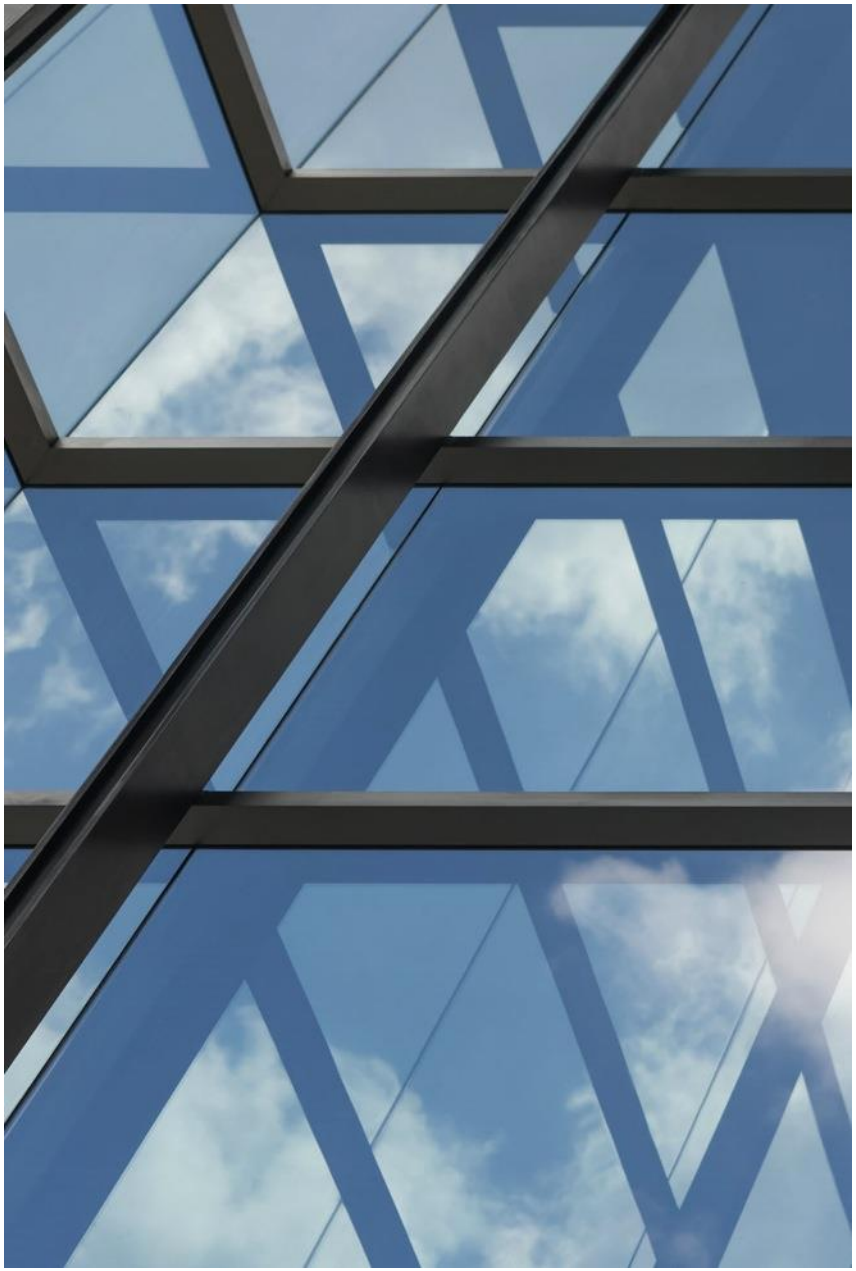
INFO3315 Human-Computer Interaction

Lecture 9 – Interfaces

Zhanna Sarsenbayeva



THE UNIVERSITY OF SYDNEY

Recap

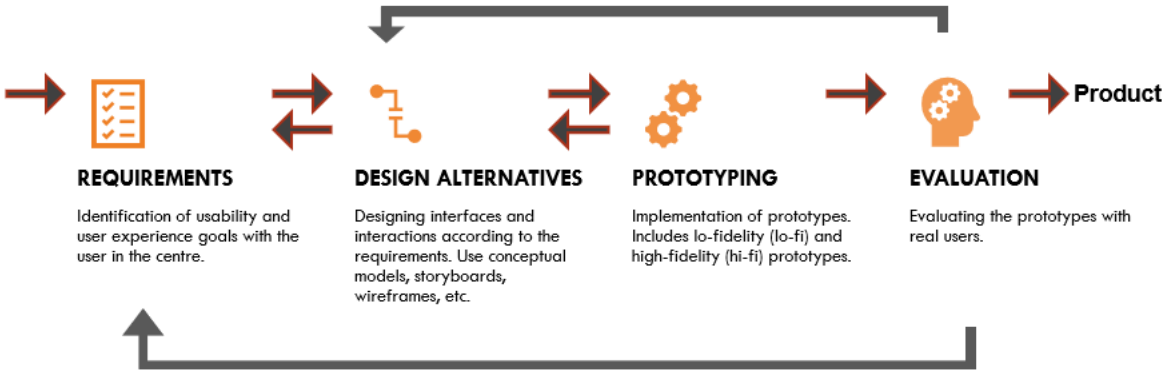
- Evaluation with users
- Usability testing
- Experimental designs
- Lab studies
- Field studies

Reminder – Upcoming assessments

- Project Part 2 demo – 25 Oct 2026
- Project Part 2 poster – 25 October 2026
- Project Part 2 final report – 08 Nov 2026
- All quizzes – 08 Nov 2026
- Final exam – Check your timetables!
  - We will have a revision lecture for Final exam

Final report and demo

- Organize the work the group have done for the project:
  - 1. List all the work that you have done since the start of the project, from Week 4 to now.
  - 2. Be honest with your own actions and results.
    - Actions: What did you do and why?
    - Results: How does this influence the group's subsequent action(s)?
  - 3. Match each action to activities of interaction design.



Demo

Project: Part 2 - Demonstration

Published | Assign To | Edit | ⋮

Each group is expected to have conducted a usability testing session using their prototype during Week 11 workshop. You must submit to this link, as a single submission, the materials that you used during the session:

- A single PDF file of your prototype and a link to their prototypes.
- A single PDF file of the task description, max THREE(3) tasks. These are the tasks that the participant will be trying to complete during the session. It must include the main task that the target user will perform to accomplish their goal of using your solution.
- A single PDF of your poster.

Submission notes

- Only the Project Manager of the group needs to upload the submission to Canvas.
- You can upload your submission to Canvas multiple times ahead of the due date.

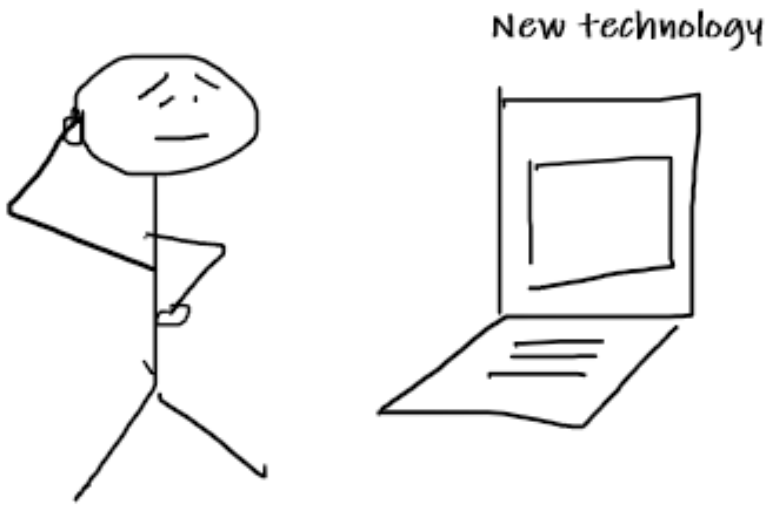
Interfaces



https://www.abc.net.au/news/science/2022-01-16/future-smart-automated-homes-and-connected-devices/100750266

Recall: conceptual design

- Interface metaphors: help users understand the interface
- Interaction type: what the user is doing when interacting with the system
- Interface type: interface used by the user to support the interaction e.g. command, menu-based, gesture, voice etc.



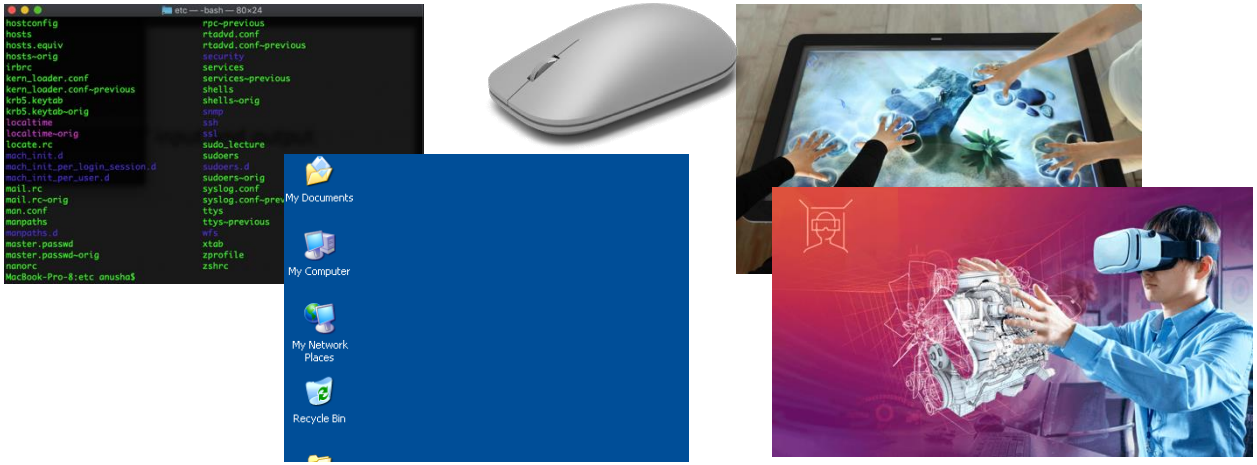
Why user interface is important?





Interface types

- There are many different types of input and output methods available
- Given
  - different environments
  - People
  - Places
  - and activities



We must select the appropriate interface type

Command-Line Interfaces (CLI)

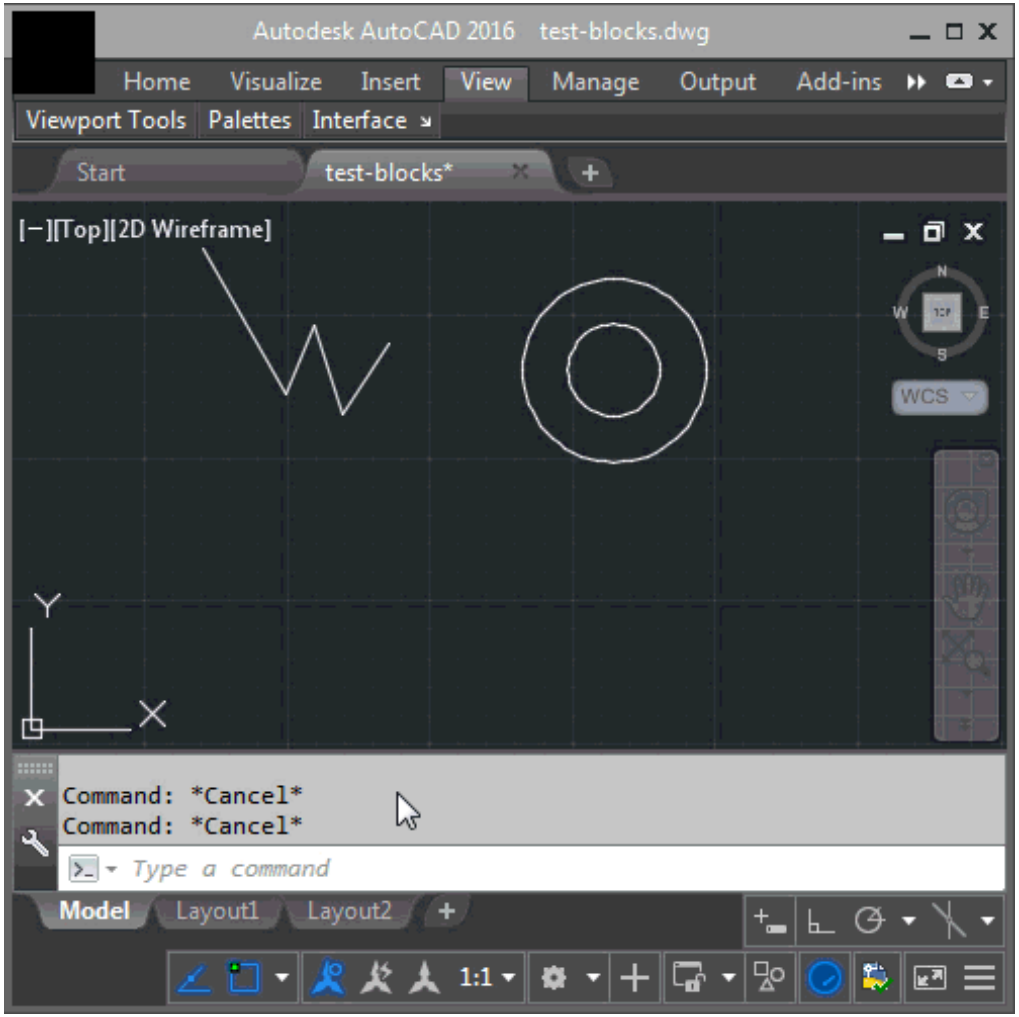
- Uses a text displays
  - Interactive
  - Input through keyboard
  - Display / print information
- Great for configurations
  - E.g. Batch processing
  - Need expertise



https://www.inexhibit.com/case-studies/computer-design-commodore-pet-2001-1977/

CLI in modern applications

- Autodesk AutoCAD
  - Precise input



CLI – advantages

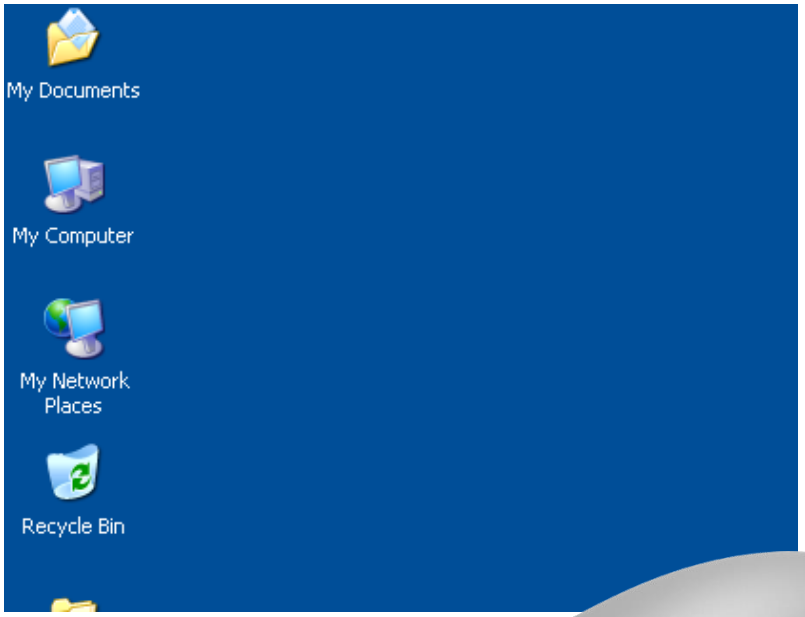
- Granular control of an OS or application
- More efficient management of a large number of systems
- Ability to store scripts to automate regular tasks
- Basic command-line interface knowledge can enable troubleshooting of network connection issues or resolving other system tasks
- The CLI is the preferred tool for many enterprise-wide systems management tasks

CLI – disadvantages

- Less user friendly
- Steeper learning curve associated with memorizing commands and complex syntax/arguments
- Different commands used in different shells

Graphical User Interfaces (GUI)

- WIMP
  - Windows
  - Icons
  - Menus
  - Pointing device
- Great for everyday tasks
  - Intuitive
    - No need expertise
  - Not the most efficient for some tasks



https://qwertytutorials.com/software_tutorials/windows_icons_1b.png



through-the-interface.typepad.com

GUI – advantages

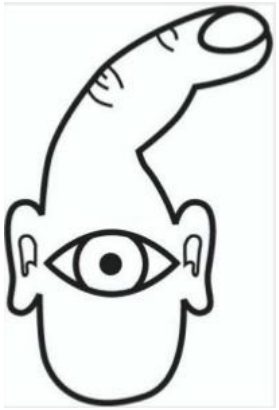
- More user friendly and intuitive - features leverage familiar metaphors, e.g., *drag-and-drop for transferring files*, and use familiar icons, e.g., *a trash bin for deleted files*
- Does not require expertise or training
- GUI applications are self descriptive, feedback is typically immediate, and visual cues encourage and steer discoverability.

GUI – disadvantages

- Does not have the same level of functionality and granular control as CLIs; hence, can require numerous clicks and movement through several dialog boxes in a GUI to accomplish the same result as a single command line.
- Does not readily support scripting or automations a command-line interface

From GUIs to Post-WIMP user interfaces

- Bill Buxton: **WIMP GUIs** … are the perfect interface only for creatures with a single eye, one or more single-jointed fingers and no other sensory organs
- WIMP reduces interaction to the visual channel



Dan O'Sullivan and Tom Igoe. 2004. Physical Computing: Sensing and Controlling the Physical World with Computers. Course Technology Press, Boston, MA, United States.

Post-WIMP user interfaces

- Interfaces "containing at least one interaction technique, not dependent on classical 2D widgets such as menus and icons" – Andries van Dam, 1997
- https://doi.org/10.1145/253671.253708

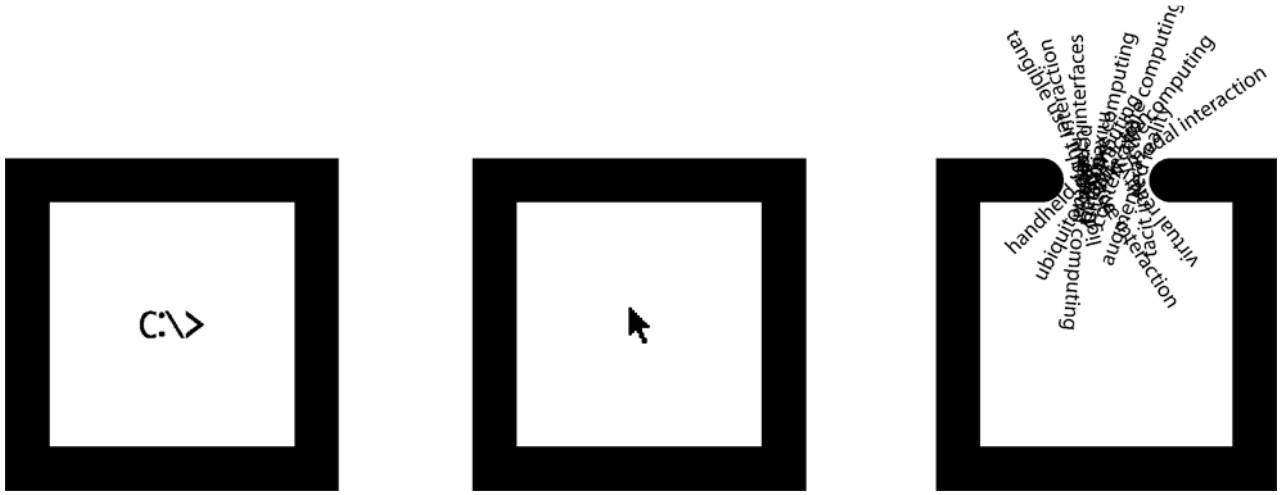
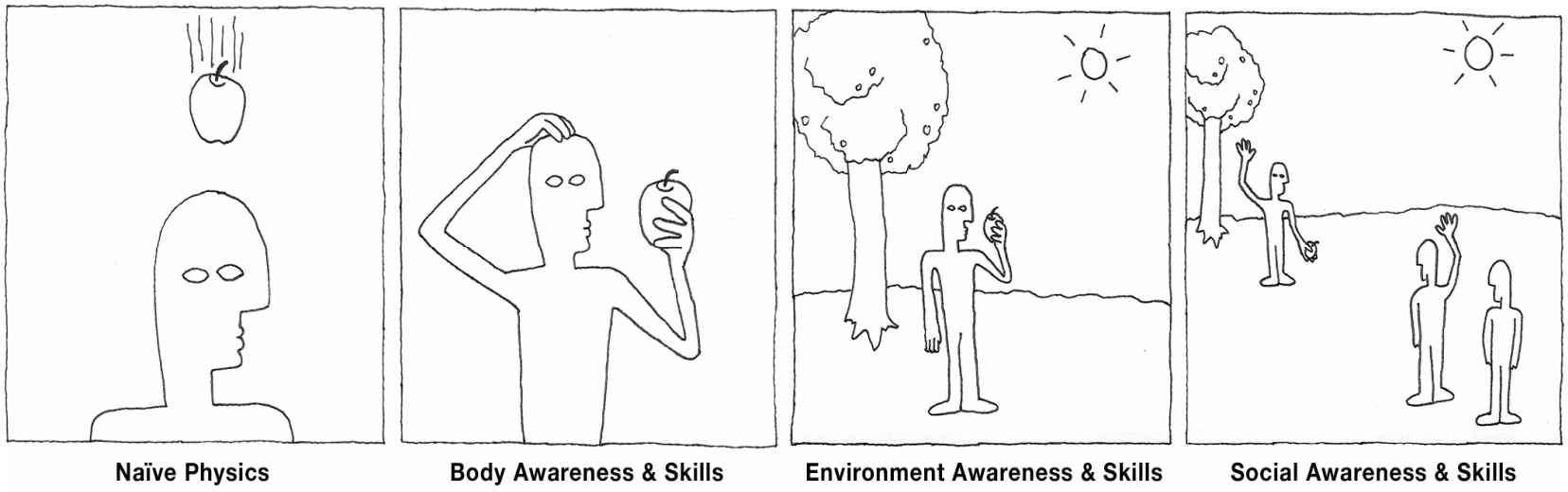


Figure 1. Generations of interaction: command line, direct manipulation, and diverse emerging interaction styles [26].

Robert J.K. Jacob, Audrey Girouard, Leanne M. Hirshfield, Michael S. Horn, Orit Shaer, Erin Treacy Solovey, and Jamie Zigelbaum. 2008. Reality-based interaction: a framework for post-WIMP interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08). ACM, New York, NY, USA, 201-210. DOI: https://doi.org/10.1145/1357054.1357089

Aspects of Post-WIMP interfaces



Robert J.K. Jacob, Audrey Girouard, Leanne M. Hirshfield, Michael S. Horn, Orit Shaer, Erin Treacy Solovey, and Jamie Zigelbaum. 2008. Reality-based interaction: a framework for post-WIMP interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08). ACM, New York, NY, USA, 201-210. DOI: https://doi.org/10.1145/1357054.1357089

Aspects of Post-WIMP interfaces

- Naive physics
  - Illusion of a rubber surface when zooming into an image
- Body awareness and skills
  - Putting the iPhone next to the face, switches the display off
- Environmental awareness and skills
  - Spatial metaphor for browsing photos
- Social Awareness and Skills
  - Awareness of others and their actions, multitouch displays in shopping malls

Robert J.K. Jacob, Audrey Girouard, Leanne M. Hirshfield, Michael S. Horn, Orit Shaer, Erin Treacy Solovey, and Jamie Zigelbaum. 2008. Reality-based interaction: a framework for post-WIMP interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08). ACM, New York, NY, USA, 201-210. DOI: https://doi.org/10.1145/1357054.1357089

Post-WIMP user interfaces

- Mobile User Interfaces
- Speech-based User Interfaces
- Interactive Surfaces
- Tangible User Interfaces
- Virtual Reality
- Wearable Computing

Speech interfaces

- Conversation style
- Helps to create accessible interfaces (e.g., for visual impaired users)
- Hands-free interaction
- Good examples
  - Google
    - https://developers.google.com/assistant/smarthome/develop/create
  - Alexa
    - https://developer.amazon.com/en-GB/alexa/alexa-skills-kit

Interactive surfaces



Interactive surfaces

- Used in smart watches to smart walls
- Also used in artistic installations



Tangible interfaces

- Tangible objects are used to control AND represent digital information
- Intangible representation can help to synchronize digital information with the tangible representation
  - A video projection

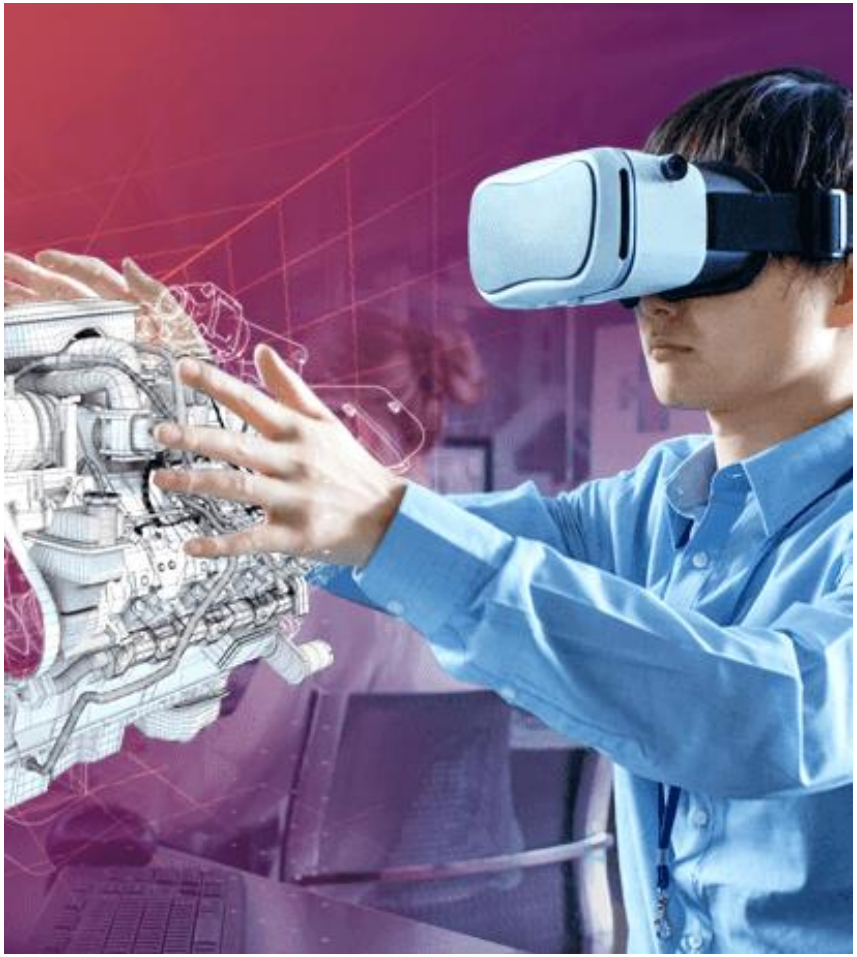
Tangible interfaces



https://www.youtube.com/watch?v=IvtfD_rJ2hE

Virtual reality

- Computer simulated environment
- Sensory experience is artificially created
- User can interact in this environment
- Multiple application areas
  - Telepresence, telemedicine, gaming, simulation



Wearable interfaces

- Operational while user is on the move
- Always-on
  - direct access & hands-free use Context awareness
- Various form factors
  - e.g., textile, glass, wrist-worn, interactive skin, ...
- Various interaction modalities
  - e.g., visual output, haptic output, touch input, gaze input, ...



www.toptal.com/designers/ui/the-psychology-of-wearables

Post-WIMP interfaces – advantages/ disadvantages

- Advantages:
- Easier to use and deliver superior user experiences
- Innovative – new interaction methods

- Disadvantages:
- Might be device-specific

Brain Computer Interfaces (BCI)

- Brain-computer interfaces (BCI) provide a communication pathway between a person's brain waves and an external device, such as a cursor on a screen
- Person is trained to concentrate on the task, for example, moving the cursor
- BCIs work through detecting changes in the neural functioning in the brain

Brain Computer Interfaces (BCI)

- Brain control air shark:
  - Article (IEEE subscription): https://spectrum.ieee.org/geek-life/hands-on/openbci-control-an-air-shark-with-your-mind
  - Video: https://youtu.be/Qnr3YWWAZL0
- BCI WoW:
  - https://youtu.be/jXpjRwPQC5Q

Social Interfaces

How are you feeling today?



Early social interfaces

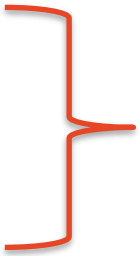
- The Whole Earth 'Lectronic Link, short for The WELL
- One of the oldest virtual communities
  - Best known for the forum
- Predates the world-wide-web



https://en.wikipedia.org/wiki/The_WELL

Early social interfaces

- Started by creating *computer-mediated experiences* between people
- Social experiences called community
- Generally consists of:
  - Message boards
  - Groups
  - List-servs
  - Virtual worlds



"Place-centric" gathering place

Being social

- Giving information to another person – news, changes in life, developments on project, events
- Social technologies developed to enable us to persist in being social when apart
  - They differ in how they support us
  - Some encourage social interactions (for example, family games with Alexa)
  - Others have a negative impact on everyday conversations (Turkle, 2015)
    - Preference to text instead of talk
    - Children are less likely to talk since adults don't talk

Decline of F2F conversations…





Source:
Left: https://sites.psu.edu/siowfa16/2016/09/13/the-effects-texting-has-on-communication/
Right: Preece, J.,Rogers, Y.,&Sharp, H.(2019). Interaction design: beyond human-computer interaction(Fifth edition.).Wiley. The University of SydneyPage5Right: Preece, J., Rogers, Y., & Sharp, H. (2019). Interaction design : beyond human-computer interaction (Fifth edition.). Wiley.

Questions

- Do the same conventions, norms and rules established in f2f interactions apply to social computing tools?
- Have new conversational mechanisms evolved for various kinds of social media?
  - Do people take turns talking during online video call?
  - How do you choose which technology or app to use?

F2F conversations

- Various mechanisms and 'rules' are followed when holding a conversation face to face.
- Sacks et al. (1978) conversation analysis of conversations propose three basic rules:
  - Rule 1: The current speaker chooses the next speaker by asking an opinion, question, or request
  - Rule 2: Another person decides to start speaking
  - Rule 3: The current speaker continues talking
- Cues to indicate:
  - Length of conversation – "I have three things to say…"
  - Interrupt conversation – Gesturing, "Excuse Me"
  - End of conversation – Body orientation (moving away/closer), raising voice to indicate question

F2F conversations

- People don't necessarily abide by rules all the time
  - Interrupt each other
  - Talk over the other person
  - Listener not take up cue to answer question
  - Misinterpretation of conversation
- Breakdowns in conversation must be detected before it can be repaired.
- Speaker and listener must pay attention to what the other says to detect breakdowns and repair conversation.

Remote conversations

- Early inventions – telegraph and telephones
- Many applications to make it happen now:
  - Emails
  - Video conferencing
  - Instant messaging
  - Chats
- How to support conversations when people are ‘at a distance’ from each other?

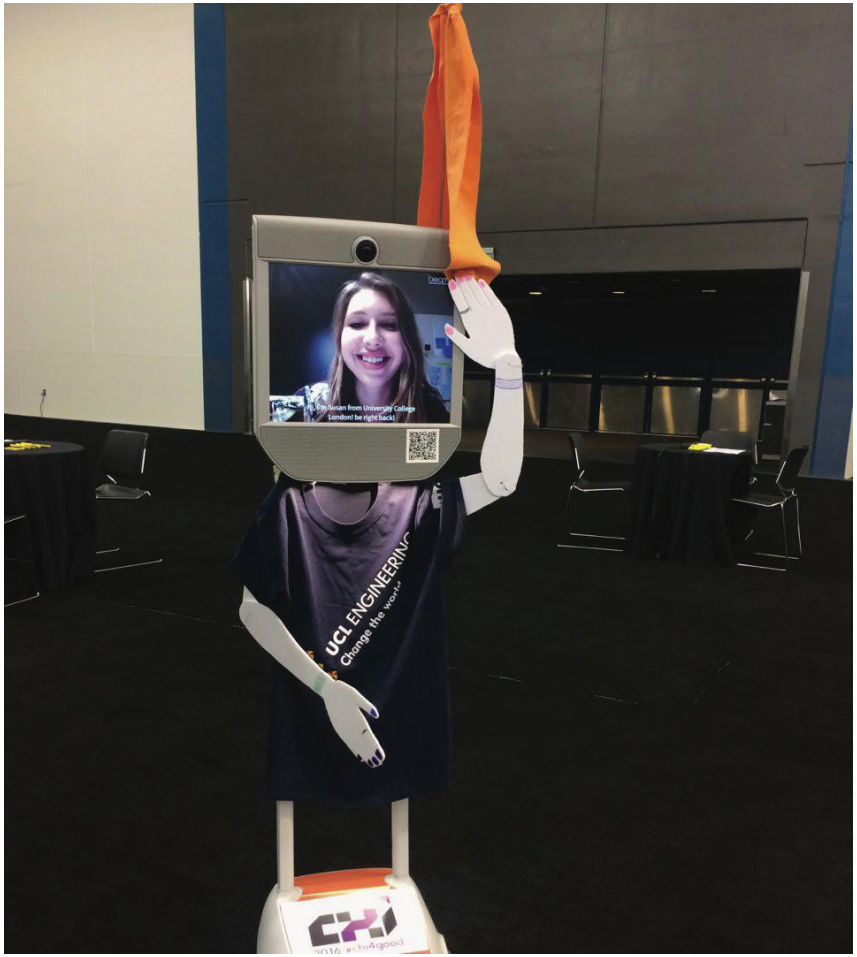
Remote conversations

- Lack of non-verbal cues
  - Early solution: video phone call
  - Current solution: Video calls
- Multiple people conversation:
  - Enlarging person who is currently speaking
  - Eye-tracking and directional microphones to project body movement and expressions to other location.



Remote conversations

- Lack of presence in location of conversation
  - Telepresence robots – enable people to attend by controlling their robot remotely
  - Social presence – degree of awareness, feeing and reaction to other people who are virtually present in the online environment.



Co-presence

- Technology that supports people in their activities when interacting in the same physical space.
- Many technologies have been designed to:
  - Enable groups to work, learn and socialize more effectively together
  - For example, tabletops, whiteboards, and public displays
- Understanding f2f interactions:
  - Coordination mechanism
  - Awareness mechanism

Coordination mechanisms

- When a group of people act or interact together, they need to coordinate themselves

- To do so, they use:
  - Verbal and non-verbal communication
  - Schedules, rules, and conventions
  - Shared external representations

Coordination mechanisms

- F2F Coordination
  - Talk is central
  - Non-verbal also used to emphasize and as a substitute
    - Orchestra – arm and baton movement to coordinator musicians
    - Airport grounds – hand signal to land plane
  - Explicit structures to record events
    - Agenda – items to discuss
    - Minutes – discussion record
  - Shared external representation
    - Memos – reminders to do activity

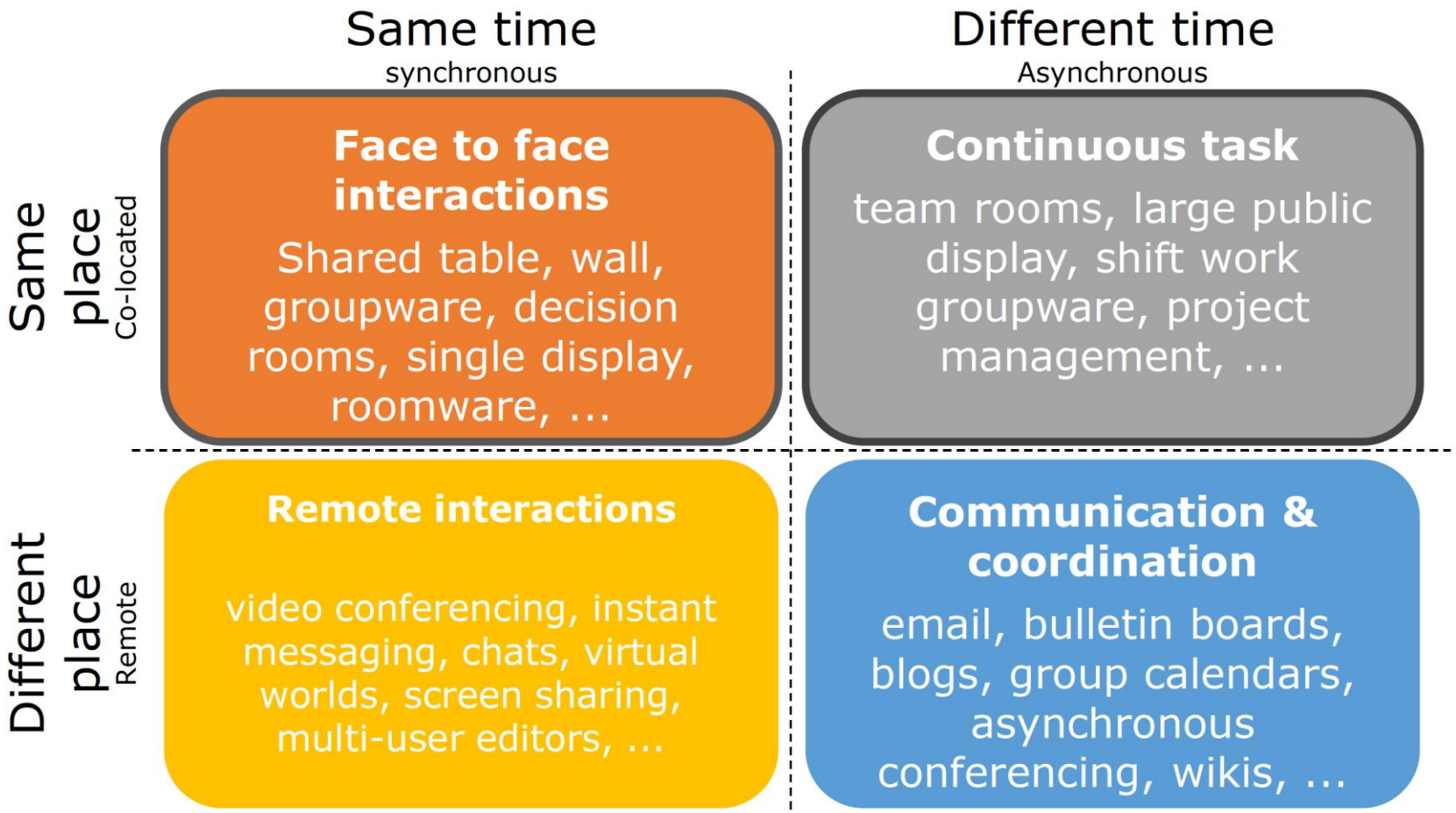
Awareness

- Involves knowing who is around, what is happening and who is talking with whom
  - Peripheral awareness
    - Keeping an eye on things happening in the periphery of vision
    - Overhearing and overseeing — allows tracking of what others are doing without explicit cues
  - Situational awareness
    - Being aware of what is happening around you in order to understand how information and your actions will affect ongoing and future events
      - For example, air traffic control or an operating theatre

Shareable interfaces

- Also known as groupware
- CSCW research – understand collaborative behaviour and design technology to support collaboration between users
- Classification of technology in time/space groupware matrix
  - Time – when the interaction takes place
  - Place – where the interaction takes place

Time/Space groupware matrix



Social engagement

- Refers to participation in activities of a social group
- Social exchange where people give or receive something from others
  - Voluntary, unpaid and often altruistic (in the sense of sharing and doing good for others)
- Websites often used as hub to connect people
- Retweeting is a powerful way of connecting millions of people…

Week 9 In-Class Quiz

- 5 min
- 4 questions

Summary

- Different interface types suit different applications
- CLIs, GUIs, Post-WIMP user interfaces
- Social interaction is central to our everyday lives
- Social mechanisms, like turn-taking, enable us to collaborate and coordinate our activities
- Keeping aware of what others are doing and letting others know what you are doing are important aspects of collaborative working and socializing
- Many technology systems have been built to support telepresence, social presence, and co-presence
- Social media has brought about significant changes in how people keep in touch and manage their social lives

Required reading

- Preece, J., Rogers, Y., & Sharp, H. (2019). Interaction design: beyond human-computer interaction (Fifth edition.). Wiley. Chapter 5