

Usability in Context

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Everything is so fragmented that I just keep phuphing (sp?) about!

A user with his
computer,
digital camera,
digital radio,
CD player,
DVD player/recorder,
etc.



Usability

ISO 9241-210:2009 (*Guidance on Usability*) defines **usability** as:

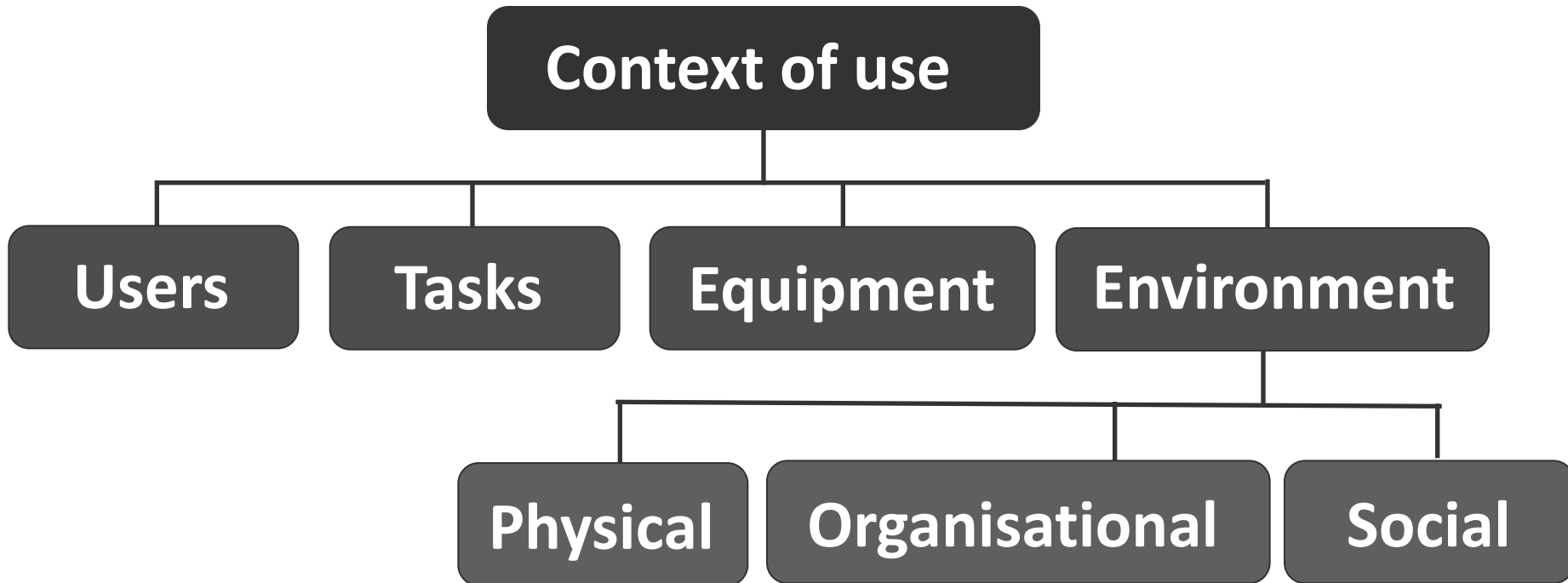
The extent to which a system, product or service can be used

by specified users

to achieve specified goals

with effectiveness, efficiency and satisfaction

in a specified context of use.

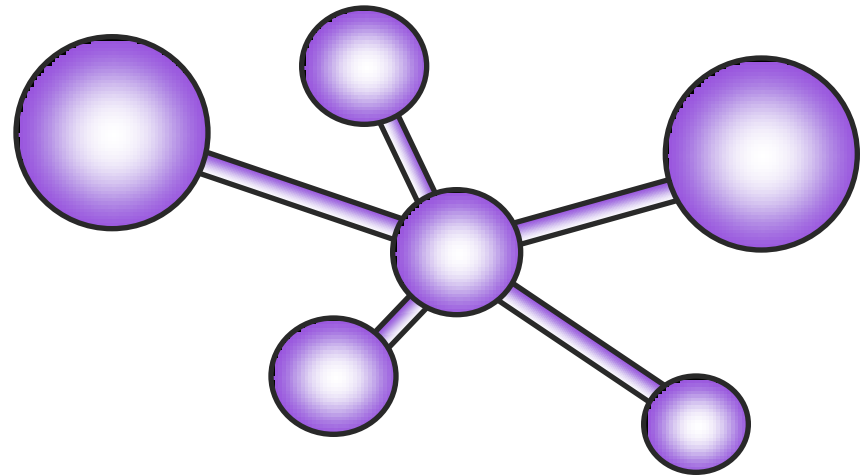




The vast majority of product interactions make demands on the visual and dexterous (arm, hand and finger) capabilities of the user

- from <http://www.inclusivedesigntoolkit.com/betterdesign/>

...and here comes the science bit
(with thanks to Eddy Elton, ESRI)

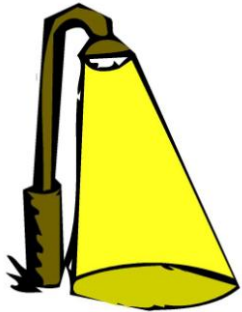


i~design3 project



Experimental investigation

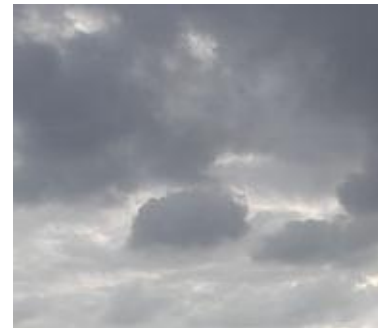
Measured the effect everyday lighting levels had on the visual acuity of older adults ($n_1 = 38$) (mean age = 74 years old)



Street lighting



In-house lighting



Overcast



Daylight

LogMar acuity charts at one metre

U V K N Z D P E
H U C N E Z R D
Z U P K D R V E
P E R F N D U Z
K P E U C R V H
C H E D N P F U
K N E Z P D C U
N P Z U V R H E
P N G E V R U F

90% contrast

F Z P R N V U C
Z C P V R H E N
Z R C P F D H V
U R E K H P F V
Z C V F E K D P
P H R F V K N Z
K U P E V N H D
K R F E D U N Z
C K U F R N P V

70% contrast

F Z U D N H R V
Z P N U D C H R
H V D C P N Z E
H K R N P F V U
E Z U V F N R D
R E N U C K D Z
C Z H R V P E F
E R P Z H C D U
U N F R H E V C

50% contrast

R H Z N K F V C
D N Z K V U H C
C K E R P H D V
F K P N V C E D
U K H Z P V N D
P R U K C H V Z
N H K V P R E U
F R C U E P V K
Z C K U E D H N

30% contrast

Results

Smallest letter size 50% of participants could read

	90% Contrast	70% Contrast	50% Contrast	30% Contrast
Street Lighting	2.9mm	2.9mm	3.7mm	3.7mm
In-house lighting	2.3mm	2.9mm	2.9mm	3.7mm
Overcast	1.8mm	1.8mm	2.3mm	2.3mm
Daylight	1.8mm	1.8mm	1.8mm	2.3mm

Mean readable letter size, across all contrast levels, generally decreases as the level of ambient illumination increases.

Your TV screen can do so much more . . .



Still talking about this . . .

EU TIDE projects from 1992

- ASHoRED (Adaptable Smarter Homes for Residents who are Elderly and Disabled People)
- CASA project (Concept of Automation and Services for people with Special Needs)

Some findings:

- Systems made up of a large number of elements
- Different systems require careful integration, but there has been little integration of different systems and performance of the whole automation system

Poulson, D.F (2001). Guidelines for the development of home automation products. *Inclusive Design Guidelines for HCI*. NICOLLE, C. & ABASCAL, J. (Eds.). London: Taylor and Francis.

TAHI Smart Homes review (2002): Emerging themes

- **The inherent complexity of the housing sector and service provision**

- **The complexity of market forces in this sector, e.g.**
 - **Housing associations and charities**
 - **Mainstream office automation**
 - **Social alarm providers**
 - **Specialist environmental control manufacturers**
 - **Service providers**

Poulson, D., Nicolle, C., and Galley, M. (2002). Review of the current status of research on 'Smart Homes' and other domestic assistive technologies in support of the TAHI trials. Prepared for the Department of Trade and Industry, in support of The Application Home Initiative (TAHI)

Consistent, seamless user interface

Guidelines are needed which:

- Will not restrict the development of new technologies
- Will allow for interfaces to be tailored to meet individual needs
- Will be adopted by all, or most, of the relevant parties



Wide-ranging needs

- **Impaired vision:** difficulty reading displays and labels on buttons and controls.
- **Reduced motor control:** difficult to select and press small keys.
- **Loss of use of limb:** only able to operate device with one hand or no hands.
- **Difficulty bending** to reach poorly positioned equipment.
- **Impaired hearing:** unable to hear auditory sounds such as warnings or confirmations.
- **Reduction in short term memory:** difficulty in memorising commands and codes. Other cognitive problems restricting the processing of information.
- **Possible lack of confidence** in using new technology.

7 Principles of Universal Design

From the Center for Universal Design <http://www.design.ncsu.edu/cud>

1. **Equitable Use:** The design must be useful and marketable to any group of users.
2. **Flexibility in Use:** The design must accommodate a wide range of individual preferences and abilities.
3. **Simple and Intuitive Use:** The design must be easy to use and understand, regardless of the user's experience, knowledge, skills or concentration.

7 Principles of Universal Design

4. **Perceivable Information:** The design must communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. **Tolerance for Error:** The design must minimise hazards and the adverse consequences of accidental or unintended actions.
6. **Low Physical Effort:** The design must be usable efficiently and comfortably and with minimum fatigue.
7. **Size and Space for Approach and Use:** Appropriate size and space must be provided for approach, reach, manipulation and use, regardless of the user's body size, posture, or mobility.

Guidelines which support and promote:

- Suitability for the context of use:
(user, task, environment)
- Ease of use
- Simple functionality
- Good feedback
- Safety in use
- Reliable and fail-safe operation
- Discouraging passivity
- Design aesthetics
- Ethical considerations

Getting more specific . . .

- Size/contrast of font
- Colour contrast
- Style of font
- Layout / Appropriate spacing
- Clear labelling
- Understandable symbols
- Familiar language, free from jargon



KEEP THINGS SIMPLE!



Something for everyone . . .

Economics determines the commercial value of design

Ergonomics determines the human value of design

Jeremy Myerson, Director of the Helen Hamlyn Centre, Royal College of Art, interview at Design Museum's "Ergonomics: Real Design" (You and Yours, BBC radio 4, 19 February 2010)

It's time to work together . . .



Thank you for your attention!