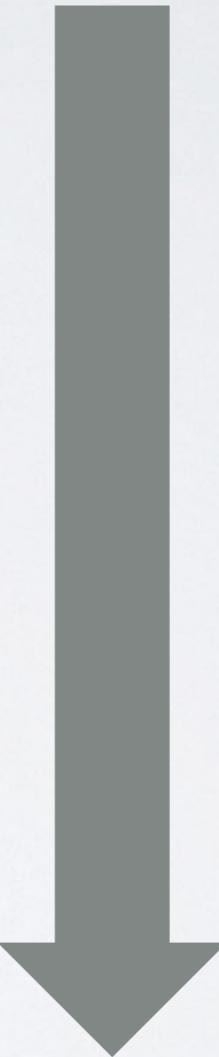


Traditional lifecycle model

- Requirements
- Specification
- Design
- Implementation
- Testing
- Delivery
- Maintenance



Some sources of problems

- People are mentally and physically limited
- Different people have different cultures, conventions, mental models, experience etc.
- The logical way to implement something is not necessarily the logical way to use it
- Interfaces are unclear or inconsistent

Psychology I

Video

User-centred design

- An attitude to software engineering
- A design philosophy
- People and context at the centre of product development
- Not just relevant to technology development

“Design is not about how things look. Design is about how things work.” – Steve Jobs

Practical II

Ease of use

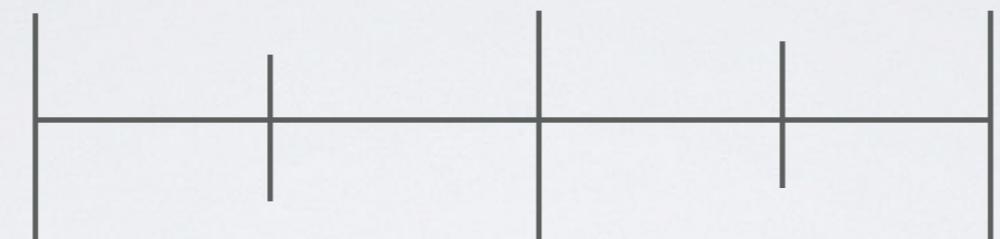
List all the interactive technologies that you have used in the past 2 days.

Discuss with your neighbour:

- what made it easy to use?
- what made it hard to use?
- if it was hard to use, how did that affect you?

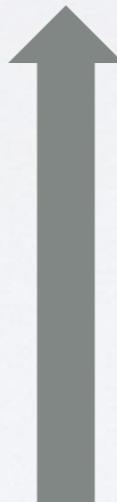
Rate each item:

1 2 3 4 5



hard to use

easy to use



Likert scale

To what extent did you feel the task was difficult?*

1 2 3 4 5

not at all very difficult

Congratulations!
.....Really?

Usability

“...the effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments.”

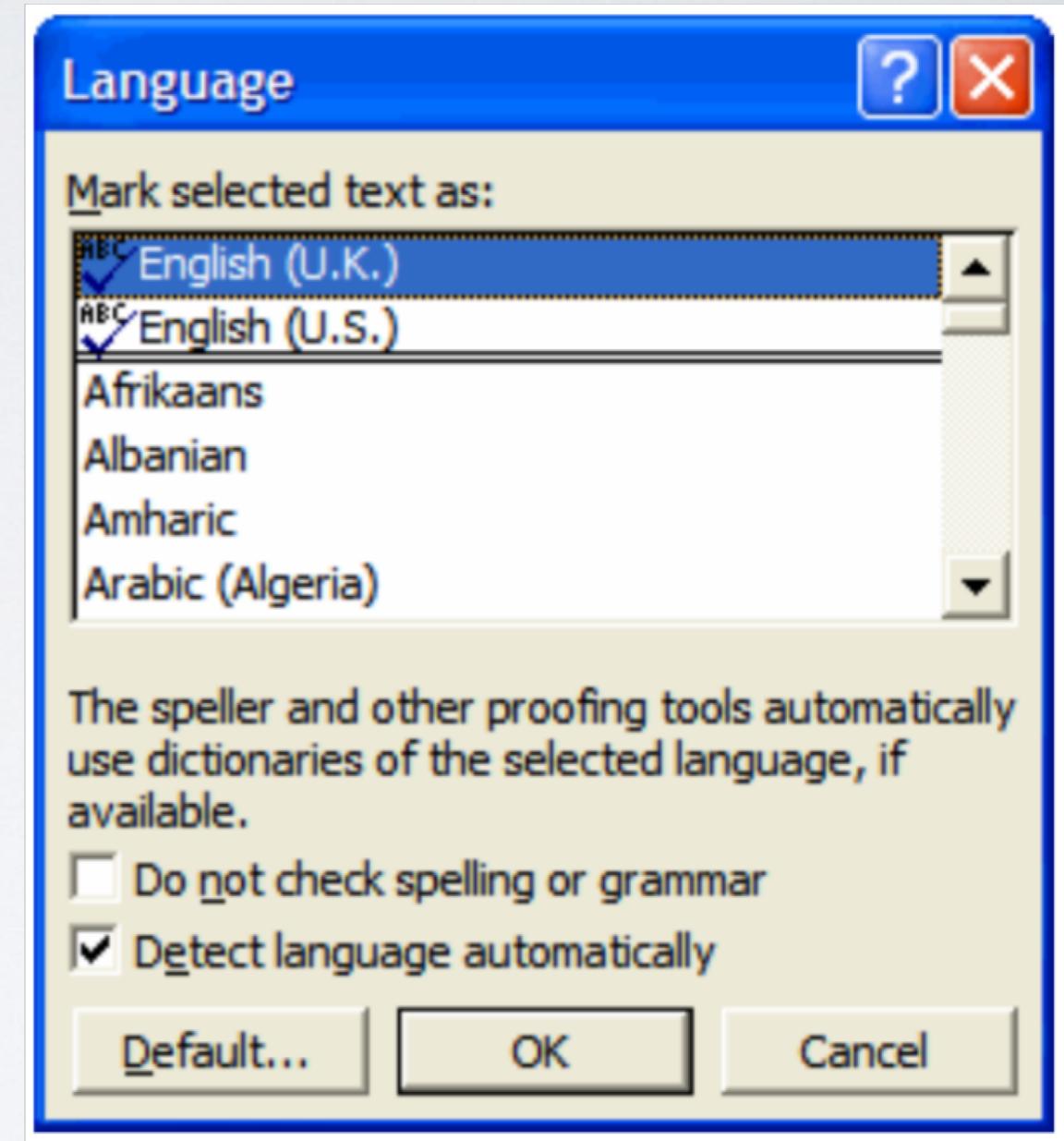
(ISO 9241-11:1998)

Alternative aspects of usability

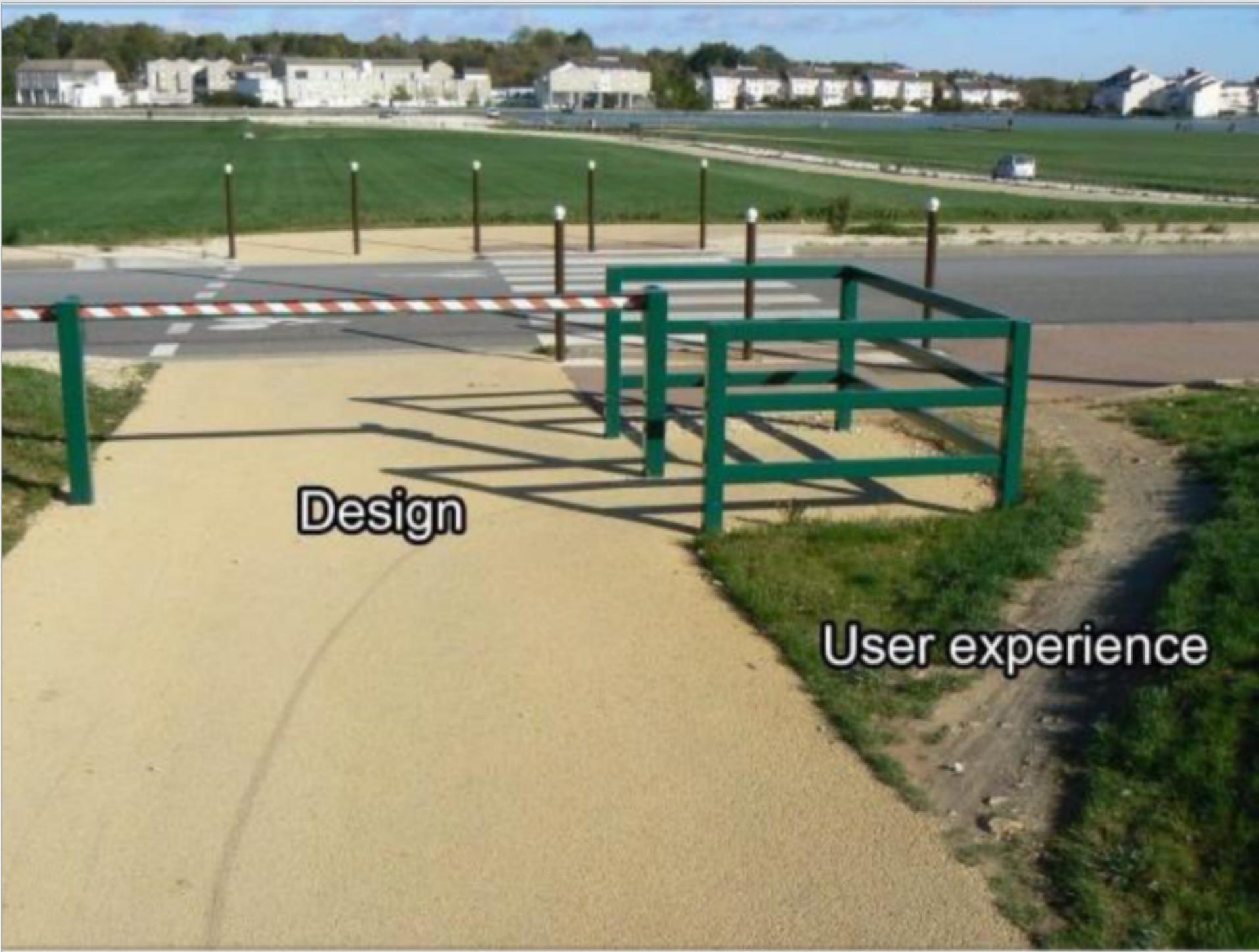
- Effectiveness
- Efficiency
- Safety
- Utility
- Learnability
- Memorability

Minor usability problems

**Product is useful enough
that the users accept the
difficulties**



Minor usability problems



User adapts to overcome issue

Catastrophic usability problems

Product is not fit for purpose



Product is unusable
Complete waste of time and money

Fatal usability problems

“The Alaris Infusion Pump involved was accidentally programmed for 68 mL/hr instead of the ordered rate of 6 • 8 mL/hr. [...] The patient expired the next day. It is believed that, although the pump did not malfunction, inherent design flaws in the infusion pump may have contributed to this event.”



**“ ...A MAGNIFICENT LAUNCH OF ONE OF
THE GREATEST ENGINEERING
ACCOMPLISHMENTS...
WE ARE A PART OF HISTORY. ”**

JOAN HAAS
Space Shuttle Budget Analyst



NASA Office of the NASA Chief Engineer
NASA Technical Standards Program

Standards System

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NASA Space Flight Human System Standard Volume 2: Human Factors, Habitability, and Environmental Health

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[!\[\]\(206ec7cb94545d8df1a21a109d9a7737_img.jpg\) Download NASA-STD-3001-VOL--2A.pdf \(2.01 MB\)](#)

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Document History:
[!\[\]\(32fc66e2d8433cfa95d8b14d0d5f1cc4_img.jpg\) NASA-STD-3001 Vol 2 \(2011-01-10\)](#)
[!\[\]\(fb9e34bed8da5ee681b334a25cc7d089_img.jpg\) NASA-STD-3001 Vol 2 Rev A \(2015-02-10\)](#)

Application Notes – explanatory text of use/application of standard NOT site Feedback

NASA SPACE FLIGHT HUMAN-SYSTEM STANDARD VOLUME 2: HUMAN...	2011-01-10	Baseline
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Lessons Learned

LLIS-0631	Human Factors Design Consideration for Space Flight
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<https://standards.nasa.gov/standard/nasa/nasa-std-3001-vol-2>



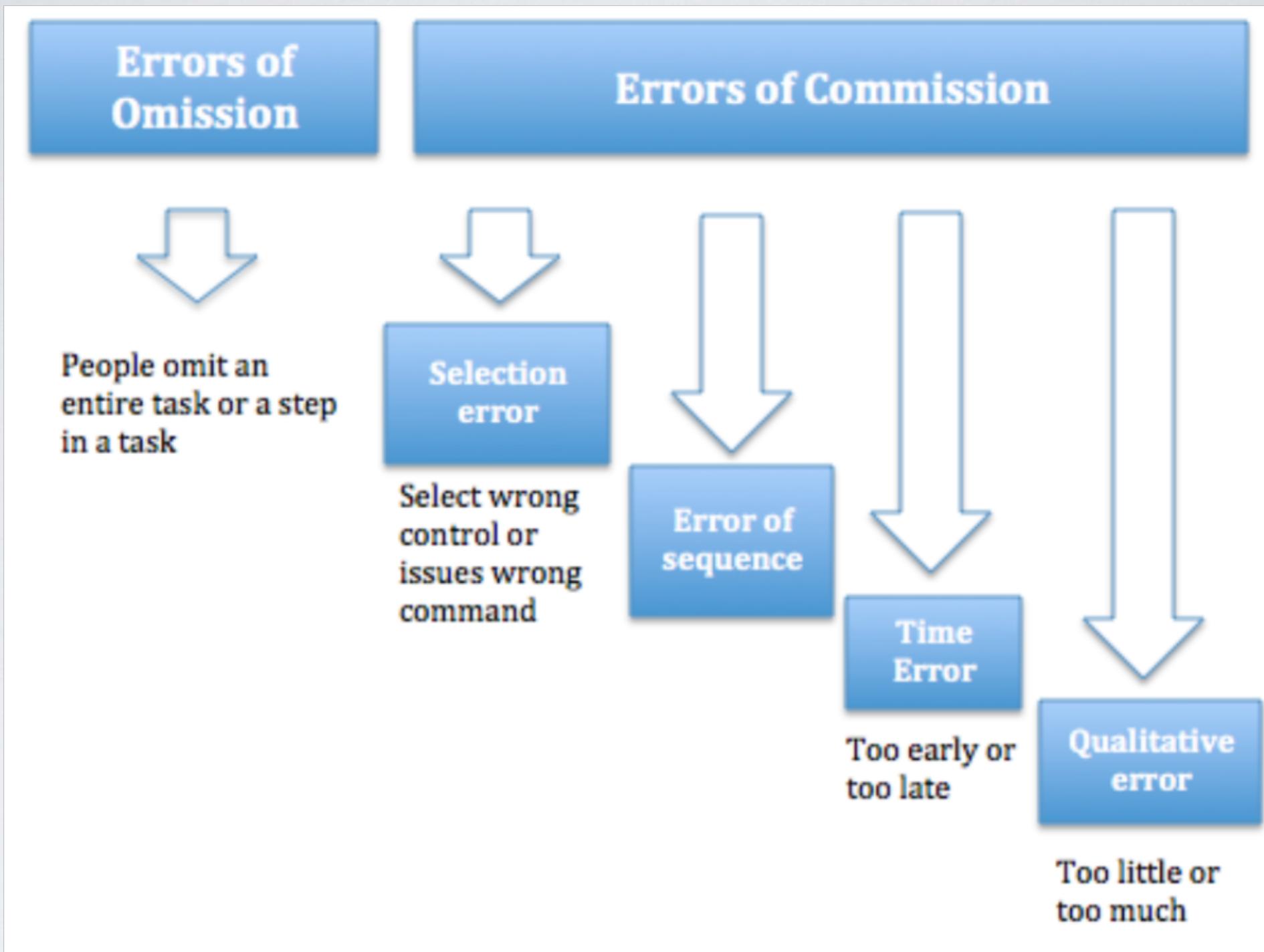
Airbus A320



Original A320 Autopilot design and display modes
(source: FAA, 2014)



Revised Airbus A320 autopilot interface design (source: FAA, 2014)

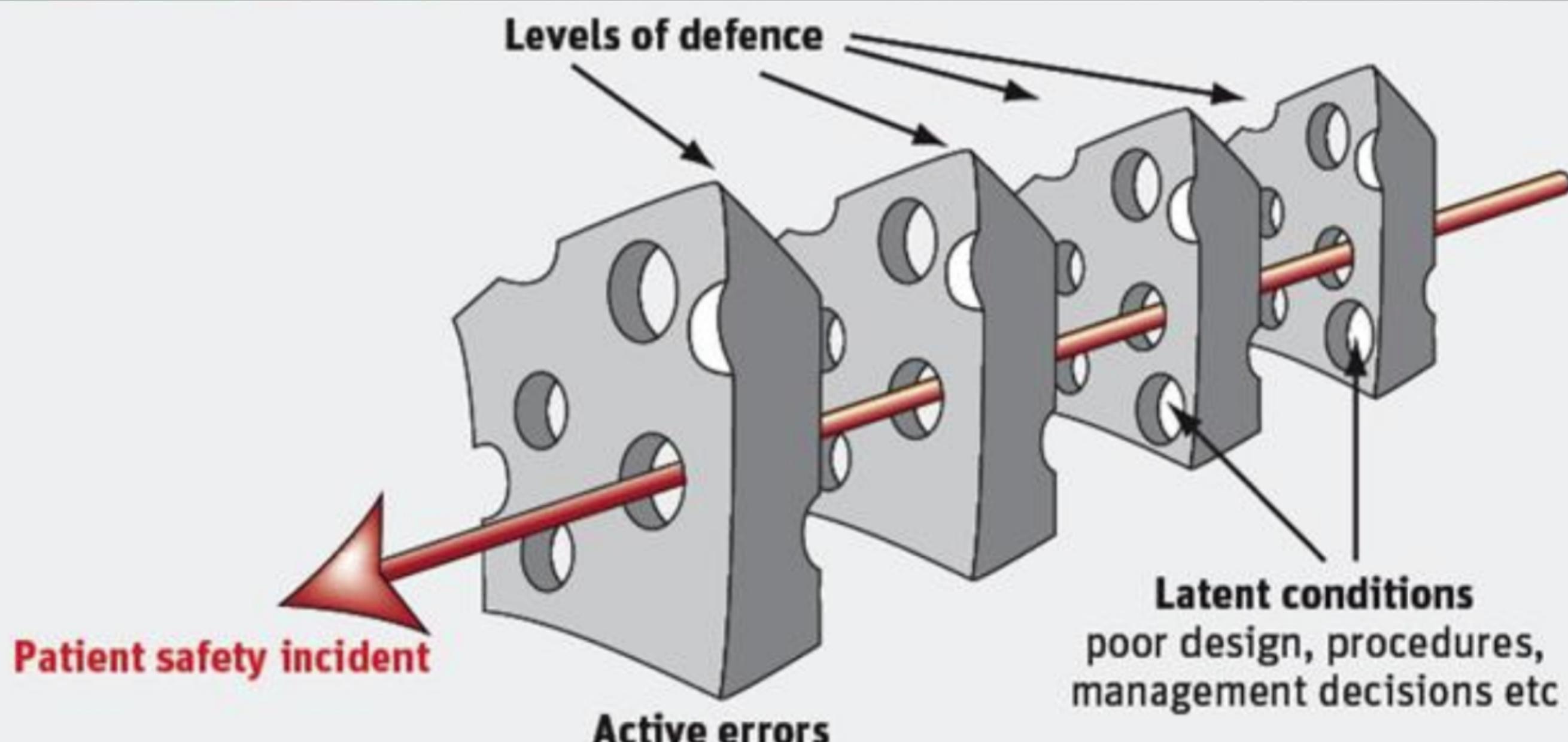


Error Classification according to Swain and Guttman (1983)

Safety layers ?

Ground Proximity Warning
System (GPWS)

Sadly no ☹



Swiss cheese model (source: Reason, 1990)

Which one is best ?

(a)



(b)



(c)



(d)





"When you look at the statistics for the 1.2 million people who are killed in traffic accidents every year, over 90% of that is human error. If we could reduce that by even 1%, that's about 120,000 lives a year that we could save."

GOOGLE HITS THE ROAD

DO NOT FORCE DOORS CLOSED



Cultural aspects

Gestures



Gestures



Pictures & Symbols



Pictures & Symbols

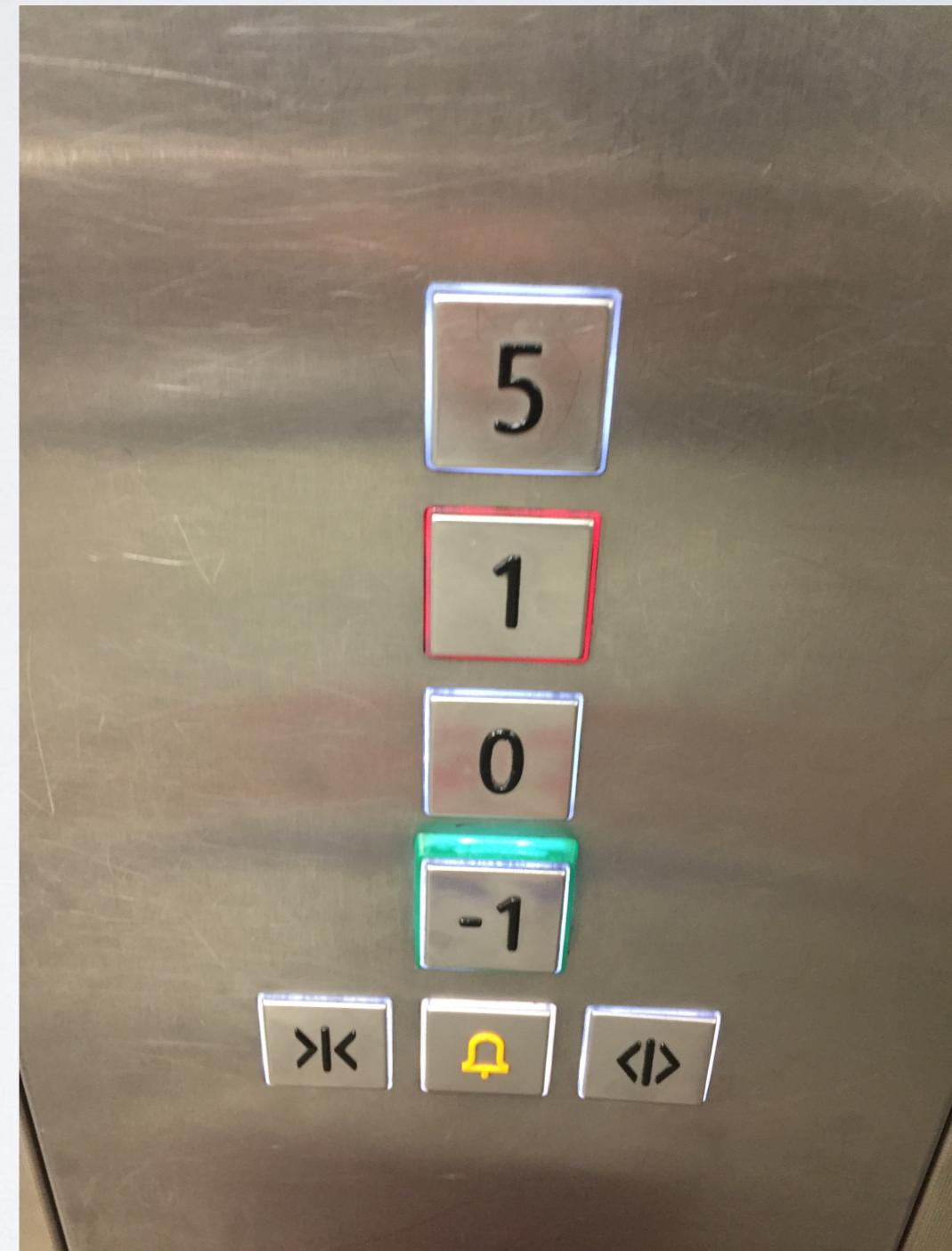


Dinosaurs!





Symbols & Numbers



Psychology I



















BLUE