

# *International Standards: Their Scope, Quality, and Impact*

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- **Standards and Internationalization**
- **Motivations for Standards**
- **Types of User Interface Standards**
- **Overview of Organizations**
- **Areas of Standardization**
- **A Model for New UI Standards**

## *Standards and Internationalization (1)*

- **For localization or internationalization**
  - **Designer must follow all relevant local and regional and/or international standards, respectively**
  - **Another design constraint**
- **The potential: Make internationalization *easier***
  - **Local standards bodies may allow their own standards to be superceded by equivalent international and/or regional standards**
    - **e.g. ANSI, DIN, others**
  - **Designer can build to one international standard instead of numerous, possibly divergent, local standards**

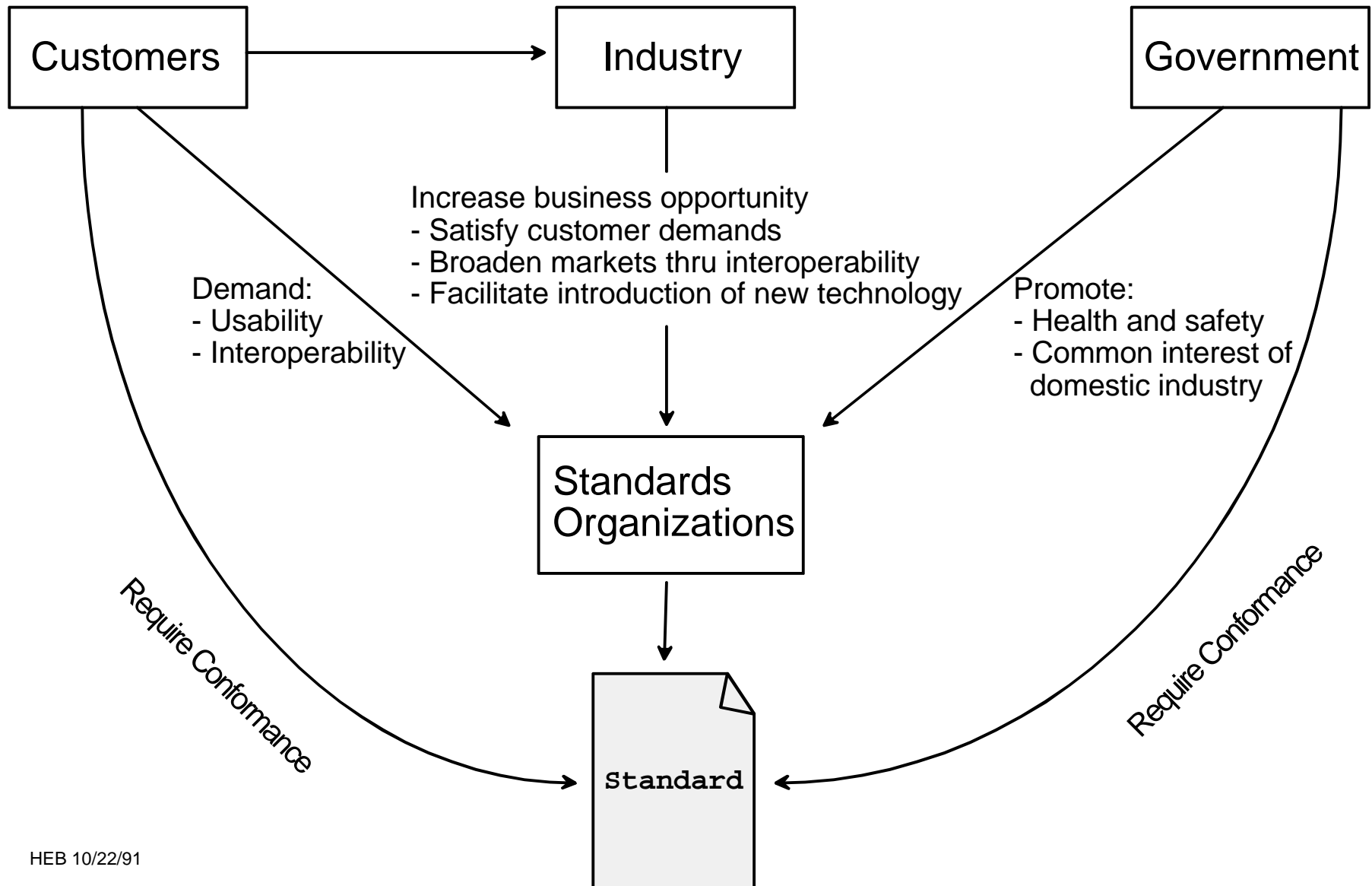
## *Standards and Internationalization (2)*

- **Solve some costly localization problems**
  - **International agreement on user interface elements to look and act the same worldwide**
  - **Example: E-mail icon**
    - **Mailboxes vary widely across countries**
    - **What if an agreement can be made on one symbol?**

## *Motivations for Standards*

- **Past success**
  - **ANSI/HFES 100**
  - **ISO VDT standards**
  - **ISO 9000 series**
- **Customer Demand**
  - **ease of use**
  - **interoperability**
- **New technology (Multimedia, the Web)**
- **Promote good user interface design**
- **“Solve” user interface problems**
- **Visibility of health and safety issues**
- **Politics and economics**

# Motivations and Significance of User Interface Standards



## *Factors Influencing Standards Development*

- Existing standards
- Interests of competing:
  - industries
  - nations
  - standards bodies
- Empirical data
- Current practice and de facto standards
- Expert and non-expert advice
- Future impact of a standard
- Dynamics of individual committees
- Time and resources available to a committee

## *Standards Implementation*

- **Customer/supplier Requirements**
  - **For purchasing or software development**
- **Customer/supplier Contracts**
- **Governments require conformance**
  - **Health and safety regulations, legislation**
  - **Government purchasing regulations**
- **User groups require conformance**
  - **For example, trade union contacts**

## *Types of User Interface Standards*

- **Implementation Standards**
- **Design Rules and Guidelines**
- **Design Process Standards**

## *Implementation Standards*

- **Consensus on exact form, appearance, and/or user action-sequences for user interface elements**
- **International, cross-company “requirements documents”**
- **Consensus is difficult to achieve**
  - **Exactness and specificity can sometimes be conceptually elusive**
- **Low success**
- **Examples**
  - **IEEE P1201.2 Standards for window system controls**
  - **ISO/IEC 11581 – screen icons**

## *Design Rules and Guidelines*

- **Agreement on general guidelines and design rules**
  - **Designers and developers can refer to rules while designing their products and services**
  - **Sample standard:**
    - **'Order options in a menu by frequency of use if conceptual organization not available'**
  - **High success**
  - **Example**
    - **Much (but not all) of ISO 9241 (Guidelines for work with VDTs)**

## *Design Process Standards*

- **Agreement on processes and procedures put in place by organizations to develop products and services**
  - **Make usability assessment and user-centered design procedures required steps in development life cycle**
  - **ISO 9000 – design process for quality**
- **Some notable success**
  - **Example**
    - **ISO 13407 on User-centered design process**

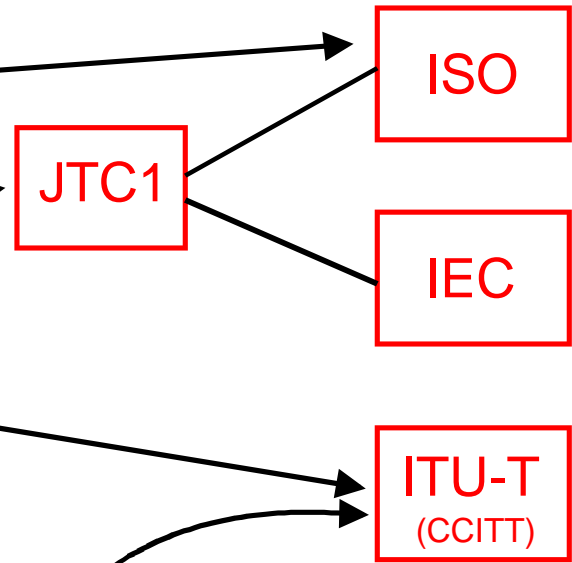
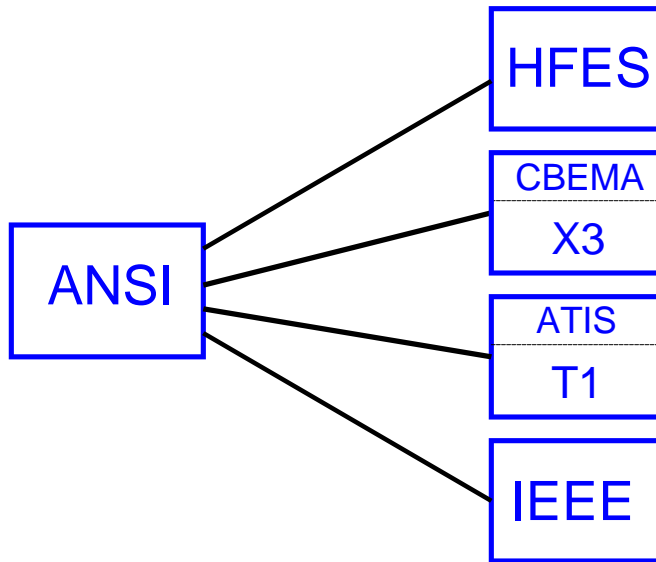
## *Other types*

- **Standards which specify a benchmark or minimum performance standard for usability or ergonomic characteristics**
- **Standardized test procedures and/or formats**

# Standards Organizations

DOMESTIC

INTERNATIONAL



Industry Forums



EUROPEAN



## *Standards Organizations: Overview*

- **ISO: International Organization for Standardization**
  - “Federation” of national standards organizations
  - Voluntary, consensus, non-UN, non-gov’t.
  - Cross-disciplinary industrial standards
  - Members not necessarily gov’t. (e.g. ANSI, BSI)
- **IEC: International Electrotechnical Commission**
  - Similar to ISO in mission, structure
  - Covers electricity and electronics

## *Standards Organizations: Overview (2)*

- **JTC1: ISO/IEC Joint Technical Committee 1**
  - Information technology standards
  - Joint venture to reduce ISO/IEC redundancies
- **CEN: Comité Européen de Normalisation**
  - European Community analog to ISO
- **Professional societies**
  - **Human Factors and Ergonomics Society (HFES)**
    - via US/ANSI
  - **IEEE (currently inactive in user interface)**

## *Standards Organizations: Overview (3)*

- **ANSI: American National Standards Institute**
  - **Voluntary, consensus standards, non-US government, non-profit**
  - **Manages private sector standards activities by accredited technical groups, professional societies, and trade associations**
- **NCITS (was “X3”)**
  - **U.S. Information Technology standards under ANSI**

## *Standards Organizations: Telecommunications*

- **ITU-T: International Telecommunications Union  
Technical Standards**
  - Formerly CCITT
  - ITU committee, some treaty relationships, UN
  - “Recommendations” often very powerful via PTTs
  - Membership:
    - Administrative (PTTs, telcos)
    - RPOAs (Recognized Private Operating Agencies)
    - SIOs (Scientific and Industrial Organizations)
- **ETSI: European Telecommunications Standards Institute**
  - Regional European analog to ITU-T
  - Greatly influences ITU-T at times

## *Standards Outside of the Traditional Structure*

- **Industry Forums and Consortia**
  - **Formed outside of established agencies, often in response to a problem area**
    - **Open Software Foundation (OSF)**
    - **Information Industry Association (VMUIF)**
  - **Activity may later transfer to established agency**
  - **May have different or weaker due process procedures**
  - **Particularly important due to the Internet**
    - **IETF: Internet Engineering Task Force**
    - **W3C: World Wide Web Consortium**

## *Standards Outside of the Traditional Structure (2)*

- **De facto standards, Industry leaderships**
  - **May lack official agreements**
  - **Standards defined in practice or openly offered from a company**
  - **Power from market dominance or competitive opportunity**
  - **Sun: Java**
  - **Microsoft and Microsoft Windows**

## *Areas of Standardization*

- **Hardware: Workplace/Workstation, Environment, VDTs**
- **Software: User-Computer Interaction**
- **Telephony and Interactive Voice Response**
- **User-Centered Design Process**
- **Multimedia**
- **Information Services, WWW/Internet**
- **Accessibility**

## *Hardware: Visual Display Terminal Workstations*

- **ISO TC 159 (Ergonomics)**
  - **ISO 9241 on ergonomics of VDTs**
  - **Essentially complete, most parts available**
  - **Other standards**
    - **ISO 9355: Displays and Control Actuators**
    - **ISO 11064: Control Centers (layouts, displays)**
    - **ISO 13406: Flat Panel Displays**
- **HFES**
  - **US (ANSI) standards on ergonomics of workstations and anthropometry**

## *Hardware: VDT Workstations (2)*

- **ISO/IEC JTC1 SC35**
  - **“User Interfaces”**
    - **was: Text and Office Systems**
  - **ISO/IEC 9995: Keyboard layouts published**
    - **Zones defined for where keys go**
    - **Specific key assignment left for national bodies, e.g. ANSI keyboard standard**
  - **New work on keyboards for laptops**
  - **New work on segmented keyboards**
  - **TR 15440 “Technical report of future keyboards and other associated input devices and related entry methods”**

## *Software: User-Computer Interaction*

- **ISO TC159 SC4 WG5**
  - **ISO 9241: Parts 10-17 Software ergonomics with VDTs**
    - **Menus, forms, direct manipulation, user guidance, commands, presentation**
    - **May be completed by end of year**
    - **Documents dominated by guidelines-style recommendations**
    - **Adopted compromise position eliminating most “shall” statements**
    - **Testing as alternate conformance mechanism might return as issue**
    - **Checklists not required but prominent as appendices**

*ISO 9241: Ergonomics of Visual Display Terminals*

Part	Title
1	<i>General Introduction</i>
2	<i>Guidance on Task Requirements</i>
3	<i>Visual Display Requirements</i>
4	<i>Keyboard Requirements</i>
5	<i>Workstation Layout and Postural Requirements</i>
6	<i>Environmental Requirements</i>
7	<i>Display Requirements with Reflections</i>
8	<i>Requirements for Displayed Colors</i>
9	<i>Requirements for Non-keyboard Input Devices</i>
10	<i>Dialogue Principles</i>
11	<i>Guidance on Usability</i>
12	<i>Presentation of Information</i>
13	<i>User Guidance</i>
14	<i>Menu Dialogues</i>
15	<i>Command Dialogues</i>
16	<i>Direct Manipulation Dialogues</i>
17	<i>Form-filling Dialogues</i>

## *Software: User-Computer Interaction (2)*

- **ISO/IEC JTC1 SC35**
  - **“User Interfaces”**
  - **ISO/IEC 11581 Icon Symbols and Functions**
    - **standard pictures for common office software icons**
    - **Completed and issued:**
      - **Part 1: General**
      - **Part 2: Object Icons**
      - **Part 3: Pointer Icons**
      - **Part 6: Actions Icons**
    - **In preparation:**
      - **Part 4: Control icons**
      - **Part 5: Tool icons**

## *Software: User-Computer Interaction (3)*

- **ISO/IEC JTC1 SC35 con't**
  - **Cursors – published**
  - **ISO/IEC 14754 Information technology – Pen based interfaces – Common gesture for text editing with Pen based systems (published)**
    - **Standards for gestures in pen-based input**
  - **In progress: ISO/IEC 18021 Information technology – User interfaces for mobile multimedia communication devices**
    - **Personal digital assistant devices and smart phone communicating wirelessly with remote servers**

## *Software: User-Computer Interaction (4)*

- **UNIX Windowing System Standards**
  - No longer highly visible: COSE Motif, X/Open
- **HFES**
  - US (ANSI) standard alignment with ISO
  - ANSI/HFES Standards development on color, voice recognition, accessibility and telephony
- **IEEE**
  - No activity, IEEE P1201.2 on GUI “driveability” withdrawn

## *Telephony and IVR*

- **ISO/IEC JTC1 SC18 WG9 (Text and Office Systems)**
  - **ISO/IEC 13714 Voice messaging systems – published International Standard**
- **ITU-T Study Group 2 (New Services – Human Factors)**
  - **Guidelines for interactive voice response (published)**
  - **Q and Z on 7 and 9 on the dialpad (published)**
  - **Pictograms for telephony equipment and documents**
  - **Standard method for evaluating of pictograms and icons**
  - **Common international network tones**

## *Telephony and IVR (2)*

- **ITU-T Study Group 10**
  - **G-interface specification standard published**
    - **GUI for internetwork OAM&P (window systems for telecommunications network management)**
  - **Renewed interest in user interface specifications at last meeting (“Design Principles”)**
- **HFES**
  - **Standards on IVR, voice recognition, and audio output**

## *HFES Human Computer Interaction Standards Committee*

### **ANSI/HFES 200 Current Outline and Status**

<u>Section</u>	<u>Title</u>	<u>Status</u>
1	<i>Introduction</i>	<i>In Voting</i>
2	<i>Accessibility</i>	<i>In Voting</i>
3	<i>Interaction Techniques</i>	<i>ISO documents</i>
	<i>User Guidance, Direct Manipulation, Forms Fill-In, Menus, Command Languages</i>	
4	<i>Visual Presentation</i>	<i>ISO documents and new drafts</i>
	<i>Presentation, Coding of Information, Color, Windows and Window Systems</i>	
5	<i>Voice Input/Output and Telephony</i>	
	<i>Voice Recognition</i>	<i>Held back</i>
	<i>Non-speech Auditory Output</i>	<i>Held back</i>
	<i>Interactive Voice Response</i>	<i>In Voting</i>

## *User Centered Design Processes*

- **ISO TC159 SC4 WG5 (Software Ergonomics)**
  - **ISO 9241 Part 11: Usability**
  - **ISO TC159 SC4 WG6 (UCD Process)**
  - **ISO 13407: Human-Centered Design Process for Interactive Systems**
- **ITU SG10 (Telecom network management)**
  - **Proposals for design principles for human-machine interface**

## *Multimedia (1)*

- **ISO TC159 SC4 WG5**
  - **ISO 14915: Multimedia User Interface Design**
    - **Currently drafts going through voting process**
    - **Part 1: Introduction and Framework**
    - **Part 2: General Design Issues ... Control and Navigation**
    - **Part 3: Media Combination and ... Requirements for Individual Media**
    - **Part 4: Domain Specific Multimedia Aspects**

## *Multimedia (2)*

- **IEC TC 100 (Audio, Video, and Multimedia Systems and Equipment)**
  - **New work item: Guidelines for the User Interface for Multimedia Equipment for General Purpose Use**
  - **Larger scope than ISO 14915: beyond computers to include household devices, TVs, video**
  - **Larger scope of users and accessibility issues**
  - **Potential conflict with ISO**
  
- **ISO/IEC JTC1 SC35**
  - **New work item: ISO/IEC 18035 Information technology – Icon symbols and functions for controlling multimedia applications**
    - **(Approved and in preparation)**

## *Information Services, Internet, WWW*

- **World Wide Web Consortium**
  - **Definition of HTML**
  - **No user interface committee**
  - **Active on accessibility of web and web pages**
  - **Deliberately avoided work on usability**
- **ISO TC159/SC4/WG5**
  - **New work item proposal on Internet design – as part of Multimedia work**
- **ISO/IEC JTC1 SC35**
  - **NWI: ISO/IEC 18035 Icon symbols and functions for World Wide Web browsers**
- **ITU-T**

## *Information Services, Internet, WWW*

- **Global Standards Conference, Brussels 1-2 Oct. 1997**
  - **Facilitate “timely and coherent development” of the Global Information Society/Global Information Infrastructure (GIS/GII)**
  - **Resolve standards issues**
  - **Promote interoperability for GIS/GII**
  - **Steering committee**
    - **US, Europe, Japan, Canada, ISO, IEC, ITU-T**
  - **Topics: Electronic commerce, public services (e.g. libraries), individual use (e.g. interactive games), communications infrastructure**

## *Information Services, Internet, WWW (2)*

- **US: ANSI IISP (Information Infrastructure Standards Panel)**
  - **Accelerate development of standards crucial to Global Information Infrastructure (GII)**
  - **Covers: cable TV and set-top box based systems, customized information systems and video, WWW and the Internet**
  - **Identify needs for standards and solicit development**
  - **User interface and accessibility needs identified**

## *Accessibility (Universal Access)*

- **ISO TC159 SC4 WG5**
  - **Technical Report on Accessibility**
    - ISO re-wrote HFES document as ISO TS 16071
  - **Will migrate to standard**
- **IEC TC 100**
  - **Accessibility in working standard on Multimedia**
- **World Wide Web Consortium**
  - **Web Content Accessibility Guidelines**
  - **Draft: User Agent Accessibility Guidelines**
- **HFES**
  - **ANSI/HFES 200.2 on Accessibility in Voting Stage**
  - **Basic accessibility requirements**
  - **Usability requirements: make systems easier to use for people with disabilities**
- **NCITS - Information Technology Industry Council (US)**
  - **Alternative Interface Access Protocols**

**ISO TC159 SC4 WG5**  
Ergonomics

*Vote  
July 1999*

NWI  
Accessibility

ISO  
TS 16071

ISO  
Accessibility  
Standard

EC

Global  
Industry

**HFES / ANSI**  
Human Computer Interaction

*Document  
Contribution  
1998-1999*

HFES HCI  
Accessibility  
Document

HFES  
200  
Part 2

Review &  
Voting

Review &  
Voting

ANSI  
Standard

ANSI  
Standard

Domestic  
Industry

*Harmonization  
May 1999*

2Q 2000

??  
?

**US Government**

2Q 2000

US Legislation:

- ADA
- Sec 508
- Telecom Act

EITAAC

Access Board  
Standards for Electronic  
and Information Technology

DoD

Federal  
Gov't

W3C/WAI

Ref Pr. 1, 2  
checkpoints

## *HFES 200.2: Software User Interfaces – Accessibility*

- **Goal: Make software easier to use for people with disabilities**
  - **Focus is on usability and not accessibility per se**
  - **No statements requiring systems to be accessible**
  - **One goal is to reduce need for add-on hardware**
    - **Design systems with features to make them usable “out of the box” to people with disabilities (e.g. build in control over font size, sticky keys)**
  - **Second goal is to increase usability of systems operating in combination with assistive technologies**
    - **Provide operating system “hooks” to work with assistive hardware**
      - **e.g. make text available associated with pictures/icons for screen readers**
    - **Increase usability of assistive systems**
      - **e.g. make controls for accessibility features accessible for people with that disability**
- **Surprise: The boundary between usability guidelines “for disability” and “general” guidelines is fuzzy**

## *A Model for Creating New UI Standards*

- **When is a content area ready for standardization?**
- **Four areas of evaluation (Blanchard 2000, 2001)**
  - **Maturity of Technology**
  - **User Benefit**
  - **Implementation**
  - **Specificity**

## *Maturity of Technology*

- **User interface technology:**
  - **Standardize when new, just developing**
  - **Standardize when mature**
- **Early:**
  - **No entrenched user bases to certain solutions**
  - **Less understanding of user interface**
- **Late:**
  - **Body of knowledge and user data has accumulated**
  - **May be too late to change things**

**Issues which are likely to be somewhat arbitrary may benefit from early standardization**

**Difficult issues are best left for the state of the art to mature**

## *User Benefit*

- **Can we demonstrate that standardization will benefit users?**
  - **This is not always easy to empirically prove**
  - **General research shows consistency can be good**
  - **Often little research to show benefits from specific aspects of consistency (e.g. standardized close box on windows)**

**Nevertheless, this seems an essential consideration**

## *Implementation*

- **Is it reasonable to expect industry to implement the standard?**
  - **Will it be accepted?**
  - **Will logistical problems exist for implementation?**
  - **Politics or commerce (competitive pressures) may exist to block acceptance of standardization**

**It's not worth the effort to standardize if it's impossible to implement**

**These issues can lead to difficult judgements: When should compromises to ideal solutions be accepted to make a standard acceptable?**

## *Specificity*

- **Can a standard be defined which is specific enough to be useful to the users of the standard?**
- **Can reasonable and acceptable conformance procedures be defined for a standard?**

**Can motivations for the development of new standards be made clearer by formalization? Will it improve standards?**

## *Further information*

- **Books:**
  - **Smith, W. J. (1996). *ISO and ANSI Ergonomic Standards for Computer Products*. Prentice Hall.**
- **Articles:**
  - **SIGCHI Bulletin — quarterly column: Blanchard**
    - `http://www.acm.org/sigchi/bulletin`
  - **HFES Bulletin — occasional column: Williams**