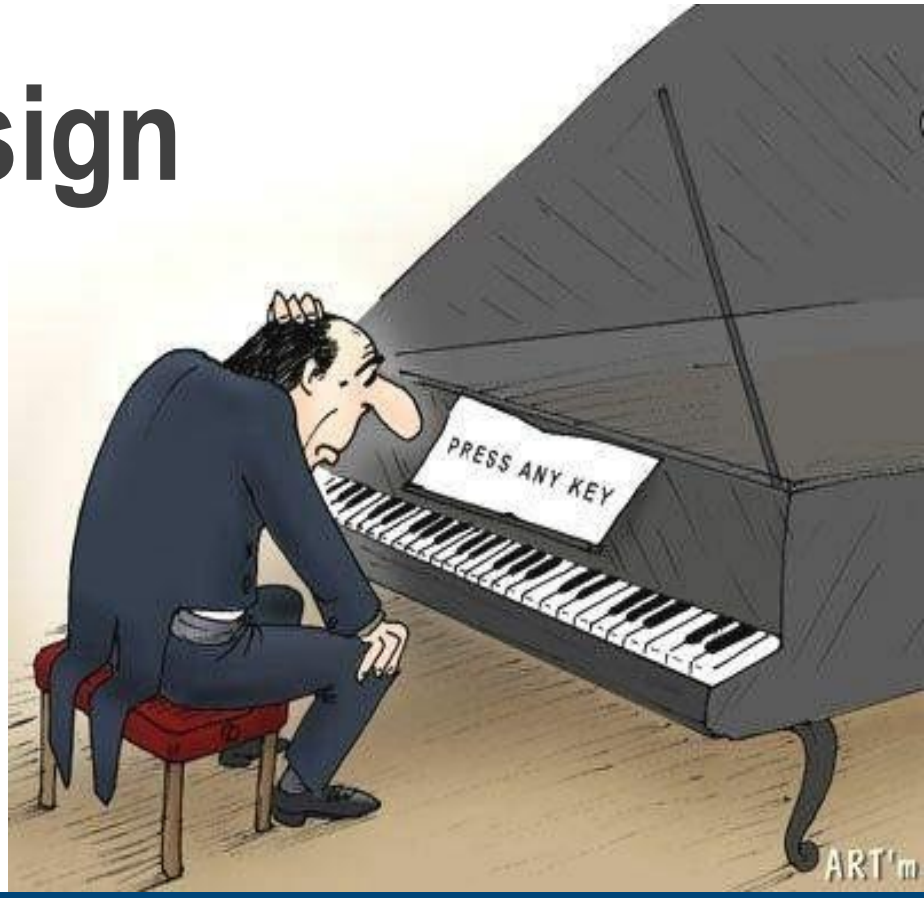
User Interface Design

Sommerville, Chapter 16;
Pressman, Chapter 12

Instructor:	Peter Baumann
email:	pbaumann@constructor.university
tel:	-3178
office:	room 88, Research 1



The User Interface

- User interfaces must be designed to match skills, experience, expectations of anticipated users
- Users often judge system by interface rather than functionality
- Poor UI design reason why many software systems remain unused
- Poor UI can cause catastrophic errors

Human Factors in Interface Design

- Limited short-term memory
  - People can instantaneously remember max 7 items
  - Overload → mistakes
- People make mistakes
  - mistakes → systems go wrong → inappropriate alarms & messages → increase stress → likely more mistakes
- People are different
  - wide range of physical capabilities
  - Do not design for own capabilities
- People have different interaction preferences
  - Some like pictures, some like text, some…

Pressman's Golden Rules

- Place user in control
- Reduce user's memory load
- Make interface consistent

I - Place User in Control

No need to learn these items by heart, but be able to cite examples

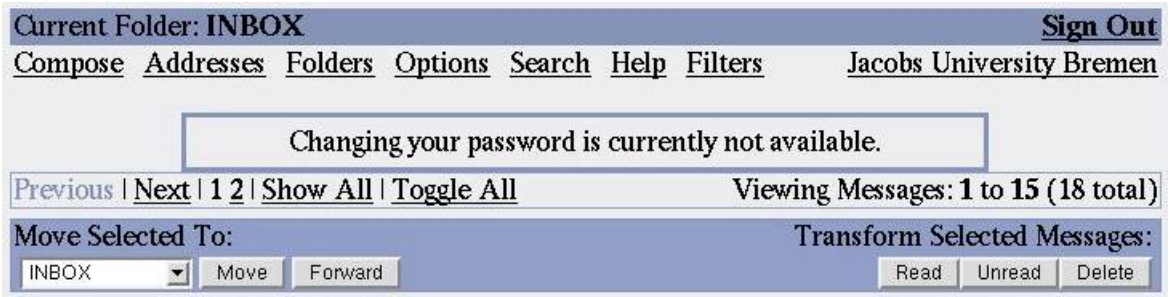
- Do not force user into unnecessary or undesired actions
- flexible interaction
- Allow user interaction to be interruptible & undoable
- Streamline interaction as skills advance, allow customizing interaction
- Hide technical internals from casual user
- Direct interaction with objects on screen

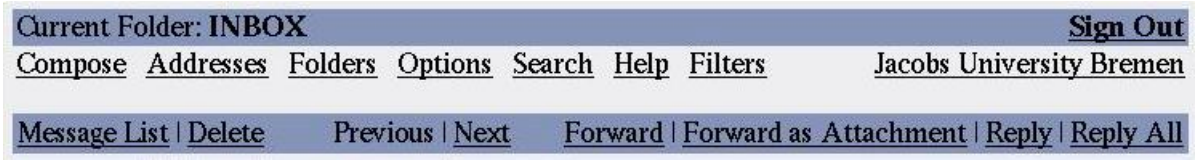
II - Reduce User's Memory Load

- Reduce demand on short-term memory
  - Quick check: Golden rules?
- meaningful defaults
- Intuitive shortcuts
- Visual layout using real world metaphor
  - Ex: in office environments,
    talk about: documents of various types (letter, spreadsheet, …), folders, …
    instead of: *files with extensions (.doc, .xls, …), directories, …*
- Disclose information in a progressive fashion

III - Make Interface Consistent

- put current task into meaningful context
- Maintain consistency across family of applications
- If past interaction has created expectations, do not change
  - unless there is very (!) good reason





Anti-Examples

- *ssh -p port* vs *scp -P port*
- Win registry:

```
My Computer\HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer
```

...which rules are violated?

...want to add another rule: make interface safe (particularly for casual users)

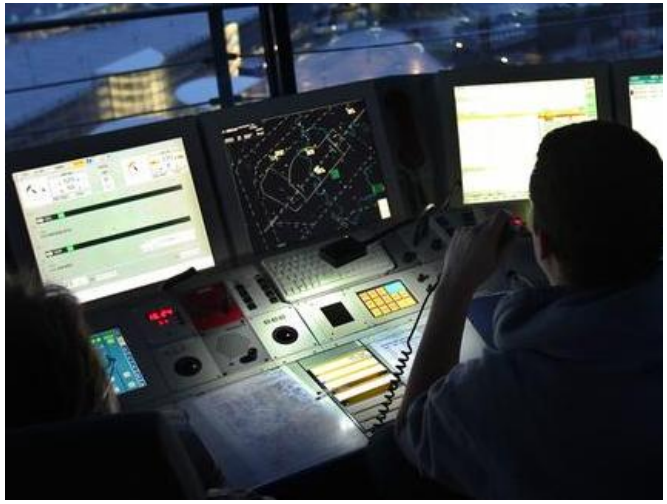
User Analysis

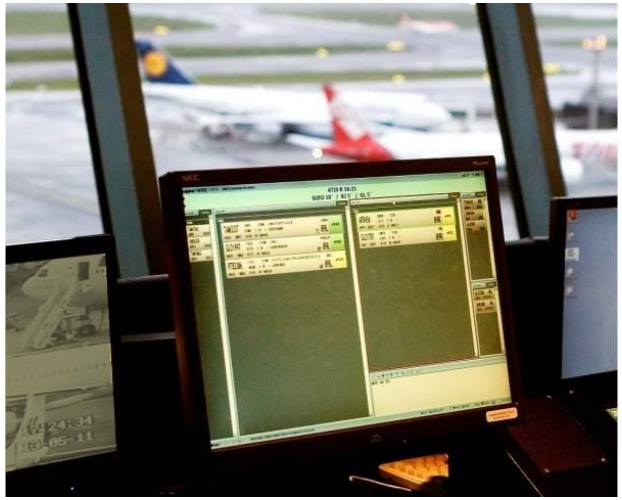
- If you don't understand what users want to do with a system, you have no realistic prospect of designing an effective interface.
- User analyses have to be described in terms that users and other designers can understand.
- Helpful:
  - Use cases = let user explain typical episodes of use
  - Ethnography = observe user at work, ask

Ex: Ethnographic Records

[Pressman]

Air traffic control involves a number of control ‘suites’ where the suites controlling adjacent sectors of airspace are physically located next to each other. Flights in a sector are represented by paper strips that are fitted into wooden racks in an order that reflects their position in the sector. If there are not enough slots in the rack (i.e. when the airspace is very busy), controllers spread the strips out on the desk in front of the rack.





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When we were observing controllers, we noticed that they regularly glanced at the strip racks in the adjacent sector. We pointed this out to them and asked them why they did this. They replied that, if the adjacent controller has strips on their desk, then this meant that they would have a lot of flights entering their sector. They therefore tried to increase the speed of aircraft in the sector to ‘clear space’ for the incoming aircraft.

Insights from Ethnography

- UI to always show all flights in a sector
  - No scrolling displays
- UI to tell controllers how many flights in adjacent sectors
  - plan workload

UI Wrap-Up

- UI design process involves
  - user analysis
  - system prototyping
  - prototype evaluation
- Create metaphors, use them consistently
- UI critical for acceptance or failure of the whole project
  - Prototyping + high customer interaction advisable