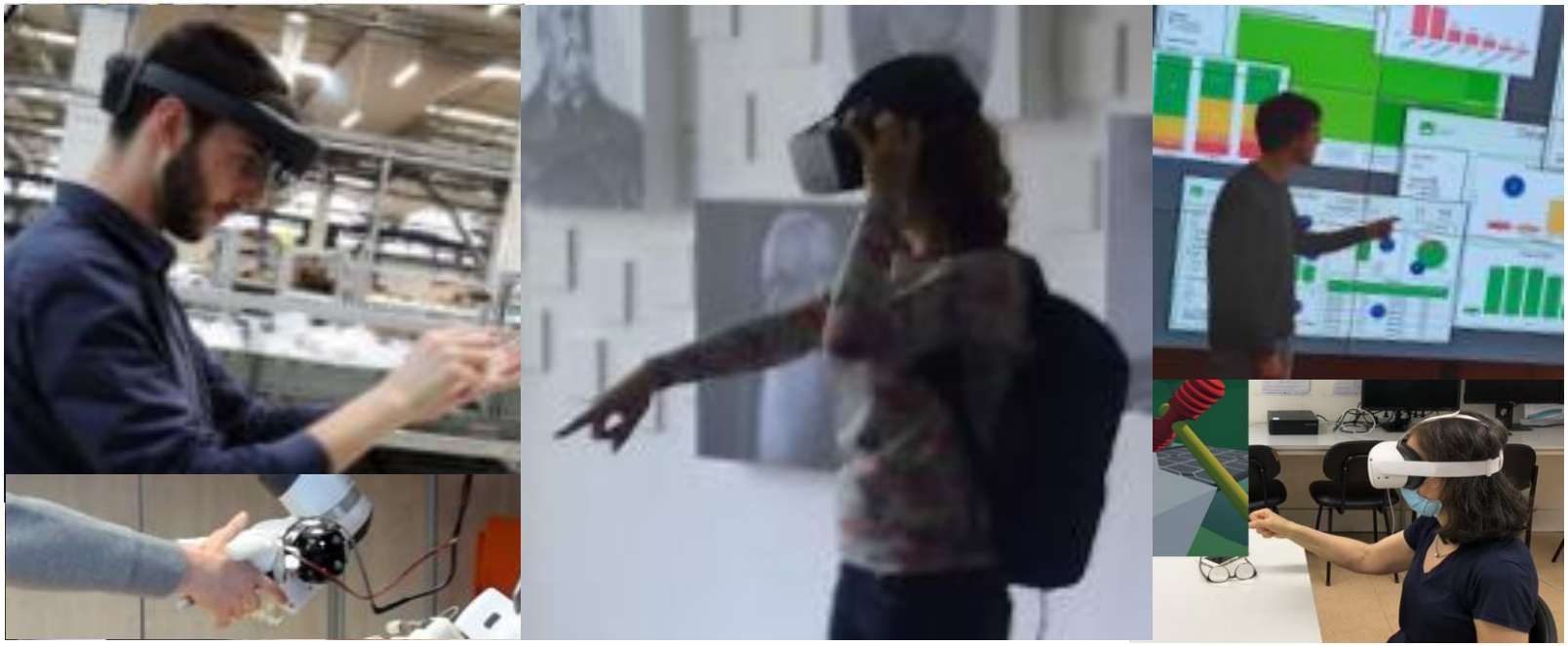
Universidade de Aveiro
Departamento de Electrónica,
Telecomunicações e Informática

Human-Computer Interaction
2026



Interactive systems are meant to be used by people: the users and must be designed considering their characteristics

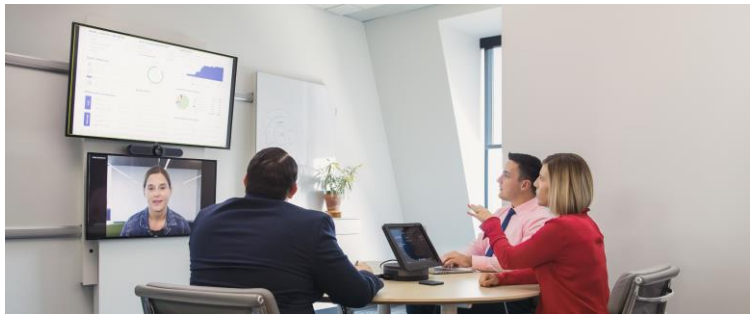
Is it the same to develop for any user?

We need to know who are the **users**, their characteristics, and what motivates them

Human Factors

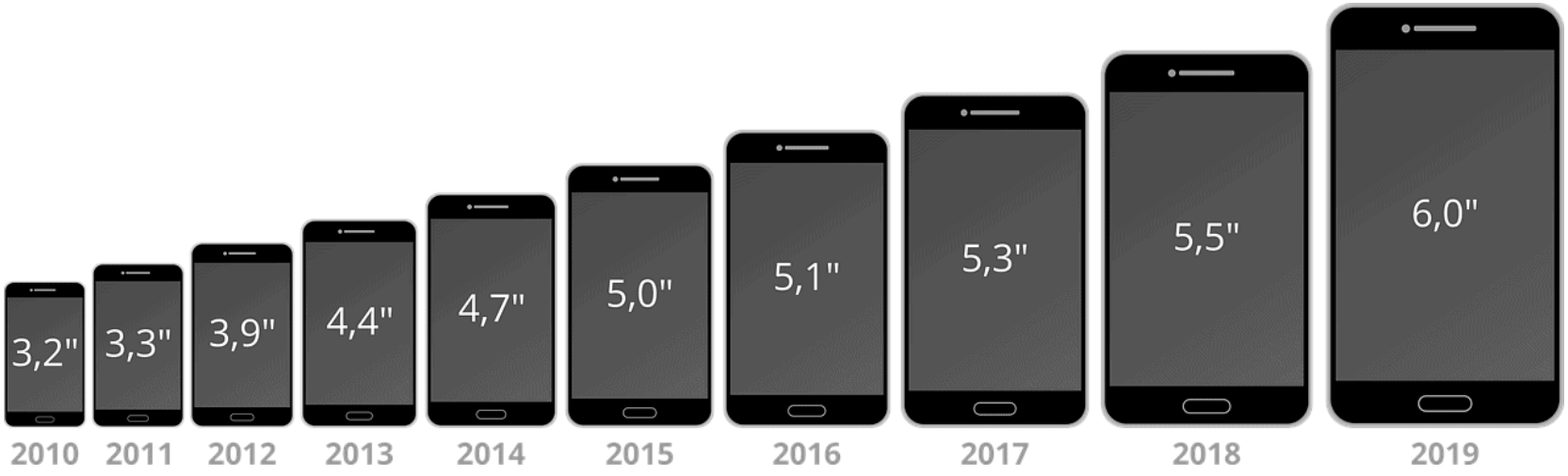
Human senses and cognition have characteristics that determine or limit what we can perceive and process

Is it the same to use a system in a train station or at home?



We need to understand the **contexts/scenarios** where our system will be used

And after understanding the context, how do we choose the technologies?




Gestures User Interfaces

Conversational User Interfaces

IMMERSIVE ENVIRONMENTS

We need to choose **the platform and modalities** that best adapt to the task and contexts

…not just because they are trendy

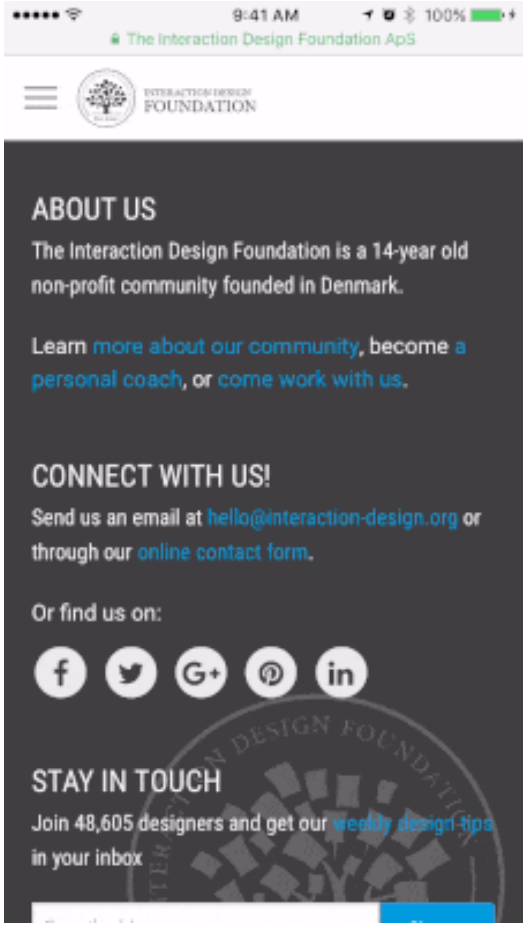
Now we just need to design the interface.
What can go wrong?

Everything

But some mistakes can be avoided by looking into good practices

Following simple design guidelines can make a difference

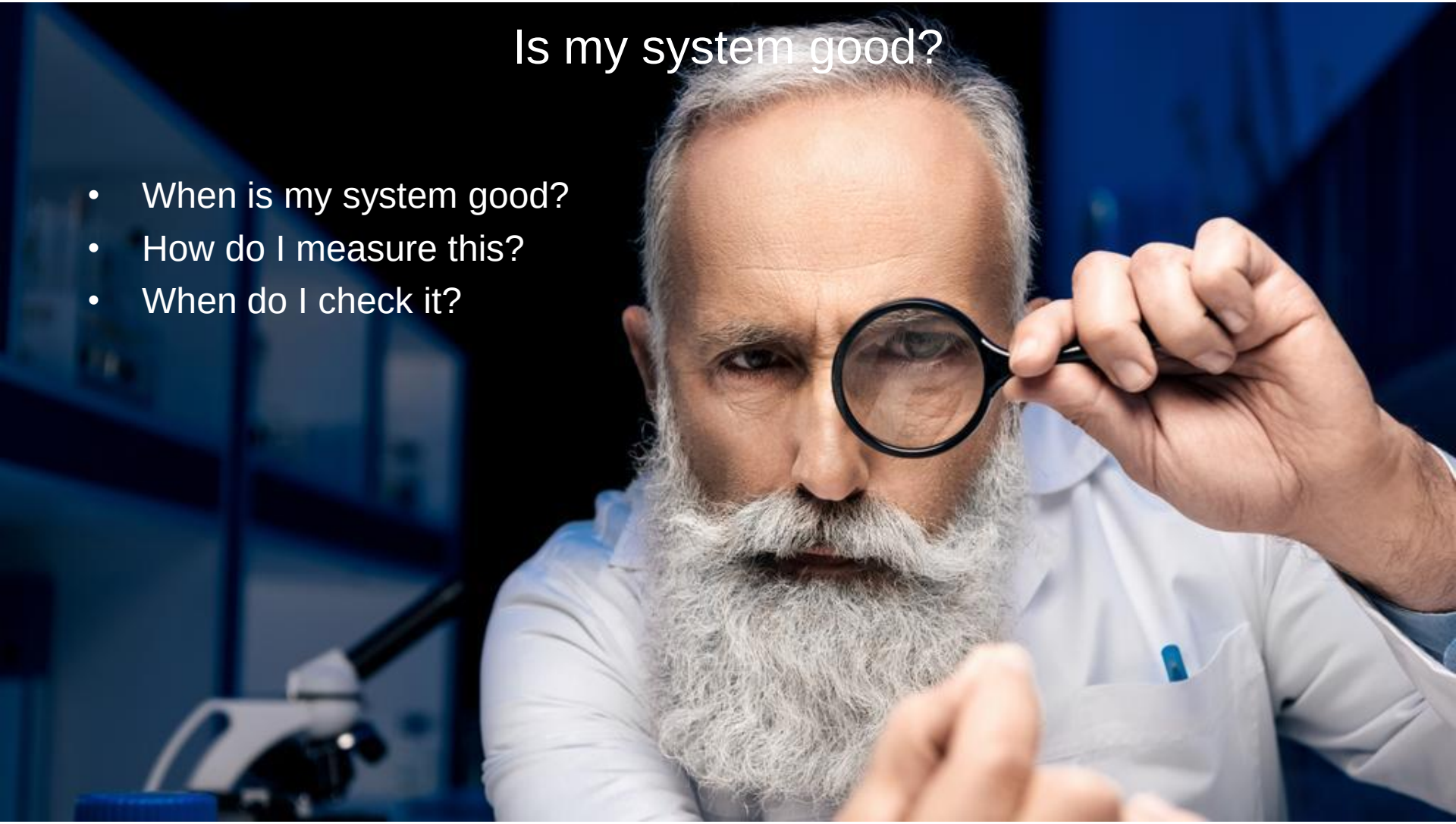
Material You



Friction

We need to understand the **design principles** that make good interfaces and apply them

Is my system good?



- When is my system good?
- How do I measure this?
- When do I check it?

Is the system usable*?

Do users understand it?

How can it be better?

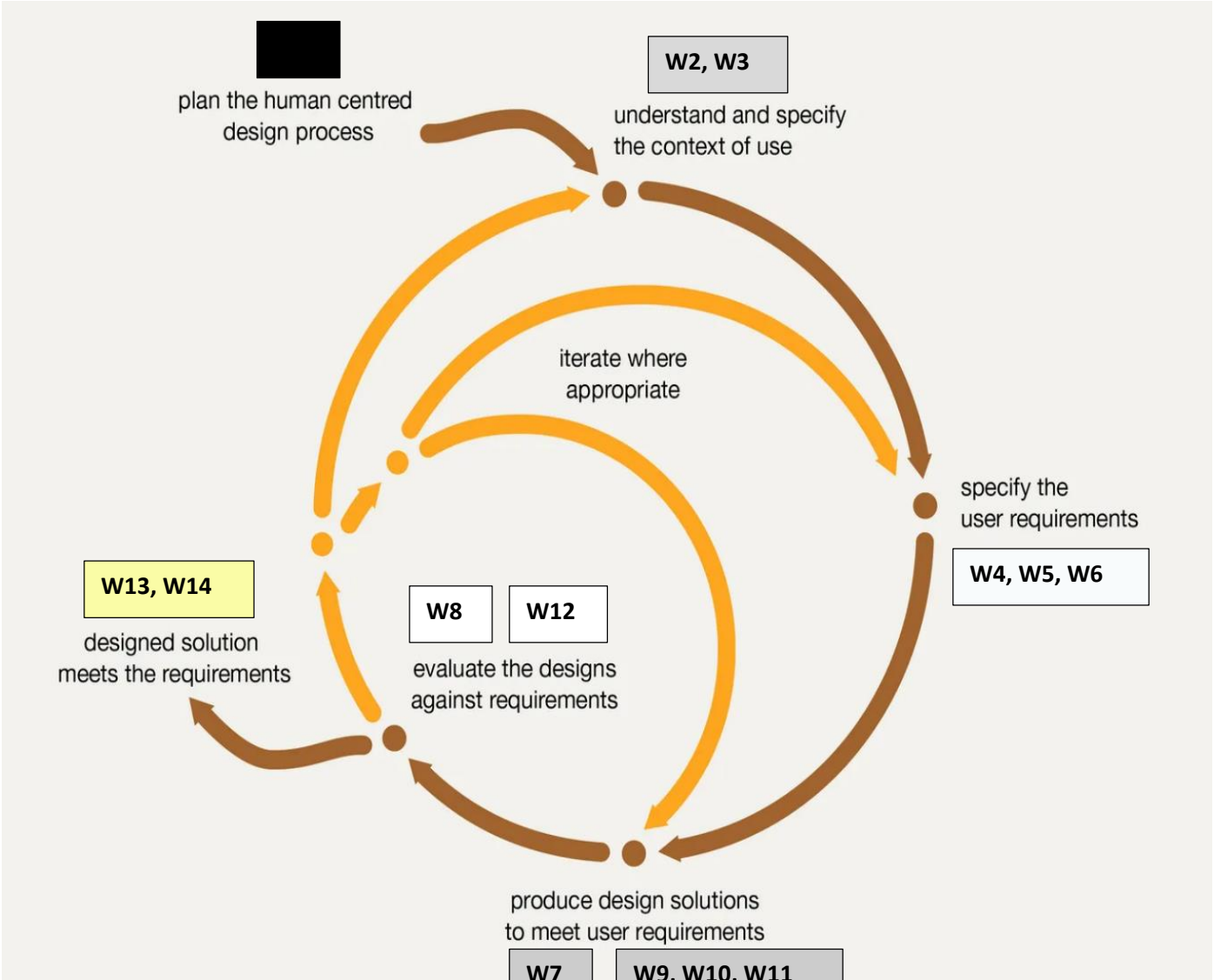
* You will learn about what this means, in this course.

We need to work with users to **evaluate** and improve our designs

We should not design a complete solution in one go. We need to **iterate** and adjust development based on feedback

Human-Centered Design process

(to be followed in Lab classes)



Human-Centred Design

Human-Centred Design is an iterative problem-solving approach that **prioritizes user needs, behaviours, and experiences**.

It involves **research, ideation, prototyping, and testing** to create intuitive, accessible, and effective solutions, while considering real-world contexts and constraints.

Interaction and Interface

"Roughly speaking, **interaction** refers to an **abstract model** by which humans interact with the computing device for a given task, and an **interface** is a choice of **technical realization (hardware or software)** of such a given interaction model."

(Kim, 2015)

- **Interface enables interaction**

- **Interaction gives life to the interface**

About this course:

Main objectives you should attain:

- understanding of what is the Human-Computer Interaction field

- understanding the importance of the User Interface (**UI**), usability and User eXperience (**UX**) of an interactive system;

- knowledge of the fundamental concepts, methods and techniques involved in **Human-Centered Design** for the:
    - design
    - implementation
    - evaluation of Interactive Computer Systems

Course information

- Web
  - https://sweet.ua.pt/bss/courses/HCI/HCI-home.htm
  - More materials in moodle.ua.pt

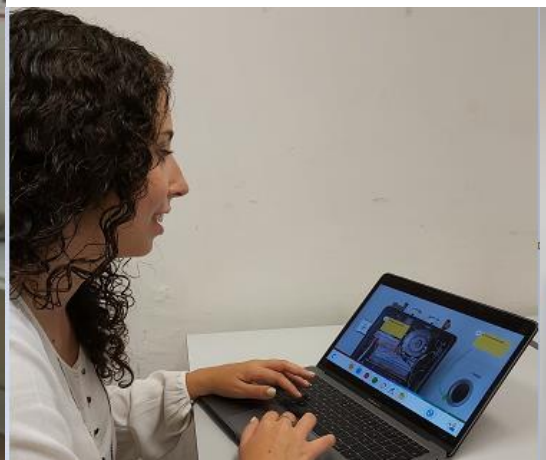
- Team:
  - Beatriz Sousa Santos
    - bss@ua.pt
  - Paulo Dias - Coordinator
    - paulo.dias@ua.pt

Lectures and Lab classes

Lectures - fundamental concepts; methods to support practical assignments
paper presentation and discussion

Lab classes – design, implementation and evaluation of User Interfaces (UIs)
and interactive systems

- participation in user studies (if possible …)



You will have the opportunity to:

Learn the fundamentals of this pivotal field

Attend the presentation of cutting edge research

Test and use new interaction and display equipment

Develop for various platforms

And participate in user studies

Attending lectures and lab classes

- Attending lectures will help you in several ways,

  addressed topics are to be applied in the practical assignments!

- Attending lab classes is mandatory, will be registered formally and you cannot pass if you do not have the minimum required

- Working students must contact paulo.dias@ua.pt during the two first weeks of the semester

Topics per lecture (subject to minor changes)

1- feb/12 - Introduction to the course and to the Human Centered development cycle

2- feb/19 - User Interface (UI), Usability and UX principles and paradigms

3- feb/26 - The user: the Human Information Processing System (HIPS)

4- mar/5 - From the user to UIs: mental models and conceptual models

5- mar/12 - Human-Centered Design

6- mar/19 - Models for UI design (user models, task analysis)

7- mar/26 - Interaction styles: menus and direct manipulation

8- apr/16 - Other Interaction styles

9- apr/23 - Screen layout. Color models and color usage

10- may/7 - Evaluation methods (more detailed study)

11- may/14 - Input and output devices

12- may/21 - 3D user interfaces/extended reality

13- may/28 - Paper presentations

+ paper presentations after March 5

Lectures:

Thursday 9-11 am

Lab classes:

Monday 1-3 pm
3-5 pm

Dia	9	10	11	12	13	14	15	16	17
Segunda					P1 (*) (04.2.17)		P2 (*) (04.2.17)		
Terça									
Quarta									
Quinta	TP1 (*) (04.1.02)								
Sexta									
Sábado									

OT sessions:
Thursday – 7pm
Via registration in Moodle
until Thursday 2pm

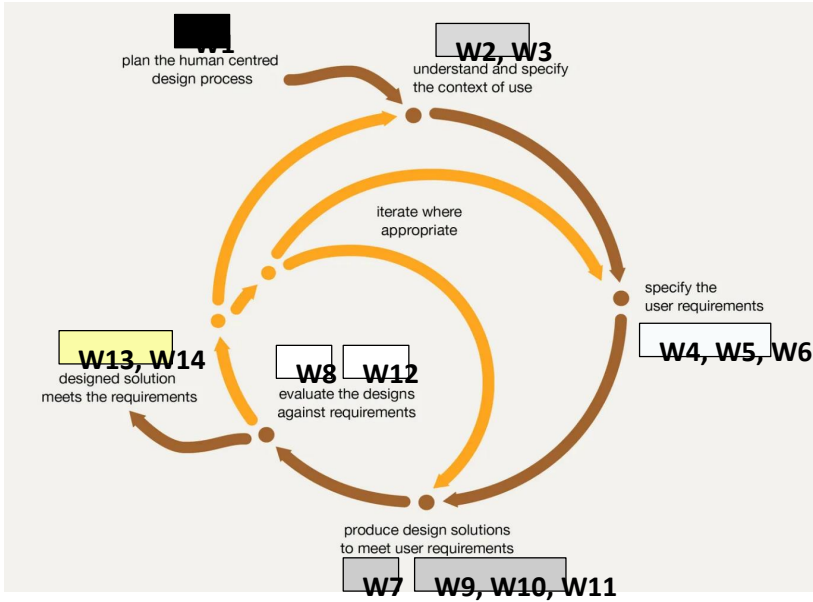
Lab classes (subjected to minor changes)

- Introduction to the Lab classes

- **Develop a prototype of an interactive system (3 students)**

- **Human-Centered** approach to design and develop interactive systems: requirements analysis; prototyping and evaluation; prototyping and evaluation

- Stage 0: Problem identification and planning
- Stage 1: Context definition
- Stage 2: Requirement definition and discussion
- Stage 3: Solution design
- Stage 4: Evaluation and analysis
- Stage 5: Solution design
- Stage 6: Evaluation
- Stage 7: Solution refinement, reporting
- Stage 8: Delivery



Assessment

Final grade -> Exam (45%) + paper presentation (10%) +

practical assignment (45%)

Minimum mark in each component (TP / P) – 7.5/20

- paper from a conference -> 15 min presentation (groups of 2 students)

- assignment n. 2: design, implementation and test of a interactive prototype following **User Centered Design** -> presentation, demo, discussion (groups of 3 students)

Exams: multiple choice + True/false + open questions (possibly)

Bibliography

- Sharp, H., Preece, J., and Rogers, Y., *Interaction Design- beyond Human-Computer Interaction*, 6th ed., Wiley, 2023 https://learning.oreilly.com/library/view/interaction-design-6th/9781119901099/cover.xhtml

- Shneidermen, B., *Designing the User Interface, Strategies for Effective Human-Computer Interaction*, 6th ed., Addison Wesley, 2016

- Soegaard, M. and, Rikke Friis, D.(eds.). *The Encyclopedia of Human-Computer Interaction*, 2nd Ed. Aarhus, Denmark: The Interaction Design Foundation. https://www.interaction-design.org/encyclopedia/interaction_design.html

- Daniel Gonçalves, Manuel J. Fonseca, Pedro Campos, *Introdução ao Design de Interfaces*, FCA, 2017

- Online playlist with other books: https://learning.oreilly.com/playlists/33cfa275-b19d-4919-9959-a2e52e1bece7/

Moodle Walkthrough

Course materials

All course materials are available in the following two folders

- Plan of TP classes
- Lecture Classes
- Plan of practical classe
- Lab Classes

Paper Presentation

- Vote on a paper presentation
- Paper selection and presentation guidelines
- List of selected presentation dates and papers - TP1
- Form to indicate a paper to present - TP1

Paper presentation assignment (groups of two students)

- Thursday 2-4 pm - 20 paper presentations
- Starting on February 26th

Submission of paper presentation slides

Please submit the presentation slides using the following file name format:

TPX_nmec1+nmec2_presentation date; e.g.:

TP1_120000+120001_March_1.pdf

Paper Presentation

Vote on a paper presentation

Selecting a paper:

This year you may read and present papers from one of these major conferences

HRI-2025
Human Robot Interaction

https://humanrobotinteraction.org/2025/
https://dl.acm.org/doi/proceedings/10.5555/3721488

https://mobilehci.acm.org/2025/
https://dl.acm.org/doi/proceedings/10.1145/3737821

https://ieeevr.org/2025/
https://ieeexplore.ieee.org/xpl/conhome/10937339/proceeding

Selecting a paper:

Or from one of these smaller conferences

17th International ACM Conference on
Automotive User Interfaces
September 22-25, 2025 | Brisbane *Meanjin*, Australia

https://www.auto-ui.org/25/authors/
https://dl.acm.org/doi/proceedings/10.1145/3744333

MUM 2025

24th International Conference
on Mobile and Ubiquitous Multimedia
December 1st — 4th
Enna, Italy

https://mum-conf.org/2025/
https://dl.acm.org/doi/proceedings/10.1145/3771882

https://sui.acm.org/2025/
https://dl.acm.org/doi/proceedings/10.1145/3694907

- Volunteers to present a paper in two weeks?

Note that:

- Volunteers have absolute priority in selecting the paper

- And will have this assignment done (10% of final mark) soon in the semester !

Until March 7th

Each group of two students should:

- select paper (with >=7 pages) from the conference proceedings

- indicate the preferred paper via a form available in Moodle

and then:

- read the paper presentation guidelines (available at the course web page)

- prepare a 15 min presentation (~15 slides)

- submit the slides via Moodle

Submission of paper presentation slides

Please submit the presentation slides using the following file name format:

TP1_120000+120001_March_1.pdf

“ the HCI discipline investigates and tackles all issues related to the design and implementation of the interface between humans and computers. “

Some possible Present and Future trends:

3D User Interfaces

Conversational user interfaces

Gesture interfaces

Human-robot interfaces

Tangible User Interfaces

Empathic computing

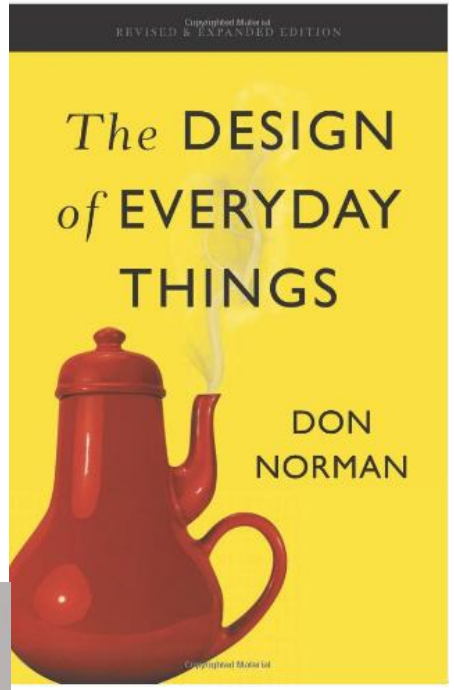
Brain-computer interfaces

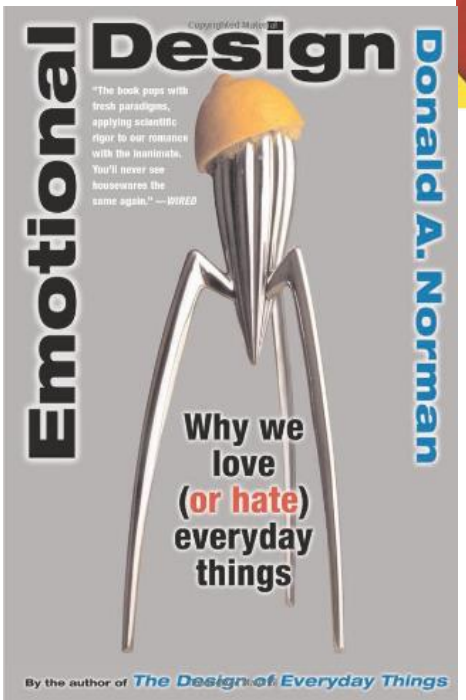
...

Interesting books

- Donald Norman, The design of everyday things, Basic Books, Revised Edition, 2013

- Donald Norman, Emotional Design: Why We Love (or Hate) Everyday Things, Basic Books, 2010





- Next week:
  - Select the presentation dates you prefer
  - And the papers you prefer via the form available in Moodle
  - Think about interactive systems/applications to evaluate

Good luck with your work
in this course and enjoy it!

Acknowledgements:

Prof. Samuel Silva,
All colleagues and students who
contributed in any way