

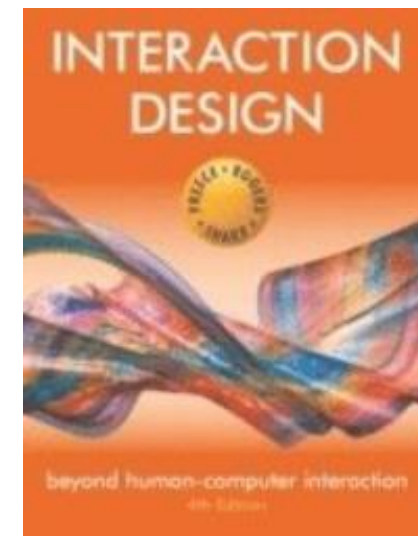
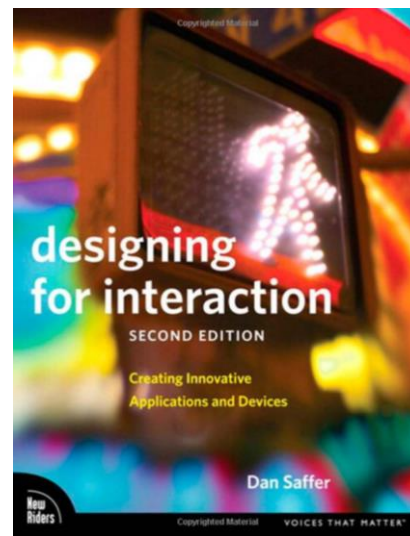
User Interface Principles

Jens Alfredson, Saab – 1 Nov, 2017

Questions

- When
- What
- How
- Why

Course Literature



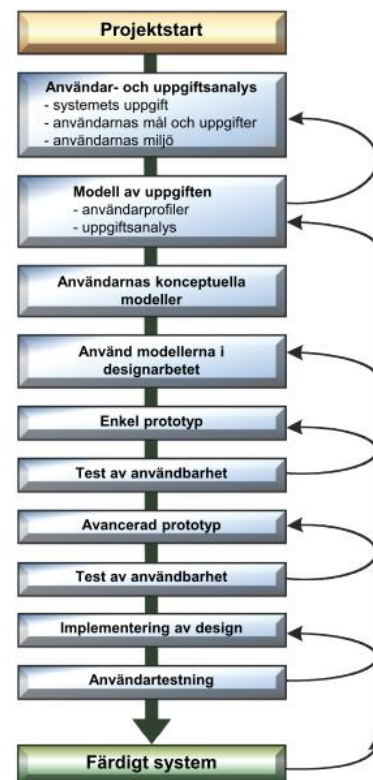
When



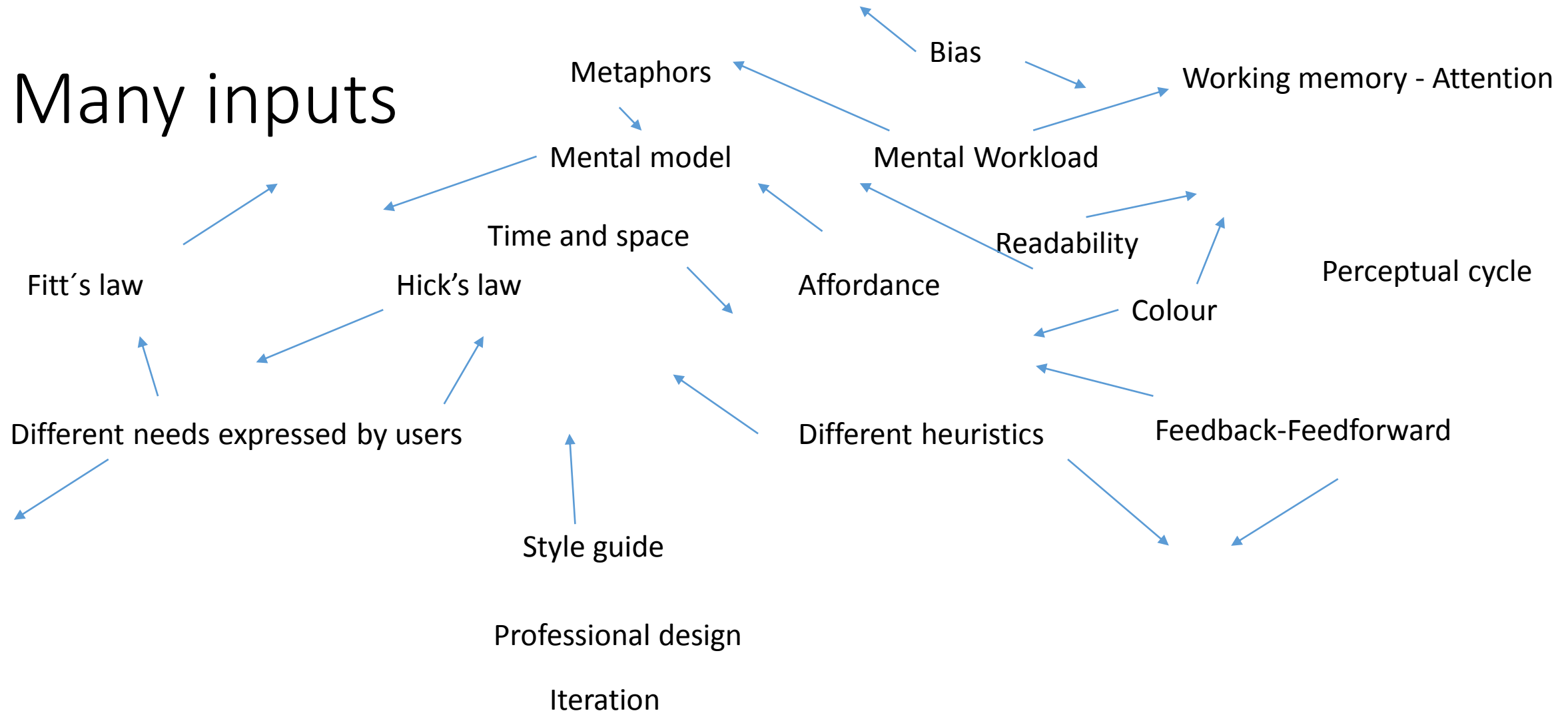
MSI-centrerad systemutveckling och systemvärdering

En översikt över metoder och metodik

PER-ANDERS OSKARSSON



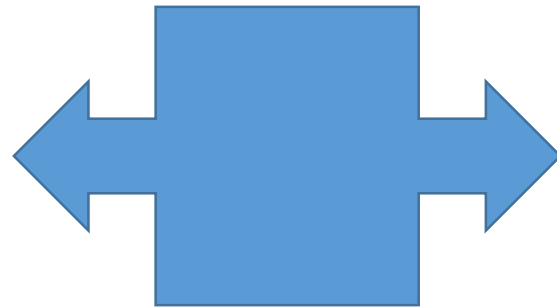
Many inputs



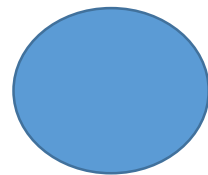
Mental workload

- Working memory
- Attention
 - Focused
 - Divided
 - Selective
- Perceptual cycle

Feedback-Feedforward



Affordance

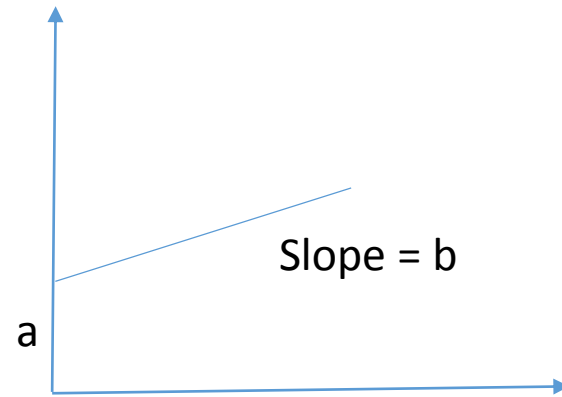


Fitt's law



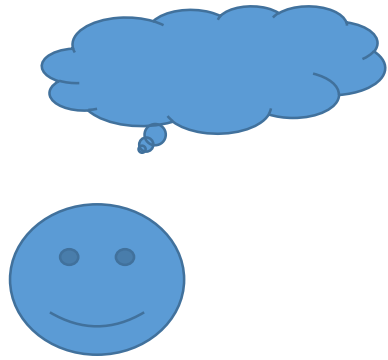
Movement time = $a + b \log_2(2A/W)$

Hick's law (Hick-Hyman law)

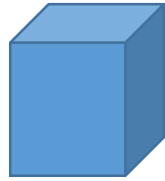


$$\text{Reaction time} = a + bH$$

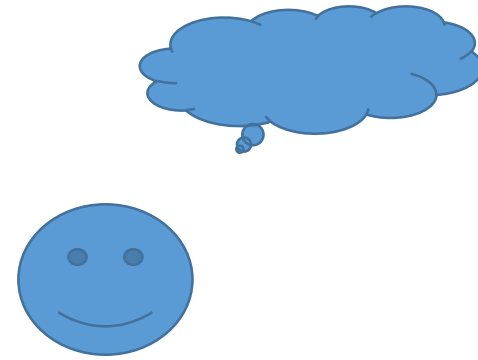
Mental model and Metaphors



How dos it work?



Analogy



What

- Visibility of system status
- Match between system and real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

Heuristics

Visibility of system status

- The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and real world

- The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom

- Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards

- Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Error prevention

- Even better than good error messages is a careful design which prevents a problem from occurring in the first place.

Recognition rather than recall

- Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use

- Accelerators - unseen by the novice user - may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Aesthetic and minimalist design

- Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors

- Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation

- Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

What

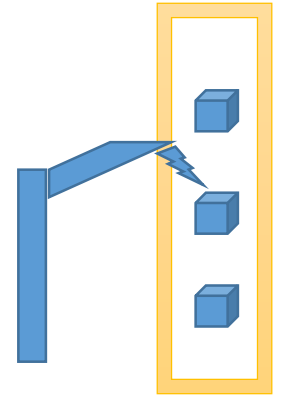
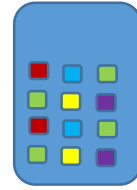
- Suitability for the task
- Self-descriptiveness
- Conformity with user expectations
- Suitability for learning
- Controllability
- Error tolerance
- Suitability for individualization

How

- Organization
- User needs
- Tasks
- Technologies

How

- Context dependent
- Guidance rather than rules
- Iterations



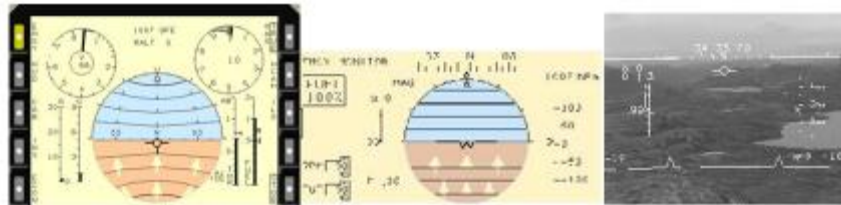
Example, Fighter Pilots

- Homogeneous group
- High demands on decision making
 - Extreme time pressure
 - Dynamic setting
 - Hostile environment
- High G-loads
- High mental workload
- Sudden and drastic light conditions and high visual demands
- Demands on rapid decision-making in a battle of life and death

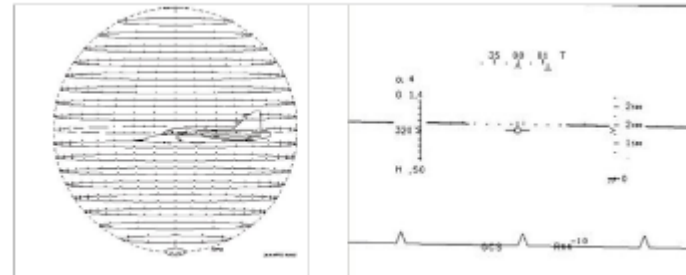
Example, Fighter Aircraft

- HOTAS
- Don't Need – Don't Show
- Fly-by-Wire
- Glass-Cockpit
- Head-Up Display

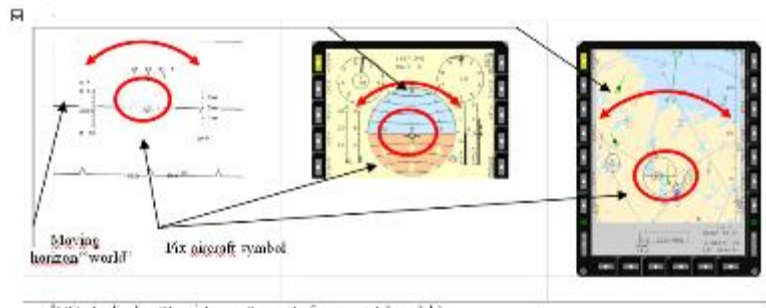
Example, Fighter Aircraft



Basic T (Consistency, Support of user mental models, Keep it simple).



Attitude display (Consistency, Support of user mental models)



Attitude display (Consistency, Support of user mental models)

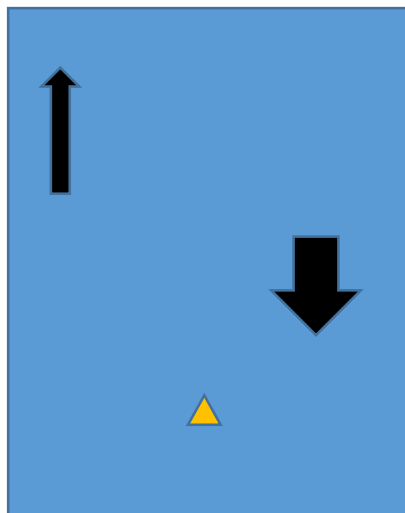
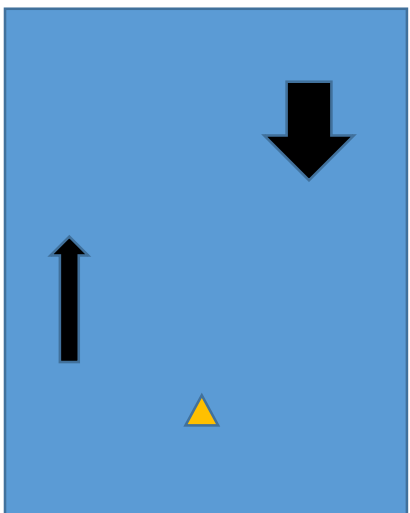
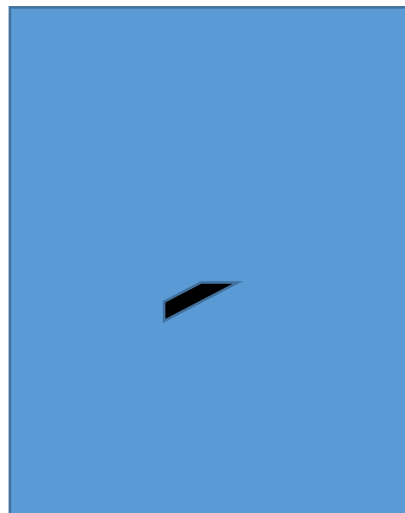
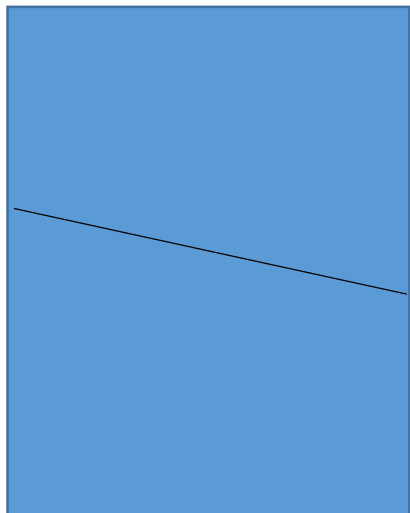


Hiding irrelevant tactical data (Keep it simple)



Attitude display (Consistency, Support of user mental models)

How



Why

- User participation
- Knowledge and lessons learned (eg. Colour)
- Design tradition (eg. Car or "Basic-T")

