

Usability and User Experience



Adapted from Saila Ovaska



Topics in This Slideset

- What is usability?
- What is user experience?
- Why are they important?





International Standards: Software Quality

ISO 9126 Software Engineering International standard for the evaluation of the quality of software

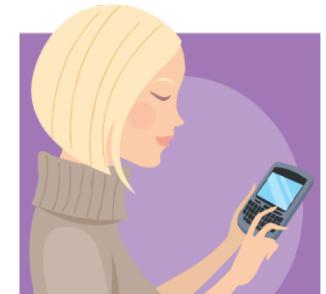
- Functionality
- Reliability
- Usability
- Efficiency
- Maintainability
- Portability





“Extent to which a system, product or service can be used by specified users to achieve specified goals with **effectiveness**, **efficiency** and **satisfaction** in a specified **context of use**.”

- ISO 9241-11





What is usability?

- ISO 9241-11
 - “the extent to which a product can be used by specified users to achieve specified goals with **effectiveness, efficiency, and satisfaction** in a specified context of use.”
 - Usability Professionals Association
 - Is an approach that incorporates direct user feedback throughout the development cycle in order to reduce costs and create products and tools that meet user needs
-





Metrics to Measure Usability: ISO 9241-11

- **Effectiveness:** The accuracy and completeness with which specified users achieve specified goals.
- **Efficiency:** The resources expended in relation to the accuracy and completeness with which users of achieve their goals.
- **Satisfaction:** freedom from discomfort and positive attitudes towards the use of the product.





What is usability?

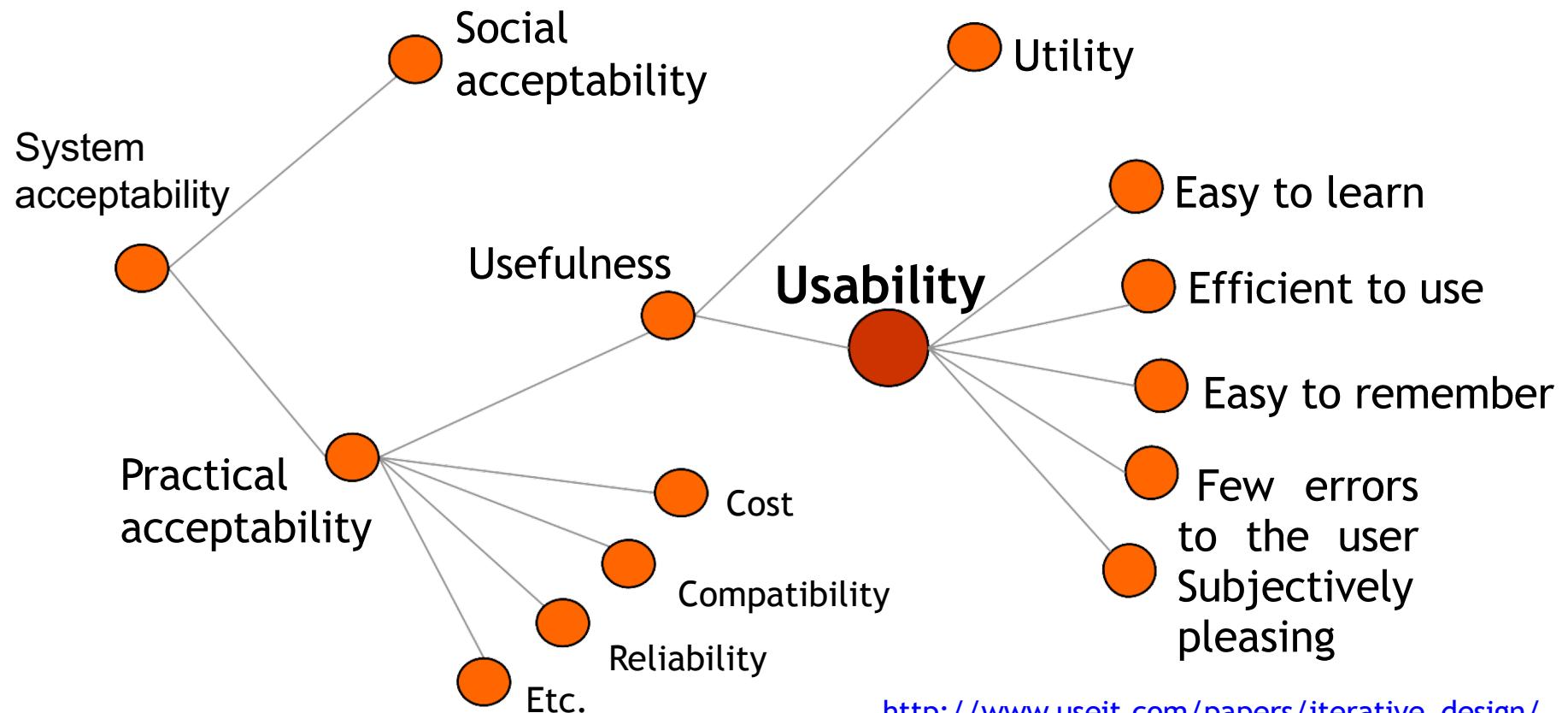
- Steve Krug, author of *Don't Make Me Think*
 - “..making sure that something works well: that a person of average (or even below average) ability and experience can use the thing --- for its intended purpose without getting hopelessly frustrated”





The Attributes of Acceptability

Source: Jakob Nielsen, Usability Engineering. Academic Press, 1993.



http://www.useit.com/papers/iterative_design/





Principles to Support Usability

Dix et al., Ch. 7

- **Learnability:** the ease with which new users can begin effective interaction and achieve maximal performance
- **Flexibility:** the multiplicity of ways in which the user and the system exchange information
- **Robustness:** the level of support provided to the user in determining successful achievement and assessment of goals.





Examples of the Principles

Dix et al., Ch. 7

- Learnability is supported for instance by:
 - Predictability: System behaves in predictable way in the eyes of the user (consistently)
- Flexibility is supported for instance by:
 - Multi-threading: System allows user to work with multiple tasks in the same time.
 - Multi-modality: Allows user to input and receive information with many modalities.
- Robustness is supported for instance by:
 - Recoverability: Ability of the user to take corrective action once an error has been recognized.





Other Common Terms...

- “User Friendly”
 - Is not a synonym of usability
 - Avoid this expression!
- “Easy-to-use”
 - Sometimes being easy to use is important, but it is only one (vague) attribute of usability





Other Common Terms...

- Accessibility
 - ⟨interactive systems⟩ usability of a product, service, environment or facility by people with the **widest range of capabilities**
- User Experience
 - person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service
- Definitions from ISO 9241-210



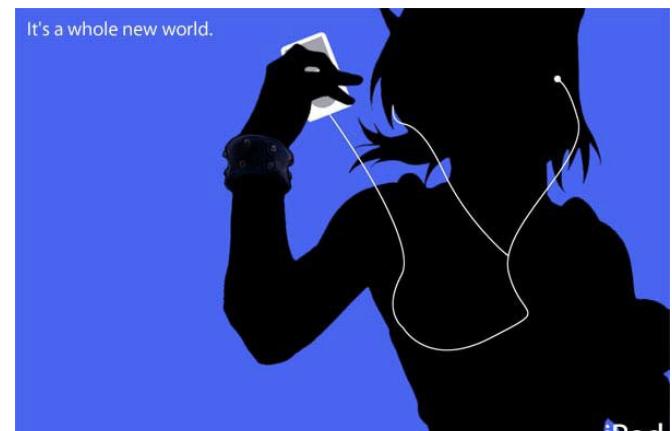


User Experience, UX

“One cannot design a user experience, only design *for* a user experience”

Every product that is used by someone has a user experience: newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.
-Jesse James Garrett, 2003

<http://www.allaboutux.org/ux-definitions>
[http://www.interaction-design.org/encyclopedia/
user_experience_and_experience_design.html](http://www.interaction-design.org/encyclopedia/user_experience_and_experience_design.html)



www.apple.com





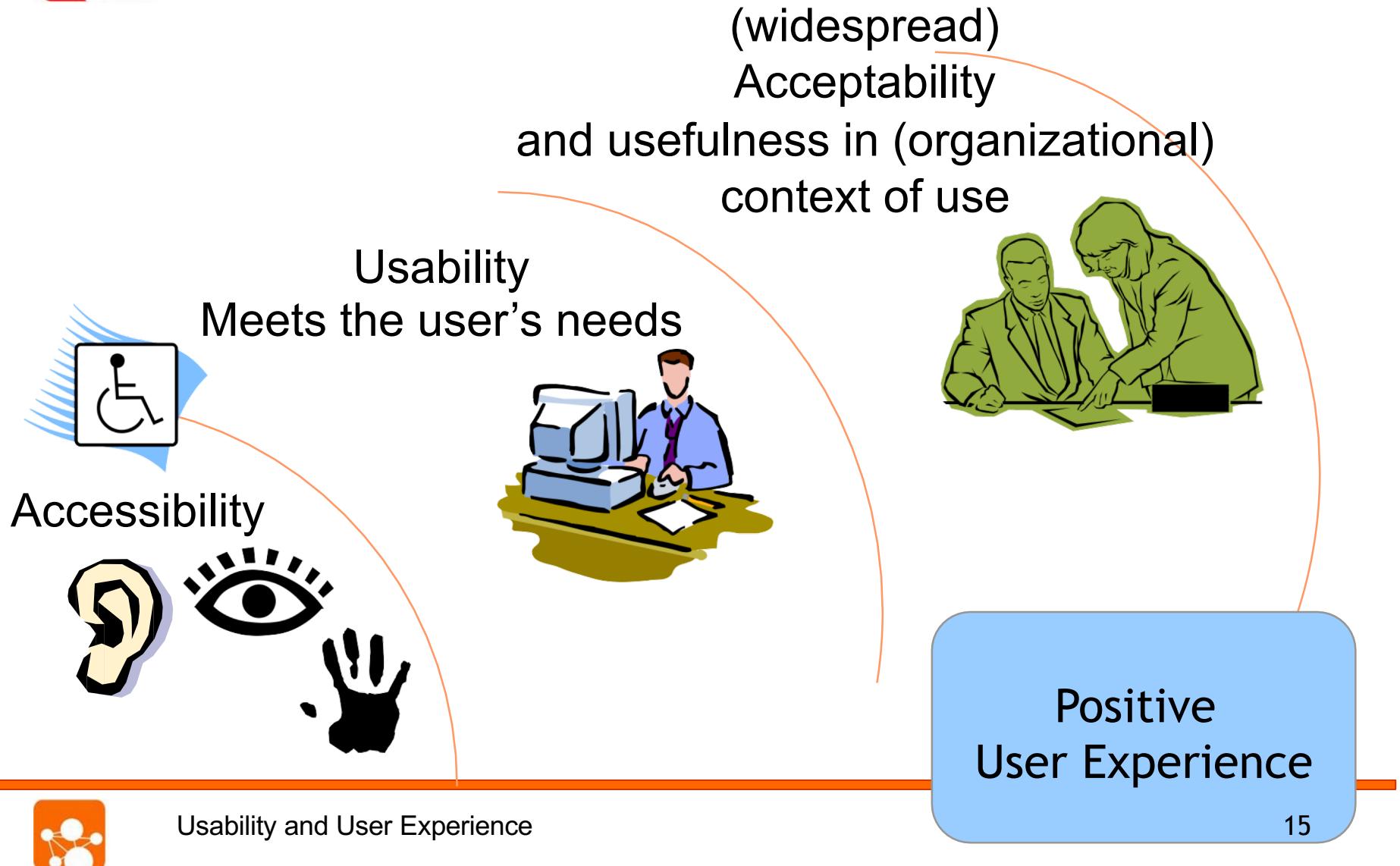
User Experience (ISO 9241-210)

- User experience includes
 - all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours and accomplishments
 - that occur before, during and after use.
- User experience is a consequence of
 - brand image, presentation, functionality, system performance, interactive behaviour and assistive capabilities of the interactive system,
 - the user's internal and physical state resulting from prior experiences, attitudes, skills and personality, and
 - the context of use.
- User Experience ~ usability from the perspective of the users' personal goals
 - usability can include the kind of perceptual and emotional aspects typically associated with user experience.
 - Usability criteria can be used to assess aspects of user experience.





The User as the Starting Point





Why is Usability Essential?



Benefits of Usability Testing: Feedback from Real Customers

- **If your website is difficult to use, customers leave.**
 - **If they get lost in your website, customers leave.**
 - **If a customer can't FIND your product, they can't BUY it.**
-
- Then, they leave!**



Real feedback directly from customers that use the product, which provides data—not opinions.



Why is Usability Essential?

- The everyday use of information technology in life-critical applications has become increasingly widespread over the years (e.g., in hospitals, flight controls, rescue services)
- Reliability and safety should be improved

Case: Airplane controls

- From manual to automated
- Problem:
lack of space vs.
having the control
at hand!





Airbus cockpit



Airbus Accident



Ergon tilaiset ohjelmistoontekijät varoittivat niemakäytäntöjen ohjaamoiden ongelmista kaksi vuotta ennen Airbusin turmaa. Ranskassa, Strasbourgissa läheille morirootuksen jälkeen kuoli vuosi 87 ihmisen lopun.

Ammattilaiset pitivät määräyksiä leväperäisinä

Ohjelmistojen turvapäätelöstä varoitettiin ennen Airbus-turmaa

Strasbourg 20.1.1992:
87 people died

There had been a public warning of the Airbus's cockpit system design before the accident

source: Tietoviikko





Investigations of Airbus Accidents

- Several accidents, the worst of all was near Strasbourg in January 1992.
- Problems found
 - Absence of natural feedback
(the airplane flies too evenly and quietly)
 - The autopilot's guidance and operation functions had serious defects





The Airbus cabin:
All flight
information (not
just the engine),
including the
associated meters
and controls, are
placed together.



Control Board



- The display can be read differently, depending on which mode was selected with a control below the display.
- Angle of descent $3,3^\circ$ vs. descent speed of 3300 feet/min (= angle of descent $\sim 10^\circ$!)

"An interim report points out that the crew had set figures for angle of descent in the FMS when the mode was set for rate of descent."

Flight International, 1993.





Reasons for the Accident?

Automation may be too complex in that it may consist of many interrelated components and may operate under many different modes. This makes automation difficult for pilots to understand and use safely.

- Flight Deck Automation Issues Database

Pilots may not be able to tell what mode or state the automation is in, how it is configured, what it is doing, and how it will behave. This may lead to reduced situation awareness and errors.

- Flight Deck Automation Issues Database





Excessive Automation

Too much system automation is problematic:

- Humans are poor at monitoring for operational problems.
 - When everything is ok, it is tiring to watch the monitors.
- Humans are good at observing when they are actively operating the devices, but when they take action they can make mistakes.
- When a problem arises the user is overloaded with information.
- Objective: Humans stay in control but the system assists and checks
 - E.g. Airbus: Became compulsory to have the “Ground Proximity Warning System” on.





Why is Usability Important?

- Reliability and safety of the system is improved
- Number of users, applications and devices is growing rapidly
 - The user is “anybody” (i.e., with no special training)
 - banking services
 - other home computer services
 - ticket machines, information kiosks
 - navigators
 - ...





The Cost of Training...

CS295 - Microsoft Office XP

This comprehensive training course for Microsoft Office XP includes 15 CD-ROM's containing over 24 hours of quality, instructor led training. You get the Beginner, Intermediate, and Advanced courses for Access, Word, Office, and Excel. As a bonus you will receive a three CD set which covers Outlook. You can view the outlines of the individual components by visiting their course pages. We have included a short introduction to each trainer below.

Microsoft Office XP set of 15 (CD)	\$679.95	add to cart
Microsoft Office XP set of 15 (VHS)	\$679.95	add to cart
Shipping (US only)	FREE	

About The Trainers:

Word 2002 - Dawn Bjork has over 12 years of experience as an independent consultant, and has helped over 12,000 computer users in major corporations,





Why is Usability Important?

- Reliability and safety of the system is improved
- Number of users, applications and devices is growing rapidly
- Good usability saves time and money
 - Less training time is required
 - When the design suits the user's tasks well, the user is satisfied
 - Tasks are completed faster





?#!@%&!!



BusinessWeek, April 29, 1991.



Usability and User Experience



Mouse Rage

- Laboratory study on web usability (2006)
- On poorly designed web sites, increases in stress symptoms:
 - Increased heart rate
 - Increased sweatiness
 - Increased muscle tension in the facial muscles and in the limbs
 - Loss of concentration
- Manifested in anger and swearing, lower task performance, and violence towards the mouse
- If prolonged, will have negative implications for physical and mental health



http://www.sirc.org/publik/mouse_rage.pdf



Usability and User Experience





Improvements Ahead?

People spend more time with Office than the love of their life. Since that's a big sacrifice, we want our customers to love using Office.

That means we spend time listening, sharing, building relationships, generating innovative ideas, and designing with our customers. The end result is software that our customers want to wrap their arms around and kiss.

- Microsoft 2004





Why is Usability Important?

- Reliability and safety of the system is improved
- Number of users, applications and devices is growing rapidly
- Good usability saves time and money
- Good usability is worthwhile financially, even for the company:
 - the product is easier to sell (viral marketing)
 - product markets itself when the user experience has been positive
 - greater possibility to gain brand loyalty
 - ... but note: calculating ROI (Return-on-investment) is difficult





Usability as a Cost Saver

- Australian insurance company
 - Usability-enhancing project, costing < A\$ 100.000
 - Annually saving as a result > A\$ 530.000
- IBM employees login system
 - Usability project, financing \$ 20 700
 - Savings in work time during the first day of the new system \$ 41.700
- Popular new HP printer and driver
 - More than half of the first 100,000 customers called the help line (for driver installation help)
 - Increased helpline staff = almost \$ 500.000 in 1 month
 - All customers (over 200.000) were sent a new driver diskette (total cost ~ \$3 per customer)

Sources: Jakob Nielsen, Usability Engineering. Academic Press, 1993.
Randolph G. Bias, Deborah J. Mayhew, eds., [Cost-Justifying Usability](#). Academic Press, 1994.





Final Example

Email Address:

Password:

[forgot password?](#)



Jared Spool



The \$300,000,000 Fix (per Jared Spool):

In the above example, we have a form with two fields, two buttons, and one link. This form appeared on the bottom of a Shopping Cart. What are the problems?

Hint: Current and New Customers both had problems.





Email Address:

Password:

[forgot password?](#)



Jared Spool



New Customers:

New customers did not want to register. They resisted clicking the Register button. New customers wanted to buy what was in their shopping cart. They did not want a relationship. Most wanted to leave. As it turns out, customers are not required to register—it is optional.



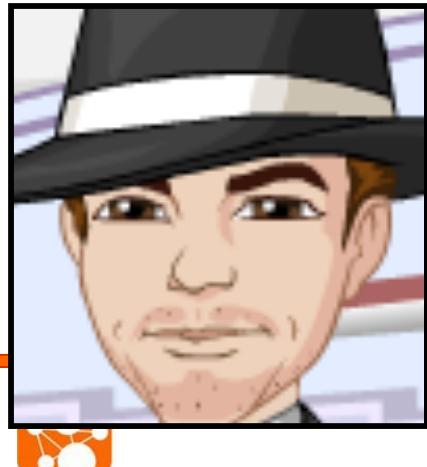
Email Address:

Password:

[forgot password?](#)



Jared Spool



Existing Customers:

Existing customers couldn't remember their exact email and/or password. They clicked the "Forgot Password" link. Help Desk logs revealed this link was clicked about 167,000 each day! According to Spool, 75% of these people didn't make a purchase. They did **leave!**



You do not need an account to make purchases on our site. Click Continue to proceed to checkout. To make future purchases faster, create an account during Checkout.

Continue



Jared Spool



Jared Spool's \$300,000,000 Fix:

Make it obvious. The results: The number of customers purchasing went up by **45%**. The extra purchases resulted in an extra **\$15,000,000** the first month. For the first year, the site saw an additional **\$300,000,000**.





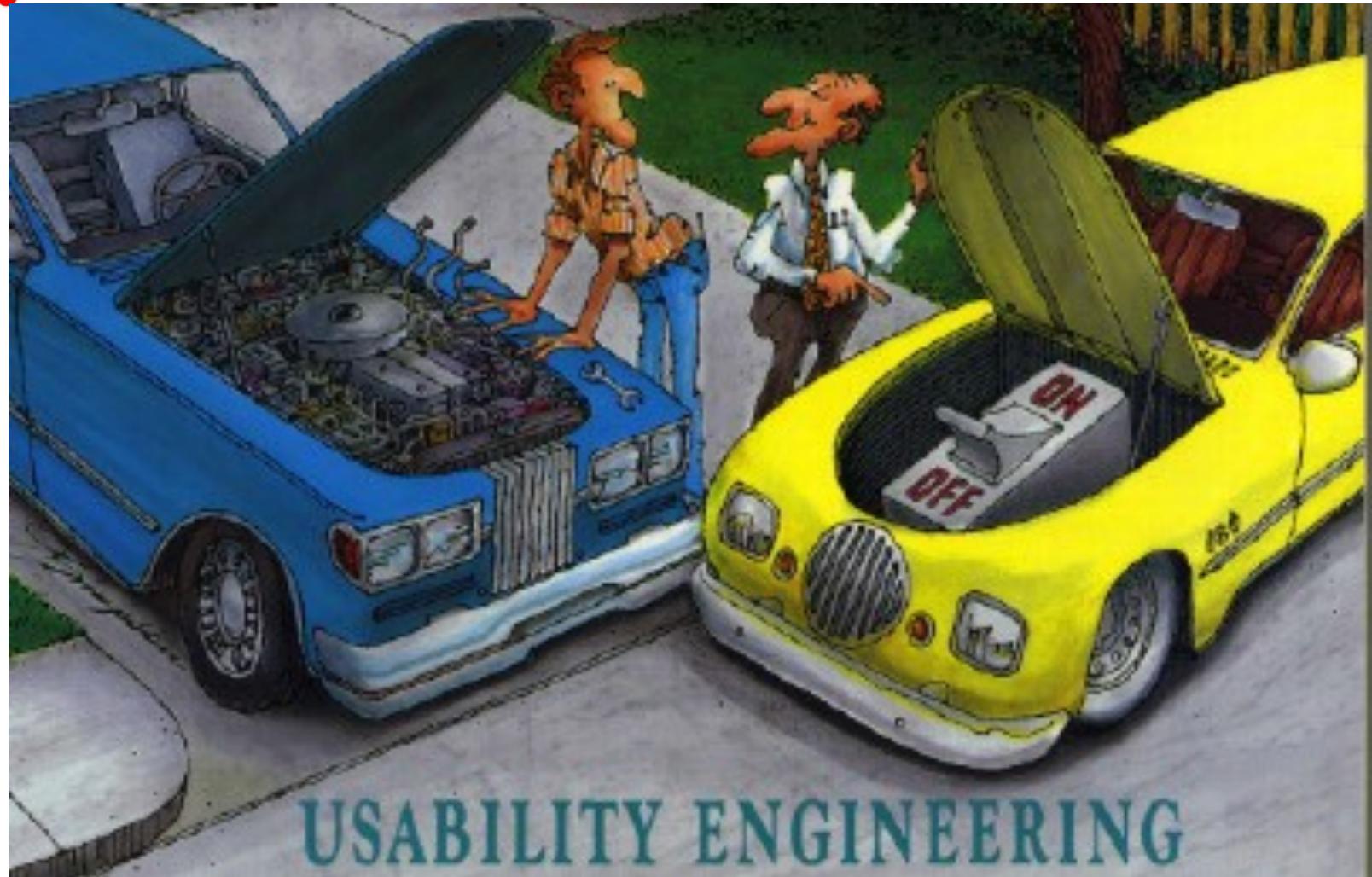
Why is Usability Important?

- Good usability is part of *product quality*





So... What is Usability?



Usability and User Experience

[IEEE Computer](#) magazine cover from the year 1994.

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