Stefan Olafsson
HCI (IS4300) – Fall 2016

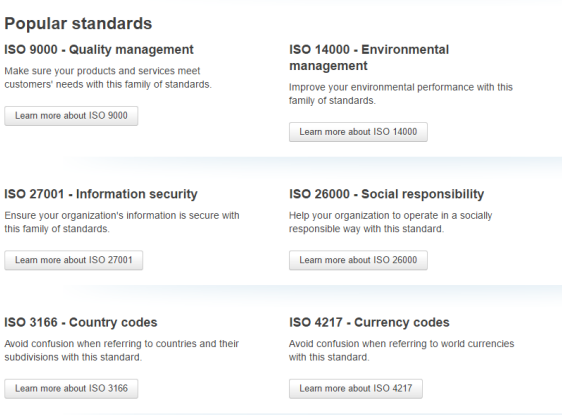
# Standards and Guidelines

## Overview

- HCI and Standardization
- Industry Design Guidelines

# Standards

- What?
  - Document of requirements, specifications, guidelines or characteristics
  - Shows that "*materials, products, processes and services are fit for their purpose*"
- Why?
  - Safety, reliability, and quality of goods and services




International Organization for Standards – iso.org

# Standardization Example

- *A Practical Guide to the CIF* – Mary Theofanos et al. 2006
- $46 million computer system kills business operations
  - Too complicated, difficult to learn, non-intuitive, etc.
- Problem
  - No consideration for usability during design
- Solution
  - Measures! (and the ISO/IEC 25062 Common Industry Format)

# Example cont.

- CIF format
  - For reporting results of **formal usability tests** with **quantitative measurements**

1. Measure the usability of the current system
   - Which measures and how to measure?
2. Identify and specify target usability requirements from users
   - There is a standard for that!
3. Measure the usability of the new system
   - Iterate

"*adopting the CIF and quantitative measurement is straightforward and easy*"

# A Mixed Blessing

- *HCI Standards: A Mixed Blessing* – Elizabeth Buie 1999

- Use of standards for HCI
  - Standardize the look and feel of an interface
  - Incorporate human factors research and 'best practices'
  - Smooth the HCI design process
  - Achieve mandated compliance (e.g. gov't laws)

- They should contain statements about the features of the product's HCI design

# A Mixed Blessing

- Two problems
  1. Standards address a small percentage of the questions that need to be answered during user interface design
  2. The use of standards seen as certifying usability

- Only one issue:

  HCI standards and guidelines cannot ensure a usable product

# A Mixed Blessing

- So, should I use them?
  - Yes, save time and energy where you can

- How to use a standard
  1. Select a standard
  2. Develop a project standard
  3. Apply the recommendations
  4. Revise and refine your project standard
  5. Inspect the design and completed output

# A Few HCI Related ISO Standards

- Human-centred design processes for interactive systems
- Ergonomic requirements for office work with visual display terminals (VDTs) (**17 parts**)
- Ergonomics of human-system interaction (**100+ parts**)
- Information technology — Software product evaluation — Quality characteristics and guidelines for their use.
- Information technology — Keyboard Layouts for text and office systems.
- Information technology — User System Interfaces
- Information technology — Software product evaluation

…

## ISO 15536-1:2005

Ergonomics -- Computer manikins and body templates

**This standard was last reviewed and confirmed* in 2014.**

**Therefore this version remains current*

### Abstract

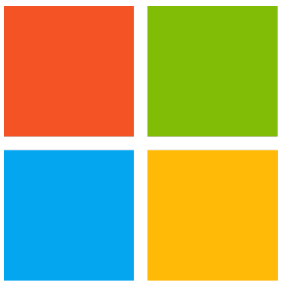
**Preview** ISO 15536-1:2005

ISO 15536-1:2005 establishes the general requirements for the design and development of computer manikins, body templates and manikin systems. It addresses their anthropometric and biomechanical properties, taking into account their usability and restrictions for structural complexity and functional versatility, and is also intended as a guide for the selection of manikins and manikin systems and for the evaluation of their accuracy and usability for the

# Design Guidelines

- Set of recommendations for developers
- Informed by
  - Usability studies
  - Design principles
- Benefits
  - Consistency
  - Extendibility

# Industry Design Guidelines

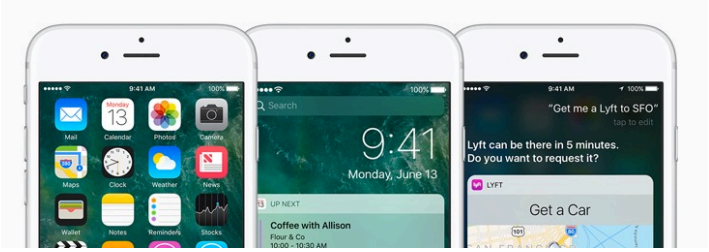




# Apple

## Design Guides

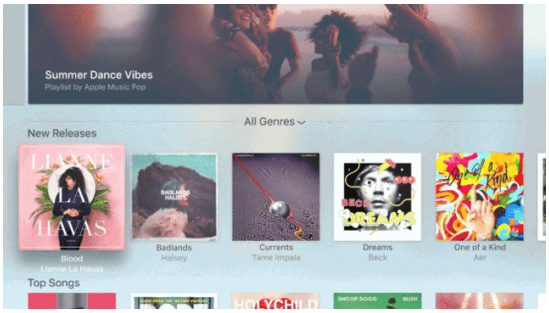
Get in-depth information on how to design successfully for Apple platforms with these standards and principles. Keep these details in mind as you plan your app.

| iOS | macOS | watchOS | tvOS |
|---|---|---|---|
| Human Interface Guidelines | Human Interface Guidelines | Human Interface Guidelines | Human Interface Guidelines |
| View Guidelines › | View Guidelines › | View Guidelines › | View Guidelines › |

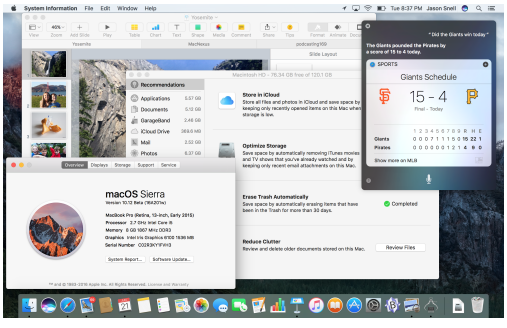



iOS

watchOS




tvOS




macOS

# iOS

- Themes
  - Clarity, deference, depth
- Principles
  - Aesthetic integrity
  - Consistency
  - Direct manipulation
  - Feedback
  - Metaphors
  - User control

# macOS Principles

- Mental model
- Metaphors
- Explicit and implicit action
- Direct manipulation
- User control
- Feedback and communication
- Consistency
- Forgiveness
- Aesthetic integrity

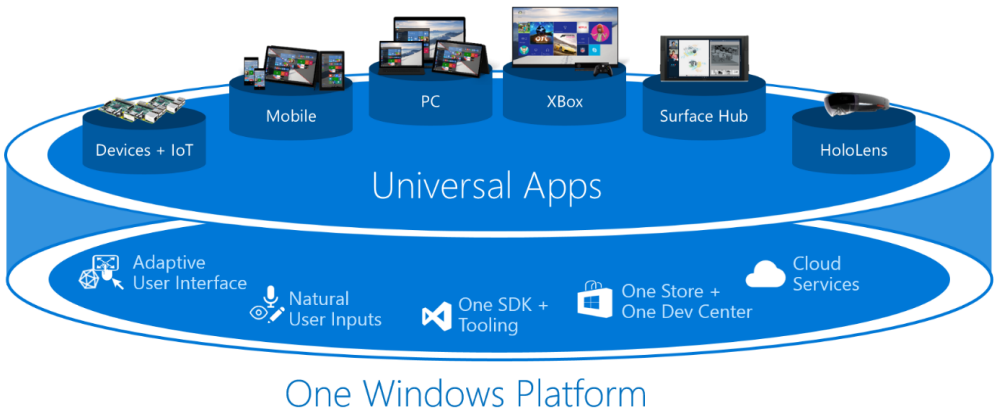
## watchOS Principles

- Glancable
- Actionable
- Responsive

## tvOS Principles

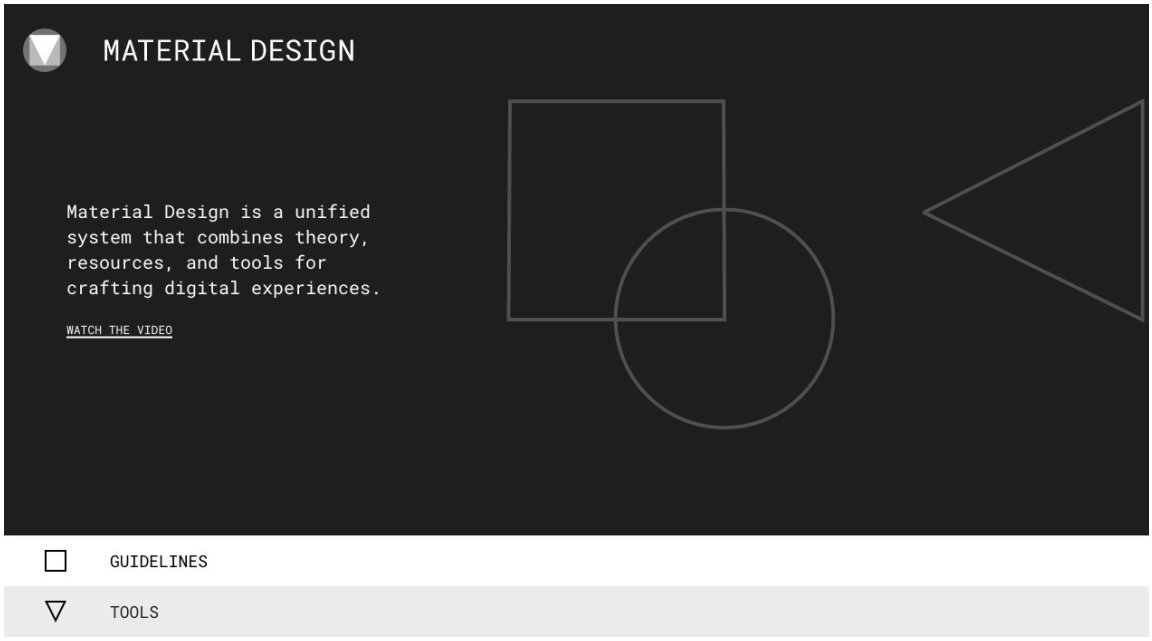
- Connected
- Clear
- Immersive

# Universal Windows Platform



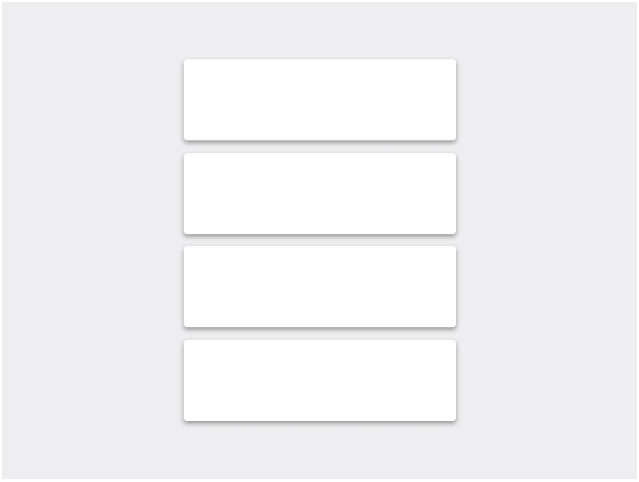

# UWP Principles

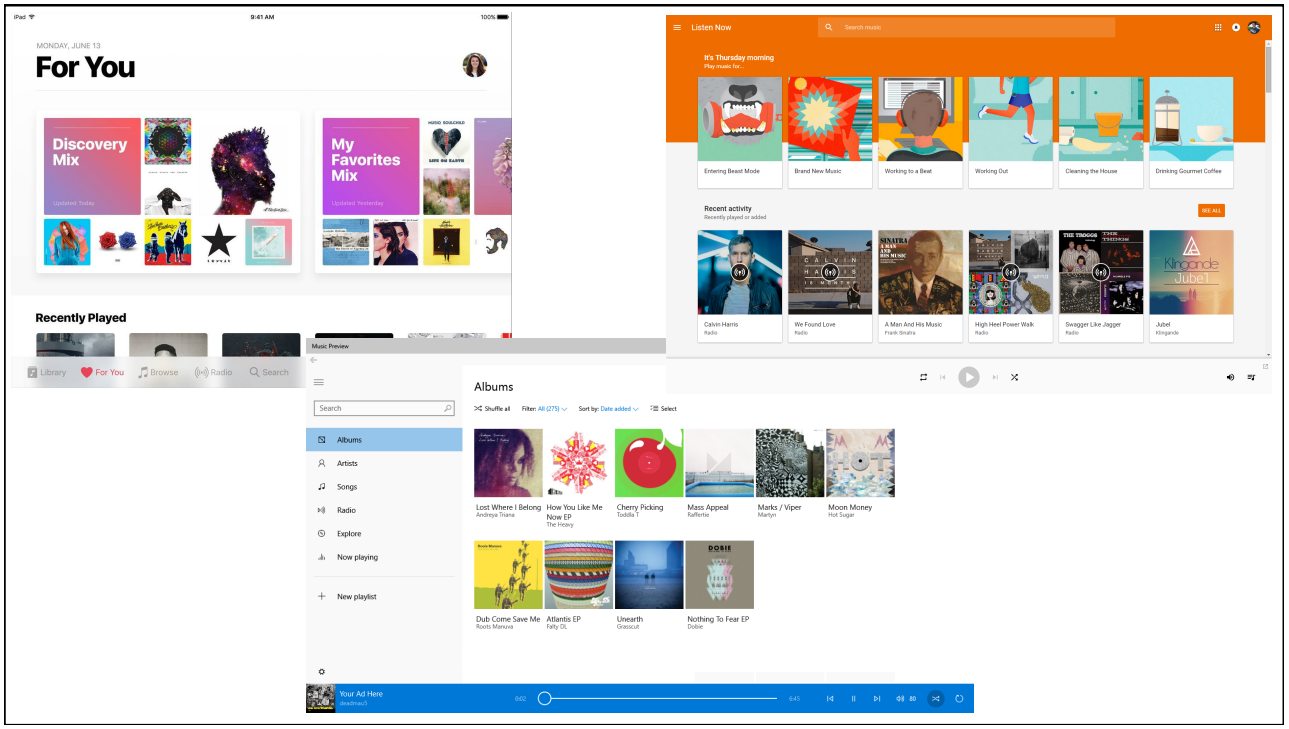
- Keep it simple
- Make it personal
- Think universal
- Create delight




# Google – Material Design

- Material is the metaphor
- Bold, graphic, intentional
- Motion provides meaning






# In with the old?

# Guideline Content Example

- Animation
  - Movement
- Style
  - Color, typography, icons
- Layout
  - Structure, UI regions
- Components
  - Widgets
- Patterns
  - Behavior: confirmation, errors

**Exercise:**

**Come up with guidelines for your project!**


IS4300 HCI
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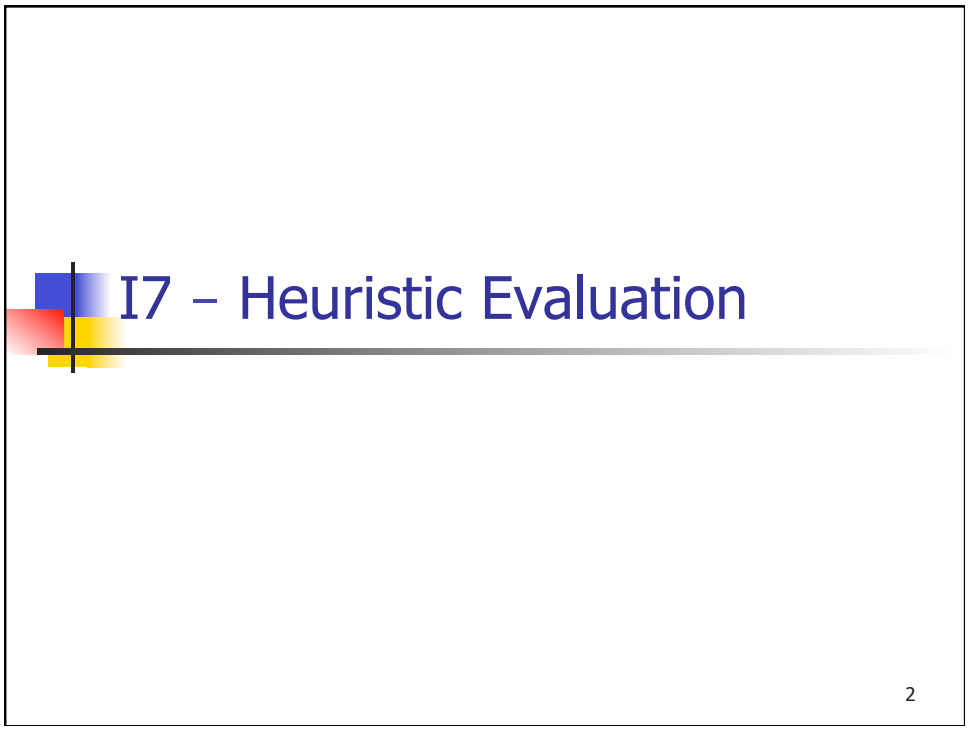
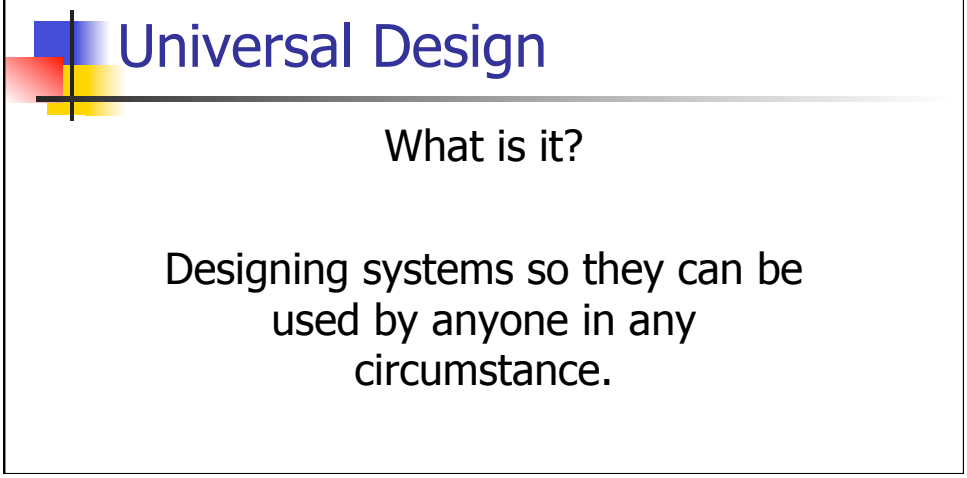
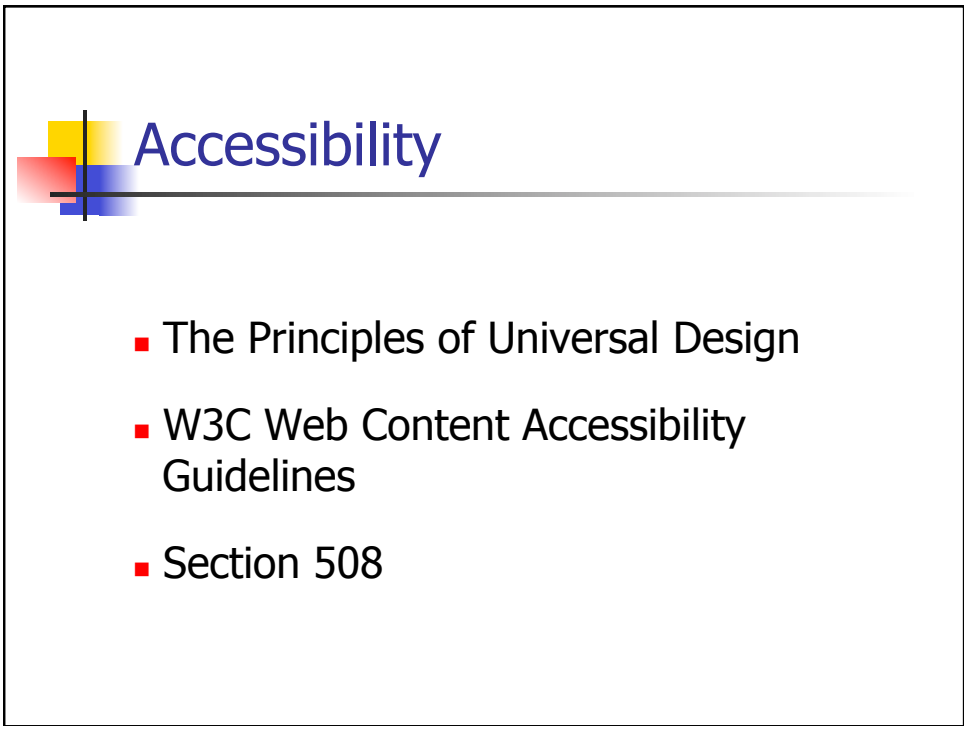

I7 – Heuristic Evaluation
2


Universal Design
What is it?
Designing systems so they can be used by anyone in any circumstance.


Accessibility
The Principles of Universal Design
W3C Web Content Accessibility Guidelines
Section 508

# Universal Design

# Universal Design: 7 Principles ('97, committee)

1. Equitable use
   - useful to all
2. Flexibility in use
   - range of ability
3. Simple & intuitive to use
   - literacy
4. Perceptible information
   - Regardless of user ability / Multiple modalities of output
5. Tolerance for error
   - E.g., unintended behavior
6. Low physical effort
   - Comfortable; minimize physical fatigue
7. Size & space for approach & use
   - Reached by all, regardless of mobility or physical ability

## US Stats

- 7M people visually impaired
- 1M people in are deaf
- 2.2M people in use wheelchairs
- 6.5M use canes or walkers

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## Multimodal Interfaces

- Why good for accessiblity?
- Complementary vs. Redundant info across channels

## Many kinds of Special populations

- Older adults
  - Enormous variability in physical & cognitive abilities, familiarity with technology
- Children
  - Abilities strongly indexed by age

## Health Literacy

A Significant Accessibility Issue in Healthcare.

# W3C Web Content Guidelines

- W3C Web Content Accessibility Guidelines
  - 14 general principles of accessible design
  1. *Provide alternatives to auditory and visual content*
  2. *Don't rely on color alone*
  3. *Use markup and style sheets properly*
  4. *Clarify natural language usage*
  5. *Create tables that transform gracefully*
  6. *New technology pages transform gracefully*

# Guidelines are Only Half the Story: Accessibility Problems Encountered by Blind Users on the Web

Chris Power, et al

CHI 2012

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# WCAG 1.0 – Web Content Accessibility Guidelines

- 1999 W3C Standard
- Promote web accessibility
- Prepare web content so people with disabilities could use
- The *de facto* standard for web accessibility

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# WCAG 1.0 – Web Content Accessibility Guidelines

- Succeeded in raising awareness
- Actual impact remains very low
  - Numerous studies
  - Heuristic/Expert evaluation
  - Algorithmic checking
  - User testing with disabled users
- General awareness high, specific awareness of guidelines low
- 30% of websites claiming conformance overstated level of conformance
- 22% of site owners surveyed had no knowledge

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# WCAG 1.0 – Web Content Accessibility Guidelines

- Usability evaluation of the Guidelines themselves highlighted many problems
  - Users found them confusing, hard to navigate, contradictory or ambiguous
- Evaluations have not demonstrated that a website that is fully conformant was more usable by people with disabilities
  - E.g., one study with disabled users found that only 27% of the usability problems were covered by the guideline

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# WCAG 2.0 – Web Content Accessibility Guidelines

- 2008
- Improved usability of Guidelines themselves
- Most problems remain
  - Web designers still find difficult to use (unable to reach 80% agreement on usability problems by panel of experts)
- Has not improved accessibility overall
  - Study: crawled 30M web pages, under 4% of elements met all standards.
- Power's study: websites that conform to WCAG 2.0 do not have fewer usability problems for disabled users compared to sites that do not conform.

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## Power et al's conclusions

- Many (most?) problems encountered by users are more fundamental design problems that any user would have with the websites.
- Problem-based guidelines are not the solution.
  - Identify common problems and recommend solutions.
- Overall usability testing with disabled users is a better approach.

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## Section 508

- Federal Guidelines
- IT used by federal depts must be accessible to people with disabilities.
- If you ever have to develop anything for the federal government
  - Including PowerPoint presentations!

# Research into Universal Design

- ACM SIGACCESS - Computers and Accessibility
- Annual ASSETS Conference

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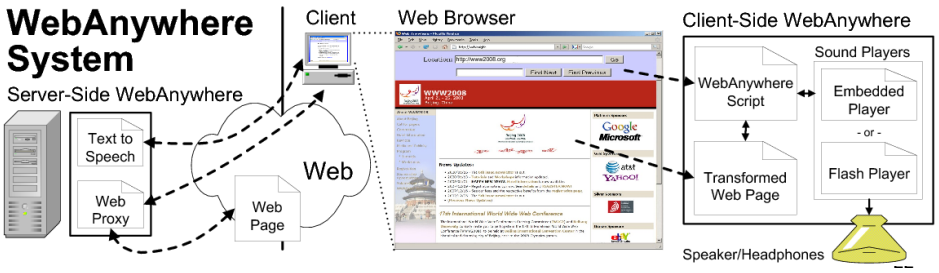
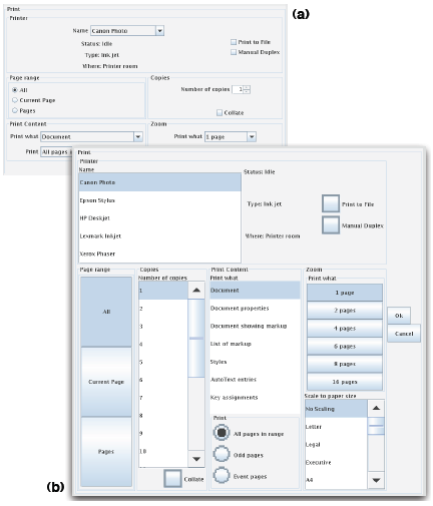
# Research: WebAnywhere Jeff Bigham, Rochester



# Research: SUPPLE
# Krzysztof Gajos (Harvard)

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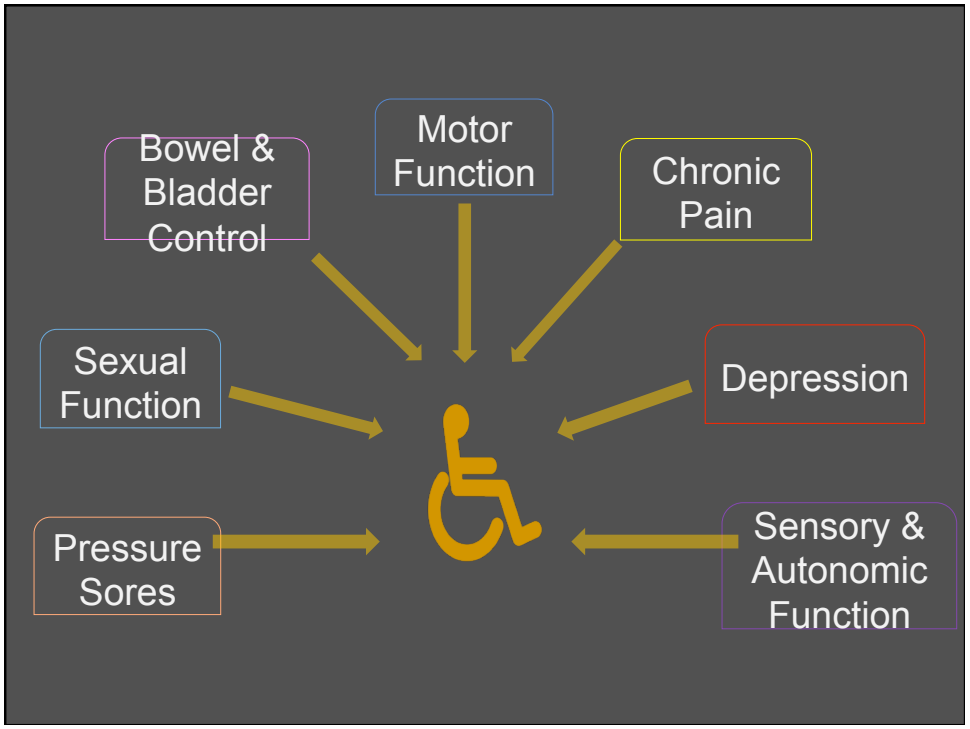
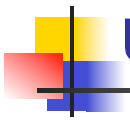
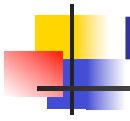

Bowel & Bladder Control
Motor Function
Chronic Pain
Sexual Function
Depression
Pressure Sores
Sensory & Autonomic Function

# SCI Project



## Universal Design

- Bottom line:
  - Know your users
  - Design for them
  - Have them evaluate your interface
  - Designing for disadvantaged users usually benefits everyone.
  - **Follow good Usability engineering practices!**



## Exercise – Project Groups

- Assume you must design for users who are blind.
- What needs to be modified?

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# To Do

- Review Usability Testing
  - Benyon Ch 10 & Nielsen Ch 6
- Finish P7 by next class (11/28)
  - Compile all feedback from heuristic evaluations
  - Combine duplicates
  - Rank the rest from critical to cosmetic
  - Address as many problems as you can
  - Report on all of the above

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