TASK ANALYSIS

Introduction

- What are Tasks
  - What the user has to do (or thinks what he/she has to do) in order to accomplish a goal
  - Each task should be
    - Meaningful
    - Associated with a goal
    - Identifiable by the user

- What is Task Analysis
  - A process of analyzing the way people perform their tasks
    - The things they do
    - The things they act on
    - The things they need to know

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.

Goals of task analysis

- Elicit descriptions of what people do
- Represent those descriptions
- Predict difficulties, performance
- Measure learnability, transfer of knowledge between systems
- Evaluate systems against usability and/or functional requirements

Task Decomposition

- What is Task Decomposition
  - A top-down process in which a task is split into subtasks by sequence
- Aims
  - Describe the actions users do
  - Structure actions in a task-subtask hierarchy
  - Describe order of subtasks

Pre-requisite for Task Analysis

- Information about users
- Description of environment
  - Where the tasks will be performed
- Major goals of the job
  - What will result in a successful end state?
- Tasks & Subtasks:
  - Physical
  - Cognitive
  - Communication

Pre-requisite for Task Analysis – contd.

- Conditions under which these tasks are done
- Results/outcomes of tasks
- Requirements to perform task:
  - Information
  - Communication with others
  - Equipment

Types of Task Analysis

- Hierarchical Task Analysis (HTA)
- Cognitive Task Analysis
- Modeling "how to" knowledge

HTA: Hierarchical Task Analysis

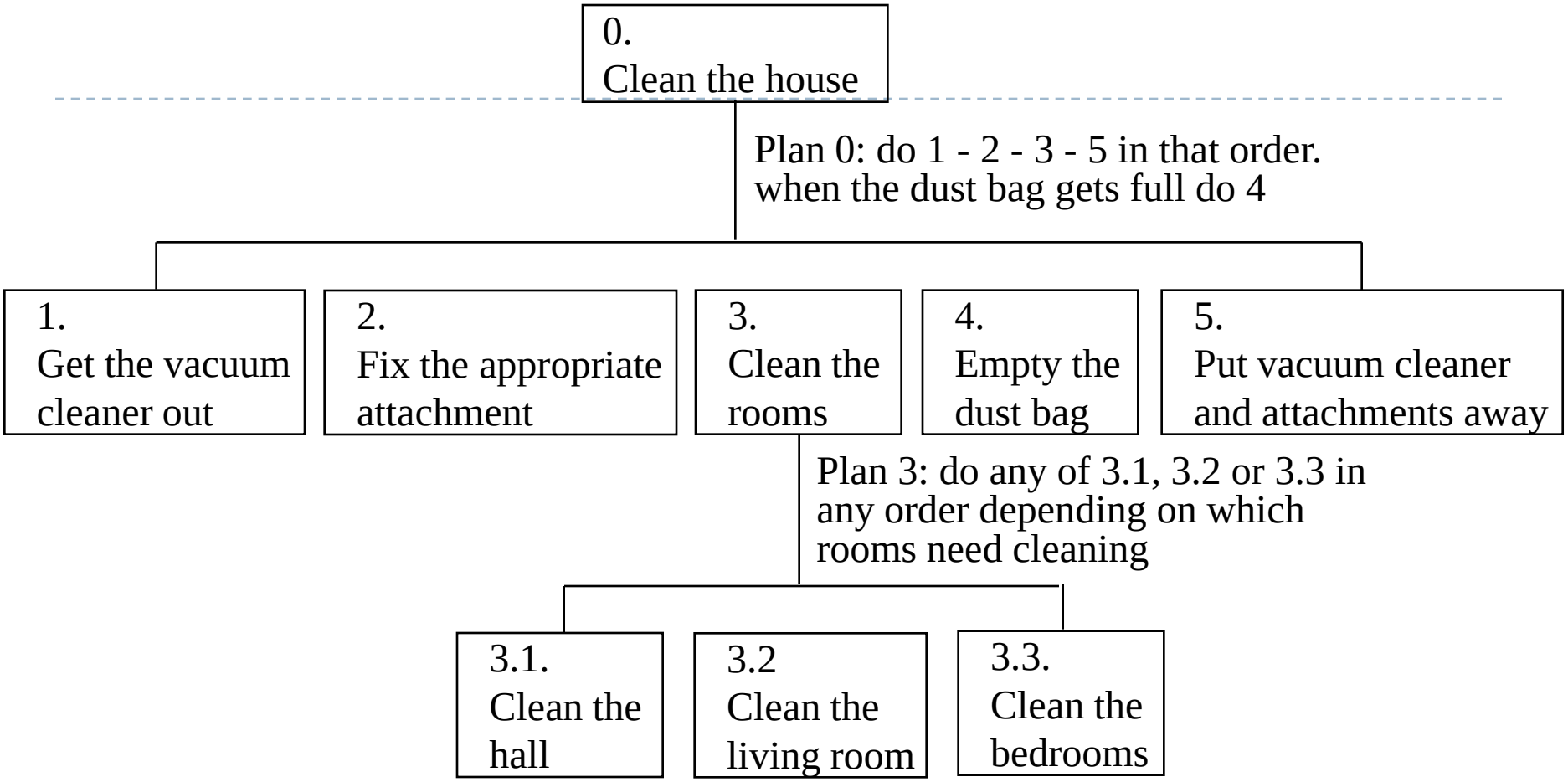
- Outputs are a **hierarchy** of tasks and subtasks and **plans** describing in what order and under what conditions subtasks are performed

- Shown as textual descriptions or diagrams
  - Information may be more accessible at a glance with diagrams, especially in hierarchies with many levels

0. 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

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

Textual HTA of the Task of Cleaning a House



Diagrammatic HTA of the Task of Cleaning a House

Generating Hierarchy

- Identify the Major Task to be Analyzed
  - e.g. clean house, purchase a flight ticket online, copy a ten-page paper, etc.
- Break Down the Major Task into Subtasks
  - What subtasks must be accomplished in order to perform the main task
  - Refer to various sources (e.g. direct observation, expert opinion, documentation, etc.)
  - Try to be specific in terms of the objectives of subtasks
- Decide Upon the Level of Detail into Which to Further Decompose the Subtasks
  - Some stopping rule
- Continue the Decomposition Process
  - Keep decompositions and numbering consistent
- Group Some Subtasks (If Too Detailed) into Higher-Level Subtasks
- Present the Hierarchy to a Domain Expert to Check for Errors or Omissions

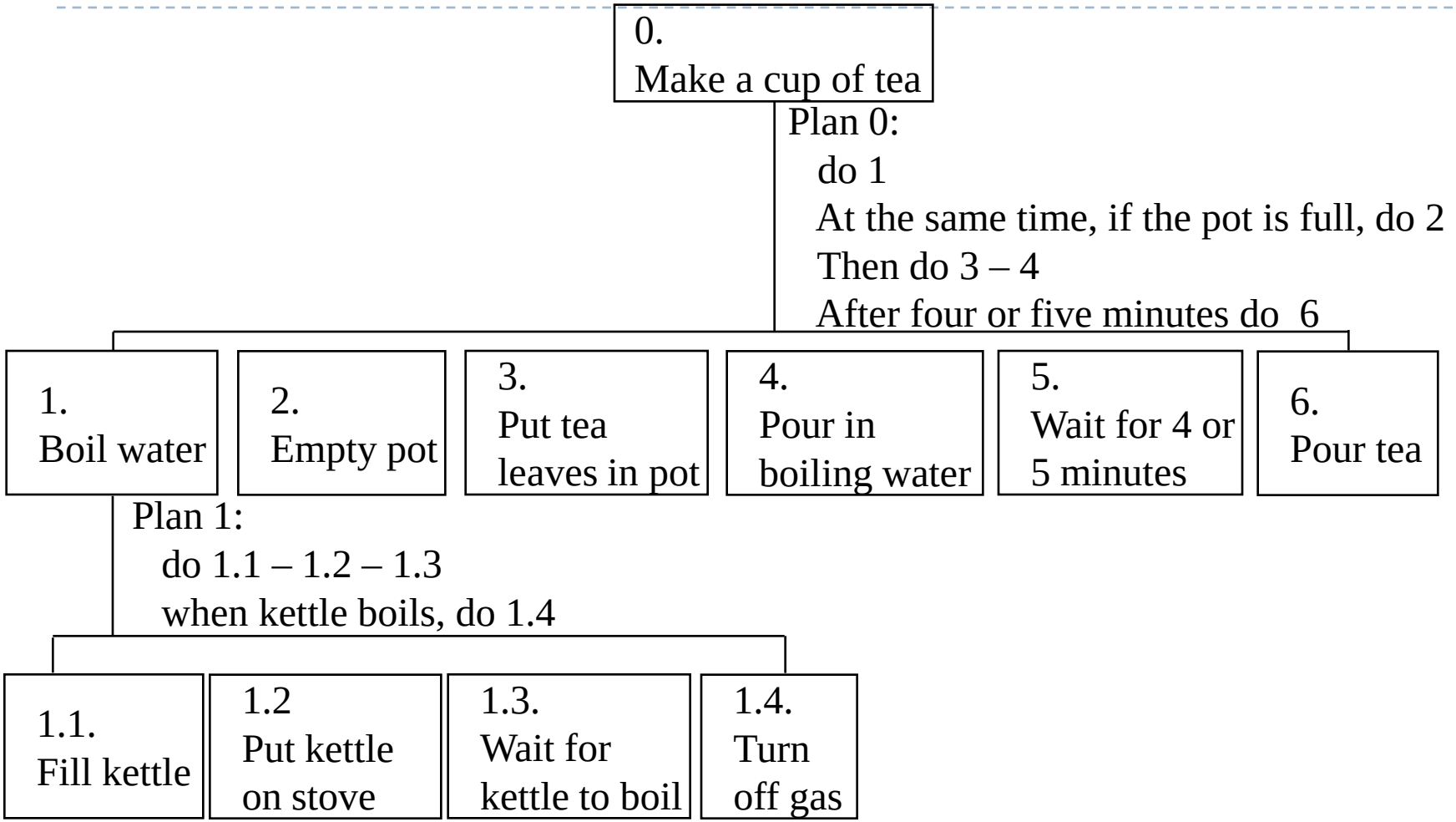
Stopping Rule

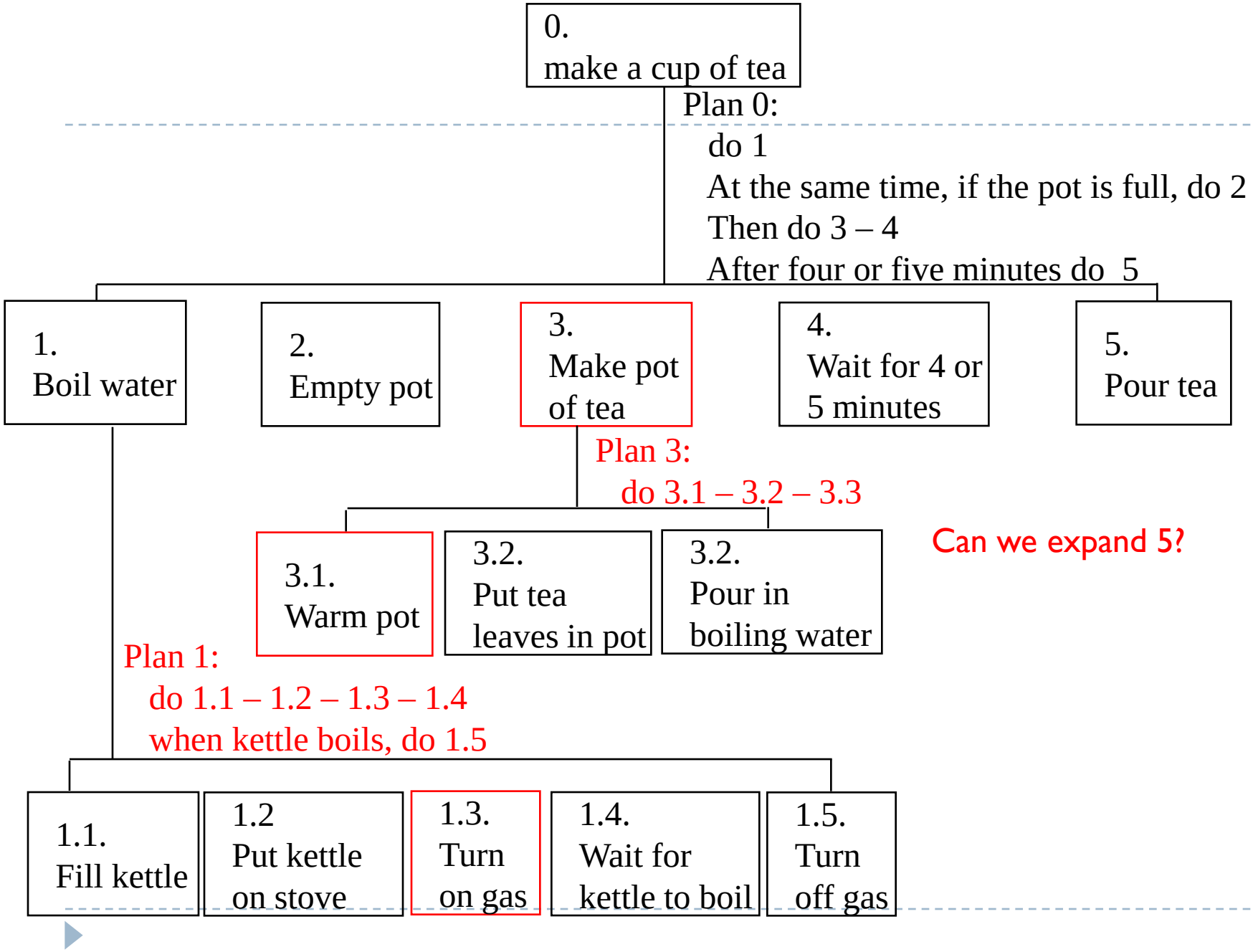
- Depends on the Purpose of the Task Analysis
  - Put more effort into those subtasks which are directly relevant to the intended purpose

0. In an emergency situation in a chemical plant
    1. Read the alarms
    2. Work out appropriate corrective action
    3. Perform corrective action

• If our ultimate aim is to install computer monitoring of the plant, then we would be interested in expanding subtasks 1 and 3
• If the aim is to produce online operations manuals, then subtask 2 would require expansion

HTA of the Task of Making a Cup of Tea



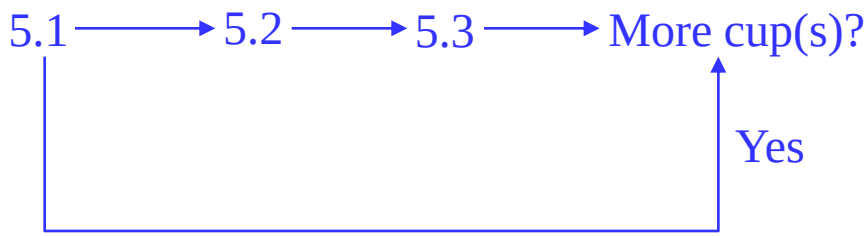

0.
make a cup of tea
Plan 0:
do 1
At the same time, if the pot is full, do 2
Then do 3 – 4
After four or five minutes do 5
1.
Boil water
2.
Empty pot
3.
Make pot of tea
4.
Wait for 4 or 5 minutes
5.
Pour tea
Plan 3:
do 3.1 – 3.2 – 3.3
3.1.
Warm pot
3.2.
Put tea leaves in pot
3.2.
Pour in boiling water
Can we expand 5?
Plan 1:
do 1.1 – 1.2 – 1.3 – 1.4
when kettle boils, do 1.5
1.1.
Fill kettle
1.2
Put kettle on stove
1.3.
Turn on gas
1.4.
Wait for kettle to boil
1.5.
Turn off gas

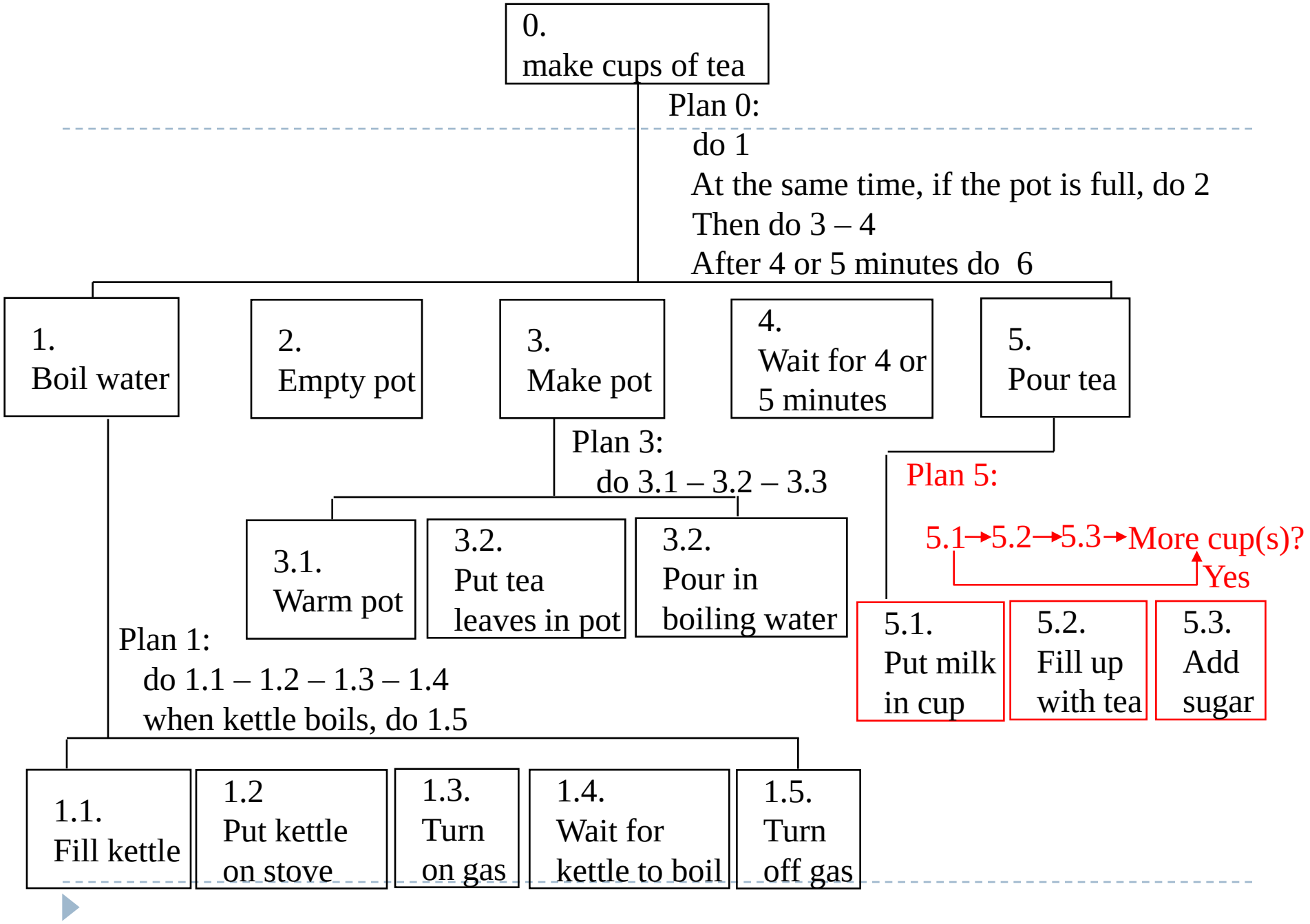
Suppose subtask 5 “Pour tea” can be further decomposed

5. Pour tea
    5.1. put milk in cup
    5.2. fill cup with tea
    5.3. add sugar to taste

Plan 5.
Do 5.1 – 5.2 – 5.3

What if we want to make more than one cup?




0.
make cups of tea
Plan 0:
do 1
At the same time, if the pot is full, do 2
Then do 3 – 4
After 4 or 5 minutes do 6
1.
Boil water
2.
Empty pot
3.
Make pot
4.
Wait for 4 or 5 minutes
5.
Pour tea
Plan 3:
do 3.1 – 3.2 – 3.3
3.1.
Warm pot
3.2.
Put tea leaves in pot
3.2.
Pour in boiling water
Plan 5:
5.1→5.2→5.3→More cup(s)?
Yes
5.1.
Put milk in cup
5.2.
Fill up with tea
5.3.
Add sugar
Plan 1:
do 1.1 – 1.2 – 1.3 – 1.4
when kettle boils, do 1.5
1.1.
Fill kettle
1.2
Put kettle on stove
1.3.
Turn on gas
1.4.
Wait for kettle to boil
1.5.
Turn off gas

Types of Plan

- Fixed Sequence
  - The same sequence of subtasks is always followed
    - e.g. Plan 3 in the HTA of tea making
- Optional Subtasks
  - Subtasks that may or may not be performed depending on circumstances
    - e.g. Subtask 2 in plan 0 in the HTA of tea making
- 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

Types of Plan

- 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
- 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
- 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