Designing Flexible, Accessible Interfaces That Are More Usable by Everyone

CHI 2003 Tutorial

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11:00 – 11:45	Experience Sessions (Round 2
11:45 – 12:30	Legislation, Regulation, Standards & Guidelines The Basics of Interface Usability (and Accessibility)
12:30 – 2:00	Lunch
2:00 – 3:30	Issues and Strategies for Info Tech Product Access
3:30 – 4:00	Break
4:00 – 5:00	Example Applications of Universal Design to Specific Products
5:00 – 5:30	Accessibility and Emerging / Future Technologies Resources for Information, Training, Technical Assistance Conclusion

Learning Objectives

1. To introduce participants to the different disabilities and develop a basic understanding for the major problems faced by people with different disabilities in using computers and information technologies.

2. To show how the problems and solutions for disability access parallel the constraints and solutions needed for the mass market customers (e.g., for data mining, mobile computing, etc.).

3. To provide hands-on experience with accessibility issues and solutions.

4. To demonstrate low-cost strategies for building access into standard products (and simultaneously increasing mass marketability).

5. To help separate key accessibility issues from lower priority issues.

6. To acquaint participants with the resources available to draw on for additional information, training, or technical assistance.

Course Overview

In designing today's information technologies, it is increasingly important to make them usable by individuals with a much broader range of abilities and limitations. The driving forces behind this trend are twofold: changing demographics (an aging population) and Federal regulation (most recently, Section 508 of the Rehabilitation Act).

This full-day tutorial is focused on commercially practical strategies for enhancing the interfaces of information technologies so that they are more flexible and accommodate a wider range of users.

We have found that the best way to enable designers to evaluate and improve the usability of their products for those who have limitations is to provide hands-on experience with products while operating with limitations, and then look at some of the key strategies used to provide accessibility. We will spend most of the morning engaged in "experience" activities to achieve this objective.

Another key to understanding how to design more usable and accessible products is to differentiate the "essential" issues and strategies from those that enhance usability and accessibility. In the afternoon, we will engage in some exercises to gain an understanding of these concepts.

At the end of the tutorial, we will take a look at what may be coming in future technology, and discuss the challenges and opportunities it presents for improving accessibility. We will also provide an overview of resources available to draw on for additional information, training, or technical assistance.

Introduction: Disabilities, Assistive Technology & Universal Design

Basis for the approach

We are disabled when we cannot adapt to the world as it is currently designed.

People experience disabilities…

… not just because of their abilities or functional limitations,
… but rather as a result of the intersection
- of a person's abilities and
- the requirements of their environment.

- If everyone else (outside of this room) had wings …
… we (in this room) would suddenly "be disabled".

- Not because we can't fly …
… but because they would design the world differently.

All part of a continuum

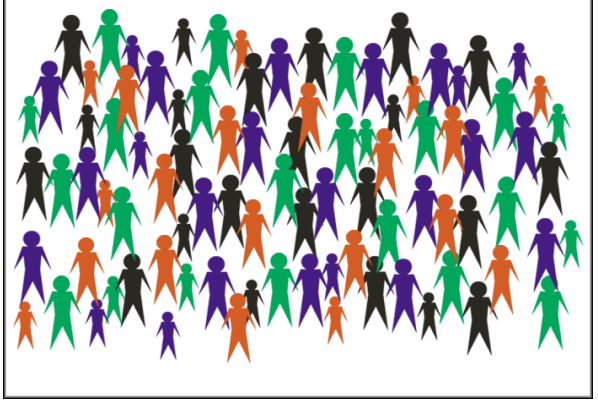
- No clear line between disability and "able bodied"

- Census results: many households list no one as disabled, but one or more people with missing limbs.

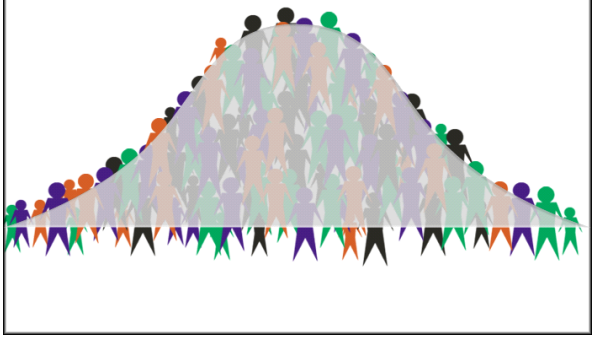
- Person may have trouble with one product (be "unable"), yet be a power user on another product or design.

- Many people have no "disability," but have trouble using products.

For Any Given Product or Function



Users Form a Usability Curve



Users who have no trouble using any part of the product (power users)

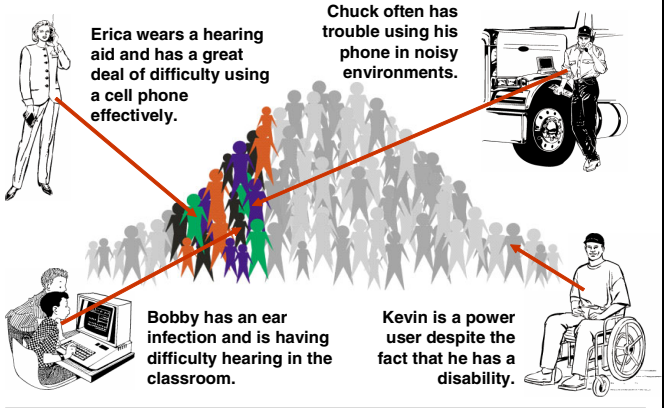
Users who only have a little trouble using the product

Users who have trouble using some product features but can use the product pretty well.

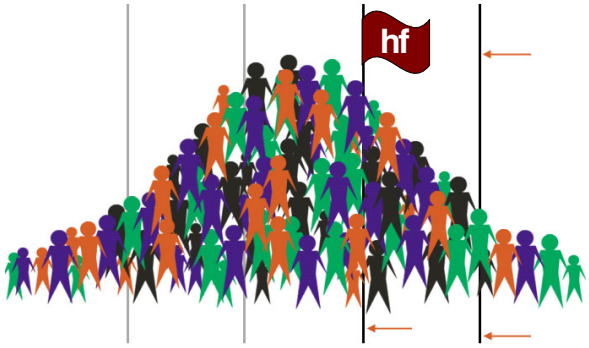
Users who find it hard to use some or all of the product

Users who are unable to use the product

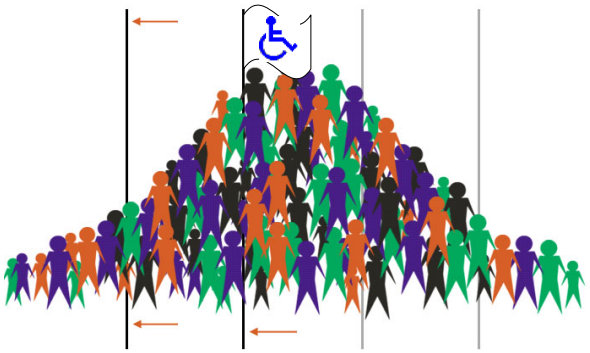
Different reasons for usability problems



Traditional human factors work tries to maximize the number of people who have little or no trouble using a product.



Disability access professionals try to minimize the number of users who have difficulty or cannot use a product.



In fact, it's all part of a continuum and the lines tend to move together with better (or worse) design.

Functional Limitations – Causes

-- At birth

-- By disease or misadventure

-- With aging *(see pages 6 – 7)*

-- Temporary

-- Circumstance

Disability As a Function of Age

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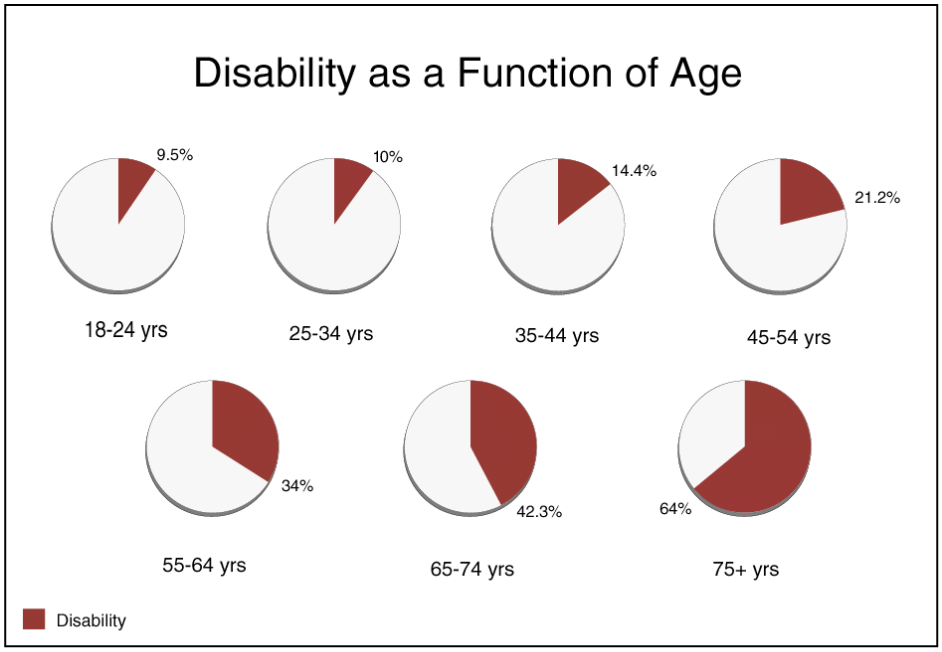
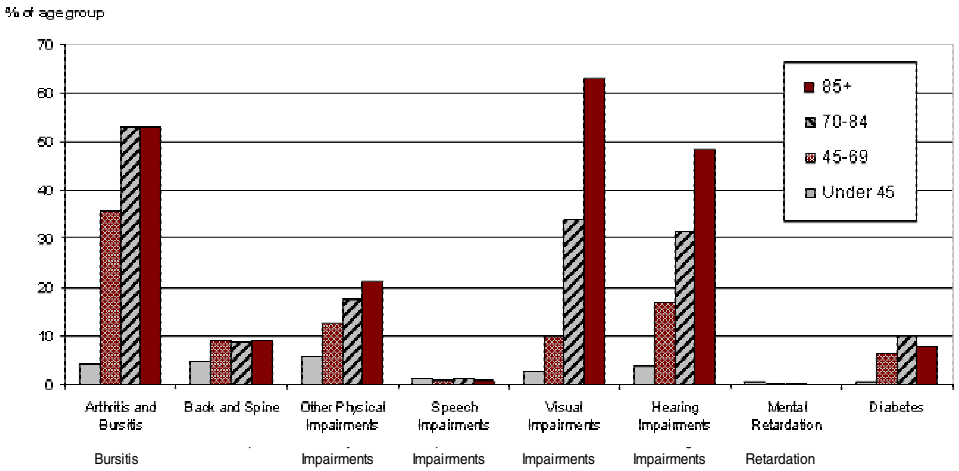
Source: U.S. Census Bureau Report on Americans with Disabilities: 1994-95, P70-61 (August 1997)

Based on Survey of Income and Program Participation, Oct. 1994-Jan. 1995



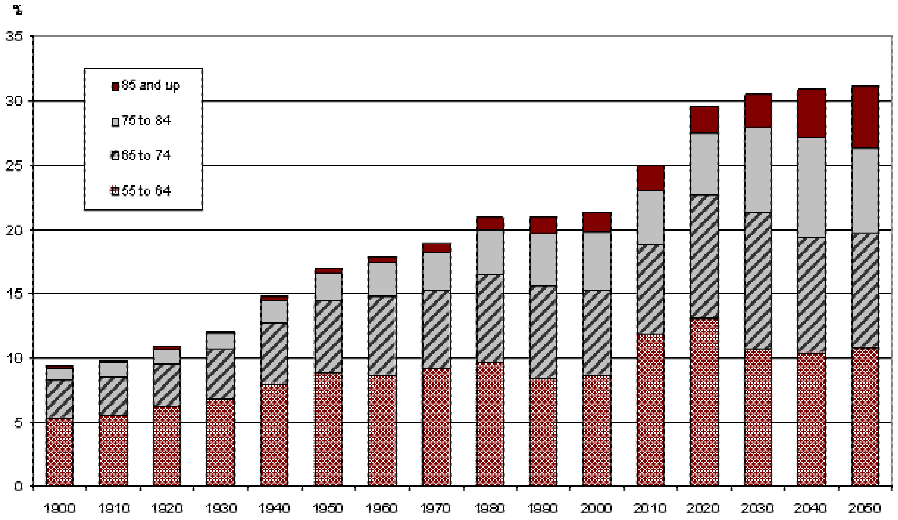
Source: U.S. Census Bureau Report on Americans with Disabilities: 1994-95, P70-61 (August 1997)
Based on Survey of Income and Program Participation, Oct. 1994-Jan. 1995

US Prevalence of Selected Impairments within Age Groups



Survey: National Health Interview Surveys, 1983-1985: tabulations from public use tapes
Based on data from LaPlante (1988)

The Graying of the United States



Sources: 1900-1980: U.S. Bureau of the Census, Decennial Censuses of Population. 1990: U.S. Bureau of the Census, Projections of the Population of the United States, by Age, Sex, and Race: 1983 to 2080. Current Population Reports, Series P-25, No. 952, May 1984. Projections are middle Series. 2000-2050: U.S. Census Bureau, Projections of the Total Resident Population by 5-Year Age Groups, and Sex with Special Age Categories, Middle Series, 1999 to 2100, (NP-T3), January 2000.

If a product is:	It will be accessible to:	And also usable by:
Operable without vision	People who are ***blind***	• People whose ***eyes are busy*** (e.g., driving your care & phone browsing) • People who are ***in darkness***
Operable with low vision	People with ***visual impairments***	• People using a ***small display*** • Or in a ***smoky environment*** • Or who just ***left their glasses in the other room***
Operable with no hearing	People who are ***deaf***	• People in ***very loud environments*** • Or whose ***ears are busy*** • Or are in ***forced silence*** (e.g., library or meeting)
Operable with limited hearing	People who are ***hard of hearing***	• People in ***noisy environments***
Operable with limited manual dexterity	People with a ***physical disability***	• People in a ***bouncing vehicle*** • Or who are in a ***space suit or environmental suit***
Operable with limited cognition	People with a ***cognitive disability***	• People who are ***distracted*** • Or ***panicked*** • Or under the ***influence of alcohol***
Operable without reading	People with a ***cognitive disability***	• People who just ***haven't learned to read 'that' language*** • People who are ***foreign visitors*** • People who ***left their reading glasses behind***

Three ways to address the problem

1. Change the person and their capabilities
   Surgery, Rehab, Training, Personal Assistive Technologies

2. Install adaptations in the environment
   AT Adaptations

3. Change the way things are designed
   - So that they are more widely usable

   - Universal / Accessible Design

Universal Design

Definition: The process of designing products so that they are as usable to people with the widest range of abilities and constraints as is commercially practical and profitable.

This includes:
- Accommodating the widest range of abilities as is practical

- Being directly usable when practical

- Being usable via assistive technologies
  when direct use is not practical

"Products" includes devices, systems, environments, services, processes, etc.

Process, <u>not</u> Outcome

There are no universal designs.

- There are always people who cannot use some or all
  of the product

Therefore, Universal Design must be approached – and presented -
<u>as a process only</u>.

QUICK QUIZ:

Is a product "universally designed" if it requires the user to have or use an assistive technology?

This is a misdirected question.

- UD is not an outcome, but a process
- ***Did you try to make the product as usable as practical to everyone?***
  (Then you practiced UD even if it is not usable by someone – or even many.
  It may not be a good example of success, but it is an example of UD practice.)

In trying to practice UD – BOTH direct access and compatibility should be considered.

Think about accessible buildings or universally designed houses
and people who use wheelchairs.

Two General Types or Uses of AT

Adaptive AT - (Assistive Technology)

Adaptations to devices or environments.

Examples
- -- Screen readers
- -- Special keyboards
- -- Adaptive software

Personal AT

AT that acts as an extension of the person and enhances their general abilities.

Examples:
- -- Wheelchair
- -- Glasses
- -- Headstick, mouthstick, brace
- -- Personal remote console / controller

Basics of Interface Usability (and Accessibility)

General Concepts

- ***Much is the same.*** Designing for people with disabilities is, in many ways, the same as designing for the full range of "mass market consumers." If you do a good job of designing for the full range of the core market, then this will just amount to extending your skill set and tool kits.

- ***Much is different.*** Unfortunately, the sameness can cause you to miss the differences. And the differences within the same group.

- ***You can't create absolutely accessible products.*** You cannot design a product which is accessible to everyone. So you can't design a product that is "accessible."

- ***Cross-disability accessibility is achievable commercially.*** You can create very salable, profitable products that are cross-disability accessible.

- ***Conformance is commercially possible even without clear criteria.*** You can design products that meet or exceed a set of accessibility standards.

- ***Profitability is King.*** You can't really help anyone for long or across products if the design isn't profitable. Competitively profitable. Externally and internally.

- ***Don't look at numbers of people with disabilities.*** The goal is to incorporate those ideas that are commercially practical to allow people with the widest range of disabilities (or functional limitations) to use the product, and to do so in a way that makes the product more usable for all.

- ***Flexibility and alternatives are the keys.*** Not the "least common denominator" (this yields zero). Allow user flexibility and choice in information presentation and controls.

EXERCISE:

- We will be passing out a pillowcase with three devices in it.
- Do not touch or explore any but the device that is closest to you until I tell you otherwise.

THE SITUATION:

You checked into a new modern hotel. You look for a phone and you find this device with a phone handset attached. The handset is dead when you put it to your ear. There is a plastic card in a holder next to the device.

What problems do you have?

In order to use a product successfully a person must…

1. be able to _____.
   _____includes:
   1.1. _____
   1.2. _____
   1.3. _____
   1.4. _____
   1.5. _____
   1.6. _____

2. be able to _____
   2.1. _____
   2.2. _____
   (by_____, _____,_____, etc)
   2.3. _____
   2.4. _____
   2.5. _____
   2.6. _____

3. be able to _____
   3.1. _____
   3.2. _____

4. be able to _____
   complex products (as a part of 2 and 3)
   4.1. _____
   4.2. _____

5. be able to _____
   5.1. when necessary to achieve 2.2
   5.2. _____

NOTE: 5 should only be used IN ADDITION TO, not in lieu of directly being able to do 1 through 4 unless:

1. _____
2. _____
3. _____
   _____
4. _____

or – _____

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