



NANYANG
TECHNOLOGICAL
UNIVERSITY

Usability

CZ2004 Human–Computer Interaction

Usability of Interactive Systems

- Reading - Textbook
 - Chapter 1.1, 1.2, 1.3, 1.4, 1.5
- Goal:
 - Give you an overview to interactive systems
 - Topics to be overviewed
 - Review of HCI, motivation for usability study
 - Usability Requirements
 - Usability Measurements
 - Usability Motivations & Application types
 - Universal Usability

Part 1:

Review of HCI, Motivation for Usability Study

Introduction & Review (1)

- The Interdisciplinary “**Design Science**” of Human Computer Interaction (HCI) combines knowledge and methods associated with professionals including:
 - **Psychologists** (incl. Experimental, Educational, and Industrial Psychologists)
 - Computer **Scientists**
 - Instructional and Graphic **Designers**
 - Technical **Writers**
 - Human Factors and Ergonomics **Experts**
 - **Anthropologists** and Sociologists

Introduction & Review (2)

- UIs affect individual users lives
 - *Airplanes, cars, trains, ships*: Pilots/drivers fly/driver/sail more safely
 - *Decision support*: a doctor's diagnosis and treatment
 - *Education and training*: Many aspect, think about the edventure system
 - *Leisure*: music and sports information
 - *Games*: on-line communities and entertainment

Introduction & Review (3)

- UIs affect entire Communities
 - *Business use*: financial planning, publishing applications
 - *Industries and professions*: web resources for journals, and career opportunities
 - *Family use*: entertainment and communication
 - *Globalization*: language and culture
 - *Virtual Society*: Facebook, YouTube, ...

Experience with UI

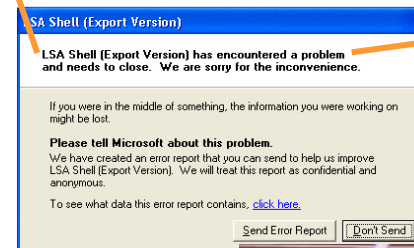
- UIs make our daily and collective lives either pleasant (or frustrating)



Pleasant

See: <http://www.g-mark.org/english/>

LSA Shell (Export Version) has encountered a problem and needs to close. We are sorry for the inconvenience.



Turn down the TV?



inconsistency



Frustrating

See: <http://www.baddesigns.com>

HCI is a discipline

- Recently a steady interest in UI design
- Factors for UI design are incredibly dynamic
 - [Different Displays]:
UIs for displays in handheld, desktop, to wall size
 - [Users Groups]:
Users span from novice to expert, to elderly and children
 - All with different user patterns and abilities
 - [Market pressure] is great
 - Areas such as mobile phones, competition is fierce

Part 2:

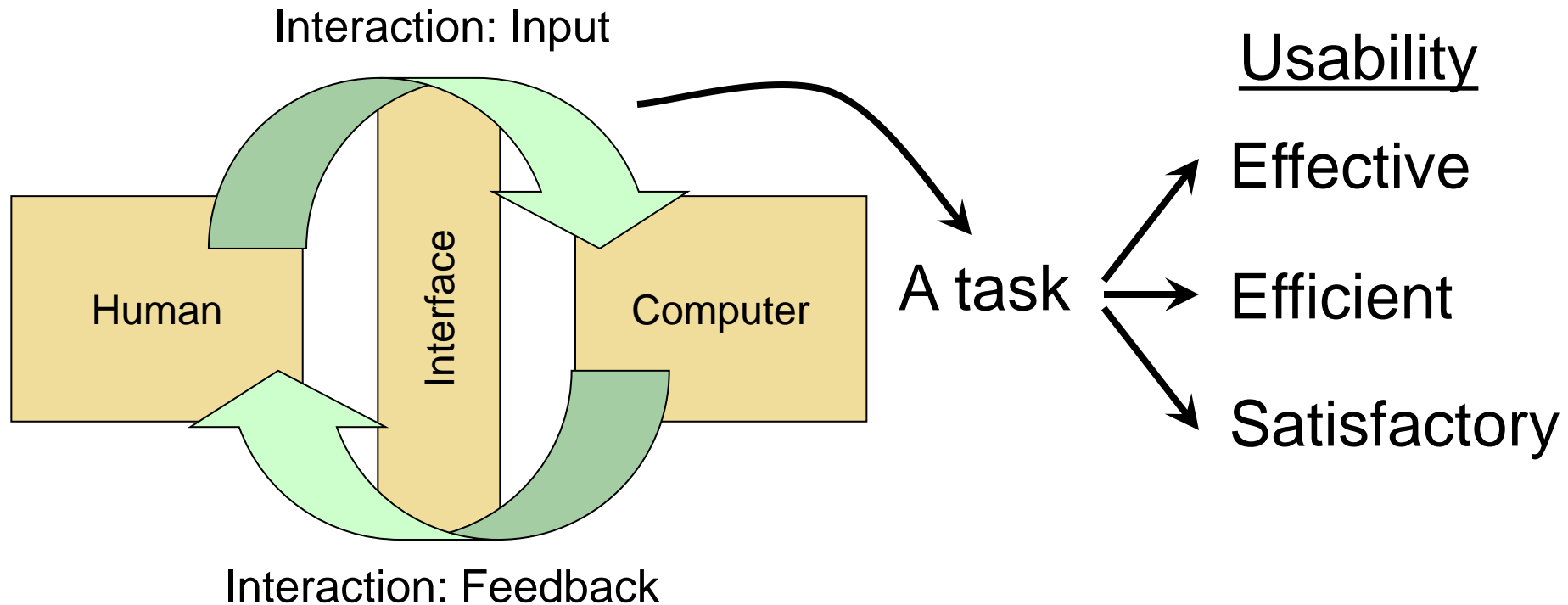
Usability Requirements

Basic Design Goal

“We all want to design good and useful systems”

- There are practical and principled ways to achieve this. The first, before any work begins, is to think through the problem/task.
- “Usability Requirements”
 - This is more than just having the goal of “user-friendly”
 - Needs thoughtful planning, sensitivity to user needs, devotion to requirement analysis and diligent testing, while keeping within budget and schedule

What is Usability...



We have all heard “User-Friendly”

- Definitions for “user-friendly” can be:
 - Easy to use
 - Accessible
 - Comprehensible
 - Intelligible
 - *Idiot proof*
- The above definitions are *subjective* and *vague*. Instead, a systematic process is necessary to develop usable system, not just say “let’s make it user friendly”
- Hence, we need:
 - 1) *Usability requirement analysis*: Topic 2 in this module note
 - 2) *Usability Measurements*: Topic 3 in this module note

Goals for Usability Requirements

Four goals for Usability Requirements (UR):

1. Ascertain the user's needs
2. Ensure proper reliability
3. Promote appropriate standardization, integration, consistency, and portability
4. Complete projects on schedule (and within budget)

Goals for requirements analysis

1. Ascertain the user's needs

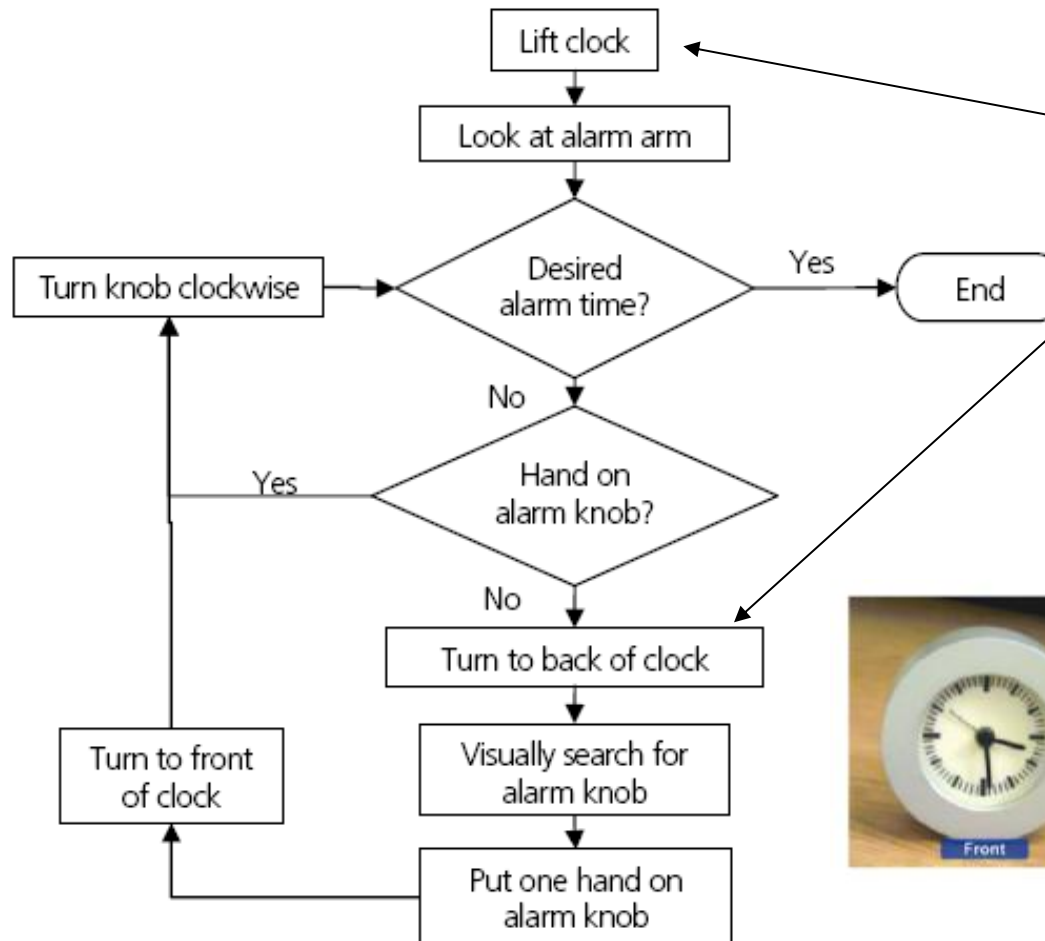
- Find out what tasks & subtasks must be carried out
- Include all tasks
 - [Daily Use] Common tasks are easy to identify
 - [Necessary Use] Not very frequent actions
 - [Edge Case] Occasional/exceptional/rarely-used tasks for emergency, repairing tasks for errors, configuration, etc.
- Functionality must match user's need; else users will reject or underutilize the product
 - Inadequate functionality frustrate users – rejected!
 - Excessive, probably the more common mistake of designers, is also danger, because the complexity makes *implementation, maintenance and learning* more difficult.

Task Analysis Example

Task : Set alarm to 8 o'clock

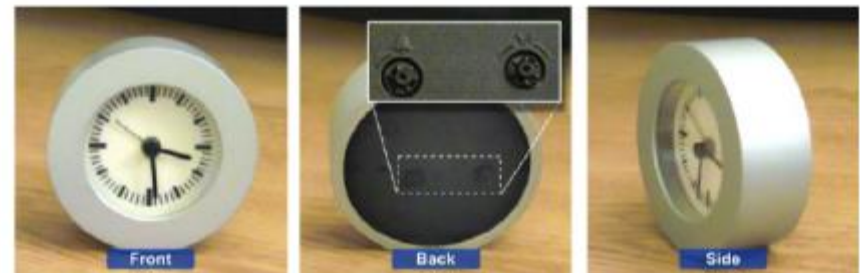
Correct sequence of actions:

Usage scenario analysis



Serious task analysis

- * Think about the **Detail** !!!
- * Anything we can learn from this diagram?



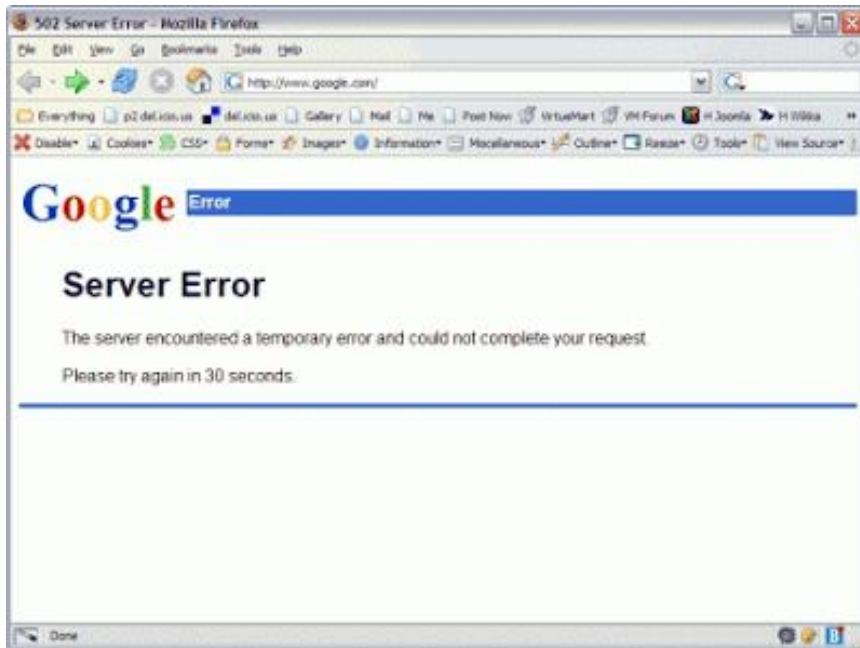
Goals for requirements analysis

2. Ensure reliability

- Actions must function as specified
- Data on screen must reflect actual database value
- Be sensitive to the user's sense of mistrust
 - Only a few errors and the user will not use your system.
 - Users trust is *fragile*! This is even more true in real world market.
- The system should be available as often as possible
 - No offline or long waits
- The system must not introduce errors
- Ensure the user's privacy and data security by protecting against unwarranted access, destruction of data, and malicious tampering

Reliability Example

- Ever saw this?
- How many times can Google be “down” before you switch to another engine?



Google.com was down for a few minutes on 17th August 2013, SG



Credit: GoSquared (UK time)

http://news.cnet.com/8301-17938_105-57598978-1/google-outage-reportedly-caused-big-drop-in-global-traffic/

Goals for requirement analysis

3. Promote standardization, integration, consistency, and portability

- *Standardization*: use pre-existing industry standards where they exist to aid learning and avoid errors
 - *Slight differences* not only increase learning times but also lead to annoying and dangerous errors
 - *Gross differences* require substantial retraining and burden users, e.g. incompatible storage formats, software versions, etc. cause frustration, inefficiency and delay.



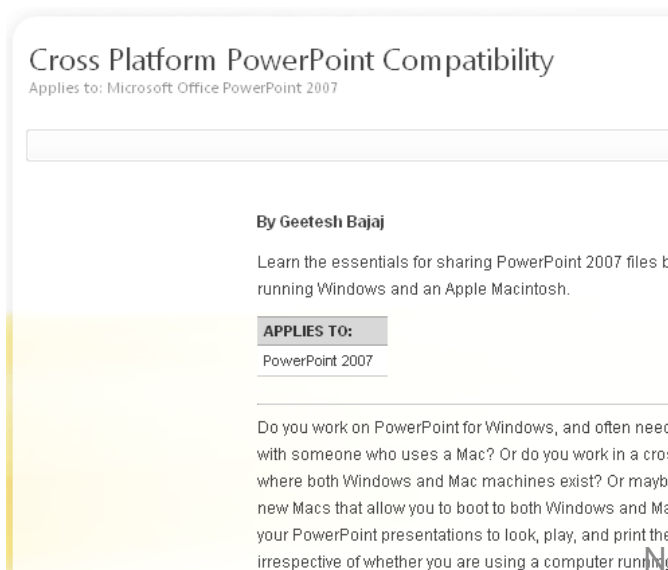
Goals for requirement analysis



Note the arrangement of 1-9 on the number pad

Goals for requirement analysis

3. Promote standardization, integration, consistency, and portability – (continued)
- *Integration*: the product should be able to run across different software tools and packages (e.g. Unix)
 - E.g. If file formats are used consistently, user can apply multiple applications to transform, refine or validate their data.



■ The new versions of PowerPoint for Windows and Mac are PowerPoint 2007 and PowerPoint 2008 respectively – they both save presentation files to the PPTX file format. They can also save to the older PPT file format but that could mean losing out on some of the new features in PowerPoint 2007 and 2008.

■ In some cases, it is possible to download an update that lets some of the older versions of PowerPoint save and read PPTX files.

Goals for requirement analysis

3. Promote standardization, integration, consistency, and portability – (continued)

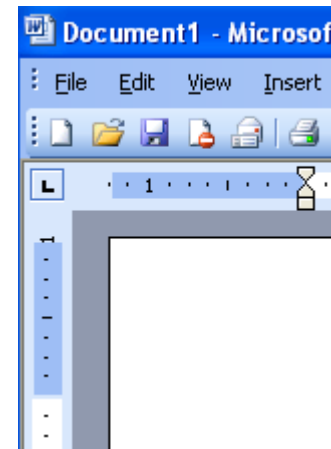
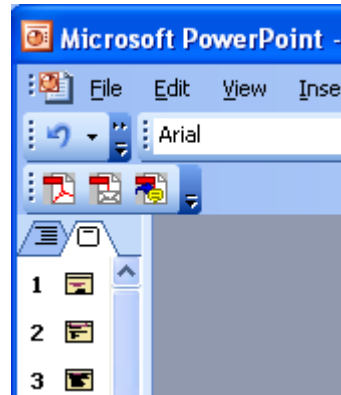
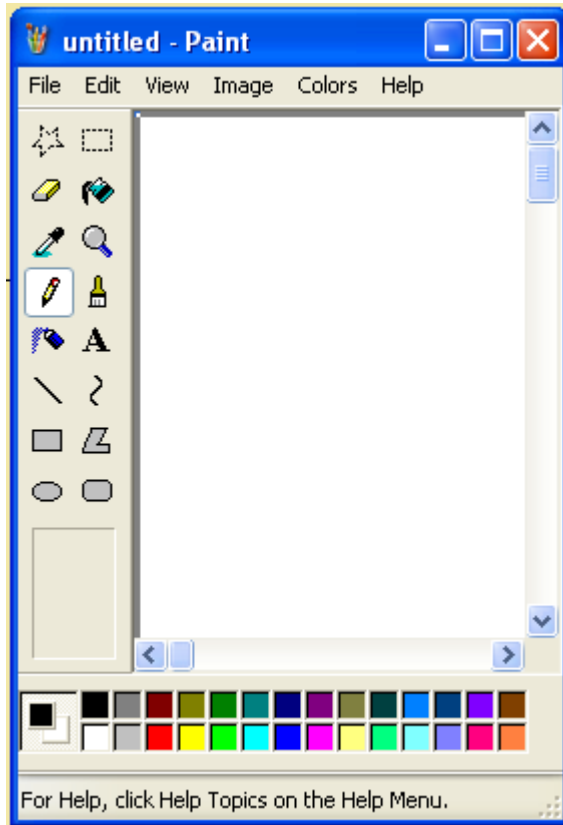
– *Consistency:*

- Compatibility across different product versions
- Compatibility with related paper and other non-computer based systems
- Use common action sequences, terms, units, colors, etc. within the program

– *Portability:*

- Allow for the user to convert data across multiple software and hardware environments
- Some UI building tools can generate user interface code for Mac, Windows, Unix, etc.

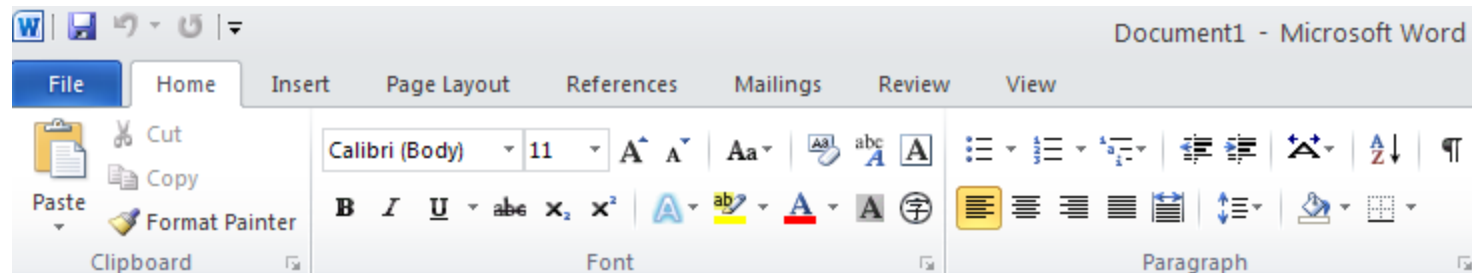
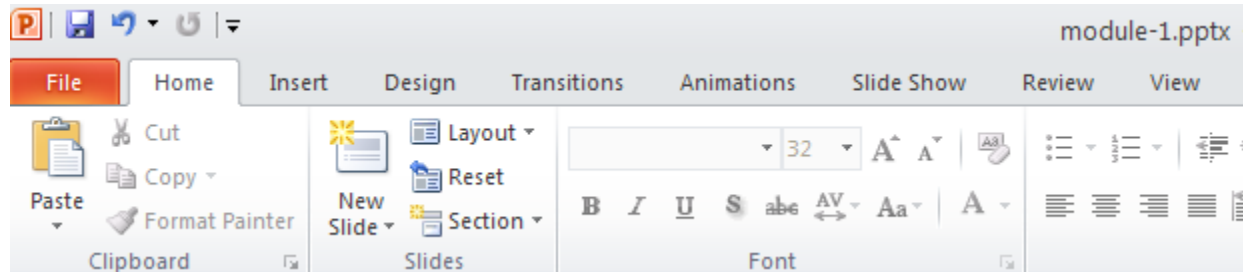
Consistency: Key to Windows



Windows consistent menus: File Edit View . . .

Even for new applications you have never seen, the users knows where to go to load/save files, cut-and-paste, change view, etc.

Finishing with re-learning Windows 7?



Windows 8



<http://www.youtube.com/watch?v=-jIUC-nMU4A>

<http://windows.microsoft.com/en-SG/windows-8/meet#t1=livetiles>

It aims at consistency
across different devices, but.....

Windows 10...



Windows 10 introduces what Microsoft described as "[universal apps](#)"; expanding on Metro-style apps, these apps can be designed to run across multiple Microsoft product families with nearly identical code—including [PCs](#), [tablets](#), [smartphones](#), [embedded systems](#), [Xbox One](#), [Surface Hub](#) and [Mixed Reality](#).

Consistency Across Platforms

- Apples QuickTime
 - Looks the same on Apple and Windows
 - Very distinct “Apple-Style”



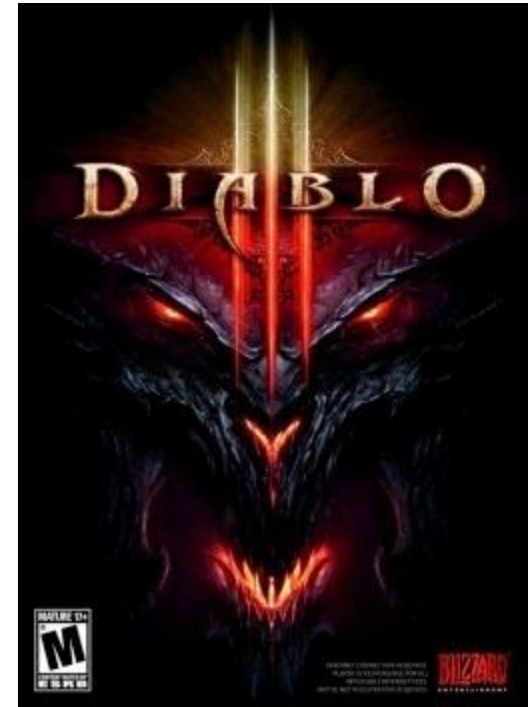
Goals for requirement analysis

4. Complete projects on time and within budget

- If an in-house system is delivered **late**, other projects may be affected, and the disruption may cause managers to choose to install an alternative system.
- If a commercial system is too **costly**, customer resistance may emerge to prevent widespread acceptance, allowing competitors to capture the market.

A case study: failed goal of Blizzard?

- “Diablo 3”
 - Time line:
 - Development began in 2001
 - Jun 2008: officially announced
 - Sep 2011: CLOSED beta test
 - May 2012: Launch
 - Shown at Blizzard Worldwide Invitational 2008 demonstration
 - Sold 3.5 million copies in the first 24 hours of its release

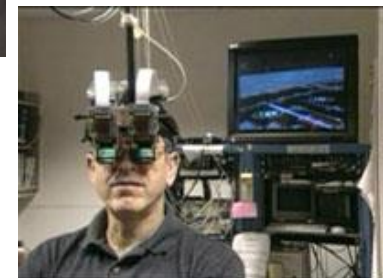
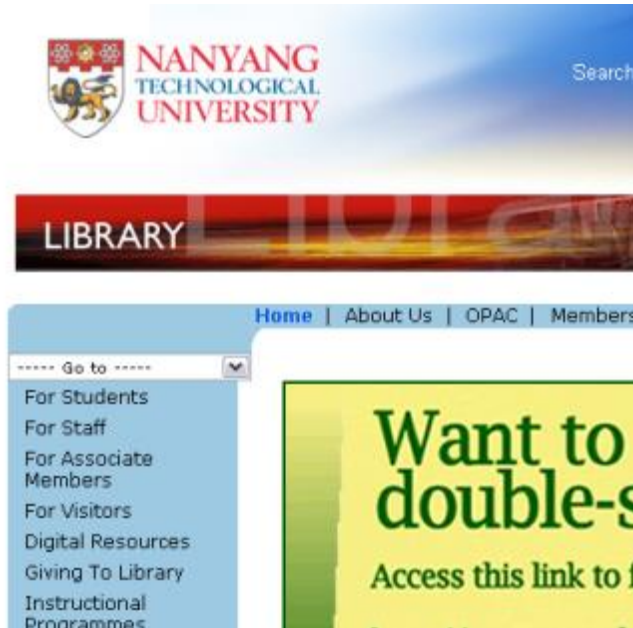


Part 3:

Usability Measurements

Usability Measures

How to measure “goodness” of an interface?



The KEY:

- * Can we make it measurable?
- * Quantitative!!!

Usability Measures

- ISO 9241, focusing on admirable goals:
 - Effectiveness; Efficiency; and Satisfaction
- 5 human factors central to community evaluation
 1. *Time to learn*
How long does it take for typical members of the community to learn relevant task?
 2. *Speed of performance*
How long does it take to perform relevant benchmarks?
 3. *Rate of errors by users*
How many and what kinds of errors are made during benchmark tasks?
 4. *Retention over time*
How well do users maintain their knowledge after an hour, a day or a week?
Frequency of use and ease of learning help make for better user retention
 5. *Subjective satisfaction*
How much did users like using various aspects of the interface? Allow for user feedback via interviews, free-form comments and satisfaction scales

Usability Measures

- 5 human factors central to community evaluation (continued)
 - Every designer would like to succeed in every category, but there are often forced tradeoffs:
 - If lengthy learning is permitted, task-performance times may be reduced by use of macros or shortcuts.
 - If the rate of errors is to be kept extremely low, speed of performance may have to be sacrificed.
 - Project managers and designers who are aware of the tradeoffs can be more effective in making their choices explicit and public.

Usability Measurement

- One serious way to measure usability: User studies
 - Costly
 - But part of any serious large-scale UI development
 - Gmail, Windows, Linux, etc., all release Betas:
 - High fidelity online prototypes create a more realistic environment for expert reviews and usability testing.



Usability Measurements

(One simple strategy – Survey)

User Profile

Company:.....

Job Title:.....

Age range (please check one):

- 18 - 24
- 25 - 34
- 35 - 45
- over 45

Sex (please check one):

- Male
- Female

Name of software being evaluated:.....

How long have you worked with this software (please check one):

- less than 3 months
- 3 to 6 months
- 6 months to 1 year
- more than 1 year

In a typical week, do you use the software for (please check one):

- less than 2 hours
- 2 - 10 hours
- 10 - 30 hours
- 30 hours plus

Describe briefly the sorts of task you carry out with this software:.....

Were you involved in choosing this software (please check one):

- Yes
- No

Have you received any training with this software (please check one):

- None
- 1 day
- 2 - 3 days
- more than 3 days

Did you find the training adequate (please check one):

- Yes
- No

any further comments on the training?

For how long have you been using computers in your work (please check one):

- less than 6 months
- between 6 months and a year
- 1 - 3 years
- 3 years or more

Thanks!

Online survey
e.g., through Facebook

The screenshot shows a Facebook interface with a survey titled "How important are the following aspects of Facebook to you...?". The survey is presented as a table with five columns representing levels of importance: "Not at all important", "Not that important", "Somewhat important", "Very important", and "Don't know/Unsure". The rows list various aspects of social networking sites.

Aspects of social networking sites	Not at all important	Not that important	Somewhat important	Very important	Don't know/Unsure
Joining/being part of various communities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E-mail/Chat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finding old friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Staying in touch with friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Playing online games	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Promotion/developing business	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General distraction/stress reliever	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making new friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

At the bottom of the survey, there are navigation buttons: "Back", "Exit", and "Next >>".

Part 4:

Usability Motivations & Application Types

Usability Motivations

- Different type of applications have different motivations and requirements for the user



Air-traffic Control



Stock-Trader



Game

Application Types and Motivation

Classification by Shneiderman:

1. Life-Critical Systems
2. Industrial and commercial uses
3. Home and Entertainment
4. Exploratory, creative, collaborative applications
5. Social/Technological applications
 - *Sociotechnical?*

“Different applications have different preference for the five measurable human factors”

(1) Life-critical systems

- Applications:

- Air traffic control, nuclear reactors, power utilities, police & fire dispatch systems

- Requirements:

- reliability and effectiveness, error free performance

- Not as important:

- Cost, training time
- user satisfaction: users are well motivated professionals



A case study: Fukushima plant

http://en.wikipedia.org/wiki/Fukushima_I_nuclear_accidents



“It was a profoundly **man-made** disaster
— that could and should have been foreseen and prevented”

(2) Industrial and commercial uses

- Applications:

- Banking, insurance, order entry, inventory management, reservation, billing system

- Requirements:

- **Ease of learning** is important to reduce training costs
- **Speed and error rates** are relative to cost
- **Subjective satisfaction** is fairly important to limit operator burnout
- **Speed of performance** is important because of the number of transactions
 - Trimming 10% off the transaction means 10% fewer operators, 10% fewer terminal workstations and 10% reduction in hardware cost



Trade off by COST!!!!!!

(3) Office, home, and entertainment

Personal-computing App.

- Applications:
 - Word processing, electronic mail, computer conferencing, and video game systems, educational packages, search engines, mobile device, etc.
- Requirements:
 - Ease of learning, low error rates, and subjective satisfaction are paramount due to use is often discretionary and competition fierce
 - Interfaces must be intuitive with easy-to-use online help
 - Market competition often forces the need for low cost
 - Choosing functionality is difficult because the population has a wide range of both novice and expert users
 - A layered or level-structures design is an approach to graceful evolution, i.e. the design of search engines, which almost always have a basic and advanced interface.

(4) Exploratory, creative & collaborative sys.

For supporting Human Creativity!!!

- Applications:
 - Web browsing, search engines, artist toolkits, architectural design, software development, music composition, and scientific modeling systems
- Requirements:
 - Users may be knowledgeable in the task domain but novices in the underlying computer concepts (however, high in their expectations on the usability), so
 - Due to exploratory nature, these systems are hard to design and evaluate
 - Designers should pursue the goal: “computer/UI should vanish” so that the user can be absorbed in their task domains

(5) Social-technical systems

For Many People!!!

- Applications (usually used by govt.):
 - Voting, health support, identity verification, crime reporting
- Requirements:
 - Trust, privacy, responsibility, and security are issues
 - Verifiable sources and status feedback are important
 - Diverse levels of users: Ease of learning for novices and feedback to build trust
 - Administrators need tools to detect unusual patterns of usage
- Difficulties:
 - Huge systems that evolve over time

A case study: e-voting

- Example: electronic voting system
 - Citizens need to have reassuring feedback that their votes were correctly recorded, possibly by having a printed receipt
 - Government officials and observers from opposing parties need to have ways of verifying that the votes from each district and regional aggregations are correctly reported.
 - If complaints are registered, investigators need tools to review procedure at every stage.



Interesting cartoon:

<http://www.reportsfromearth.com/489/electronic-voting-machines-is-hacking-us-democracy-possible-a-short-review/>

Part 5:

Universal Usability

Universal Usability

Users are diverse . . .

- Have different abilities, personalities, physical, intellectual, etc.
- Ultimate goal: try to make interfaces as usable and enjoyable by everyone
- Not always possible...so may need **multiple interfaces** that cater to different people
- This can be more work, but understanding the difference is vital for expanding market share, supporting required government services, and enabling creative participation by the broadest possible set of users.



**International
Consumer Market!!!**

Universal Usability

In this part, we will look at seven topics:

1. Physical ability and workplace
2. Cognitive and Perceptual abilities
3. Personality differences
4. Cultural and International Diversity
5. Users with Disabilities
6. Considerations for Elderly
7. Considerations for Children

#1: Physical ability & workspace

- Basic data about features of human dimensions comes from research in *anthropometry*
 - Male/female, young/adult, European/Asian, tall/short
 - Size: Head, mouth, nose, neck, shoulder, chest, arm, etc.

<http://en.wikipedia.org/wiki/Anthropometry>
<http://msis.jsc.nasa.gov/sections/section03.htm>
- There is “no average user,” either compromises to the UI must be made, or multiple versions of a system must be created
- Physical measurement of human dimensions are not enough, taken into account *dynamic measures* such as reach distance, strength or speed

A case study: door knobs

- Which one accommodates more diversity in the “user” population?



A



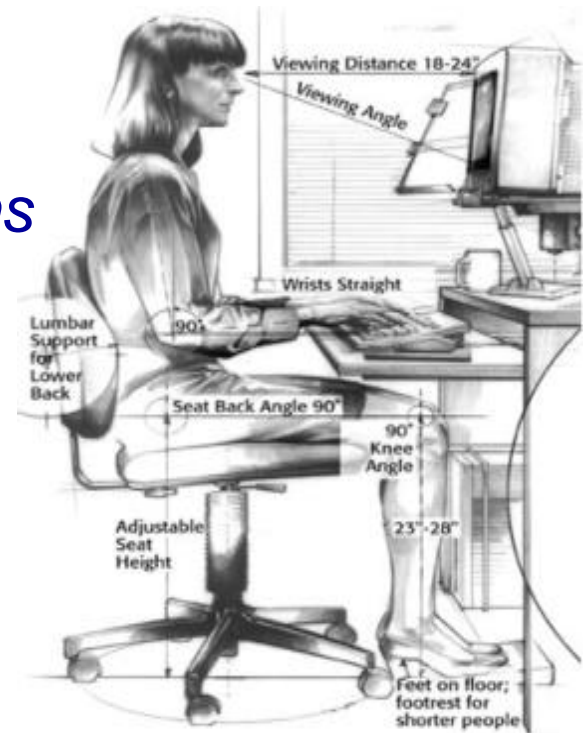
B

#1 Physical ability & workspace (cont.)

- Some common considerations:
 - Screen-brightness preferences vary substantially, designers customarily provide a knob to enable *user control*
 - Consider variances of user population's sense perception
 - *Vision*: depth, contrast, color blindness, and motion sensitivity
 - *Touch*: keyboard and touchscreen sensitivity
 - *Hand control*: Mouse speed and sensitivity
 - *Hearing*: audio clues must be distinct
 - These physical abilities influence elements of the interactive-system design, playing a prominent role in the design of the workspace or workstation (or *playstation*).

Physical workspace (cont.)

- The draft standard *Human Factors Engineering of Computer Workstations* (2002) lists these concerns:
 - Work-surface and display-support height
 - Clearance under work surface for legs
 - Work-surface width and depth
 - Adjustability of heights and angles for chairs and work surfaces
 - Posture - seating depth and angle; back-rest height and lumbar support
 - Availability of armrests, footrests, and palm-rests
- Workspace design is important in ensuring high job satisfaction, high performance, and low error rates.
 - Incorrect table heights, uncomfortable chairs, or inadequate space to place documents can substantially impede work.



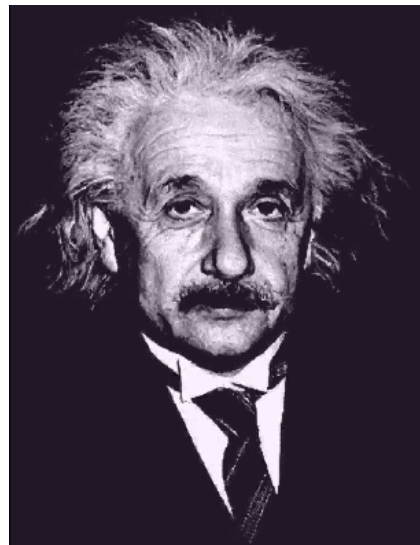
#2 Cognitive & perceptual abilities

- Human ability to interpret sensory input rapidly and to initiate complex actions makes modern computer systems possible
 - In **milliseconds**, users recognize slight changes on their displays and begin to issue streams of commands.
- There are **several factors** affecting perceptual and motor performance, e.g.,
 - Perceptual (mental) load
 - Fatigue and sleep deprivation
 - Knowledge of results and feedback, etc.
- But note, in any application, **background experience and knowledge** in the task domain and the interface domain play key roles in learning and performance

#3 Personality differences

- No set taxonomy for identifying user personality types
- Designers must be aware that populations are subdivided and that these subdivisions have various responses to different stimuli
- **Myers-Briggs Type Indicator (MBTI)**
 - extroversion vs introversion
 - sensing vs intuition
 - perceptive vs judging
 - feeling vs thinking

http://www.personalitypathways.com/type_inventory.html



Carl Jung's 4 Personality Types

1. extroversion versus introversion

- Extroverts focus on **external stimuli**
 - Talk to other people
 - Listen to what someone is saying
 - Cook dinner, or make a cup of coffee
 - Work on a car
- Introverts like familiar patterns
 - Read a book
 - Think about what we want to say or do
 - Are aware of how we feel
 - Think through a problem so that we understand it
- <http://www.blogthings.com/areyouanextrovertorintrovertquiz/>
- <http://www.humanmetrics.com/cgi-win/JTypes2.asp>

Carl Jung's 4 Personality Types

2. Sensing versus intuition

- Sensing-types like established routines and using skills
 - Taste food
 - Notice a stoplight has changed
 - Memorize a speech
 - Follow steps in a plan
- Intuition-types like solving new problems and discovering new relations
 - Come up with a new way of doing things
 - Think about future implications for a current action
 - Perceive underlying meaning in what people say or do
 - See the big picture

Carl Jung's 4 Personality Types

3. Perceptive versus judging

- Perceptive-types like to learn about new situations but may have trouble making decisions
 - Postpone decisions to see what other options are available
 - Act spontaneously
 - Decide what to do as we do it, rather than forming a plan ahead
 - Do things at the last minute
- Judging-types like to make and stay to careful plans (even in new situations)
 - Make a list of things to do
 - Schedule things in advance
 - Form and express judgments
 - Bring closure to an issue so that we can move on

Carl Jung's 4 Personality Types

4. Feeling versus thinking

- Feeling: aware of other people feelings and tend to be emotional
 - Decide to buy something because we like it
 - Refrain from telling others something which may upset them
 - Decide not to take a job because we don't like the work environment
 - Decide to move somewhere to be close to someone we care about
- Thinking-types are unemotional and treat people impersonally, putting things into logical order
 - Research a product via consumer reports, and buy the best one to meet our needs
 - Do "The Right Thing," whether or not we like it
 - Choose not to buy a blue shirt which we like, because we have two blue shirts
 - Establish guidelines to follow for performing tasks

Personality and User Behavior

- Personality could affect the way the users use your interface or your software, i.e., the user behavior.
- Think about your own mailbox...
 - Some users file thousands of e-mails in a well-organized hierarchy of folders;
 - Others just keep them all in the inbox, using search strategies to find what they want later.

So... When you design an UI.....



Personality and Games

- How does personality affect the games audience?
- Game audience are traditionally male-dominated.
 - Is this true now?
- While early game designers focused on the needs and desires of men/boys, many newer games are more attractive to women
 - e.g. the Sims, social games, cooking games, Candy Crush!!



#4 Cultural and international diversity

- Cultural and international diversity
 - Characters, numerals, special characters, and diacriticals
 - Left-to-right versus right-to-left versus vertical input and reading
 - Date and time formats
 - Numeric and currency formats
 - Weights and measures
 - Telephone numbers and addresses;
 - Names and titles (Mr., Ms., Mme.)
 - Social-security, national identification, and passport numbers
 - Capitalization and punctuation
 - Sorting sequences
 - Icons, buttons, colors
 - Pluralization, grammar, spelling
 - Etiquette, policies, tone, formality, metaphors
- Internationalization: more effective localization may produce a strong advantage. To promote effective designs, companies should run usability studies with users from different countries, culture, and language communities -> sales in overseas market!!!

Cultural Difference

- 13 is unlucky in the West
 - Friday the 13th
 - http://en.wikipedia.org/wiki/Friday_the_13th
- 4 is unlucky in Chinese
- Product Re-naming
 - Nissan Sunny (Asia)
 - Nissan Sentra (North America)
 - Nissan Tsuru (Mexico)



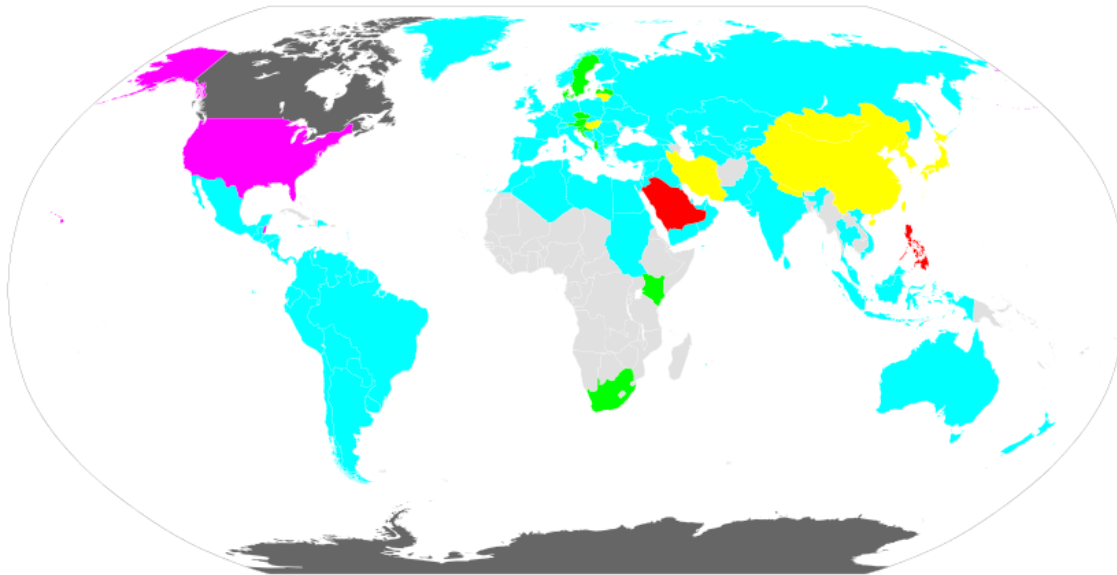
- More examples:
 - The company Bic changed its name from Bich (French pronunciation: [bik]) to prevent it from being mispronounced in English speaking countries as b[]
http://en.wikipedia.org/wiki/Foreign_branding#Products_renamed_to_avoid_offence
 - Date formatting: DD-MM-YY and MM-DD-YY
http://en.wikipedia.org/wiki/Date_format_by_country
 - First name then family name VS family name then first name



Case study: Date formatting

Order of the basic components:

- B – Big-endian (Y, M, D)
- L – Little-endian (D, M, Y)
- M – Middle-endian (M, D, Y)

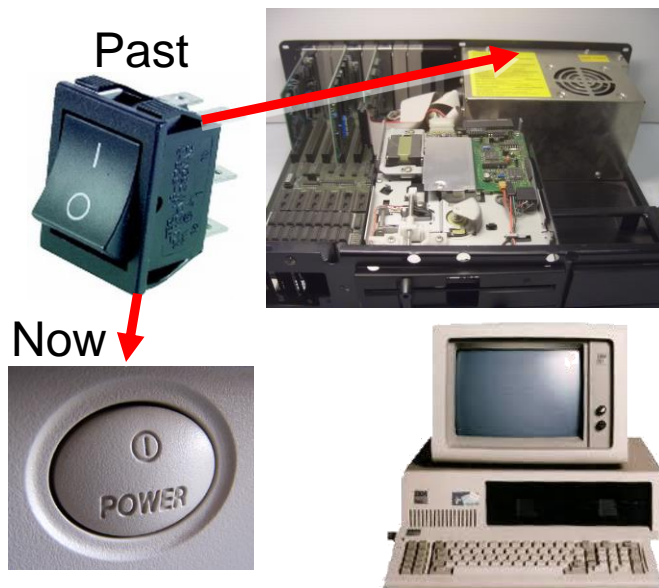


Color	Endian styles	Order styles
Cyan	L	DMY
Yellow	B	YMD
Magenta	M	MDY
Green	B, L	YMD, DMY
Red	L, M	DMY, MDY
Grey	B, L, M	YMD, DMY, MDY
Blue	B, M	YMD, MDY

http://en.wikipedia.org/wiki/Date_format_by_country

#5 Disability

- Disabilities: (vision, hearing, mobility, ...)
 - Designers must plan early to accommodate users with disabilities, over half a billion in the world
 - Early planning is more cost efficient than adding on later
 - Moving the on/off switch to the front of a computer
 - Addition of closed captions to television programs for deaf viewers



Mainland China (Sidewalk “stones” for blind)



#5 Disability (cont.)

- Disabilities (cont.)
 - In the US, businesses must comply with the "[Americans With Disabilities](#)" Act. Any company wishing to sell products to the US government should adhere to the Act.
 - The potential for benefit to people with disabilities is one of the gifts of computing, e.g.,
 - Screen magnification; text-to-speech (TTS) conversion and speech recognition
 - Hearing: Conversion of audio tones to visual feedbacks
 - In fact, many users are [temporarily disabled](#): forget their glasses, be unable to read while driving, or struggle to hear in a noisy environment.

#6 Considerations for Elderly

- Reduced

- Motor skills
- Perception
- Vision, hearing, touch, mobility
- Speed
- Memory



(But don't underestimate elderly people)

- Other needs

- Technology experience is varied
 - How many of your grandparents use emails?
- Often uninformed on how technology could help them
- Practice skills (hand-eye, problem solving, etc.)

#6 Considerations for Elderly (cont.)

- As the world's population grows older, designers in many fields are adapting their work to serve older adult citizens.
 - Large street signs
 - Brighter traffic lights and nighttime lighting
 - Touch screens, larger fonts, louder sounds
 - Clearer navigation paths
 - Consistent layouts
 - Simple command languages
- Researchers and developers are beginning to work on improving interfaces to golden-age software
 - *Let's do it before Bill Gates turns 65!*

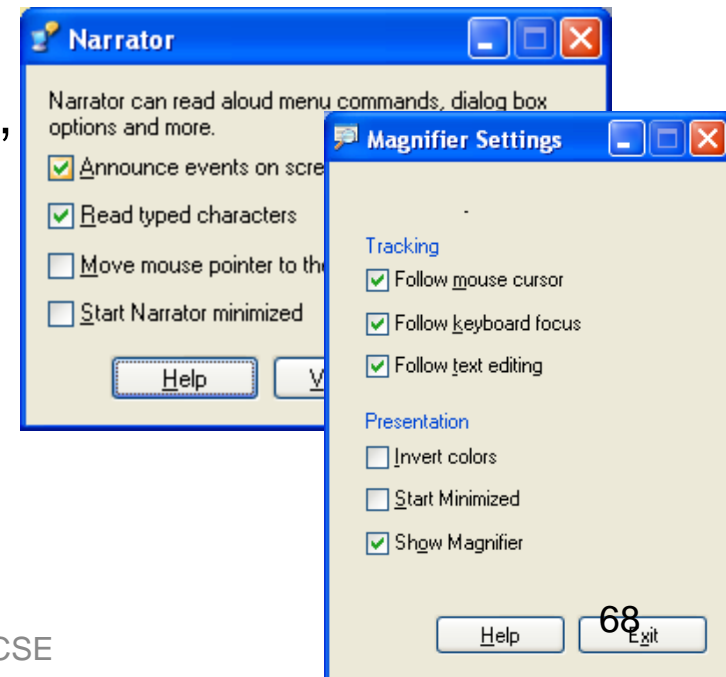
<http://www.pcworld.com/article/133221/article.html>

#6 Considerations for Elderly (cont.)

- BrooksTalk: An early Speech Project from Oxford Brooks University, UK
 - Built a Web browser for [blind and visually impaired](#) users, BrookesTalk, which won a medal for innovation in the British Computer Society IT Awards 1998.
 - Supported by [Microsoft](#) Corporation, integrated BrookesTalk with IE to increase Web functionality for visually impaired users.
 - To help older adults, developed [Voice Help](#), a special front end for BrookesTalk, which talks the user through their interaction.
 - Supported by [Hewlett Packard](#), started a project investigating access to the Web for severely disabled users, involving a range of interaction modes, particularly speech, and to investigate whether Web access has any positive influence on the lives of subjects who have not used the Web before, in terms of neuropsychological improvement and heightened levels of self esteem.

#6 Considerations for Elderly (cont.)

- Early work: BrooksTalk configurable text window where settings can be changed to suit the needs of the visually impaired:
 - **Speech** - volume, number of words spoken per minute, gender of voice.
 - **Font** - font name, text size, text colour, large text box background colour.
 - **Text** - number of lines of text to be displayed, scrolling text or each word in the same position.
 - **Cursor** - to read the letter to the left or right of the cursor.



#7 Considerations for Children

- Emphasize entertainment and education
- Abilities change with age:
 - **Evolving dexterity**: mouse-dragging, double-clicking, or small targets cannot always be used
 - **Emerging literacy**: instructions and error messages are not effective
 - **Low capacity for abstraction**: complex sentences must be avoided.
- Aspirations (of developers of children's software)
 - Educational acceleration
 - Socialization with peers
 - Psychological - improve self-image, self-confidence
 - Creativity – art, music, etc. exploration



<http://www.youtube.com/watch?v=MGMsT4qNA-c>

#7 Considerations for Children (cont.)

- Teenagers are a special group
 - Next generation
 - *Beta tester* for new interfaces, trends
 - Hand phones, text messages, simulations, fantasy games, virtual worlds
- Note #1: Safety – access to children
- Note #2: They (children)
 - Like exploring (easy to reset state)
 - Don't mind making mistakes
 - Like familiar characters and repetition
 - Sometimes re-play a game, re-read a story, or re-play a music dozens of times, even after adults have tired
 - Don't like patronizing comments, inappropriate humor



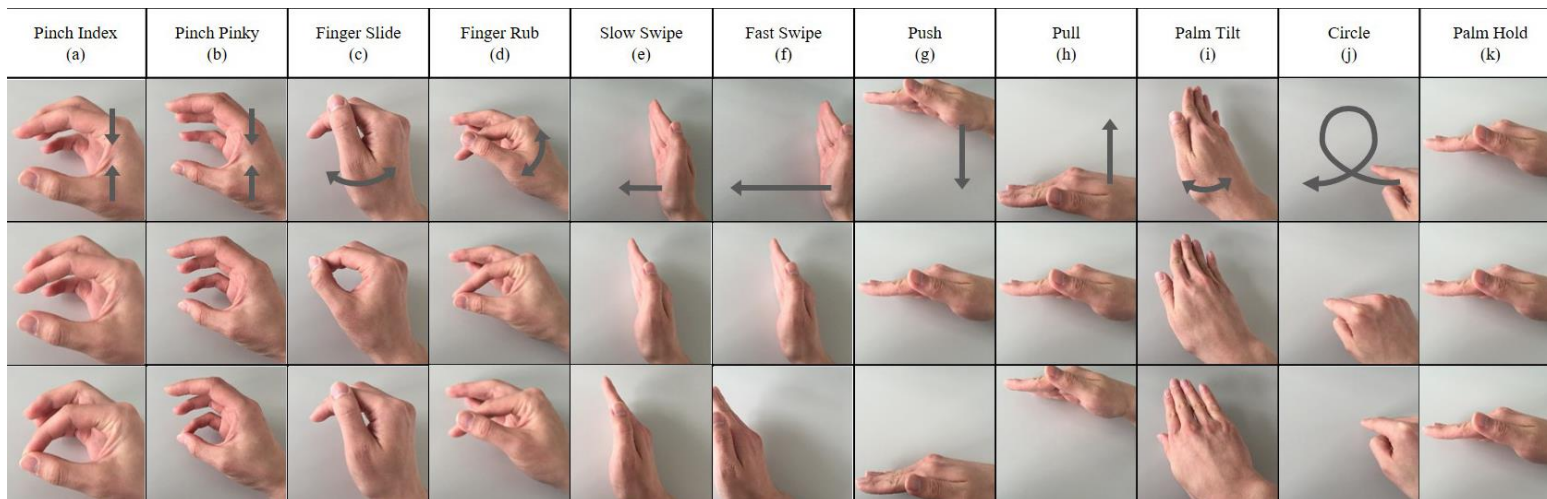
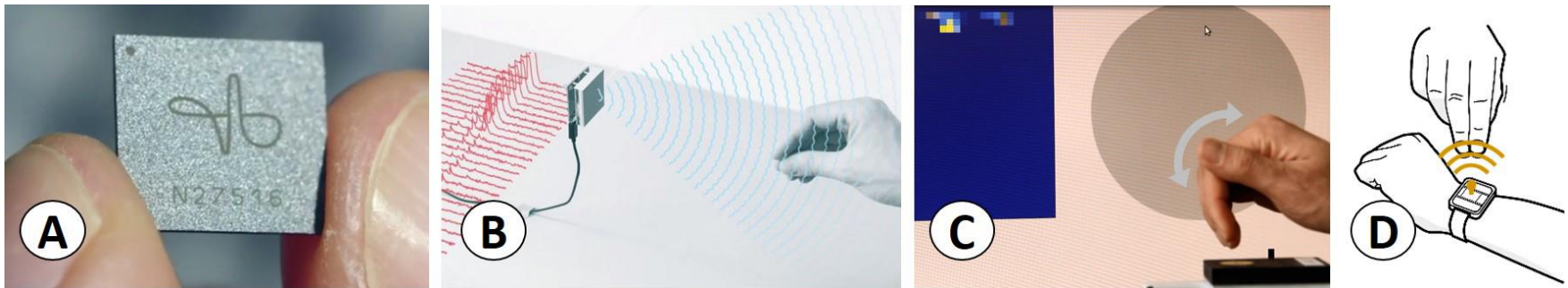
Summary

- User Interfaces are very important
 - Truly affects aspects of our lives
- This lecture discussed several aspects of UI
 - Usability Requirements
 - What is the task and goal of the UI
 - Usability Measurements
 - Factors that make a good UI
 - Usability Motivations
 - Different (application) types (life critical, business, entertainment, . . .)
 - Issues for Universal Usability
 - Considerations for various user populations
 - (Children, elderly, etc . . .)

HCI Research #1

Interacting with Soli: Exploring fine-grained dynamic gesture recognition in the radio-frequency spectrum(ACM UIST 2016):

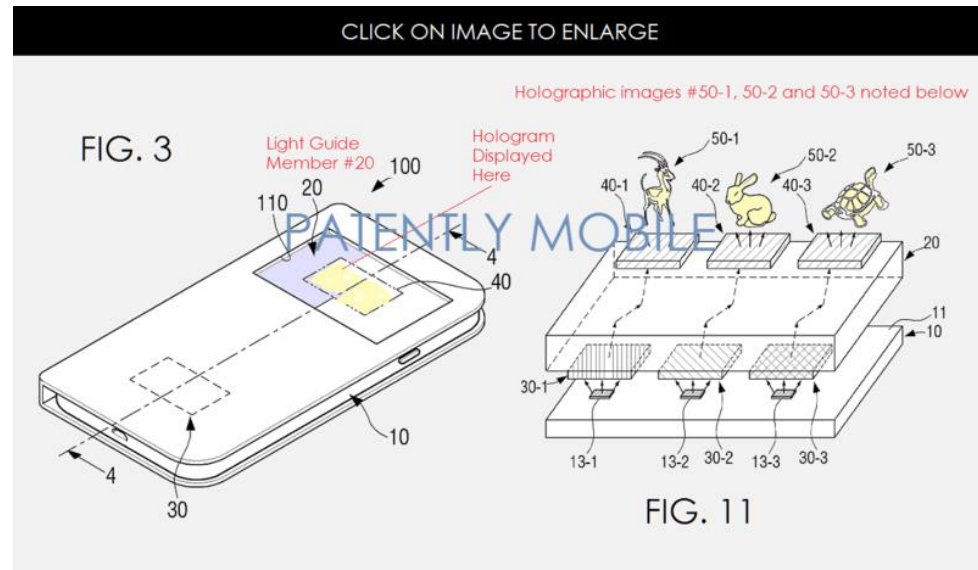
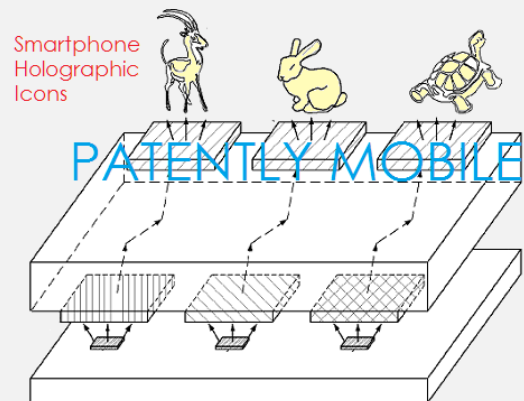
<http://www.ivanpoupyrev.com/project/project-soli> (by Wang, S., Song, J., Lien, J., Poupyrev, I., Hilliges, O: Google ATAP)



Soli is a new sensing technology that uses miniature radar to detect touchless gesture interactions.

HCI Development # 1

- Samsung files patent for smartphone that can display holographic images (2014)
- Samsung may be working on a holographic display for its next flagship smartphone.



Video Materials for Usability

<http://www.usability.de/en/services/ux-testing-research/usability-testing.html>

<https://www.youtube.com/watch?v=48dMCEDJ1gM>

<https://www.youtube.com/watch?v=JC9B0glhcrQ>

<https://www.youtube.com/watch?v=RIQEoJaLQRA&feature=related>