

INFO2222

Lecture 1 – Introduction to Usability

Sue Inn Chng

Including in parts prior materials developed by:

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- Joshua Burridge



https://padlet.com/sueinn/INFO2222_L1

Acknowledgement of Country

I would like to acknowledge and pay respect to the traditional owners of the land on which we meet: the Gadigal people of the Eora Nation. It is upon their ancestral lands that the University of Sydney is built.

As we share our own knowledge, teaching, learning and research practices within this university may we also pay respect to the knowledge embedded forever within the Aboriginal Custodianship of Country.

Today's Coverage

Course mechanics

- The team
- Assessments
- Unit Outline
- Emergencies

What is Usability?

- Definition of usability
- Focus of the Unit

Why focus on user/task?

- Three Perspectives – user, designer, system
- Benefits of human-centred design
- PACT Framework

The Team

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Assessments

- Mini Assignments (10%)
 - Usability: Reflective Assignments (5%)
 - Security: Mini Assignments (5%)
- Group Project (40%)
 - Assignment 1 (20%) – Usability
 - Assignment 2 (10%) – Security
 - Assignment 3 (10%) – Security
- Final Exam (50%)

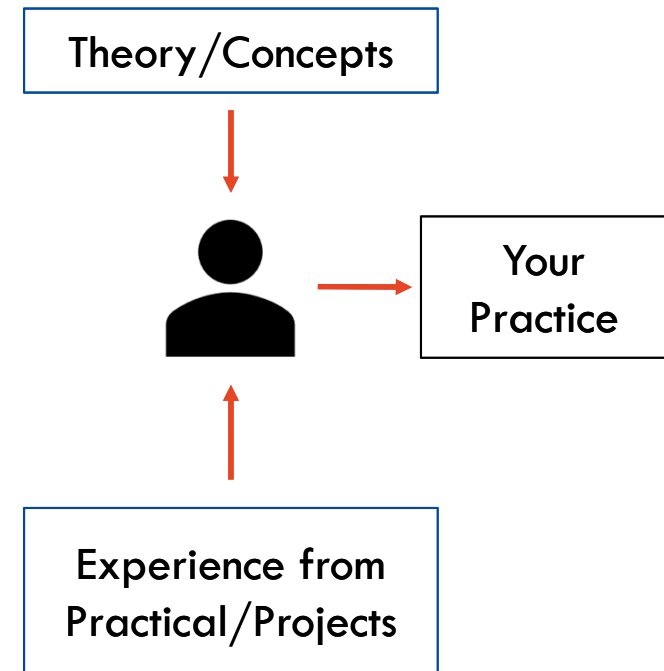
Assessment – Reflective Assignments (5%)

Why reflective essay and not report?

- Need more than a description of what you did.
- Reflection is important during design.

What do I need to do?

- Keep a logbook to note down your observation and thoughts.
- Start your work early.



<http://edshare.soton.ac.uk/12264/1/FY-RTSW3ResourceReportsAndEssaysVSReflection.pdf>
<https://emedia.rmit.edu.au/learninglab/content/writing-academic-reflection-0>

What should I write in my logbook?

- Events that have happened – what did you do/hear/see?
- Personal comments on your own work
- Photos/sketches
- Research notes
- Extracts from lectures/tutorials/books/journals

Assessment Policies

- Late Submission
 - Major: 5% per day late, 0% result after 10 days
- Academic Dishonesty
 - Includes all forms of copying without citation and resubmission of prior work without permission.
 - Has severe consequences
 - Simply not worth it. If you are struggling with assessment, say something!
- Simple Extensions (1-2 working days)
 - Request directly from lecturers
 - Requires a good reason
- Special Consideration (all other lengths)
 - Request from the Special Consideration Portal in MyUni
 - Require documentation
 - Strict time limits apply – do not delay!
 - Contact lecturers at the time you make your request

The Unit Outline

- <https://sydney.edu.au/units/INFO2222/2020-S1C-ND-CC>
- Learning Outcomes (why should I care?)
- Semester Schedule Plan

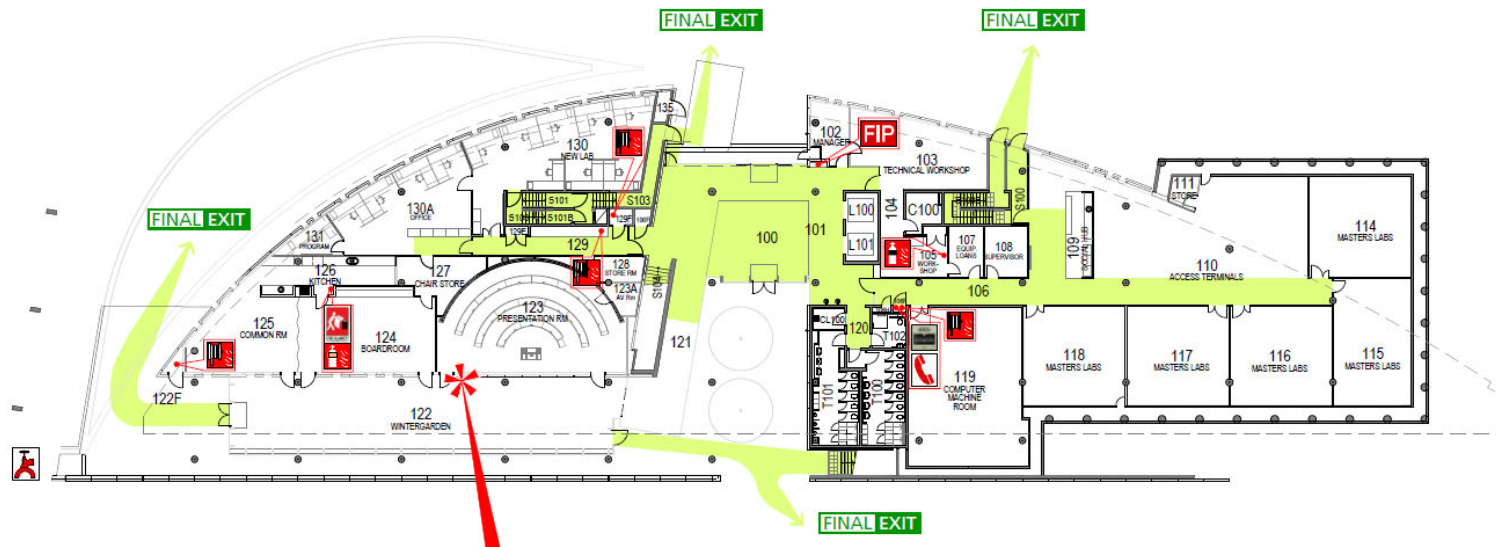
Coronavirus (COVID-19)

- **All staff and students who have cold or flu symptoms should isolate themselves from others**
- If you have a non-infectious condition such as asthma or hayfever please let your teacher and classmates know
- If you are otherwise unwell with cold or flu symptoms please excuse yourself from this class and **we will support you to continue the work remotely**
- Make sure you read the information on **special consideration in the unit outline.**

Emergencies

www.sydney.edu.au/whs/emergency

WHERE IS YOUR CLOSEST SAFE EXIT ?



School of Computer Science Safety Contacts

CHIEF WARDEN

Greg Ryan
Level 1W 103
9351 4360
0411 406 322



FIRST AID OFFICERS



Julia Ashworth
Level 2E Reception
9351 3423



Will Calleja
Level 1W 103
9036 9706
0422 001 964



Katie Yang
Level 2E 237
9351 4918

**REPORT all
INCIDENTS
& HAZARDS
to your SUPERVISOR**

OR TO

Greg Ryan
School of Computer Science Safety Officer
Level 1W 103
9351 4360
greg.ryan@sydney.edu.au

Do you have a disability?

You may not think of yourself as having a 'disability' but the definition under the **Disability Discrimination Act (1992)** is broad and includes temporary or chronic medical conditions, physical or sensory disabilities, psychological conditions and learning disabilities.

The types of disabilities we see include:

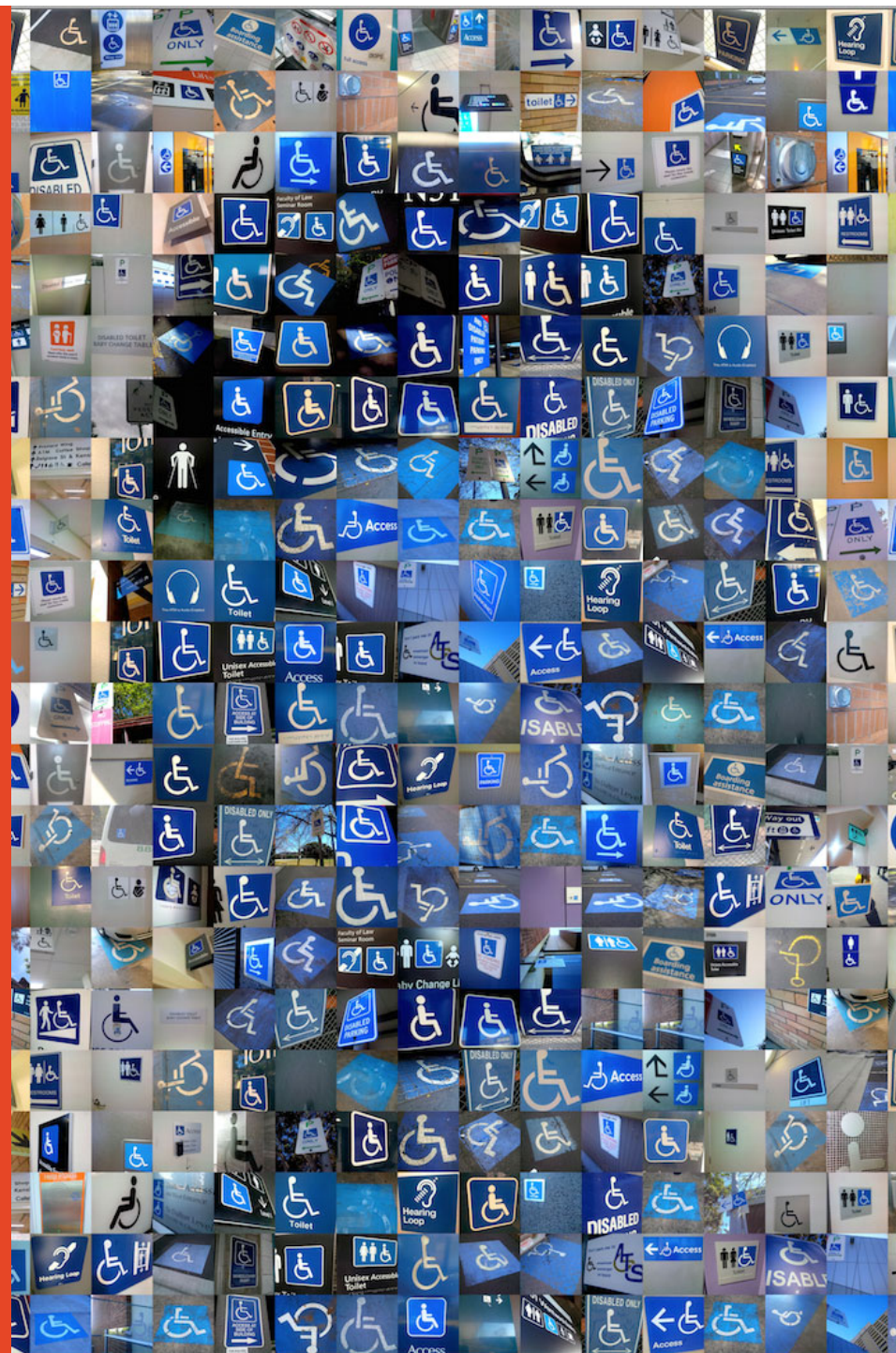
Anxiety // Arthritis // Asthma // Autism // ADHD
Bipolar disorder // Broken bones // Cancer
Cerebral palsy // Chronic fatigue syndrome
Crohn's disease // Cystic fibrosis // Depression
Diabetes // Dyslexia // Epilepsy // Hearing
impairment // Learning disability // Mobility
impairment // Multiple sclerosis // Post-traumatic
stress // Schizophrenia // Vision impairment
and much more.

Students needing assistance must register with Disability Services. It is advisable to do this as early as possible. Please contact us or review our website to find out more.



THE UNIVERSITY OF
SYDNEY

Disability Services Office
sydney.edu.au/disability
02-8627-8422



Today's Coverage

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What is Usability?

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Why focus on user/task?

- Three Perspectives – user, designer, system
- Benefits of human-centred design
- PACT Framework

Learning Outcomes

- Define the term usability.
- Explain why usability is important.
- Explain the relationship between conceptual/mental model and how it affects usability.
- Describe the components in PACT framework.

Activity – Can my software be used?

Think about ONE programming project/assignment that you have done in the previous semester. Ask yourself the following questions:

1. What is the purpose of the program that you have developed?
2. Who will primarily use it?
3. Did it do what it is supposed to do?
4. Have you tested it with your answer from Question 2 to determine your answer for Question 3?

Case Study: Therac-25

The Therac-25,
a radiation therapy
machine used to treat
certain types of cancer



Image credit: hownot2code.com

- Described as the worst medical equipment accident in modern history
- Gave fatal overdoses of radiation to 6 people
- Root cause was improper reliance on copied software which led to improper settings in the machine
- The usability of this equipment was also to blame

Case Study: Therac-25

- The Therac-25 had 64 error states, all of which were displayed as “MALFUNCTION 1” – “MALFUNCTION 64”
- The user manual did not explain these codes
- The user manual did not indicate these codes could place patient health at risk
- Operators became ‘trained’ to simply reset and continue using the equipment – “turn it off and turn it on again”
- The last line of defence against patient harm was rendered ineffective
- For more information on this case:
<http://sunnyday.mit.edu/papers/therac.pdf>

Usability Context – What Went Wrong?

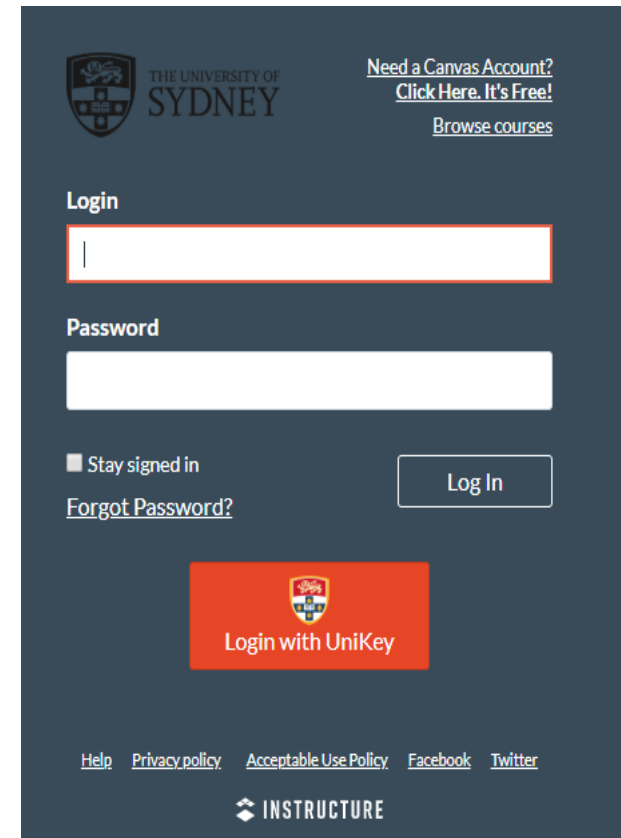
- One perspective: The operators should not have simply reset the machine without working out what the problem was. This was “**human error**”
- Other perspectives:
 - The machine should have been more descriptive
 - The user manual should have had more information
 - The machine should have blocked the restart operation

Usability Context – What Went Wrong?

- The usability perspective: *“There is no such thing as human error – only designs that fail to take into account the unavoidable fact that humans make errors”*
- We know people make mistakes – even experts
 - F1 racers crash
 - Cricket players drop easy catches
 - You sometimes click ‘don’t save’ when you meant to click ‘save’
- Good interface designs don’t ignore this fact

Interactive Systems in Daily Life

- Computing and communication devices are embedded in all sorts of everyday devices such as washing machines and televisions, ticket machines and jewelry.
- There are websites, on-line communities, cellphone applications and all manner of other interactive devices and services that needs developing.
- Designing interactive systems is concerned with developing high quality interactive systems, products and services that fit with people and their ways of living.



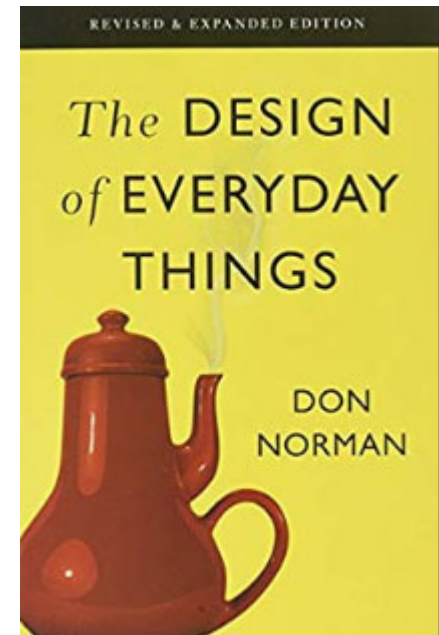
The screenshot shows the login interface for The University of Sydney. At the top left is the university's crest and name. To the right, there are links for 'Need a Canvas Account? Click Here. It's Free!' and 'Browse courses'. The main login section has a 'Login' label above a text input field, followed by a 'Password' label above another text input field. Below the password field are a 'Stay signed in' checkbox and a 'Log In' button. A 'Forgot Password?' link is also present. A prominent red button labeled 'Login with UniKey' is centered below the login fields. At the bottom, there are links for 'Help', 'Privacy policy', 'Acceptable Use Policy', 'Facebook', and 'Twitter', along with the 'INSTRUCTURE' logo.

Activity – Would you use...[X] now?

1. Select ONE interactive system.
2. Use it now!

GOAL - the starting point of use

- Don Norman (Norman, 1988) focuses on the interface between a person and the technology and on the difficulty of people having to translate their goals into the specific actions required by a user interface.
- All actions begin with a goal and these actions are repeated until the goal is achieved.
- Must think about the purpose of design (intended use) before you design something BUT...



What is Usability?

1. ISO9241 definition of usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
2. “Usability is a quality attribute that assesses how easy user interfaces are to use.” – Nielsen & Norman

T. I. S. Organisation, “Ergonomic Requirements for Office Work with Visual Display Terminals, ISO 9241-11,” 1998.

Usability Components

- **Learnability**: On first use, how easy is it for users to successfully do core tasks?
- **Memorability**: How easy to do this when returning from a break?
- **Efficiency**: Once users have moved beyond the learning stage – how quickly can they do tasks?
- **Errors**: How many errors do users make, how easily they recover, and, if not, how severe are the consequences?
- **Satisfaction**: How pleasant is it to use the design?



What should I do to design for high usability?

- A. Do my best to achieve high usability by fulfilling LMEES.
- B. Copy from existing (rival) products. What can go wrong?
- C. Use a human-centred approach to design

What is Human-Centred Design approach?

- **Early focus on users and tasks.** Designers must first understand who the users will be and study the expected work to be accomplish.
- **Empirical measurements.** Intended users should use simulations or prototypes to carry-out real work and their performance and reactions should be observed, recorded and analysed.
- **Iterative design.** Cycle of design, test and measure and redesign needs to be repeated as often as possible.

Gould, J. D., & Lewis, C. (1985). Designing for usability: key principles and what designers think. *Communications of the ACM*, 28(3), 300-311.

What you need to know?

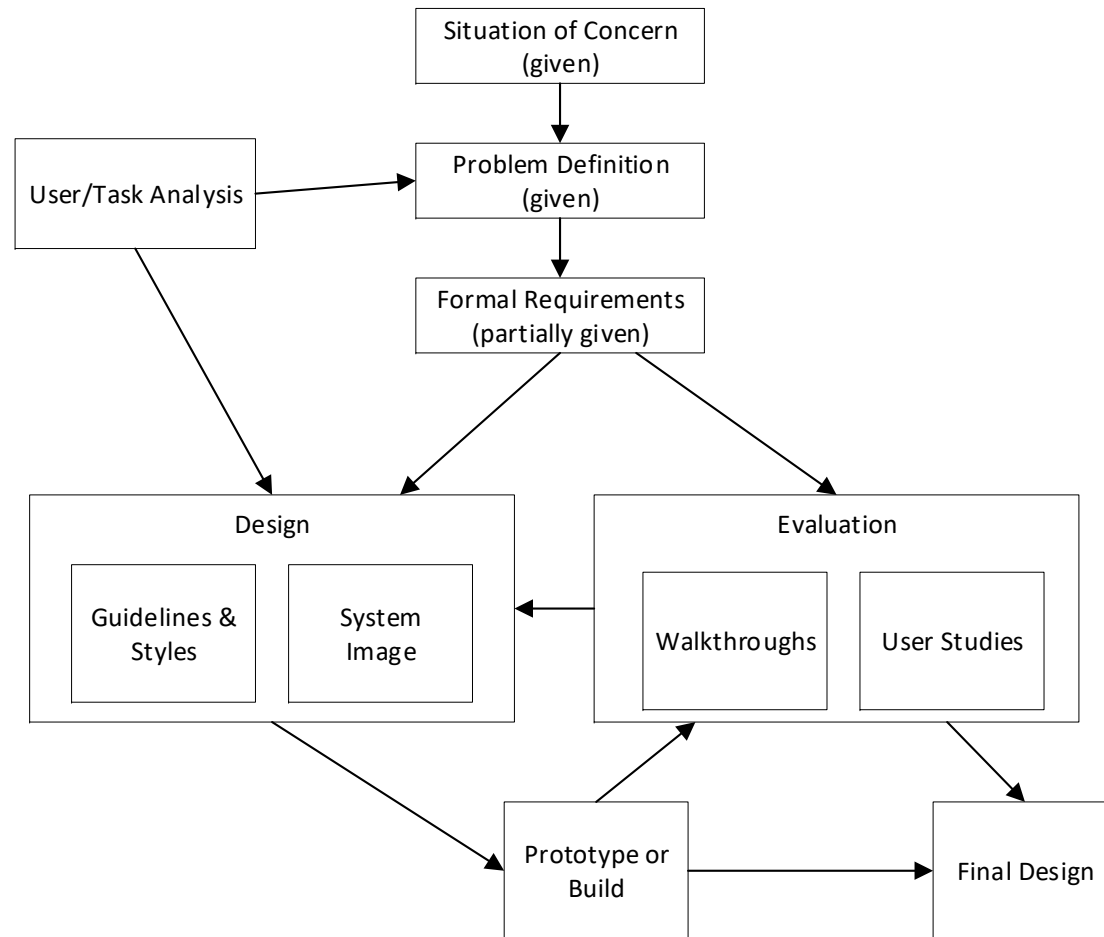
1. **Data Gathering/Elicitation techniques.** Techniques for you to collect information from the user themselves.
2. **Data Analysis, Interpretation and Presentation.** Translation of raw data into information and presenting them to your audience.
3. **Design and prototyping.** Tools that you can use to present your ideas to different audiences throughout the process.
4. **Evaluation techniques.** Techniques to determine if you are on the right path during design.
5. **Integrating with existing software development practice.**
What should I do when...

Unit Coverage

1. **Data Gathering/Elicitation techniques.** Think Aloud.
2. **Data Analysis, Interpretation and Presentation.** Basic qualitative/qualitative analysis and personas/scenarios.
3. **Design and prototyping.** Wireframes and web-development.
4. **Evaluation techniques.** Cognitive walkthrough and guerrilla usability test.
5. **Integrating with existing software development practice.** Experience from project.

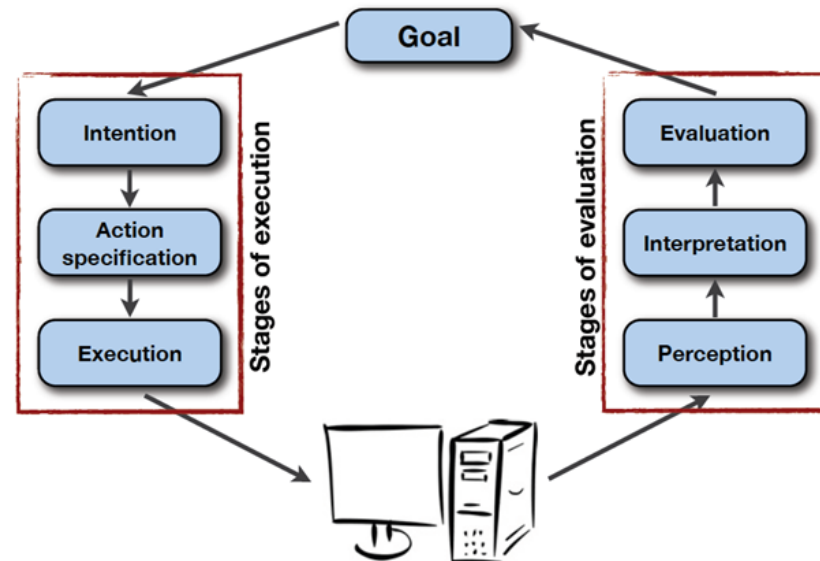
TBC: More to be covered in INFO3315

Unit Coverage



Why focus on user/task?

- Remember all actions begin with a goal
- Good designs allows users to easily translate their intention into actions.
- How do we do this?



Mental models

- **Craik (1943):** Mind constructs a small scale model of reality and uses this to reason, to underlie explanations and to anticipate events
- Hartson (2018): A mental model is a description, understanding or explanation of someone's thought process about how something works.
 - Knowledge is sometimes described as a mental model:
 - How to use the system (what to do next)
 - What to do with unfamiliar systems or unexpected situations (how the system works)
- People make inferences using mental models of how to carry out tasks

Hartson, R., & Pyla, P. S. (2018). *The UX Book: Agile UX Design for a Quality User Experience*. Morgan Kaufmann.

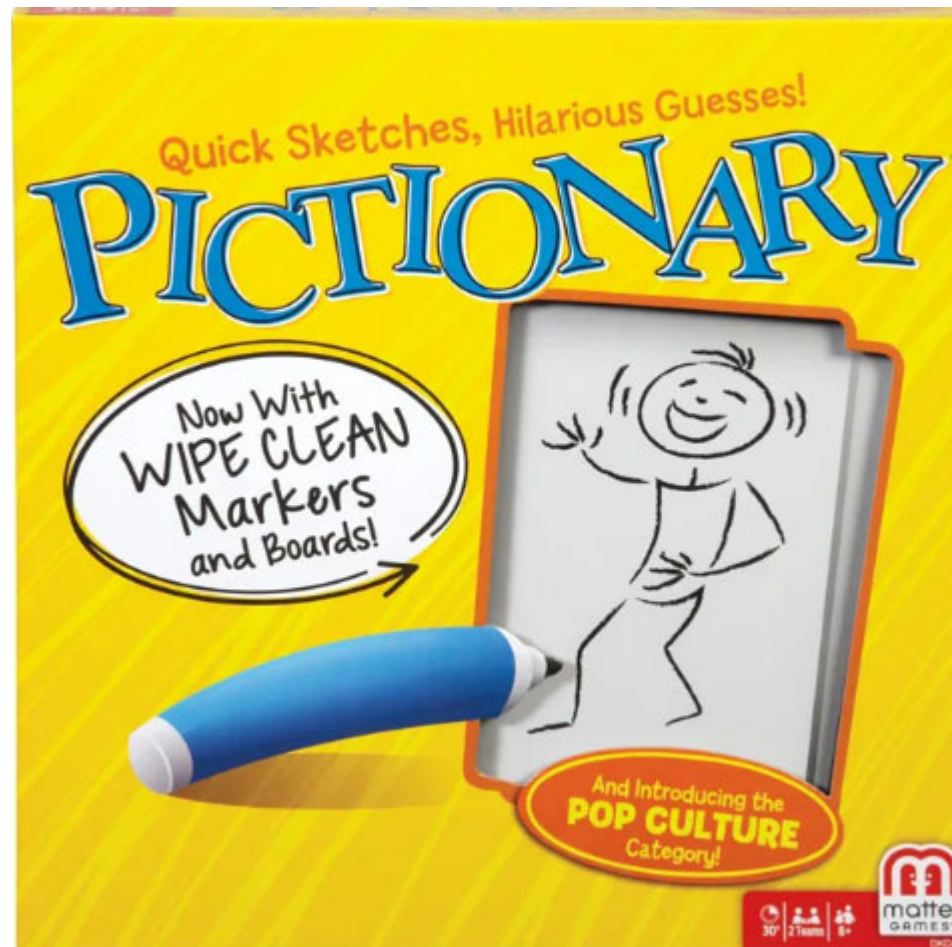
Conceptual Model

- A conceptual model is:
 - “...a high-level description of how a system is organized and operates” (Johnson and Henderson, 2002, p26)
- Enables
 - “...designers to straighten out their thinking before they start laying out their widgets”
(Johnson and Henderson, 2002, p28)

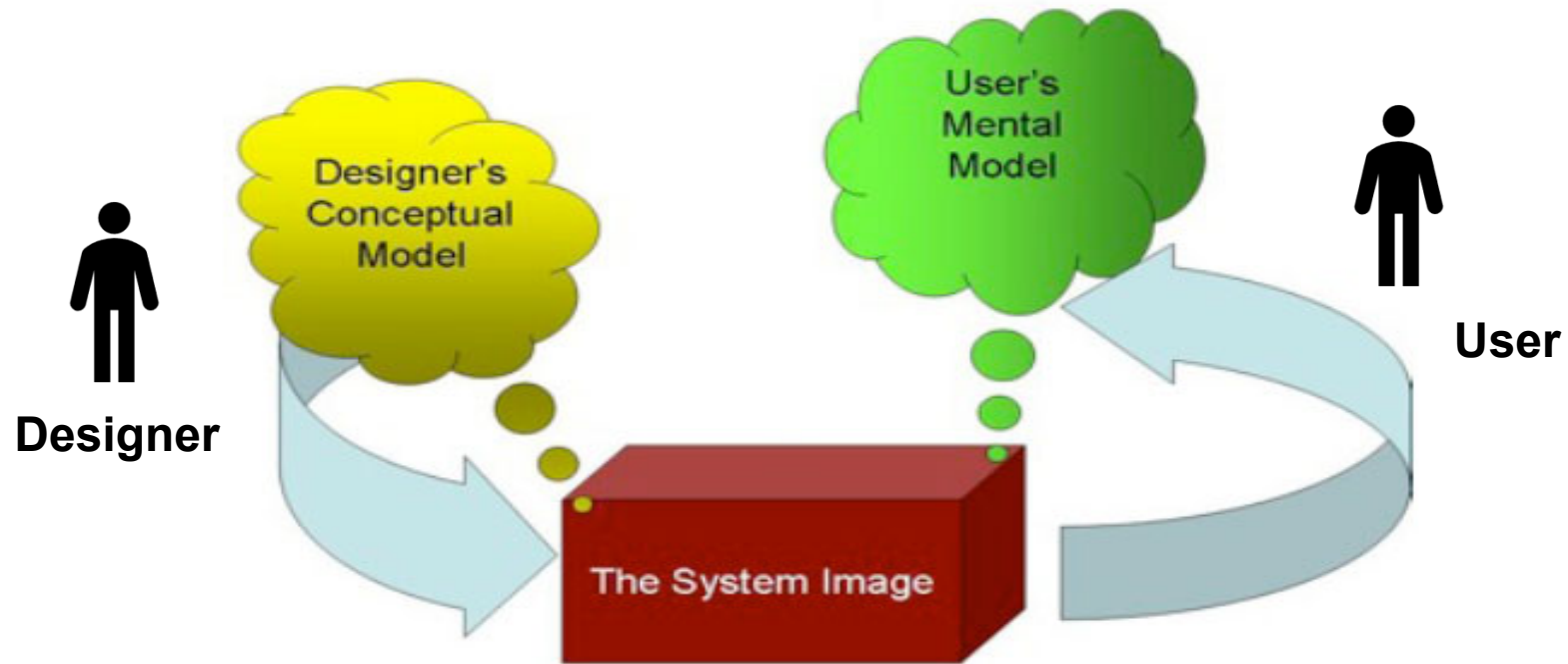
- A conceptual model is “the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”
(Preece, Rogers & Sharp, 2002, Interaction Design, Wiley, p 40)

A Game of Pictionary

<https://www.youtube.com/watch?v=C8IMW0MODFs>

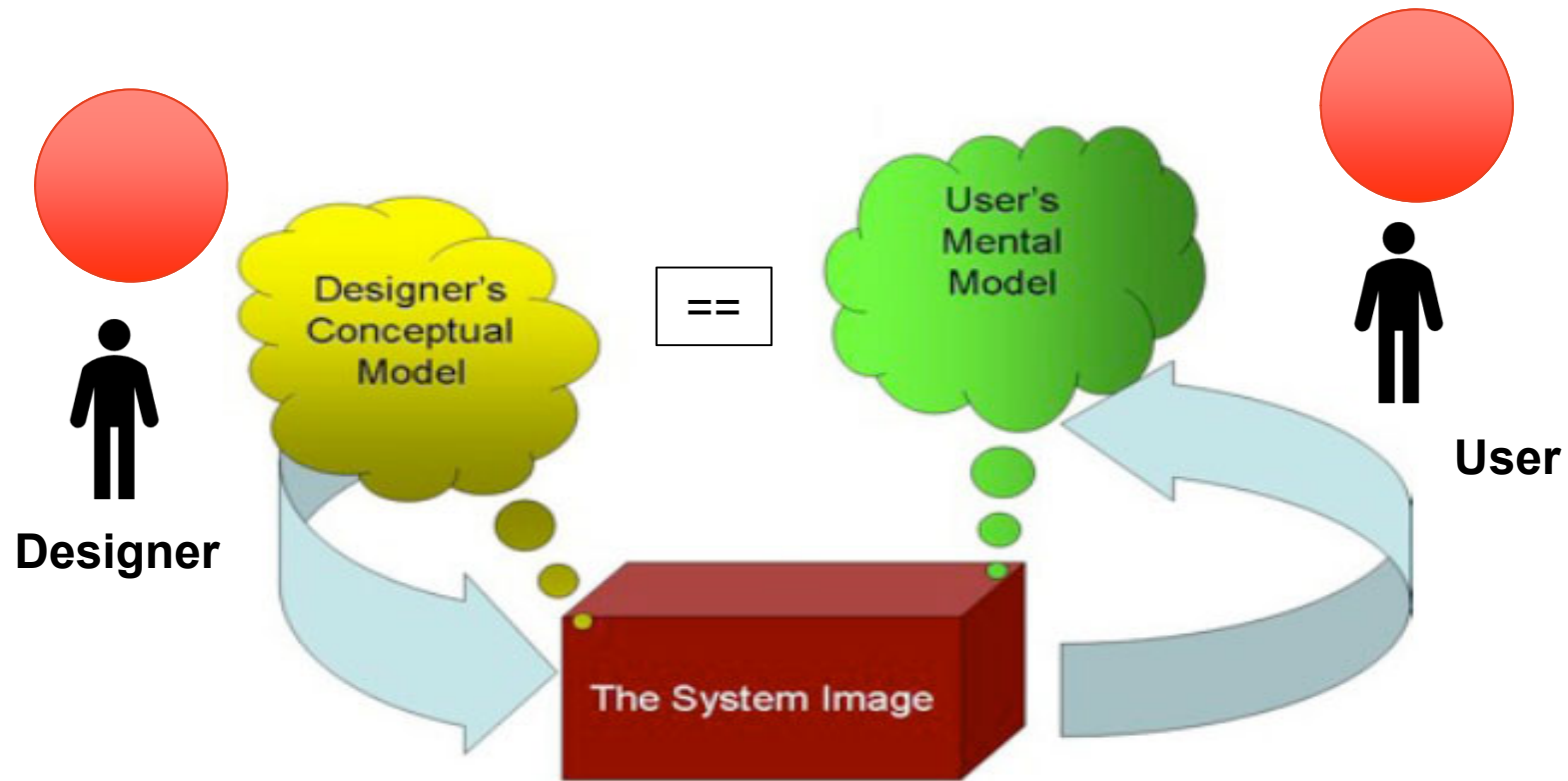


Designer – User – System Relationship



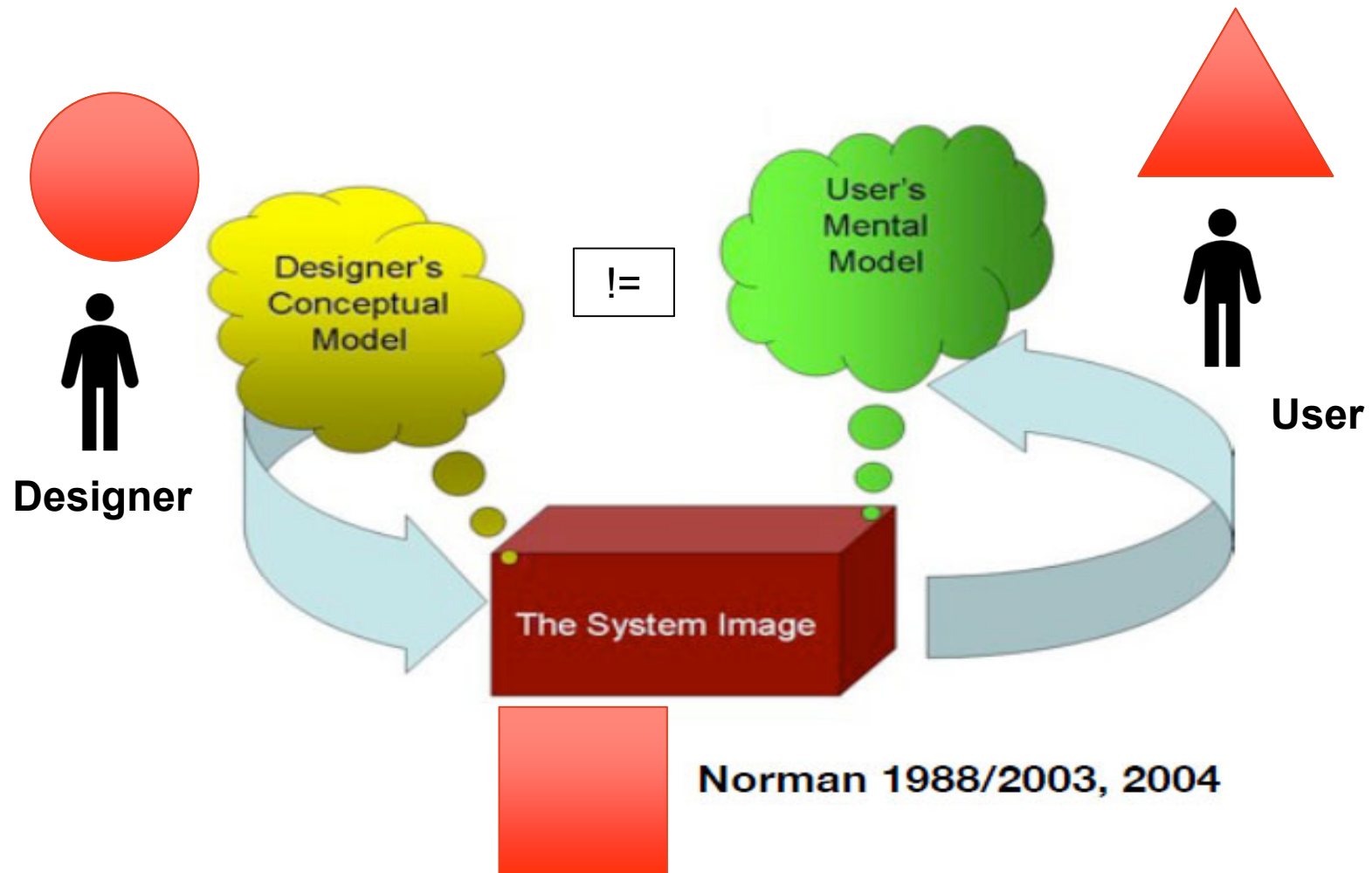
Norman 1988/2003, 2004

Ideal Situation



Norman 1988/2003, 2004

Reality



Benefits of Human-Centred Design

Being human-centred in design is expensive and time-consuming
BUT:

- Results in reduced calls to customer help lines, fewer training materials, increased throughput, increased sales and so on.
- Increase productivity
- Involving people closely in the design of their systems will help to ensure acceptability.
- Allow people to trust systems and make decisions about privacy and how they will be represented virtually.
- Ethical and legal requirements that must be met through design (more in Lecture 2).

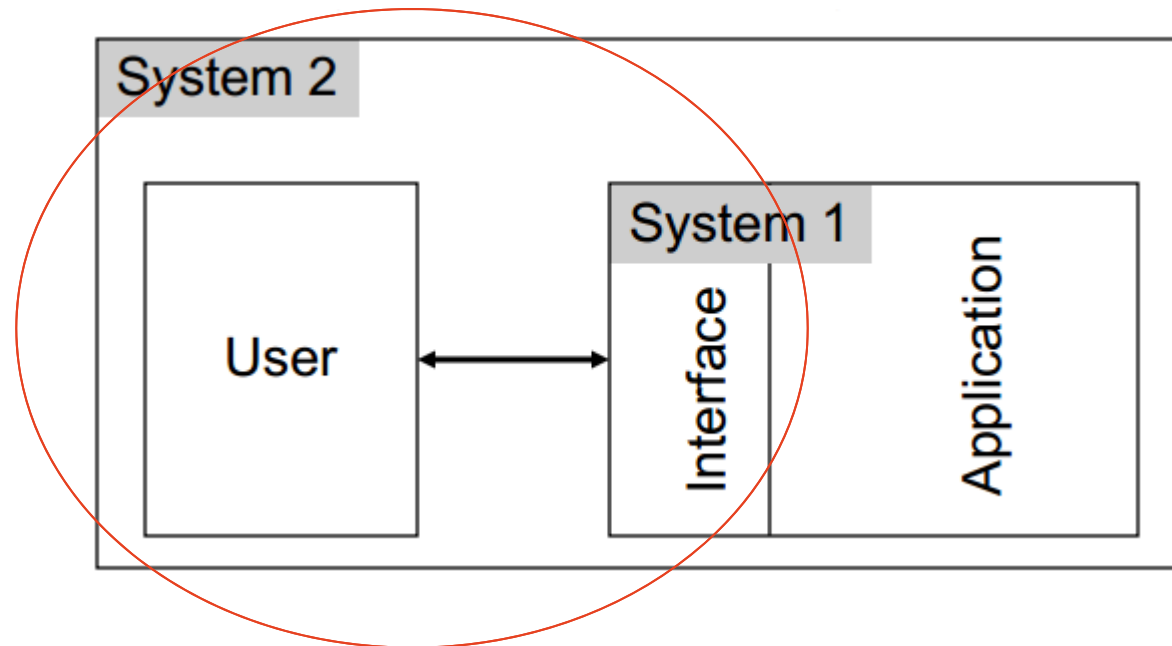
Activity – Thinking about design

Task: Design a trip planner to be integrated with the local government website

The screenshot displays the NSW Transport Trip Planner web application. The header includes the NSW Government and Transport logos, a navigation menu with 'Home', 'Plan' (selected), 'Tickets and Opal', 'Travel info', and 'Help and contact', and a search icon. The main interface is divided into two sections: 'Trip Planner' and 'Departures'. The 'Trip Planner' section features a 'From' input field with a location pin icon, a 'To' input field with a location pin icon, and a vertical double-headed arrow between them. Below these fields are a 'Leaving now' dropdown menu, a filter icon, and a 'Refine' button. A message states 'No previous trips' and 'Run a trip plan search above to view previous trips here'. The 'Departures' section is currently empty. The right side of the interface shows a map of Sydney with various suburbs labeled, including East Ryde, Lane Cove, Gladesville, Hunters Hill, Breakfast Point, Henley, Woolwich, Birchgrove, Strathfield, Belfield, Earlowood, Roselands, Pagewood, Eastwood, Clontarf, Mosman, Manly, Sydney Harbour National Park, Watsons Bay, Vaucluse, Point Piper, North Bondi, Bondi Beach, and South Coogee. Map controls like zoom in (+), zoom out (-), and a 'Map options' button are visible. The footer of the map area includes copyright information for Mapbox and OpenStreetMap, and a link to 'Improve this map'.

Thinking about the user

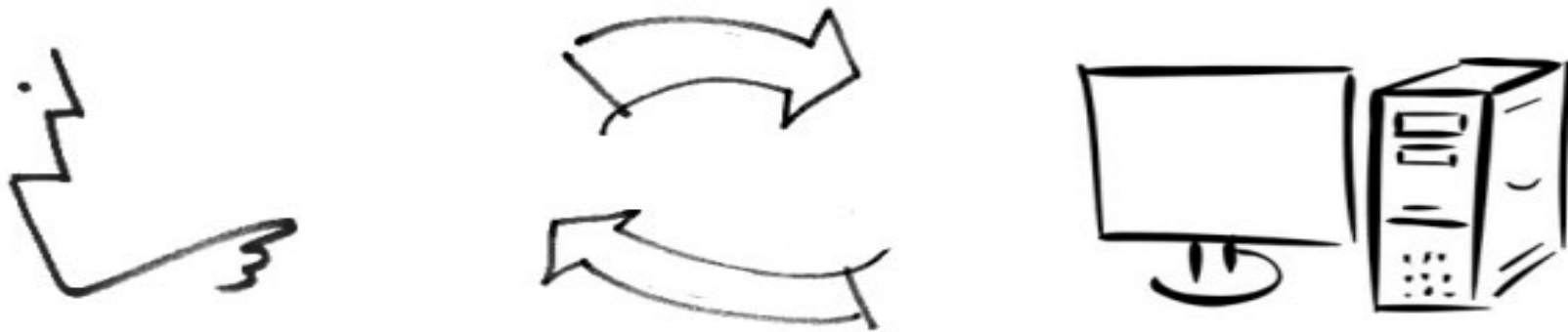
- Who are these people?
- Why do they do the task?
- Where do they do it?
- When do they do it?



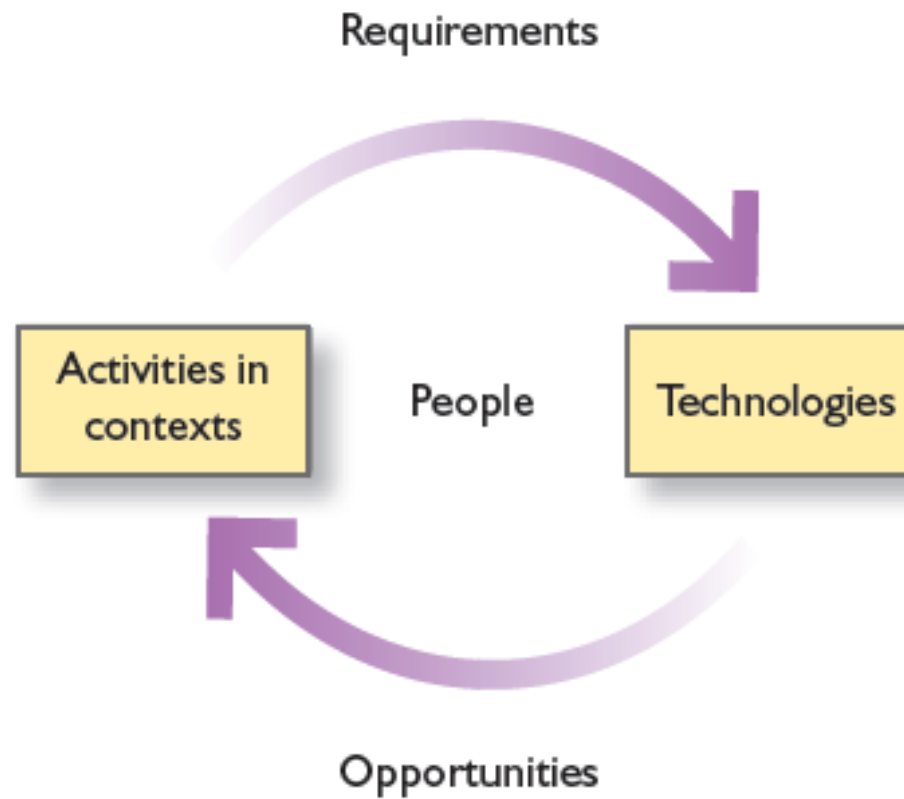
People – Activity – Context – Technology (PACT)

- People use technologies to undertake activities in contexts.
- For example, teenagers use mobile (cell) phones to send text messages to their friends whilst sitting on a bus.
- Secretaries use Microsoft Word to write documents in a firm of solicitors.
- Air traffic controllers work together to ensure the smooth operation of an airport.
- Technologies are there to support a wide range of people undertaking various activities in different contexts.
- If the technology is changed then the nature of the activities will also change.

PACT Framework

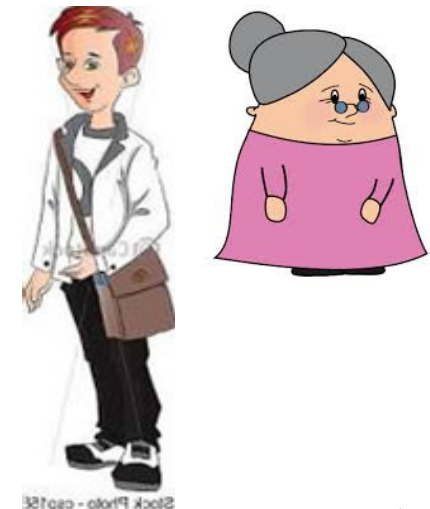


PACT Framework



People

- What are the **physical** aspects of people that need to be taken into account in the design?
- People have different abilities when it comes to attention and memory. How do you factor these into your design?
- Different goals and reasons for using systems.



Activities

- Can vary between simple to highly complex and lengthy task
- Start by focusing on the overall purpose of the activity.
- Flesh out the details of the activity from the following perspectives:
 - Temporal
 - Cooperation
 - Complexity
 - Safety-critical
 - Nature and content

Activity – Temporal

Ask yourself the following questions:

1. How regular or infrequent the activities are?
2. When do they perform these activities?
3. Single continuous set of actions? Interrupted actions?
4. Response time for the system?

Important Notes:

- Activities that are frequent should be easy to do while infrequent activities should be easy to remember
- If activities are an interrupted set of actions, design to allow users to ‘find their place’ again when they pick it up.

Activity – Cooperation & Complexity

1. Can the task be done alone?
2. How complicated is the activity? Does it follow defined steps or is it a vague activity?

Important Notes:

- Issues of awareness of others and communication and coordination is important for collaborative activities.
- Vague activities requires a different design compared to a well-defined activities.

Activity – Safety-Critical

1. Are people allowed to make mistakes?
2. What are the critical consequences of making a mistake?

Important Notes:

- To err is to be human but must consider the consequence of error
- Need to be careful when designing systems where safety is an issue i.e. errors put lives at risk.

Activity – Data and Content

1. What type of information is needed to complete the activity?
2. Does this data changes with time?
3. Where does it come from?

Context

- All activities happen in context. Must analyze both activity and context together.
- Context can be a difficult term.
- Three useful types of context are distinguishable:
 - Organization context: An organization rules and procedure affects the activity.
 - Social context: Social setting that the activity takes place.
 - Physical context: Physical circumstances under which the activity takes place.

ATM Example

Activity: Withdraw cash

Physical context:

- Surrounding location of ATM affects the use of it

Social context:

- Transaction time of each user affects other users
- Need to queue?

Organisation context:

- Impact of bank processes and its relationship with the customers

Technology

- This is always changing. Designers must keep up-to-date with latest technology trend.
- Many possibilities and ways of implementation but must consider: input, output, communication and content.
- Hardware considerations depends on type of input/output data. Example: alphanumeric inputs can be done through keyboards and numpads.
- Most systems don't standalone. Need to consider communication between devices (if it is required): wired, wireless, Bluetooth, NFC?
- Content can be presented in different ways but it affects communication.

Some Questions at this stage...

- How do conceptual models move from designers to the users?
- How do we observe these models and detect misalignments?
- How do we include this knowledge in our design processes?

Learning Outcomes

- Define the term usability.
- Explain why usability is important.
- Explain the relationship between conceptual/mental model and how it affects usability.

Recommended Reading

- **Usability 101: Introduction to Usability**

<https://www.nngroup.com/articles/usability-101-introduction-to-usability/>

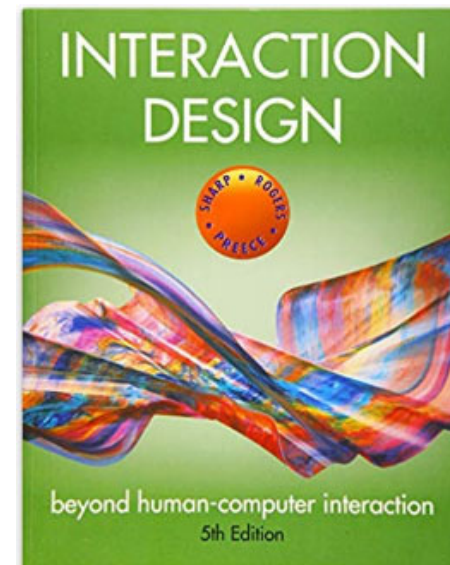
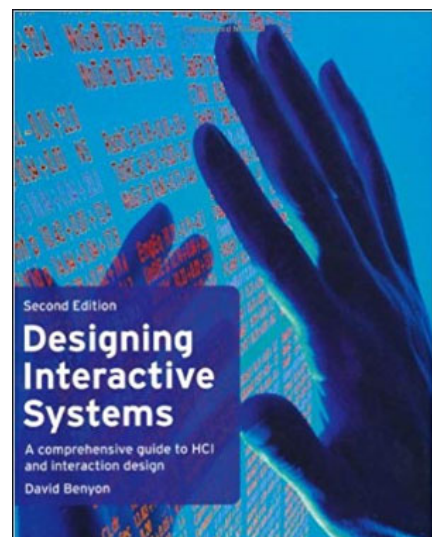
- Hartson, R., & Pyla, P. S. (2018). *The UX Book: Agile UX Design for a Quality User Experience*. Morgan Kaufmann. **Chapter 15.2**
- Benyon (2010). *Designing interactive systems: A comprehensive guide to HCI and interaction design*. Wiley. **Chapter 1&2.**

Reference Books - Usability

Hartson, R., & Pyla, P. S. (2018). *The UX Book (Second Edition)*. Morgan Kaufmann

Benyon, D. (2010). *Designing interactive systems: A comprehensive guide to HCI and interaction design*. Addison Wesley

Preece, J. (2019). *Interaction Design: beyond human-computer interaction*. Wiley



Tutorial Preparation - All about me and only me!

On a piece of A4 paper, write out the following about you:

- Legal Name/Nickname
- Country/city you grew up in
- Birthday month/Age
- Program of study/Year and semester
- Reason for studying your choice of degree
- Reason for choosing to study at USyd.
- Plans after graduation
- What do you enjoy the most about your program of study?
- Which particular unit did you enjoy the most and why?
- State ONE academic challenge that you face with your studies at USyd.
- List of interactive systems that you enjoy/dislike using as a student at USyd. Write short notes on why you enjoy/dislike using them. Min = 3. Max = unlimited.

Tutorial Preparation – Informal Evaluation

- For each item in your list**, evaluate whether they achieve each of the LMEES components.
- Does this affect your judgement whether you like/dislike to use the system?
- You might want to tabulate your results so that it is easier to present them to your group during tutorial.

System	L	M	E	E	S	Judgement
Canvas	/	/			/	Like
Usyd Library	/	/		/		Dislike
SydPay						