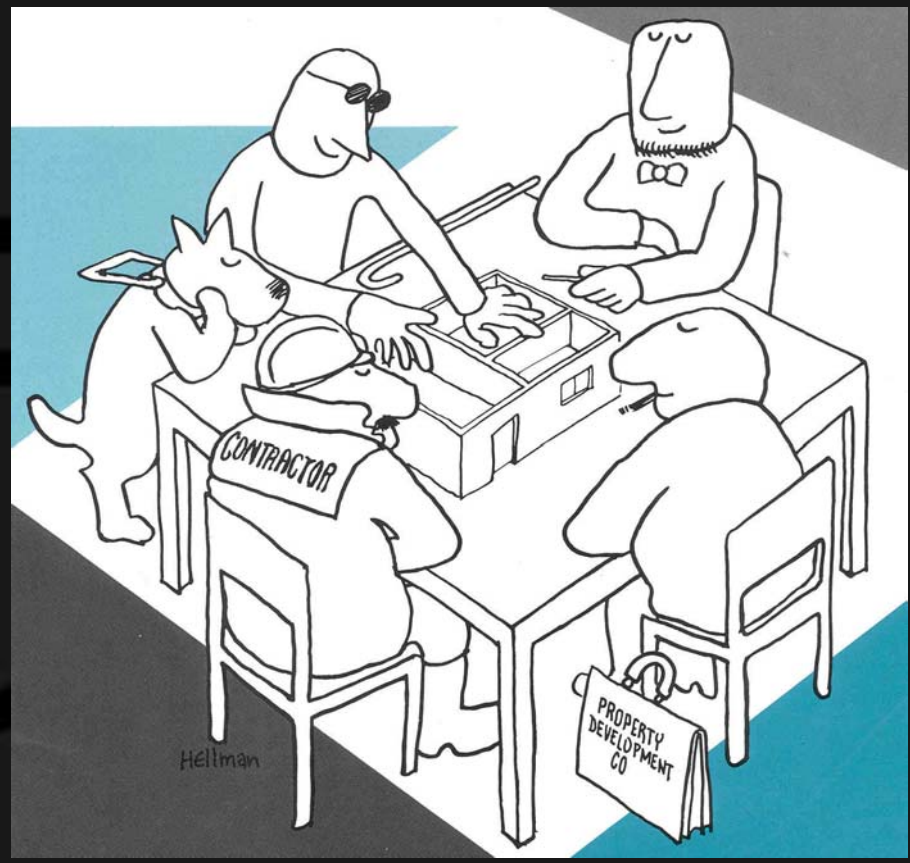
UNIVERSAL USABILITY

Annie Frazer

presenter

overview

- Definition
- Background
- 2 papers
  - User sensitive
  - Design cube
- Examples
- Discussion



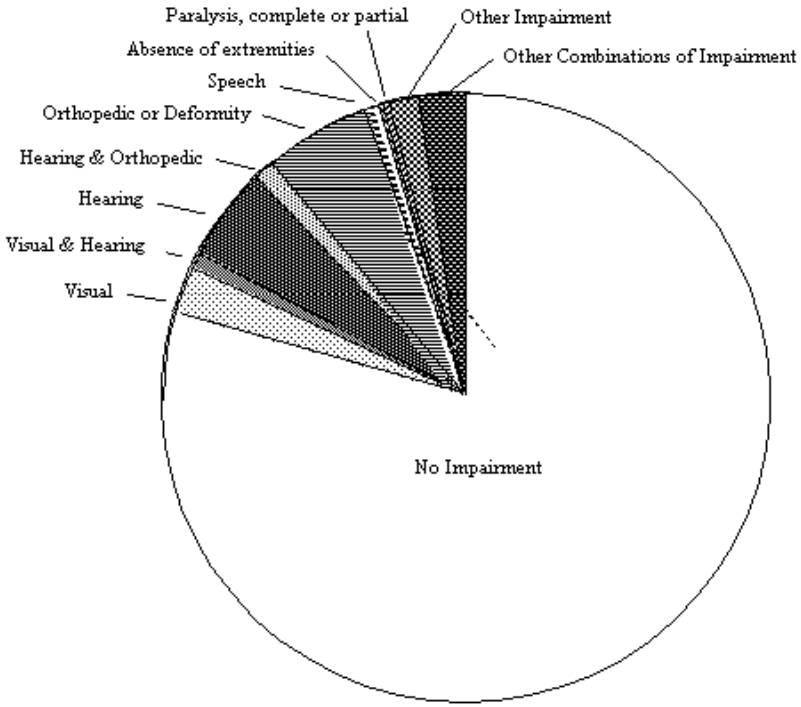
Universal Usability

- The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Statistics

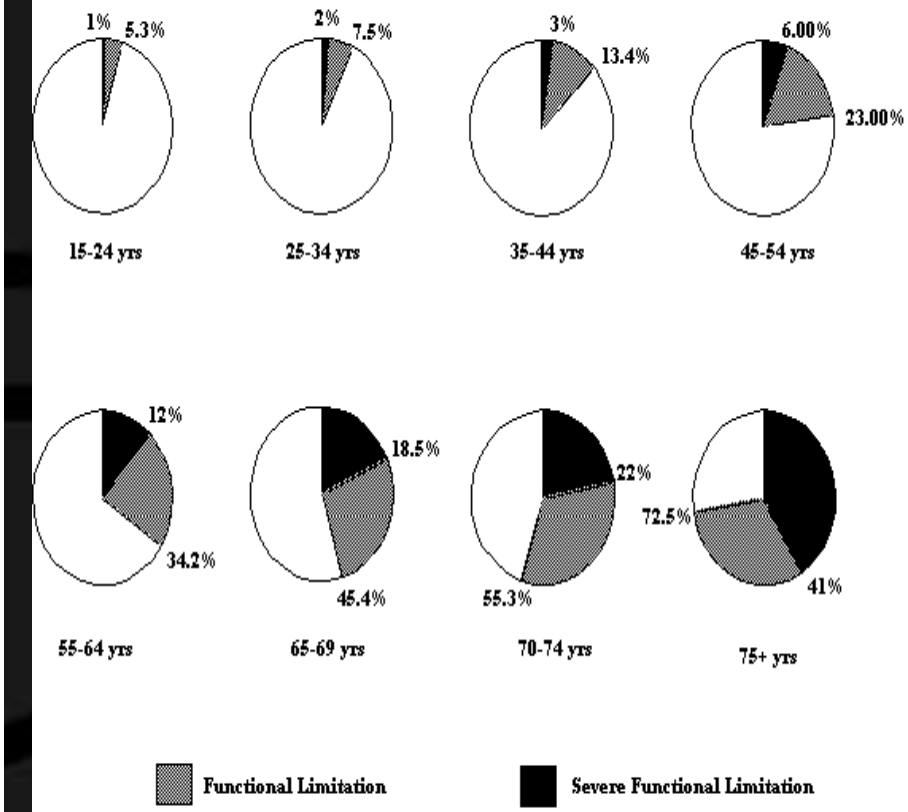
Figure 1
Percent of U.S. Population with Selected Impairments

(all ages ; non-institutionalized population)



Source: 1979 National Health Interview Survey (NHIS)
Data catagories are exclusive

Figure 4
Functional Limitation as a Function of Age



Source: Bureau of the Census, Series P-70, #8
Survey: SIPP, 1984

Vanderheiden, G.C (1990). “Thirty-something million: should they be exceptions?” *Human Factors*, 32(4), pp. 383-396.

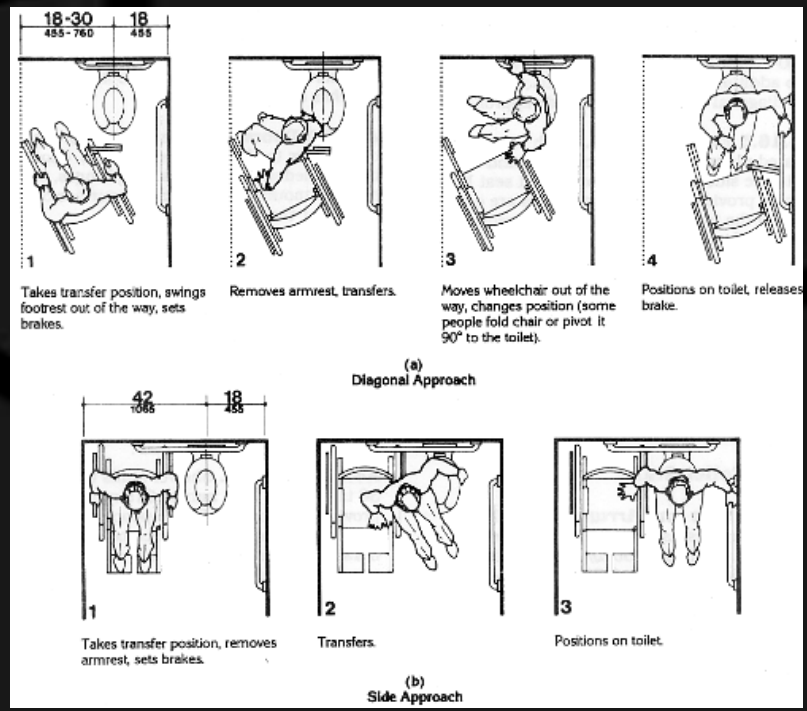
Why the sudden focus on Universal Usability?

- Recent laws that that mandate that some products be made more accessible
- Rapid increase in the number of individuals who are older- market pull
- Rise in mobile computing-> products that are usable in a wide range of environments and circumstances

The Regulations

- Americans with Disabilities Act (1990)

  -In general, all areas of newly designed buildings and altered portions of existing buildings required to be accessible

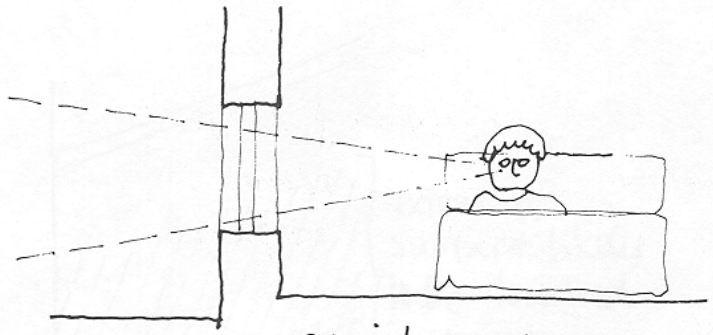


The Guidelines

UK Disability Discrimination Act (1996)

Natural Lighting

* Position windows both horizontally and vertically to maximise light and view and minimise glare and discomfort
* Take account of internal and external surfaces



The Principles

from the Center for Universal Design at NC State

1. Equitable Use
2. Flexibility in use
3. Simple and Intuitive
4. Perceptible Information

5. Tolerance for Error

6. Low Physical Effort
7. Size and Space for Approach and use

Papers

User Sensitive Inclusive Design

- Considers whether new research paradigms are appropriate and how they are different from those used within traditional technological research
- Suggests including people with disabilities within a User Centered Design
- Based on principle of “Equitable Use”- the design should be useful and marketable to any group of users

User Sensitive Inclusive Design

"Every Citizen Interfaces to the National Information Infrastructure"
NSF Strategy

- Understanding and representing user diversity. What really are the functional characteristics of ALL users?
- Common dimensions on which users can be classified (e.g. perceptual and motor abilities, literacy).
- Dynamic (rather than static) characterization of users
- Flexible interfaces, and Universal Design
- How best to present information most effectively to people with disabilities in the various modalities?
- Universal representations of data to give appropriate "hooks" for those situations where one modality is not appropriate.
- How to design interfaces which do not require good memory and language abilities

User Sensitive Inclusive Design

Current trends

- Mainstream design (often seems to be exclusively for able-bodied people)
- The design of systems exclusively for people with disabilities (sometimes called “orphan” products)
- The so-called design for all/universal design approach

User Sensitive Inclusive Design

Suggest using users with disabilities in the design approach :

- As consultants on the research team “test pilots”
- By traditional user centered design methodology
  - User panels
  - Case studies
  - Prototype evaluators

User Sensitive Inclusive Design

- Note that there are distinctions between traditional user centered design and UCD when the user group contains disabled users

Considerations:

- Much greater variety of user characteristics and functionality
- Difficulty in recruiting “representative users
- Conflict of interest between accessibility for people with different disabilities
- etc

Name

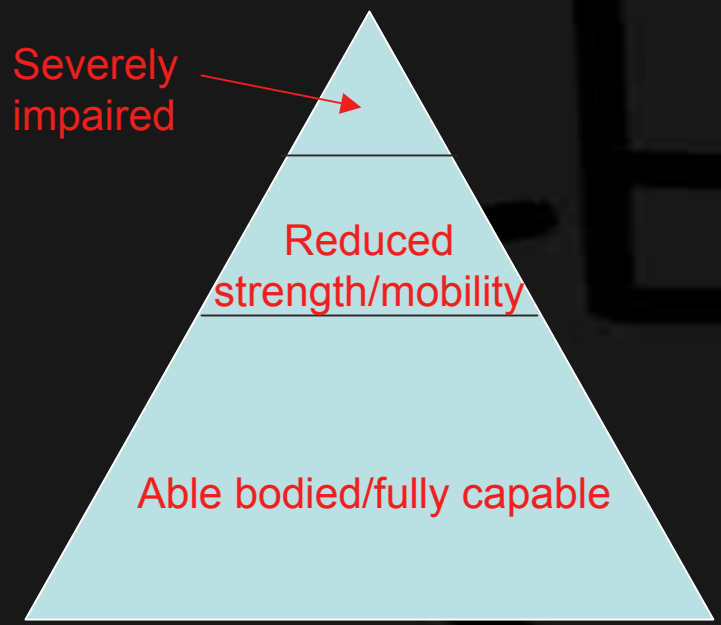
Inclusive Design Cube

- Gives summary of methods for designing for users with different capabilities
- Suggests a model that shows how different approaches can provide complete population coverage
- Principle concern of the designer should be physical capabilities irrespective of cause

Inclusive Design Cube

- *Rehabilitation design* focuses on developing solutions for specific impairments
- *Design by story-telling* 1. understand what it's like being old 2. observe what old people do and how they cope 3. visualize a different scenario without technical constraint 4. evaluate a product for the intended user
- *Transgenerational design* products should be designed from the outset to avoid the unnecessary accessibility problems by including users of all ages in design process
- *Universal Design*

Inclusive Design Cube



Claim:

If a product is designed to be accessible by a particular layer, then the resultant product will be accessible by those with less severe or no impairments

User Pyramid Design Approach

Inclusive Design Cube

- Relates capability level, population profile and a suitable design approach in a simple graphical format
- Extends pyramid levels of capability -> three design approaches
  - user-aware design
  - modular/customizable design
  - special purpose design

the cube

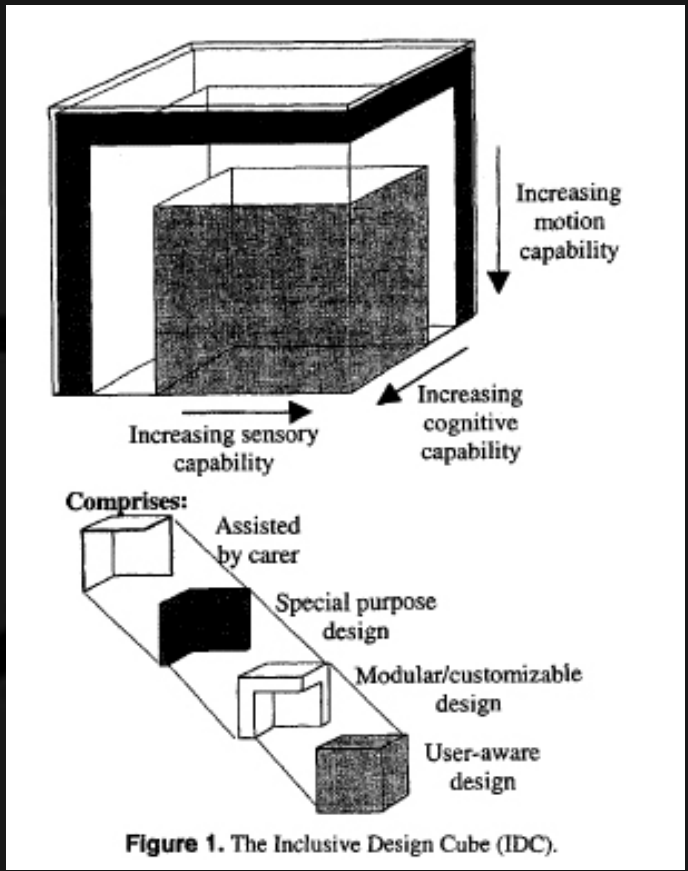
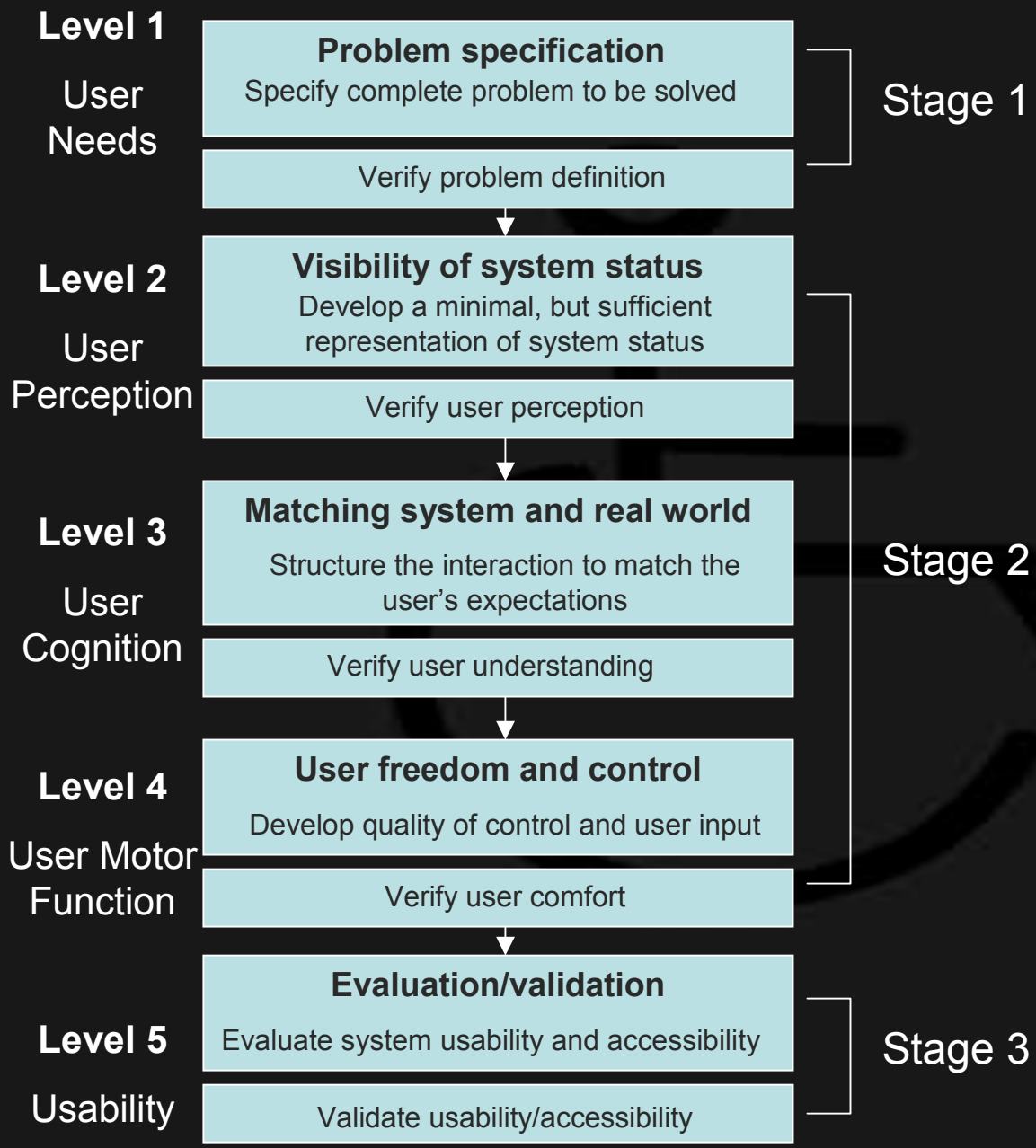


Figure 1. The Inclusive Design Cube (IDC).

Inclusive Design Cube



- Typical interaction with an interface
  - perceiving an output from the product (perception)
  - deciding on a course of action (cognition)
  - implementing the response (motor actions)

Inclusive Design Cube

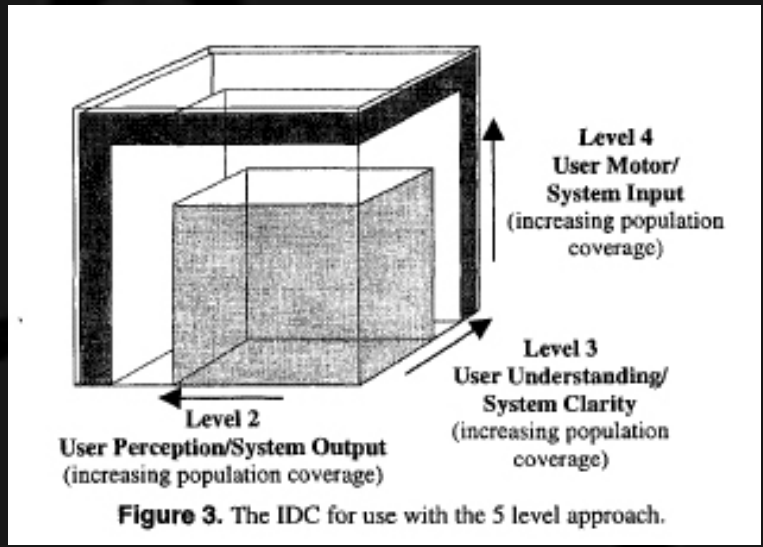


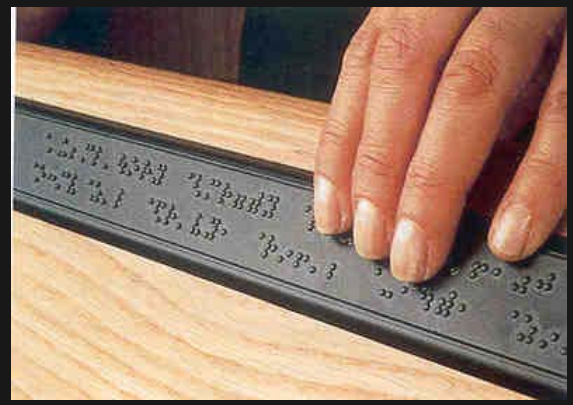
Figure 3. The IDC for use with the 5 level approach.

Design cube modified to monitor the progress of the design by indicating the population coverage achieved by different design choices

Examples

Universal Usability in Computing

Examples



Examples


EXIT
Taxi
Buses to New York City
Other Terminals & Long Term Parking Lot
EXIT

Examples

Discussion

- “It is worth noting that some of the filtered-down designs may be sub-optimal for more capable users”
- Is it better to have sub-optimal designs for all or optimal designs for special groups?
- Do you think the examples shown were actually “Universal Designs”?
- Do you feel that the field of human factors successfully addresses the needs of All users?
- Parallel between “ordinary”people operating in “extraordinary” environments and “extra-ordinary” people working in an ordinary environment