
- Entity/object based analysis
 - Relationships between objects, actions and the people

Task Decomposition

- Decompose the task into subtasks
- Hierarchical Task Analysis - HTA
 - Hierarchy of tasks and subtasks
 - Plans
 - In what order the subtasks are performed
 - Under what conditions they are performed

Textual HTA Description

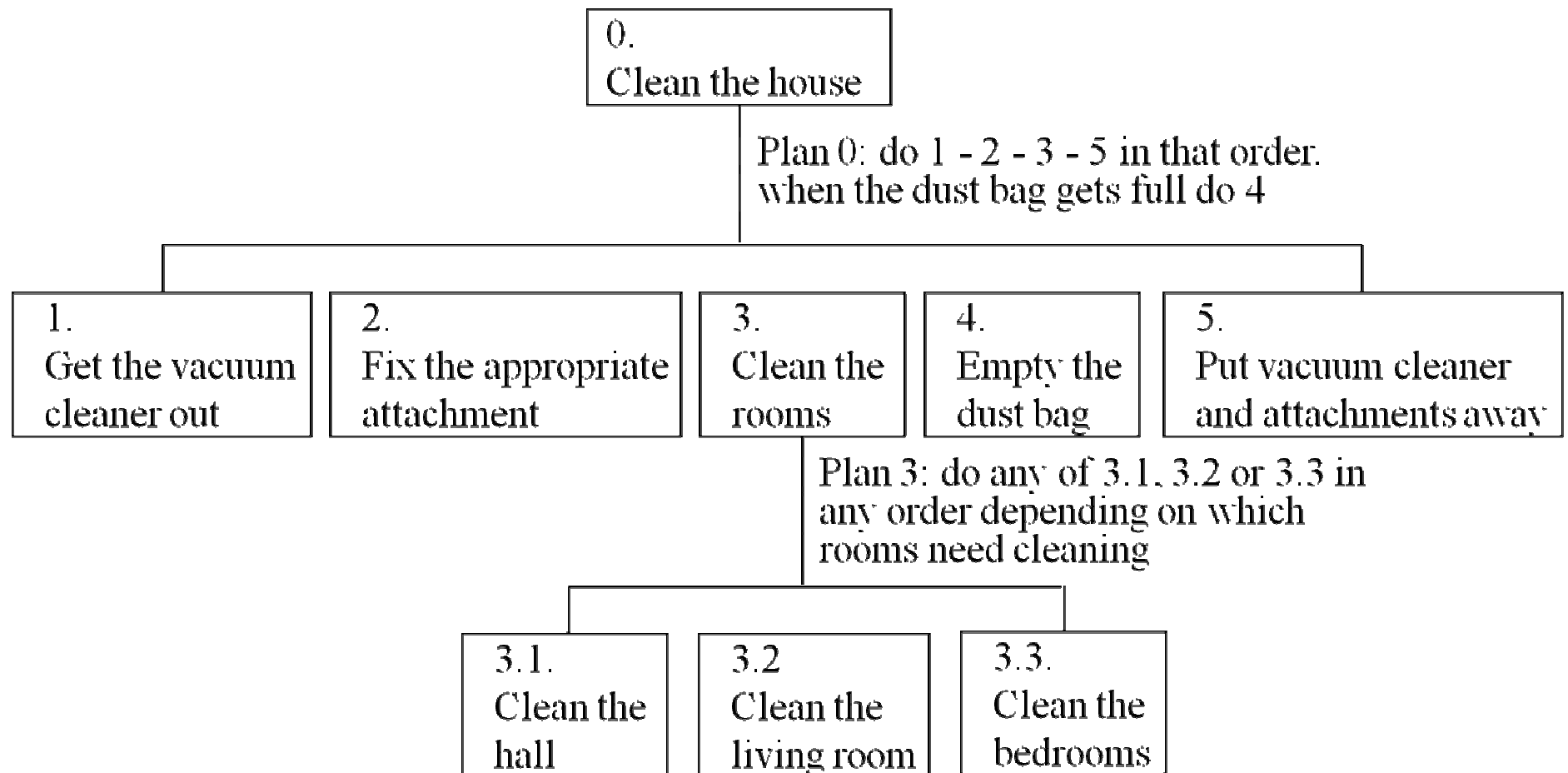
0. in order to clean the house
 1. get the vacuum cleaner out
 2. get the appropriate attachment
 3. clean the rooms
 - 3.1. clean the hall
 - 3.2. clean the living rooms
 - 3.3. clean the bedrooms
 4. empty the dust bag
 5. put vacuum cleaner and attachments away



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

Diagrammatic Representation of HTA



Generating the Hierarchy

- Iterative Process
- Task – Decompose into subtasks
 - *Direct observation, expert opinion, documentation*
- Stopping rules
 - How do we know when to stop?
 - Is “empty the dust bag” simple enough?
 - Purpose: expand only relevant tasks

Making Tea



0.
make a
cup of tea

Plan 0
Do 1
At the same time, if the pot is full 2
Then 3 – 6

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

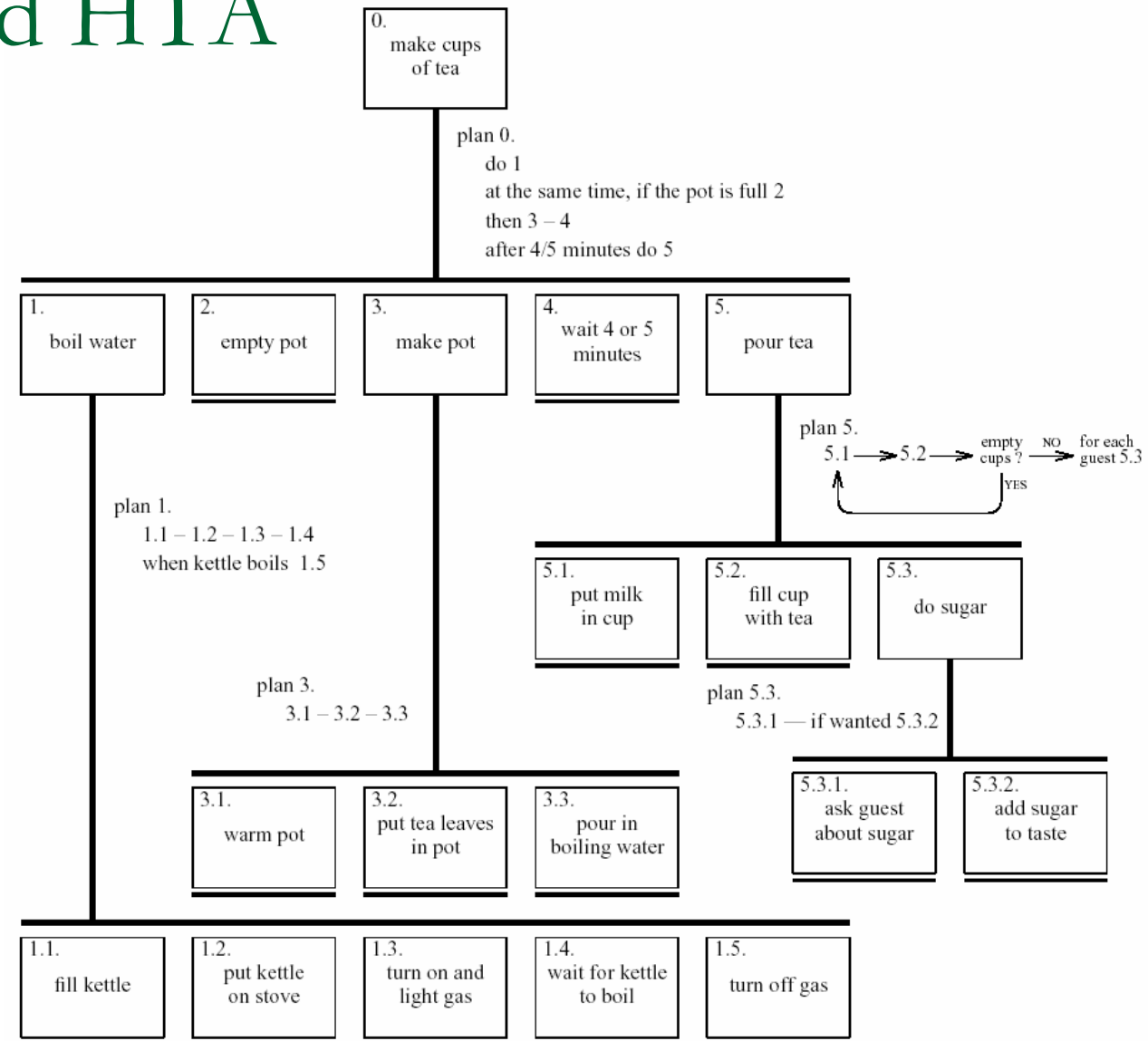
1.3.
wait for kettle
to boil

1.4.
turn off gas

Refining the Description

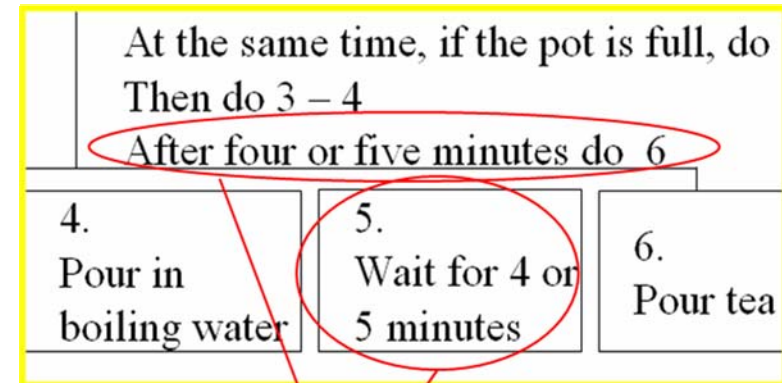
- Given initial HTA (textual or diagram)
 - How to check / improve it?
- Some heuristics:
 - Paired actions e.g., where is `turn on gas`
 - Restructure e.g., generate task `make pot`
 - Balance e.g., is `pour tea` simpler than making pot?
 - Generalise e.g., make one cup or more

Refined HTA



Handling Waiting

- Is waiting part of a plan?
... or a task?



Redundant?
Plan or subtask?

Types of Plans

- Fixed Sequence

- The same sequence of subtasks is always followed

- *E.g. 1 then 2 then 3*

- Optional Subtasks

- Subtasks that may or may not be performed depending on circumstances

- *E.g. If the pot is full ...*

Types of Plans

- Waiting-For Events

- Wait for a certain time

- *E.g. Wait for 4 or 5 minutes in plan 0 in the HTA of tea making*

- Wait for the occurrence of some event

- *E.g. Wait for kettle to boil in plan 1 in the HTA of tea making*

- Cycles

- Repeat some subtasks until a condition is reached

- *E.g. Repeatedly perform subtasks 5.1 – 5.3 until no more cup is left in the HTA of tea making*

Types of Plans

- Time Sharing

- Some subtasks can be done at the same time

- *E.g. Subtasks 1 and 2 can be done at the same time in the HTA of tea making*

- Discretionary Subtasks

- Whether to perform some subtasks is at the people's discretion

- *E.g. In plan 3 in the HTA of room cleaning, the person is allowed to clean any room that he/she thinks needs cleaning and in any order*

Types of Plans

- Mixtures

- Most plans are a mixture of different types

- *E.g. Plan 1 in the HTA of tea making is largely a fixed sequence but split by a wait*

Types of Plans

- 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

References

- Chapter 15 - Human Computer Interaction by Dix et al.

