SoberIT
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User-Centred Product Development

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Why 19120 voted for two?

Valokuvat: CNN

Confusion at Palm Beach County polls

Some Al Gore supporters may have mistakenly voted for Pat Buchanan because of the ballot's design.

Although the Democrats are listed second in the column on the left, they are the third hole on the ballot.

Misregistration leads to increased ambiguity.

ELECTORS FOR PRESIDENT AND VICE PRESIDENT

(A vote for the candidates will actually be a vote for their electors.)

(Vote for Group)

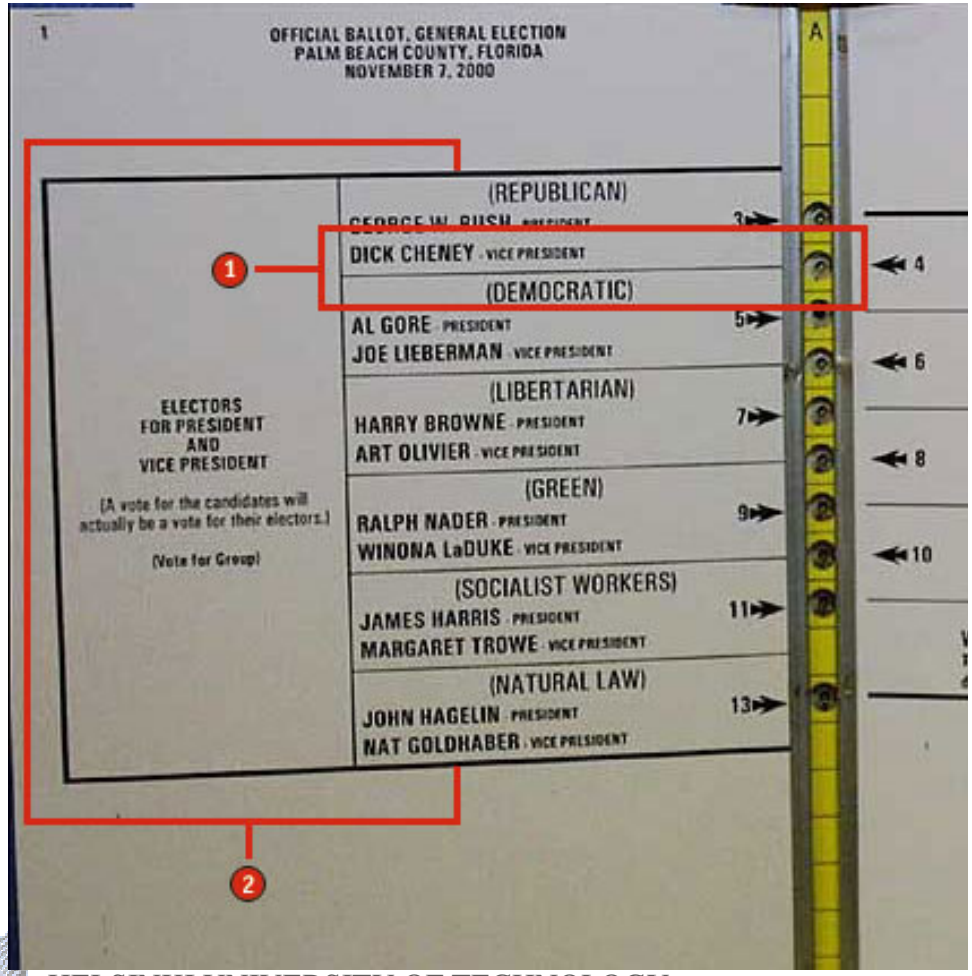
(REPUBLICAN) GEORGE W. BUSH - PRESIDENT, DICK CHENEY - VICE PRESIDENT	3	
(DEMOCRATIC) AL GORE - PRESIDENT, JOE LIEBERMAN - VICE PRESIDENT	5	
(LIBERTARIAN) HARRY BROWNE - PRESIDENT, ART OLIVIER - VICE PRESIDENT	7	
(GREEN) RALPH NADER - PRESIDENT, WINONA LaDUKE - VICE PRESIDENT	9	
(SOCIALIST WORKERS) JAMES HARRIS - PRESIDENT, MARGARET TROWE - VICE PRESIDENT	11	
(NATURAL LAW) JOHN HAGELIN - PRESIDENT, NAT GOLDHABER - VICE PRESIDENT	13	
(REFORM) PAT BUCHANAN - PRESIDENT, EZOLA FOSTER - VICE PRESIDENT	4	
(SOCIALIST) DAVID McREYNOLDS - PRESIDENT, MARY CAL HOLLIS - VICE PRESIDENT	6	
(CONSTITUTION) HOWARD PHILLIPS - PRESIDENT, J. CURTIS FRAZIER - VICE PRESIDENT	8	
(WORKERS WORLD) MONICA MOOREHEAD - PRESIDENT, GLORIA La RIVA - VICE PRESIDENT	10	
WRITE-IN CANDIDATE To vote for a write-in candidate, follow the directions on the long stub of your ballot card.		

Sun-Sentinel graphic

Modified by Jeff Brandenburg
brand@pagesz.net

3,000 or so people might have made the mistake of voting for Pat Buchanan when they meant to vote for Al Gore. But why would a much larger number of people--19,120 out of 461,988 who voted--invalidate their ballots by voting for *two* candidates for president?

Usability Problems

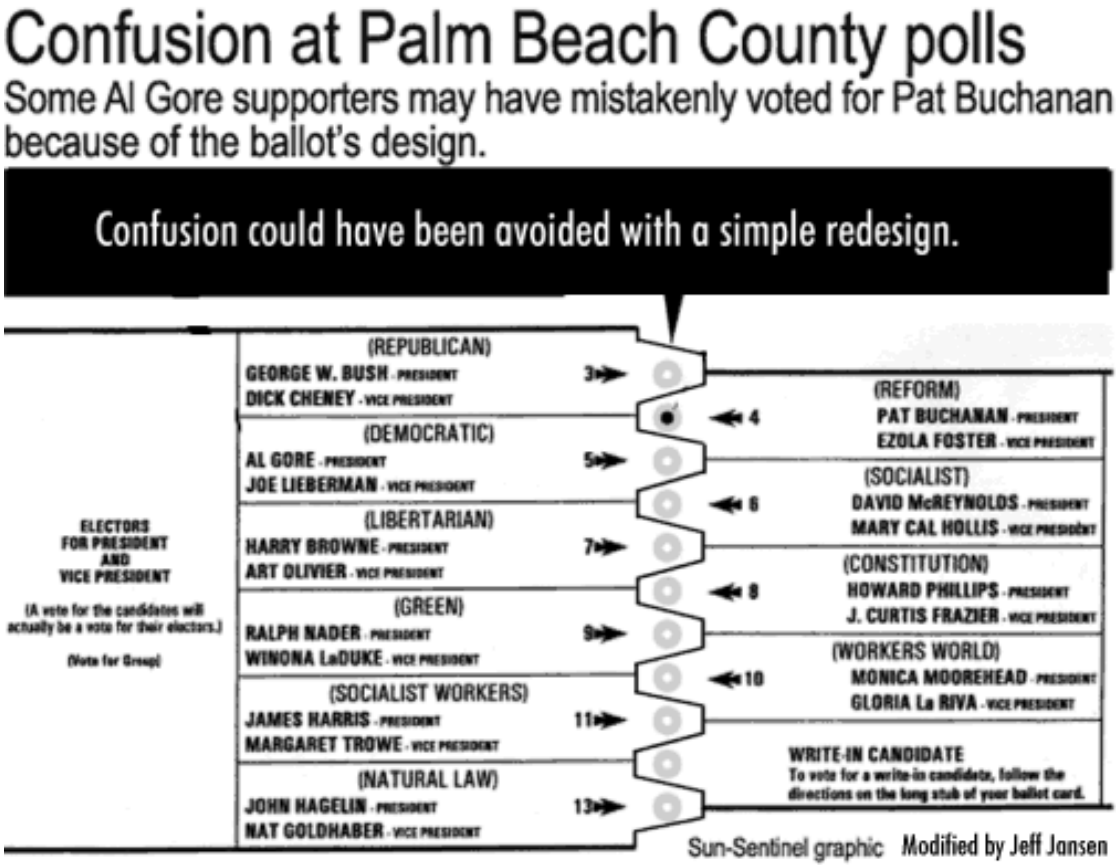


Faulty visual cues:
On the ballot, small black arrows point to the holes that should be punched for each candidate. However, the lines that separate the candidates also correspond to specific holes. For instance, the line separating the words "Dick Cheney" and (DEMOCRATIC) points to the hole for Pat Buchanan. It is conceivable that voters may have viewed the word (DEMOCRATIC) as a label for that line which points to the appropriate hole for casting a democratic vote.

A heavy line outlines the area that contains the label "ELECTORS FOR PRESIDENT AND VICE PRESIDENT" and the candidates on the left side of the page. This heavy line creates a box around the label and these candidates, but there is no continuation of the box outline on the right hand page. Given this configuration, a variety of universally accepted laws of human perception invite the incorrect interpretation that the box on the left page contains all of the candidates for the stated office.

These Gestalt principles, first documented by Wertheimer (1923), include the following:
The Law of Proximity- Elements that are closer together (e.g., on a single page) tend to be perceived as a group
The Law of Closure-Stimuli tend to be grouped into complete figures (e.g., a box)
The Law of Good Continuation- Stimuli tend to be grouped so as to minimize change or discontinuity (e.g., of the box outline or the page)
The Law of Simplicity-Ambiguous stimuli tend to be resolved in favor of the simplest organization.

Alternative Solution



Additional discussion
http://stc.org/pics/usability/topics/

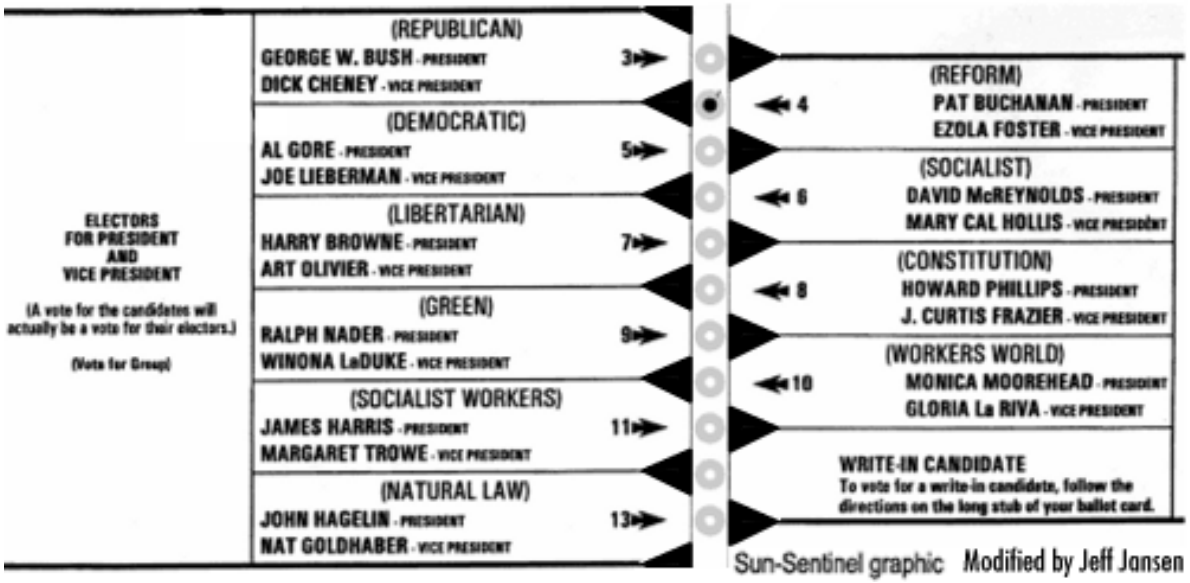
http://www.modestsystems.com/florida_ballot.htm

Practical Alternative

Confusion at Palm Beach County polls

Some Al Gore supporters may have mistakenly voted for Pat Buchanan because of the ballot's design.

Confusion could have been avoided with a simple redesign.



Sun-Sentinel graphic Modified by Jeff Jansen

Contents of the Presentation

- Overview of the concept of usability
- Main characteristics of usability
- Usability engineering: design and evaluation methods
- Benefits and utility of usability engineering

Why Usability Engineering?

- Ricoh found that 95% of the respondents to a survey never used three key features deliberately added to the product to make it more appealing. Customers either didn't know these features existed, didn't know how to use them, or didn't understand them (Nussbaum and Neff 1991).

- 80% of maintenance is due to unmet or unforeseen user requirements; only 20% is due to bugs or reliability problems (Martin and McClure 1993; Pressman 1992)

http://www.webword.com/moving/businesscase.html

Why Usability Engineering? (cont'd)

- 63% of all software projects overrun their budgetary estimates, with the top 4 reasons all related to unforeseen usability problems (Lederer and Prassad 1992)

- The percentage of software code that is devoted to the interface has been rising over the years, with an average of 47-60% of the code devoted to the interface (MacIntyre et al. 1990)

http://www.webword.com/moving/businesscase.html

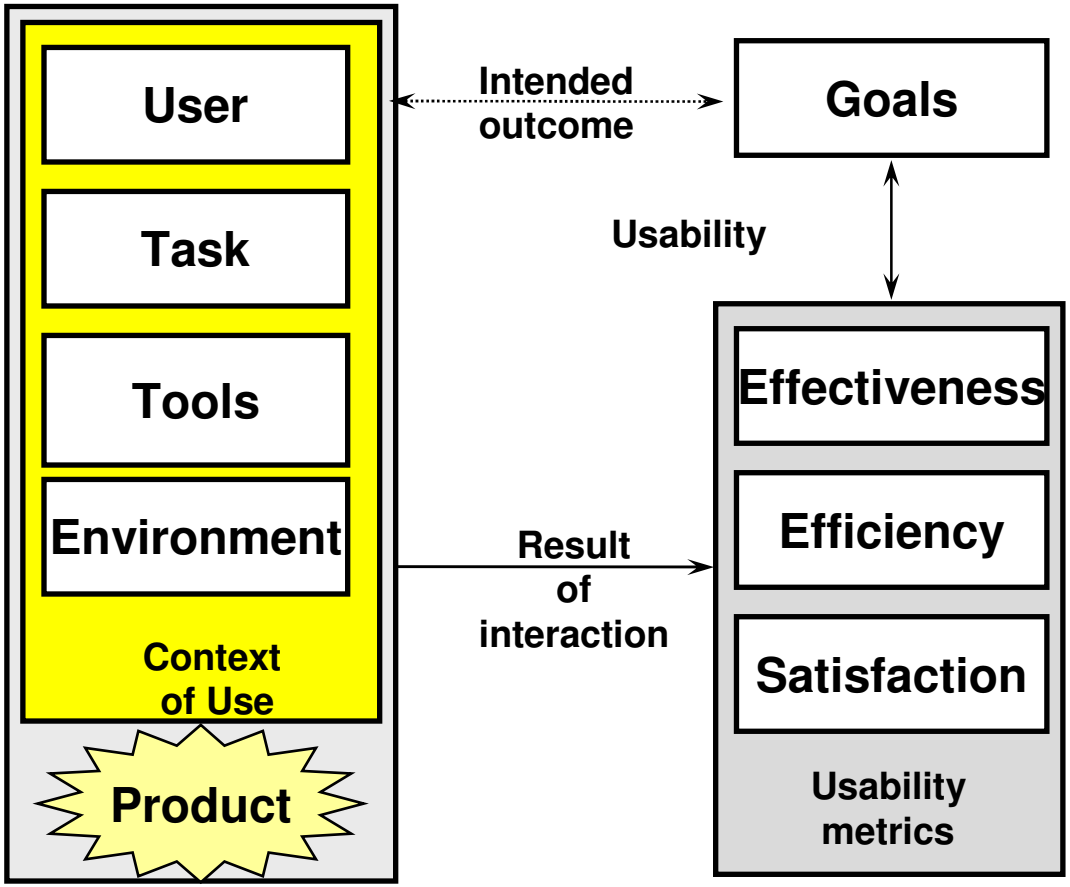
Usability

- Product usability is achieved or improved by first understanding users' needs (i.e., their actual goals, the challenges and limitations they face, the unique or unexpected ways in which they use the product, etc.)

- These needs are determined by collecting data on actual representative users' interactions with products.

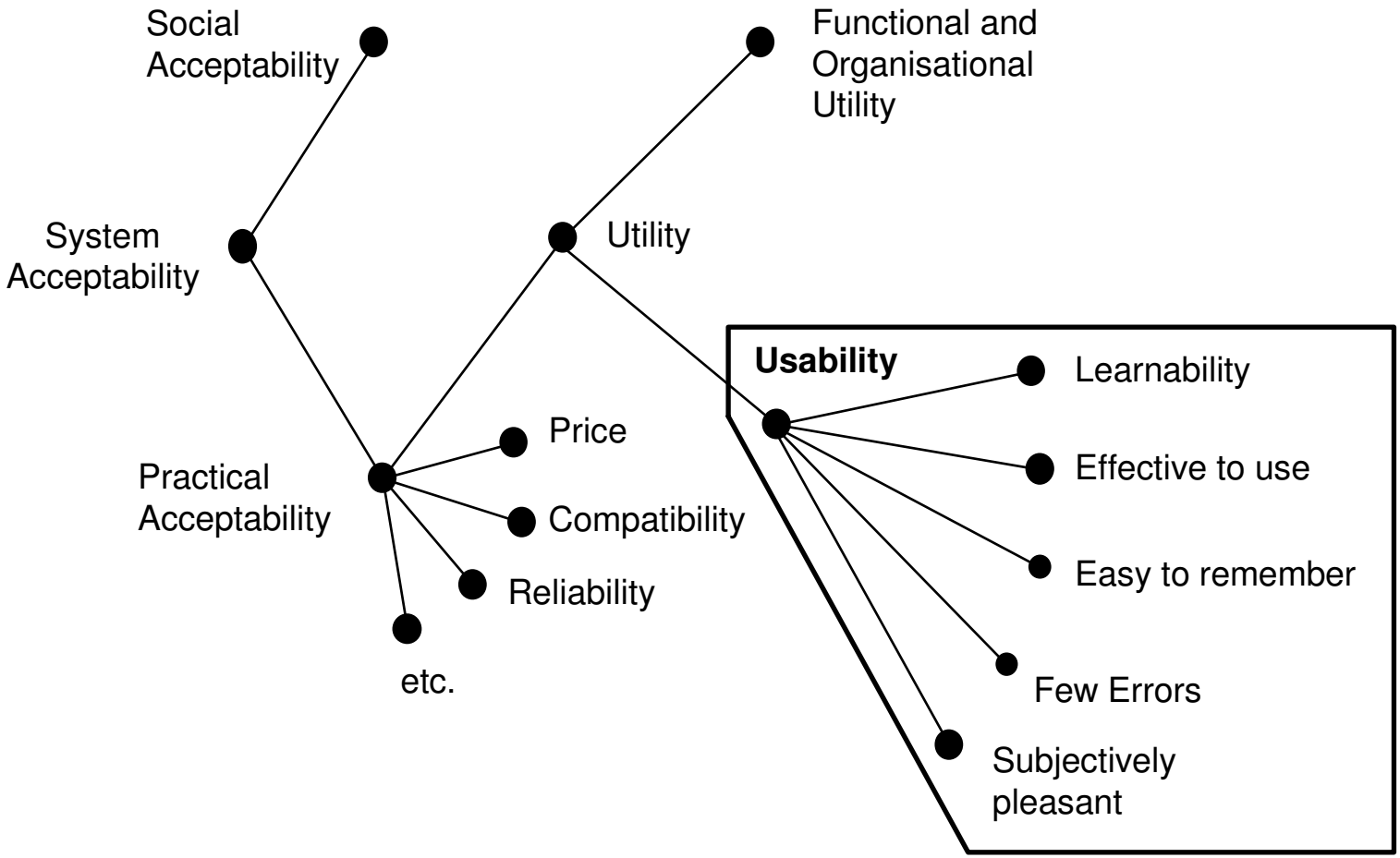
http://www.webword.com/moving/businesscase.html (Rhodes, J.; 24-Oct-2001)

Usability (ISO 9241-11)

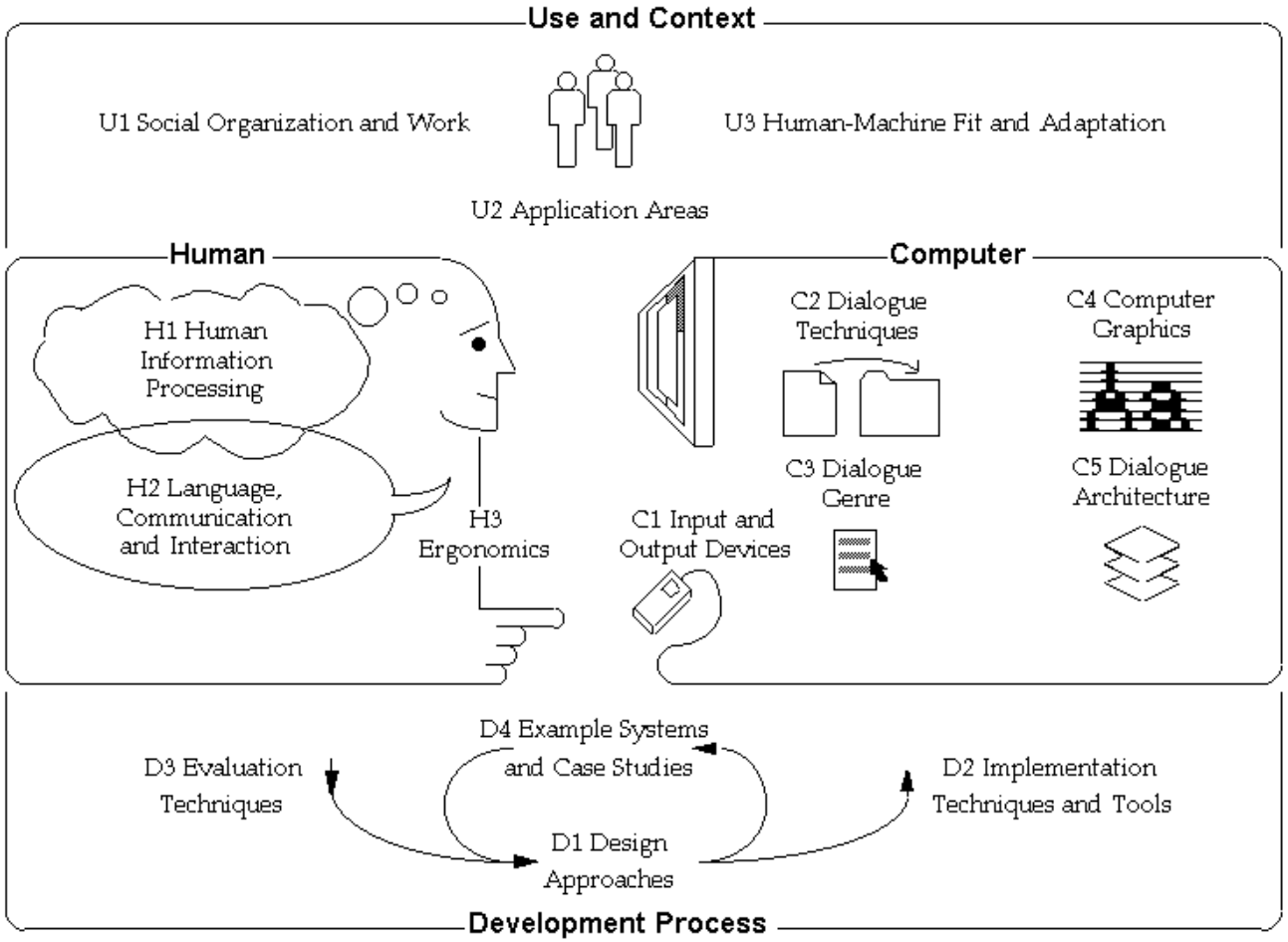


Usability

(Nielsen 1993)



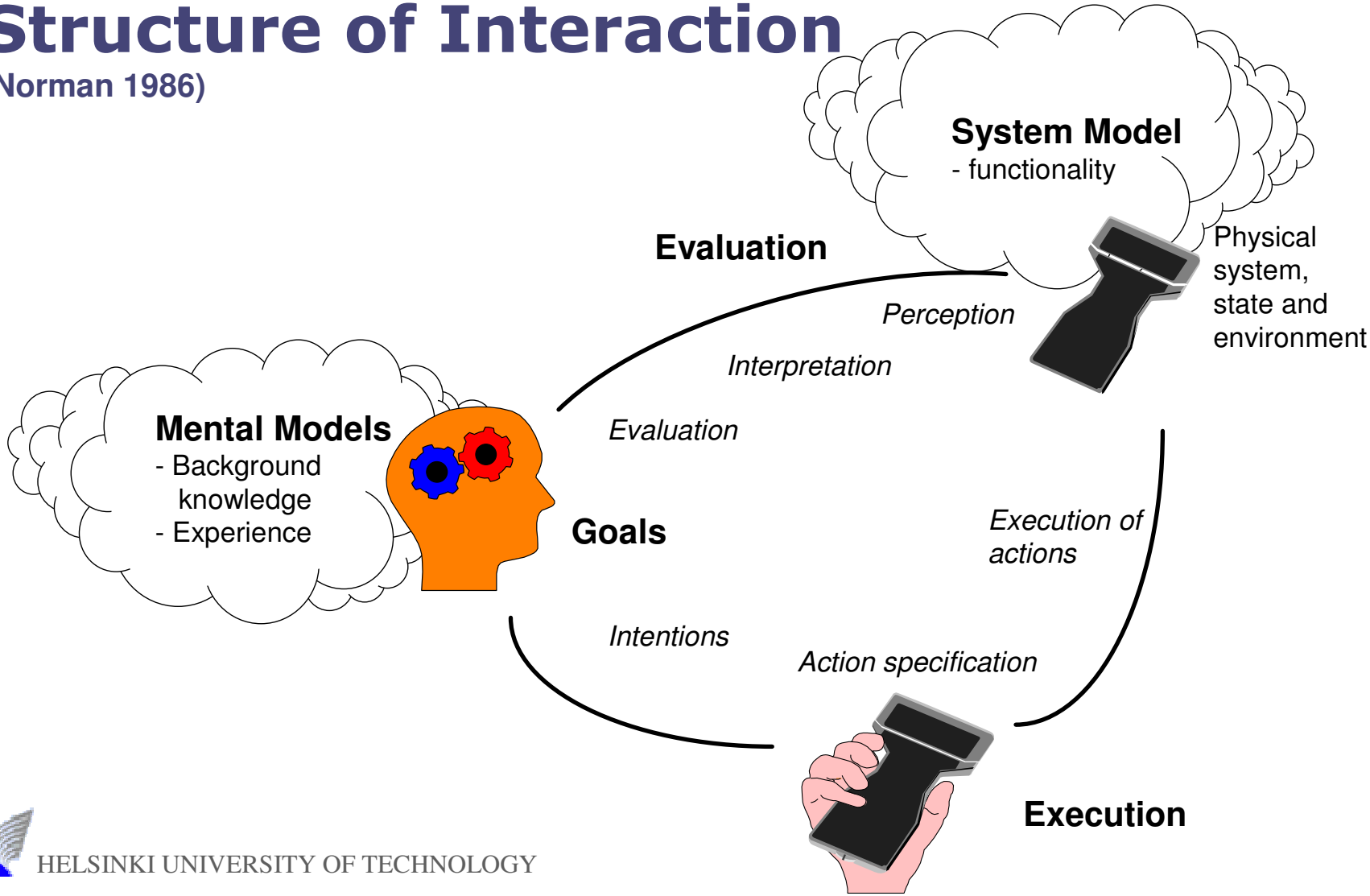
HCI – Human Computer Interaction



http://www.acm.org/sigchi/cdg/figure_1.gif
ACM SIGCHI Curricula for Human-Computer Interaction

Structure of Interaction

(Norman 1986)

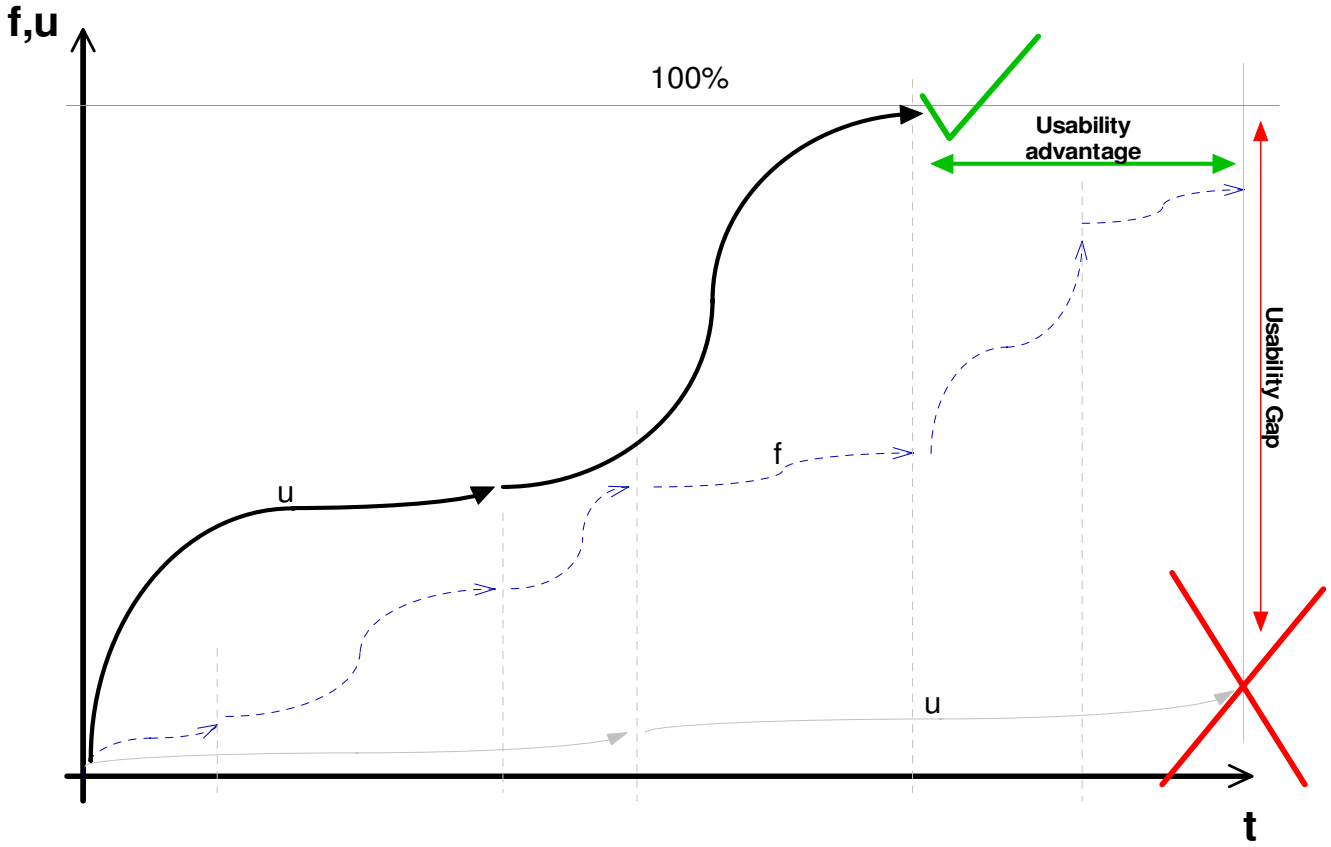


Usability Engineering

(Wixon & Wilson 1997)

A process for defining, measuring and thereby improving the usability of products.

Constructing Usability



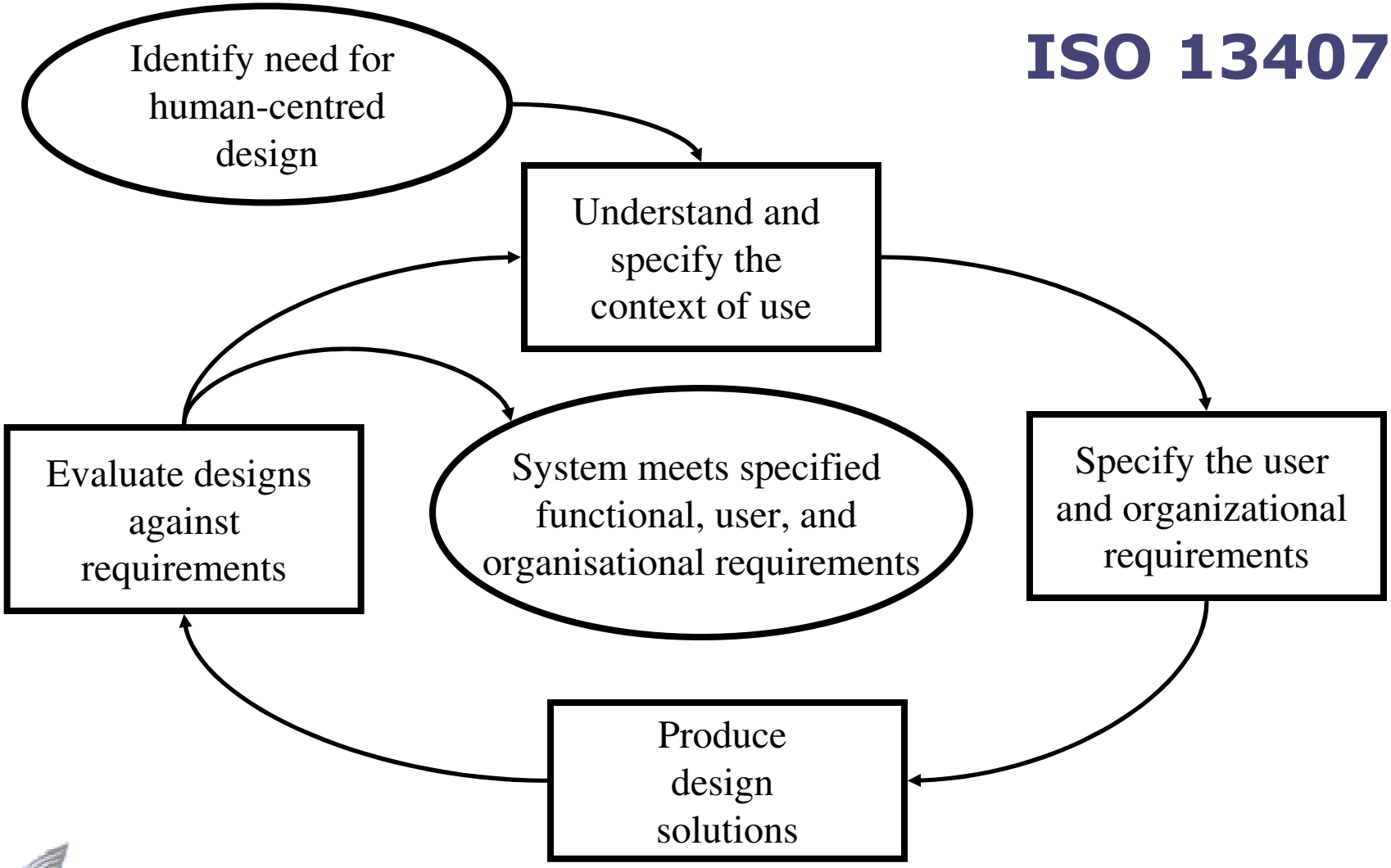
Basic Usability Engineering Process

(Wixon & Wilson 1997)

User / Environment profiles
Task Analysis
Criteria for Goals

1 Define measurable usability attributes
2 Set the quantitative levels of desired usability for each attribute (usability goals)
`=> usability specification, test plan`
3 Test the product against usability goals
4 Analyse the emerged problems
`=> problem descriptions and prioritisation`
5 Analyse the impact of possible design solutions
`=> impact analysis`
6 Incorporate user derived feedback feedback in product design

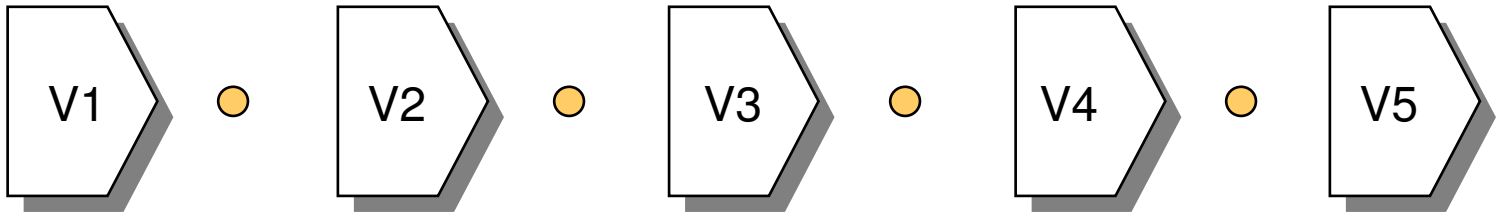
ISO 13407


Identify need for human-centred design
Understand and specify the context of use
Specify the user and organizational requirements
Produce design solutions
Evaluate designs against requirements
System meets specified functional, user, and organisational requirements

Usability Engineering – An Integral Part of Development

Requirements Definition | ***Design and Implementation*** | ***Testing*** | ***Follow-up***

Production Delivery Deployment



User detection & segments
User characteristics
Task analysis
Context / situation analysis
Usability goals

Style guides
Check-lists
Heuristic rules
Cognitive walkthrough
Small usability test
Usability goals

Usability tests
Comparison of results to usability goals

Customer/user feedback
ALL THE WAY TO DEVELOPERS!

Gathering of user and usage information

Reviews

See also http://www.usabilitynet.org/methods

Detect the User!

If your product is supposed to sell, somebody uses it!

- Who is going to use the product?
- What kind of person is she/he?
- Why does she/he want to use the product?
- In what situation is she/he using the product?
- How does she/he try to use the product?

Detect, select and describe the users!

Detecting Users, Tasks, and Situations

- Who are the real end users of the product under development?
- How large is the user population?
- What are the main user groups?
- Are there intermediate users? Are there secondary uses of the product?
- Who makes decisions about the utilisation/usage of the product?
- Finally: Why are users using the product? What is the goal that they aim at in using the product?

User Characterisation

(Booth 1989)

USER DATA

- Identify the target user group
- Proportion of males and females
- Average age / age range
- Cultural characteristics (language etc.)

JOB CHARACTERISTICS

- Job role description
- Main activities
- Main responsibilities
- Reporting structure
- Reward structure
- Schedules
- Status / quality
- Turnover rate

USER BACKGROUND

- Relevant education / knowledge / experience
- Relevant skills
- Relevant training

USAGE CONSTRAINTS

- Voluntary vs. mandatory use
- Motivators vs. de-motivators

PERSONAL PREFERENCES AND TRAITS

- Learning style
- Interactional style
- Aesthetic preference
- Personality traits
- Physical traits

Task Analysis

(Booth 1989)

GOALS

- Identify goals and list important supporting tasks

For each important task:

TASK INTRINSICS

- Task identifier
- Inputs and outputs
- Transformational process
- Operational procedures & patterns
- Planning, decision points, problem solving
- Terminology
- Equipment

TASK DEPENDENCY AND CRITICALITY

- Dependency on other tasks & systems
- Concurrent effects
- Criticality of tasks (linked to dependency)

CURRENT USER PROBLEMS

PERFORMANCE CRITERIA

- Speed, Accuracy, Quality

TASK CRITERIA

- Sequence, frequency & importance of actions
- Functional relationships between actions
- Availability of functions
- Flexibility of operation

USER DISCRETION

- Can the user control or determine pace, priority & procedure?

TASK DEMANDS

- Physical, Perceptual, Cognitive, Environmental
- Health and safety requirements

Situational Analysis

(see Booth 1989)

EQUIPMENT (what equipment)
- does not meet performance criteria
- does not meet specification
- fails

SURROUNDINGS
- Physical environment
- Social environment
- Changes in surroundings

POLICY
- Changing laws, rules, standards, guidelines

AVAILABILITY
- missing data
- missing materials
- missing personnel
- missing support

OVERLOADS
- too many people/machines using resource
- too much data, information, materials, etc.

INTERRUPTIONS
- process breakdown
- things missed/forgotten
- restart required

Question Summary

- Where is the product used?
  - What/who is the the user or organisation? In what environment is the product being used?
- Who are the users of the product?
  - What are the users' positions/titles? What are the users' names?
- What do users need to do and achieve?
  - What goals do the users have?
- In what situation is the product used?
  - What happens in a typical use situation? How do things evolve? In what stages of the task is the product being used? What other steps (than using the product) take place in the use situation? What is the most common situation?
- What information are needed when using the product?
  - Experience? Training? What information are NOT needed?
- How should the product serve the user in the use situation?

Usability Goal Matrix

(see Whiteside & al. 1988)

Usability factor	*Measured through*	*Measurement unit*	*Worst level*	*Planned (goal) level*	*Best level*	*Current situation*
Satisfaction	Initial feelings about the system	Amount of users	50 % neg.	90 % pos.	100% pos.	
Learnability	Training time	time	1 day + trainer	1 h + trainer	1 h (w/o trainer)	
Memorability	User remembers the elements in the user interface w/o help	Amount of users	70 % remembers 4 / 7	90 % remembers 6 / 7	100 % remembers 7 / 7	
User Errors	Task: find a person's phone number	Amount of errors	4	0	0	
Effectiveness	Task: answer to the inquiry about a person's phone number	elapsed time	30 sec	7 sec	3 sec	

Usability Evaluation

- Heuristic evaluation (Nielsen & Molich 1990)
  - without users
  - with ”rules of thumb” like Nielsen’s 10 heuristic rules
  - strongly dependent on evaluator’s experience

- Cognitive walkthrough (Polson Lewis & Rieman 1992)
  - without users
  - detailed dialog (interaction step) walkthrough; what users perceive, how they translate the feedback and act
  - desktop evaluation with specifications possible

Heuristic Rules (Nielsen)

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

http://www.useit.com/papers/heuristic/heuristic_list.html

Usability Questionnaires

- SUMI - Software Usability Measurement Inventory *"The de facto industry standard evaluation questionnaire for assessing quality of use of software by end users"*
  http://www.ucc.ie/hfrg/questionnaires/sumi/

- Ready-to-run Computer System Usability Questionnaire (Based on: Lewis, J. R. (1995):
  http://www.acm.org/~perlman/question.cgi?form=CSUQ

Informal "Over-the-shoulder" Usability Testing

- Ethnographic orientation
- Interviewees are interviewed in their context, when doing their tasks, with as little interference from the interviewer as possible.
- Data should be gathered during interviews with little or no analysis, interview should result in raw data
  - http://www.usabilitynet.org/methods/requirements/contextualinquiry.asp
- E.g. Contextual Inquiry
  - http://jthom.best.vwh.net/usability/context.htm
  - a structured field interviewing method
  - more a discovery process than an evaluative process
  - more like learning than testing

Usability Test

- Observation
- Real
  - tasks
  - users
- In real settings or in a special usability laboratory
- Thinking aloud
- Videotaping
- Results:
  - comparison to goals

General Business Benefits of Usability

- Usability reduces engineering/development costs and facilitates speed to market
- Usability reduces testing and quality assurance costs
- Usability reduces sales costs and shortens sales cycles
- Usability can decrease production costs while improving profit margins
- Usability improves customer Return on Investment

http://www.webword.com/moving/businesscase.html

Utility of Usability Engineering

- Usability engineering has demonstrated reductions in the product-development cycle by over 33-50% (Bosert 1991)
- Design changes due to usability work at IBM resulted in an average reduction of 9.6 minutes per task, with projected internal savings at IBM of $6.8 Million in 1991 alone (Karat 1990)

http://www.webword.com/moving/businesscase.html