Human-Computer Interation

2024/2025

Lecture Class 4

From Scenarios to Requirements

universidade de aveiro

deti departamento de electrónica, telecomunicações e informática

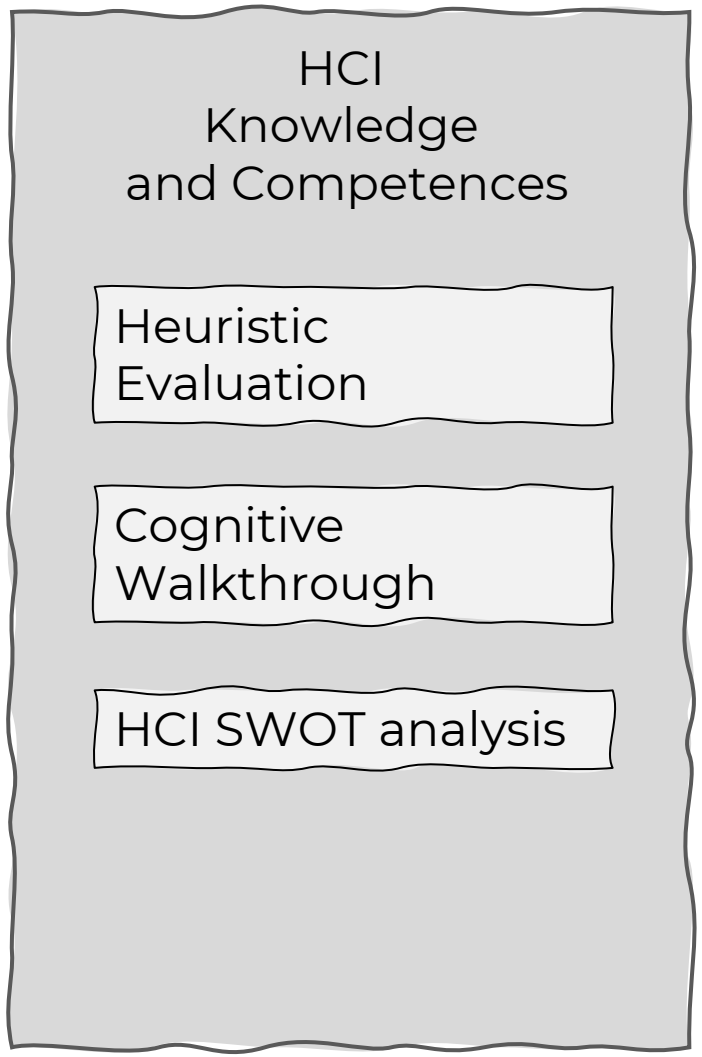
In previous episodes of HCI Season 1...

...in lectures and lab classes

Getting to Know the Competitors

Understanding what others are doing to solve the problem you identified

Use tools to perform the analysis of your biggest competitor

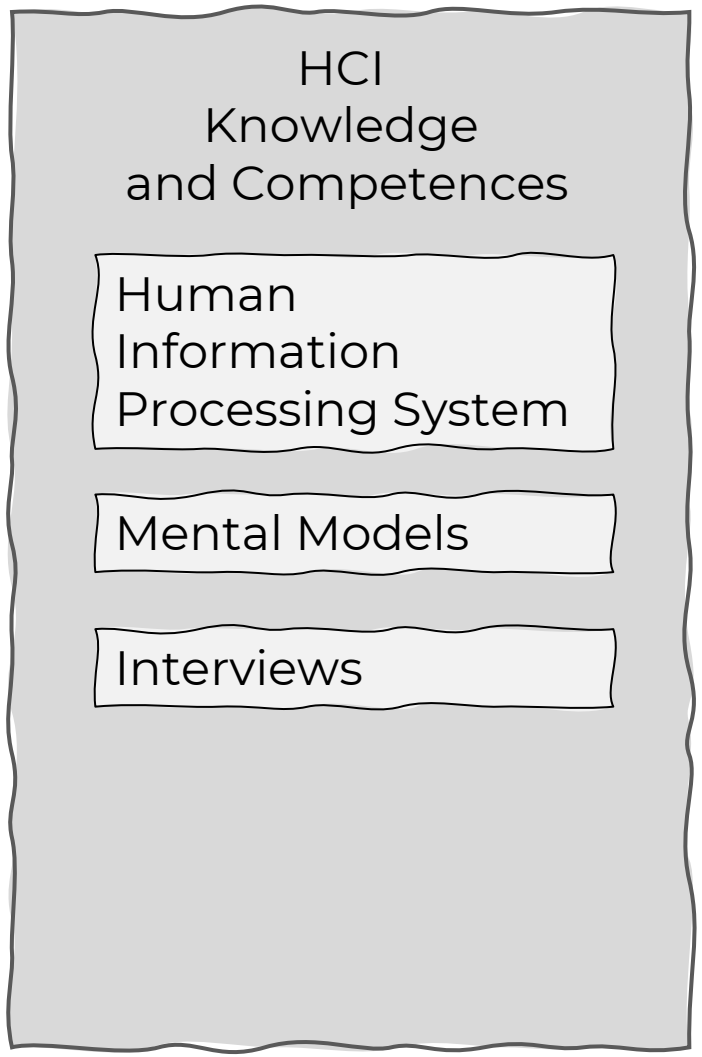


Users

Understand the characteristics of how we perceive and process information

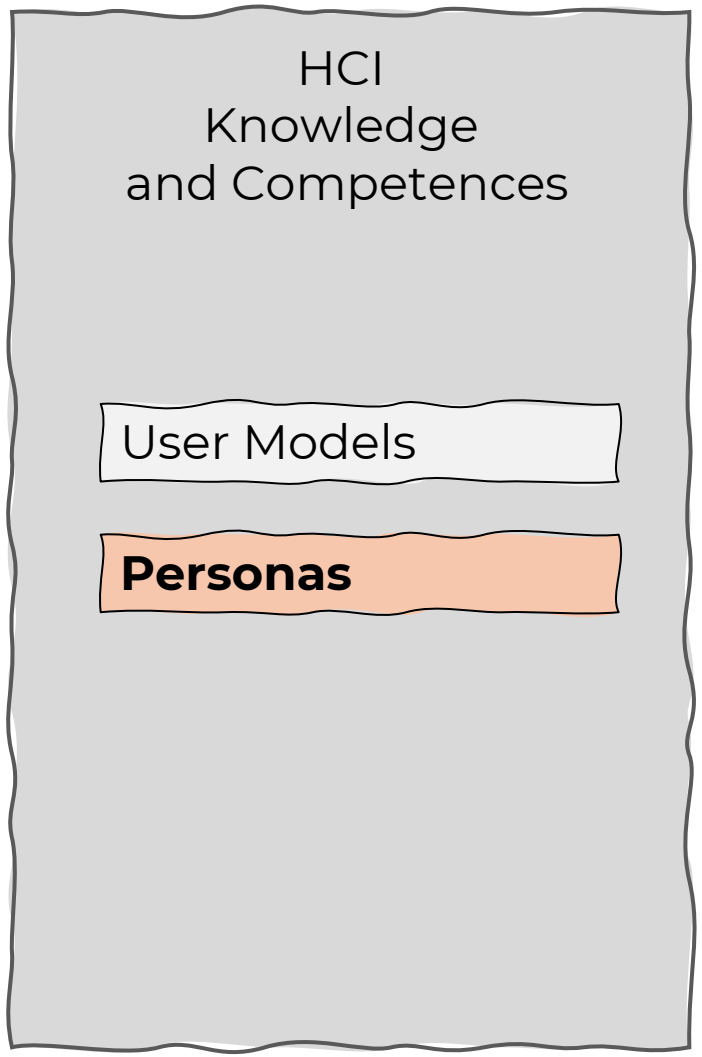
Understand how we use our knowledge to interpret new things

Gather information about what potential users for your solution face, on their day-to-day, and what are their pain points and expectations



Modelling Users

Adopt a method to integrate all the data you obtained about your potential users, their needs, and motivations



Why should we use such elaborate Personas?

Personas. Why?

- Help envision user needs
- Prioritize features based on **persona goals**.

- Create a common language for discussing users
- Defend design decisions based on user needs

- Rally the team around a shared understanding of the user.

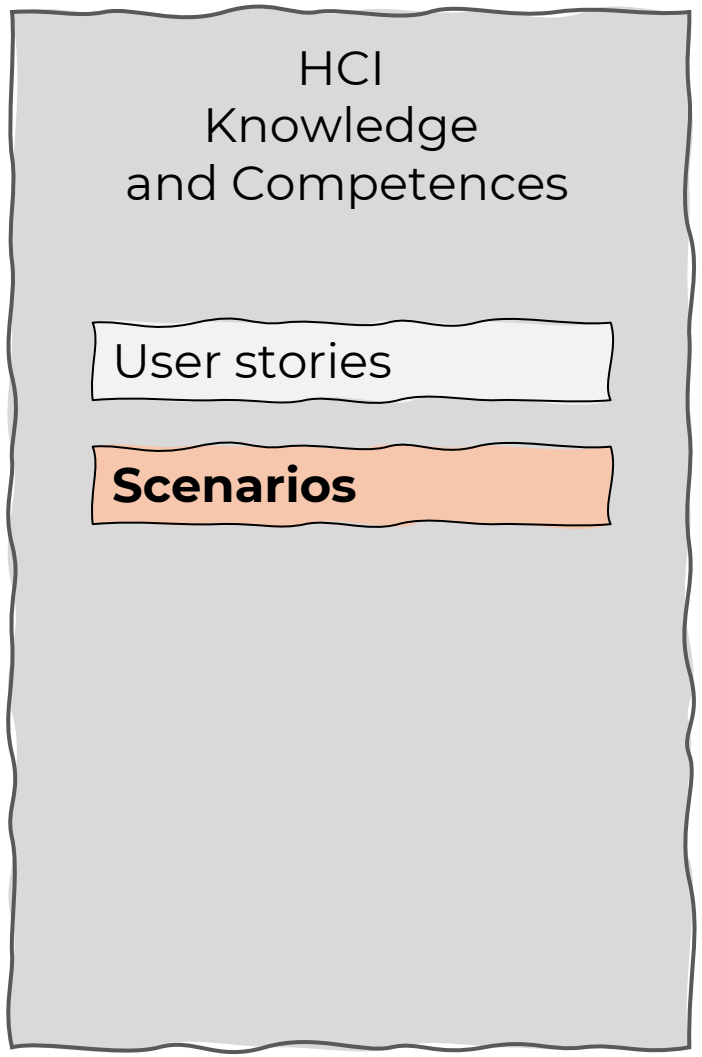
Describe your solution

Scenarios are **narrative descriptions** of how users interact with a system or service to achieve a goal

Who, When, Where, What, How?

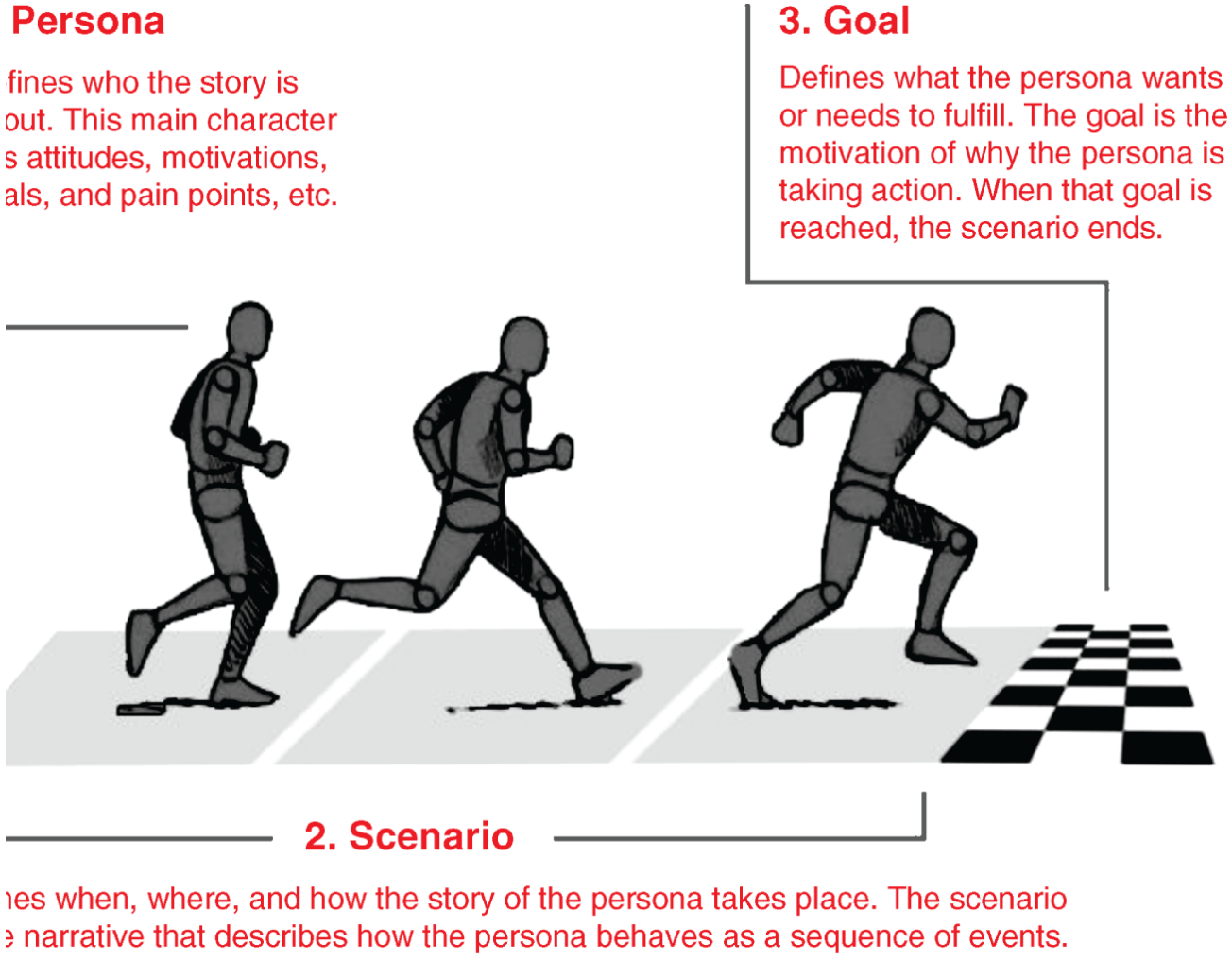
Solution agnostic

- “selects the option for special delivery” vs “goes into a dropdown and select the option for special delivery”



Goal Directed Scenarios

If your scenario does not respond to the Persona's goal, you have a problem!



How many scenarios?

around 50-60...

How many scenarios?

around 50-60...

There is no right or wrong number.

You must ask: Is everything I “see” the system needing to do already present in a scenario?

For your project, 4-5 scenarios are probably enough

Each Persona should appear

Product	Persona	Scenarios
E-mail system	A system administrator with simple needs (primary administrator)	• Set up the system • Add an account • Change settings • Delete an account • Upgrade the system
	A system administrator who makes complex connections to other systems (secondary administrator)	• Set up the system
	Someone who uses e-mail in a single location (primary end user)	• First use at the beginning of the day • Use throughout the day
	A mobile e-mail user (secondary end user)	• Remote use

Today’s episode (HCI S01E04)

Specify what we need to have
in the envisioned system

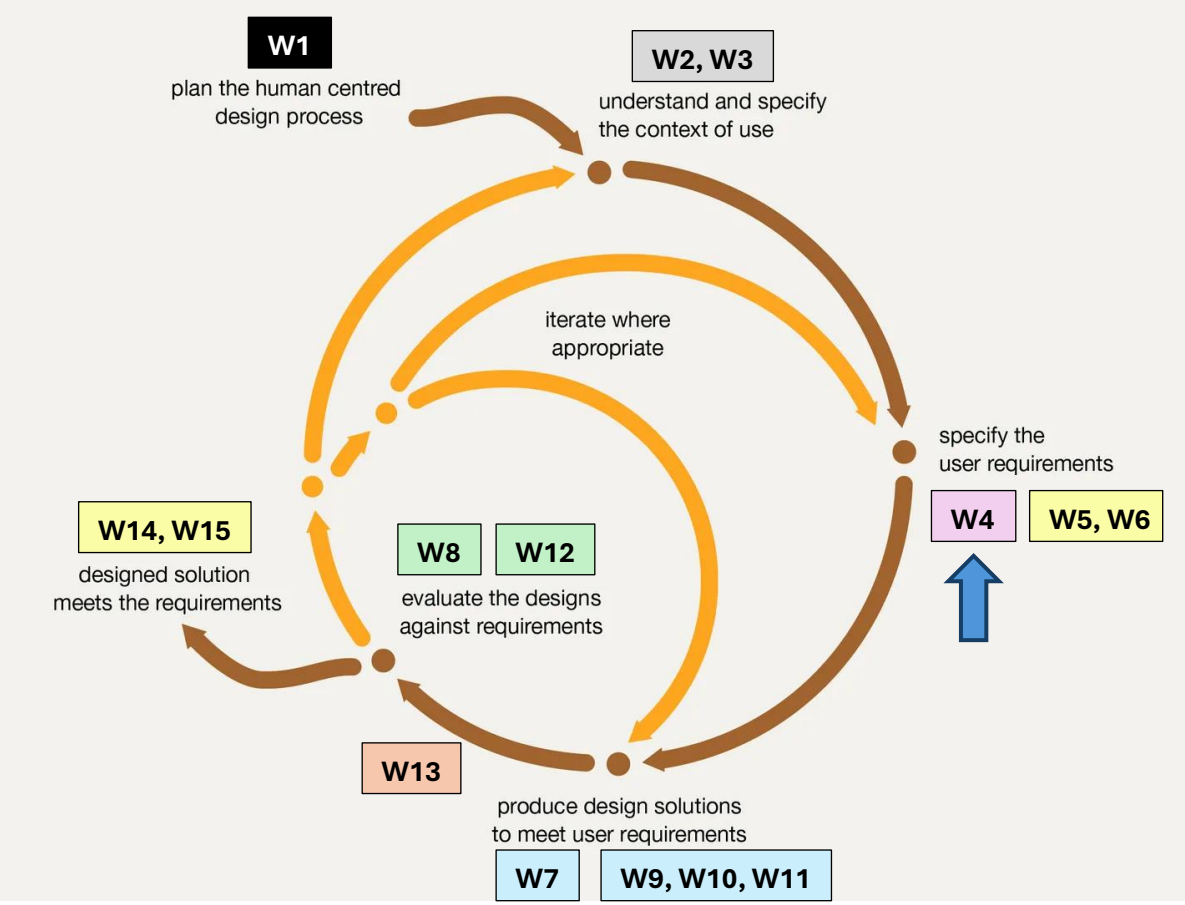
from scenarios to requirements

Today’s outline

How can we generate requirements?

Assginment 1

Article presentations



Requirements

https://usersnap.com/blog/productivity-tips-web-developers-get-process-right-requirements

What to do with a vision...

What's the Problem?

- When designing a new interactive system, how do we move from vision to concrete needs?

Why is it Important?

- Well-defined requirements ensure usability, feasibility, and alignment with user needs.

What are Requirements?

Requirements are the **conditions or capabilities** needed by a system to satisfy **stakeholder needs** or **solve specific problems**.

They guide the development of a product or service.

Requirements are not Features

Requirements are **needs**, not pre-defined solutions.

Example:

Solution as requirement: "It has to be Web-based.“
Real need: “Avoid installing on every machine.”

Solution-Agnostic Thinking: Always ask **"What is the real need?"** before committing to a solution.

Generating Requirements

Where do we obtain our requirements from?

https://half-life.fandom.com/wiki/Citadel_Core

Requirements from Scenarios

Consider the list of scenarios for different Personas using a novel email system

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You expand each into a narrative scenario

Product	Persona	Scenarios
E-mail system	A system administrator with simple needs (primary administrator)	• Set up the system • Add an account • Change settings • Delete an account • Upgrade the system
	A system administrator who	

Scenario:
Paula adds an account

Paula the system administrator, responsible for managing user access to the email system, needs to create a new account for a new employee. Using her administrative credentials, she accesses the system's account management features. She then initiates the process of adding a new user. The system prompts her for the necessary information to provision the new account. After providing the required details and confirming the creation, the new employee's account is active within the system.

From this scenario what are the requirements?

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Identify actions/tasks

Scenario:
Paula adds an account

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Requirements for Add an Account:

- provide a mechanism for administrators to manage user accounts
- allow administrators to initiate the creation of new user accounts
- prompt for the necessary information to create a new user account
- activate the new user account after confirmation by the administrator

Scenario:
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*Paula the system administrator, responsible for managing user access to the email system, needs to create a new account for a new employee. **Using her administrative credentials, she accesses the system's account management** features. She then **initiates the process of adding a new user**. The system **prompts her for the necessary information** to provision the new account. After providing the required details and **confirming the creation**, the new employee's account is active within the system.*

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- These requirements point us in the right direction, but they are rather “superficial”
- To understand better what is entailed we need to dive deeper into the tasks

We need **…**

Task

Fashion Modelling

What is Task Modelling

A set of various methods used to represent how users perform tasks to achieve specific goals

These models help designers and developers understand the **steps involved in a task**, the **relationships** between those steps, and the **information and tools users need**

Task Modelling

GOMS (Goals, Operators, Methods, Selection Rules)

- Models expert users' cognitive structure when performing a task.

Hierarchical Task Analysis (HTA)

- Breaks down a task into subtasks in a hierarchical structure.
- Focuses on goals, tasks, and plans for how tasks are executed.

ConcurTaskTrees (CTT)

- Hierarchical structure
- Concurrent/parallel subtasks

Hierarchical Task Analysis

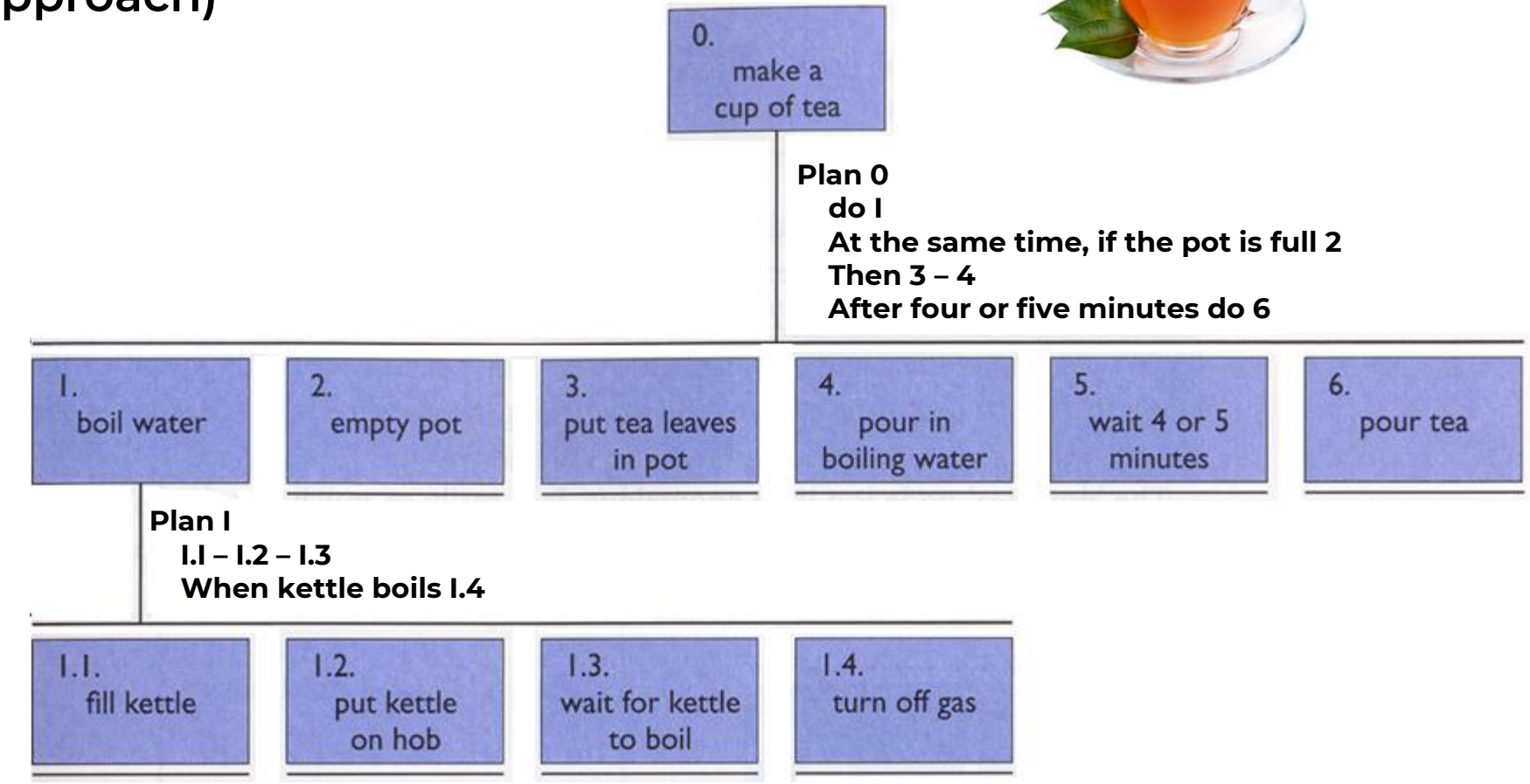
Method for **breaking down tasks** into a hierarchy of subtasks

Allows understanding **task structure**, **dependencies**, and opportunities for **optimization**

Preparing a cup of tea

Can you do a HTA describing this task?

HTA- Preparing a cup of tea
(graphical representation of first approach)



HTA – Preparing a cup of tea
(analysis of the of first approach)

Do we want only one cup of tea?

0. make a cup of tea

Plan 0
do 1
At the same time, if the pot is ful
Then 3 – 4
After four or five minutes do 6

Warm the teapot is lacking

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

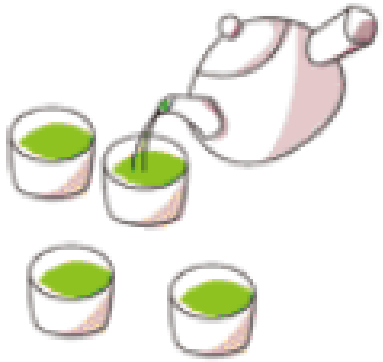
1.1. fill kettle | 1.2. put kettle on hob | 1.3. wait for kettle to boil | 1.4. turn off gas

Is it this simple?

Turn on the gas?

one important aspect to have in mind
is that **HTA is an iterative process**

HTA – Prepare several cups of tea (a new hierarchy)



Task analysis information sources

The quality of task analysis results cannot be better than the original data: ***“garbage in garbage out”***

The process of analysis in general triggers new questions, thus several phases of data collection and analysis are needed

There are several types of information sources:

- Documentation
- Observation (expensive)
- Interviews

Why do Task Analysis?

May be used for…

understanding current use, users are observed while performing tasks using the system , e.g.:

- Manuals and teaching materials

contributing to the design of the new system

- High-level system design
- Detailed design of the system user interface

Let us return to our **Add an Account** task...

Requirements for Add an Account:

- provide a mechanism for administrators to manage user accounts
- allow administrators to initiate the creation of new user accounts
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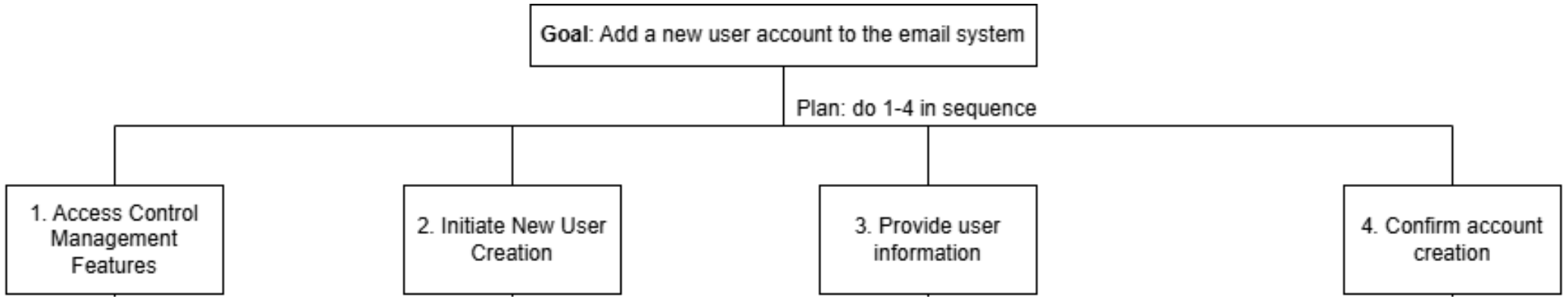
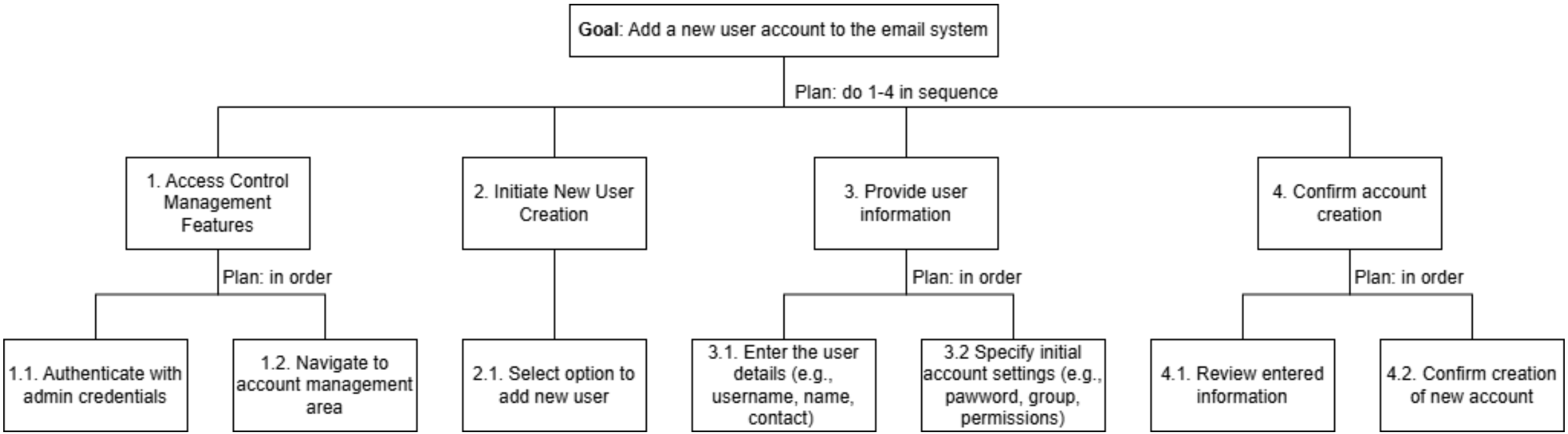
- activate the new user account after confirmation by the administrator

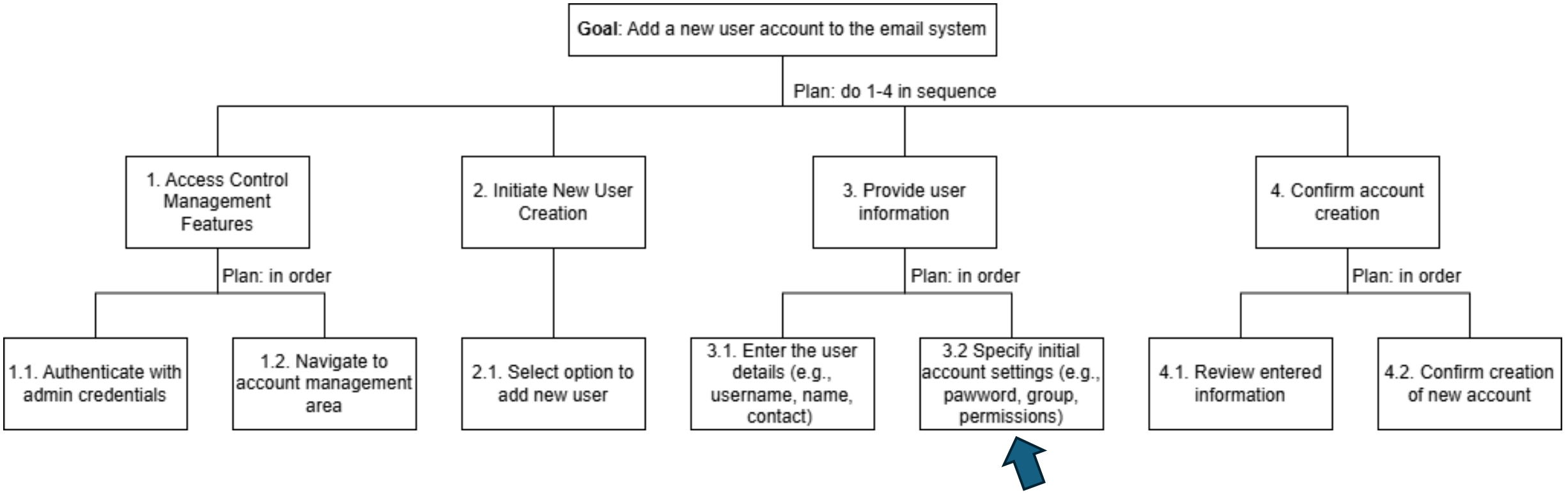
What would the HTA be like for the Add New Account task?

We can start by the already identified steps

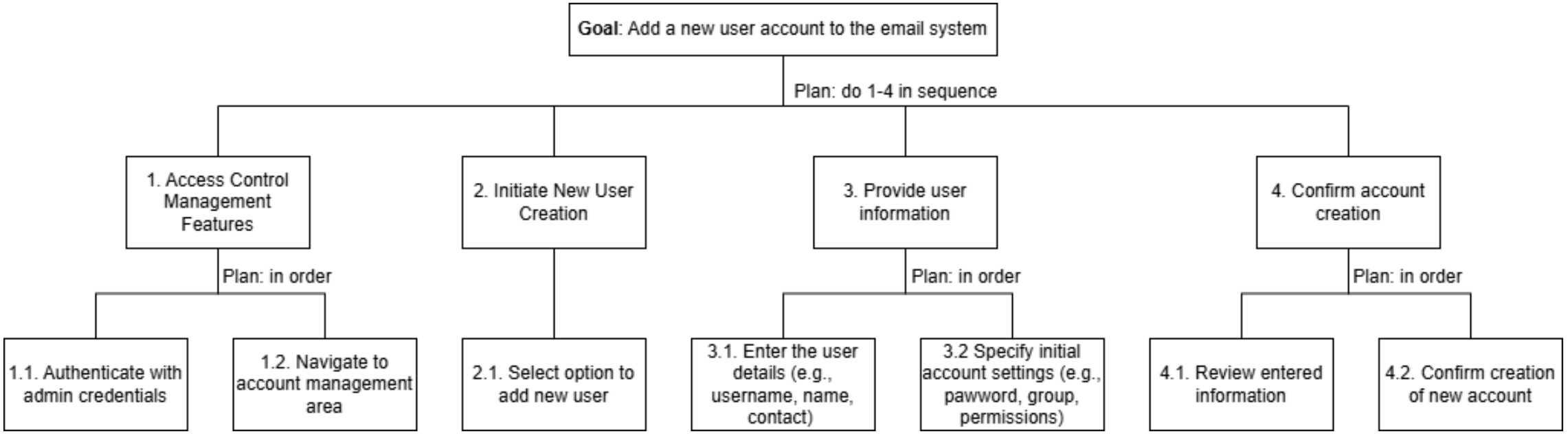
Hierarchical Task Analysis







We might keep expanding it, e.g., password can be random or not...



The system shall:

R1: provide a secure mechanism for administrators to access account management features (1.1).
R2: provide a clear pathway to the account management area (1.2).
R3: provide option to initiate the creation of a new user account (2.1)
R4: prompt the administrator for all information required to create a new user account (3.1).
R5: allow the administrator to specify initial account settings during account creation (3.2)
R6: present a summary of the entered information for review before account creation (4.1).
R7: require explicit confirmation from the administrator to finalize the account creation process (4.2).

Requirements from Personas

https://commons.wikimedia.org/wiki/Commons:Featured_pictures/People/Portrait#/media/File:Felicidade_A_very_happy_boy.jpg

Mental Model

Remember from previous class

Describes how someone thinks about objects, relationships, and actions.

Example:
A photographer who thinks of her photos as belonging to a particular event, such as a holiday or vacation, will be frustrated if she can’t group photos based on events.

Environments

Some requirements may come from:

- the virtual or physical environment where it will be used
- User expectations for what is normal for the environment

Medical equipment that melts when cleaned with disinfectant

vs

Mobile phone that stops working after a ride on... the washing machine

Physical and Cognitive Characteristics

Remember from previous classes

- Accommodate a wide range of body sizes and physical capabilities
- Users with poor vision need larger text
- Users with arthritis need less manual dexterity required for interactions
- Avoid repetitive stress injuries for all users

Goals

Goals should drive context scenarios

But some requirements are intangible

For Katie, the camera should probably look professional and feel solid

KATIE'S GOALS:

Be able to capture what she sees in her "mind's eye." Katie knows she has an eye for composition, but is frustrated when her inability to master difficult lighting makes for a lackluster photo.

Enjoy the scenery. Katie takes photos of nature as a way to enjoy its beauty. She doesn't want to be so focused on the mechanics of using her camera that she forgets to enjoy what she sees.

Feel like a "real" photographer. Katie is proud of some of her images, but hesitates to think of herself as a photographer because she feels she hasn't mastered some of the fundamentals.

Requirement Types

Requirement Types

- Functional requirements
- Nonfunctional requirements

In HCI course we will not expand beyond these

- Business requirements
- Data requirements
- Sustainability requirements
- …

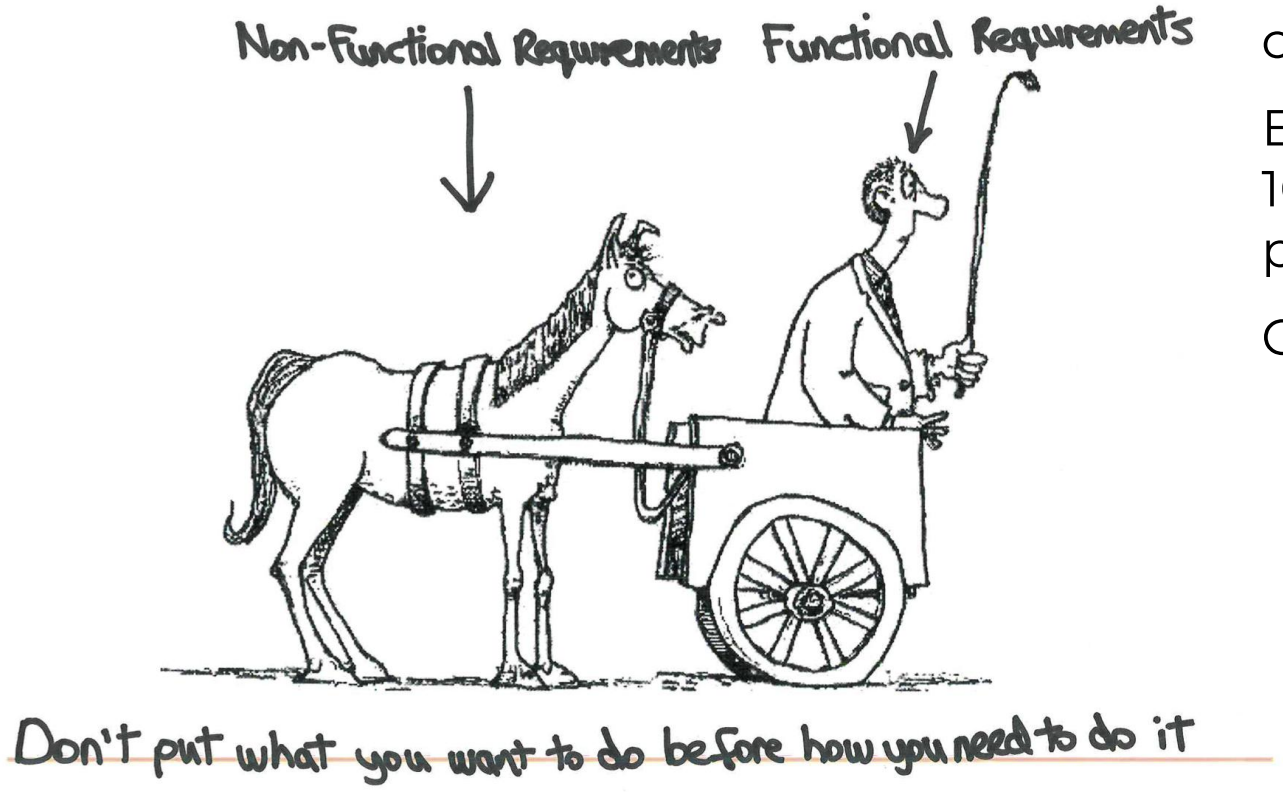
Functional

Define what the system must do.

Describe features, behaviors, and functionalities.

Example: "The system must allow users to reset their password via email."

Non-functional (NF)



Define quality attributes, constraints, and operational characteristics.

Example: "The system must handle 10,000 concurrent users without performance degradation.“

Common NF requirement categories:

- Performance (response time, scalability); Usability (ease of use, accessibility); Security (authentication, encryption); Reliability (uptime, fault tolerance); Maintainability (ease of updates, modularity)

https://stevenwilliamalexander.wordpress.com/wp-content/uploads/2015/07/nfr-non-functional-cart-before-horse.png

Reporting Requirements

for a pumpkin production management system

Functional Requirements

- **User Authentication**: The system must allow farmers to log in securely
- **Crop Tracking**:The system must enable users to track the growth stages of pumpkins, including planting, flowering, and harvesting.
- **Watering Schedule**:The system must allow users to set and receive notifications for scheduled watering times based on weather data.
- **Inventory Management**:The system must provide a feature to track the number of pumpkins harvested, stored, and sold.
- **Farm Activity Logging**:The system must log all farm activities, such as planting, fertilizing, pest control, and harvesting, with timestamps.
- **Harvest Prediction**:The system must analyze historical data to provide a predicted harvest date

Nonfunctional Requirements:

- **Performance**:The system must load within 3 seconds for all major actions (e.g., logging in, accessing reports).
- **Security**:The system must encrypt sensitive data using AES-256 encryption.
- **Usability**:The system must have an intuitive, user-friendly interface with easy navigation for farmers of all tech skill levels.

Requirement Priorization

Focus on Critical Needs: most important requirements are addressed first

Resource Allocation: limited resources (time, budget, and effort) allocated to the most valuable requirements

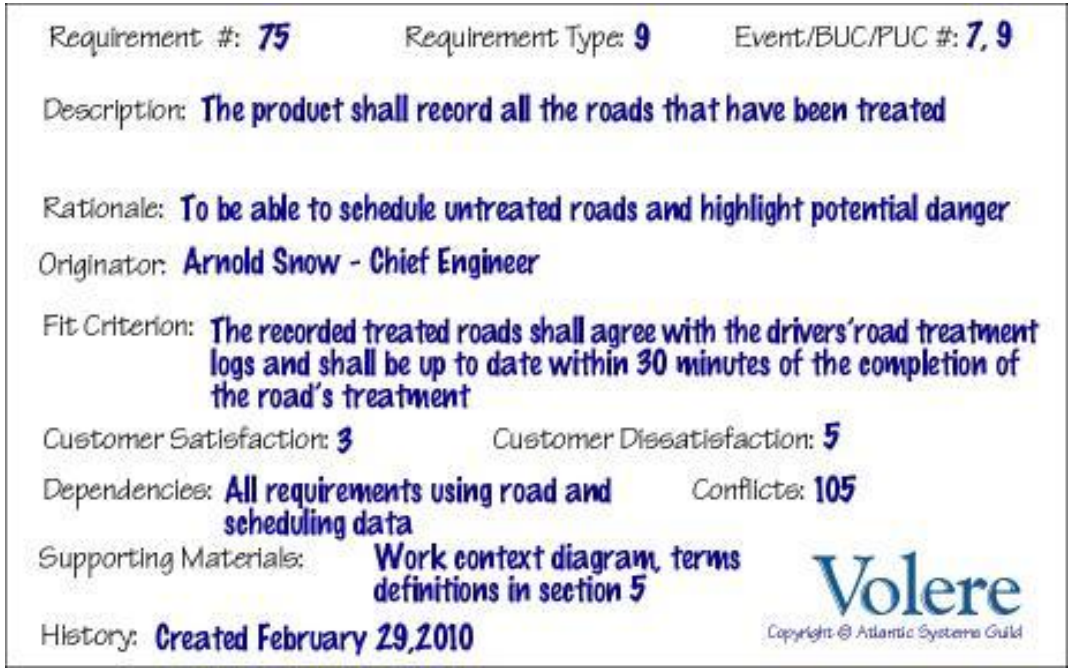
Requirement Priorization

Decision-Making: helps stakeholders make informed trade-offs during development.

Adaptability: As the project progresses, prioritization allows flexibility to adjust and refine requirements without losing sight of the overall goals.

Requirements
beyond the HCI Course

- Depending on the project, requirement listing may need to be more elaborate
- Larger teams need requirements with more information so as not to miss the context
- There are templates that can be considered (e.g., VOLERE)
- That will not be addressed in this course



In our next episode...

Now that we have a list of needs to attend to, it is time to start materializing it in something tangible.

Next class, we will address **low-fidelity prototyping**

Assignment 1

Txa txa txa txaaaaaaaam

Next Week...

Assignment 1 needs to be delivered next week, before your lab class presentations start (for all students in class)

You submit the assignment materials (slides + logbook) in Teams (only one delivery per group)

Pay attention to the template available in Teams (it was updated based on some questions from you)

Assignment 1: FAQ

- Where do I show the HCI SWOT analysis?
  - As part of the conclusions for your competitor analysis
- What is important to say about Personas?
  - their basic demographics; what challenge they often face; what is their motivation
- How many tasks should I consider to show the HTA?
  - One or two important tasks (not more than that!)
- Teachers already know how an HE or CW is performed. Do I NEED to explain it?
  - Yes. Be brief, but you should **always** outline the methods you used to obtain the results you are presenting. E.g., how many experts, which heuristics, what severity scale, individual evaluation + consensus, etc.

Bibliography

- Goodwin, K. (2011). *Designing for the digital age: How to create human-centered products and services*. Ch. 12: Defining Requirements, John Wiley & Sons. https://learning.oreilly.com/library/view/designing-for-the/9780470229101/

And Now...

The article presentations...