Accessibility
Usability
User centred design

2

Usability

Contents

- Usability?
- Usability testing
- Discount usability
- Usability adoption stages

Usability?

Usability

- What?
- Why?
- When?
- Where?

What is Usability?

- Usability is a quality attribute that assesses how easy user interfaces are to use

  The word *usability* also refers to methods for improving ease-of-use during the design process but within this course's context we will use it as a website's quality attribute

- To be usable, a product or service should be:

  Useful

  Efficient

  Effective

  Satisfying

  Learnable; and

  Accessible

What is Usability?

- Usefulness…

  concerns the degree to which a product enables a user to achieve his or her goals, and is an assessment of the user's willingness to use the product at all

  Without usefulness, other measures make no sense, because the product will just sit on the shelf

  If a system is easy to use, easy to learn, and even satisfying to use, but does not achieve the specific goals of a specific user, it will not be used even if it is given away for free

  Interestingly enough, usefulness is probably the element that is most often overlooked during experiments and studies in the lab

What is Usability?

- Usefulness, or the lack of it

  In the early stages of product development, it is usually up to the marketing team to ascertain what product or system features are desirable and necessary before other elements of usability are even considered

  Lacking that, the development team is hard-pressed to take the user's point of view and will simply guess or, even worse, use themselves as the user model

  This is very often where a system-oriented design takes hold

Jeffrey Rubin

What is Usability?

- Efficiency…

  relates to the quickness with which the user's goal can be accomplished accurately and completely and is usually a measure of time

  For example, you might set a usability testing benchmark that says

  95% of all users will be able to load the software within 10 minutes

What is Usability?

- Effectiveness…

  refers to the extent to which the product behaves in the way that users expect it to and the ease with which users can use it to do what they intend

  This is usually measured quantitatively with error rate

  Your usability testing measure for effectiveness, like that for efficiency, should be tied to some percentage of total users

  Extending the example from efficiency, the benchmark might be expressed as

  95% of all users will be able to load the software correctly on the first attempt

What is Usability?

- Learnability…

  has to do with the user's ability to operate the system to some defined level of competence after some predetermined amount and period of training

  It can also refer to the ability of infrequent users to relearn the system after periods of inactivity

What is Usability?

- Satisfaction…

  refers to the user's perceptions, feelings, and opinions of the product, usually captured through both written and oral questioning

  Users are more likely to perform well on a product that meets their needs and provides satisfaction than one that does not

  Typically, users are asked to rate and rank products that they try, and this can often reveal causes and reasons for problems that occur

What is Usability?

- Accessibility

  No need to go over this subject as it was already addressed last week

  But yes, this is where all accessibility issues would be accounted for in the broader usability scope of user centred design

What is Usability?

- This means that usability goals and objectives are typically defined in measurable terms of one or more of the former attributes

  However, making a product usable is never simply the ability to generate numbers about usage, satisfaction, etc.

  While the numbers can tell us whether something works or not

  There is a distinctive qualitative element to how usable something is which…

  is hard to capture with numbers; and

  is difficult to pin identify

  has to do with how one interprets the data in order to know how to fix a problem because the behavioral data tells you why there is a problem

What is Usability?

- Unfortunately, usability is invisible
  - If something is going well, you don't notice it
    - If the temperature in a room is comfortable, no one complains
- Usability happens along a continuum
  - How usable is your product?
  - Could it be more usable even though users can accomplish their goals?
  - Is it worth improving?
- Most usability professionals spend most of their time working on eliminating design problems, trying to minimize frustration for users
  - But know that it is a difficult goal to attain for every user of your product
    - It affects only a small part of the user's experience of accomplishing a goal
    - Although there are quantitative approaches to testing the usability of products, it is impossible to measure the usability of something

You can only measure how unusable it is, how many problems people have using something, what the problems are and why

Why does usability fail?

- Common five reason for the delivery of less usable products are:

  Development focuses on the system

  Target audiences change and adapt

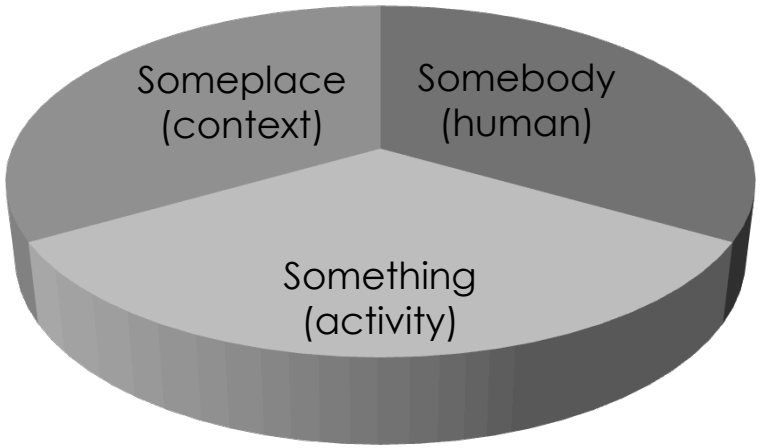
  Designing usable products is difficult

  Team specialists don't always work in integrated ways

  Design and implementation don't always match

Why does usability fail?

- Development focuses on the system



Bailey's human performance model

Why does usability fail?

- Development focuses on the system

  Unfortunately…

  - Designers, engineers, and programmers have traditionally placed the greatest emphasis on the activity component
    - And much less emphasis on the human and the context components
  - The relationship of the three components to each other has also been neglected
    - There is an underlying assumption that because humans are so flexible and adaptable, it is easier for them adapt themselves to the machine, than vice-versa
    - Developers have historically been hired and rewarded not for their inter-personal skills but for their ability to solve technical problems
    - Designers usually go about developing products for end users who were much like themselves

Why does usability fail?

- Target audiences change and adapt
  - The original users of computer-based products were enthusiasts possessing
    - expert knowledge of computers
    - a love of technology
    - the desire to tinker, and
    - pride in their ability to troubleshoot and repair any eventual problem
  - Designers and developers of these products shared similar characteristics
    - In essence, users and developers of these systems were one and the same
  - Not anymore!
    - Today's user is not even remotely comparable to the designers and developers in skill set, aptitude, expectation, or almost any attribute that is relevant to the design process.

Why does usability fail?

- Designing usable products is difficult
  - Part art, part science, it seems that everyone has an opinion about usability, and how to achieve it
    - This trivializing of usability creates a more dangerous situation than if designers freely admitted that designing for usability was not their area of expertise and began to look for alternative ways of developing products
  - Everyone as an opinion until it is time to evaluate the usability of a product
    - Which requires…
      - Operational definitions; and
      - Precise measurements

Why does usability fail?

- Team specialists don't always work in integrated ways

  To improve efficiency, many organizations have broken down the development process into separate components

  For example…

  the user interface

  the help system, and

  the written materials

  There is nothing inherently wrong with specialization

  The difficulty arises when there is little integration of these separate components and poor communication among the different development teams

  Or when organizations unknowingly exacerbate this lack of integration by usability testing each of the components separately

Why does usability fail?

- Design and implementation don't always match

  The design of the user interface and the technical implementation of the user interface are different activities, requiring very different skills

  This distinction was rarely acknowledged in the past

  Nowadays however, the challenge of design has increased dramatically due to the need to reach a broader, less sophisticated user population and the rising expectations for ease of use

  To use a computer analogy, the focus has moved from how it works to how it communicates

Why should we care?

- On the Web…

  usability is a necessary condition for survival

- If a website is difficult to use, people leave

  If the landing page fails to clearly state what a company offers and what users can do on the site, they leave

  If users get lost on a website, they leave

  If a website's information is hard to read or doesn't answer users' key questions, they leave

- There's no such thing as a user reading a website manual or otherwise spending much time trying to figure out an interface

  There are plenty of other websites available

  Leaving is the first line of defense when users encounter a difficulty

Why should we care?

- The first law of e-commerce is that if users **cannot find** the product, they **cannot buy** it either!

Why should we care?

- Even for an internal audience such as what happens on an intranet

  Usability is a matter of employee productivity

  The time users waste being lost on your intranet or trying to understand difficult instructions…

  is money being wasted by paying them to be at work without getting work done!

Why should we care?

- According to Jakob Nielsen…

  Current best practices call for spending about 10% of a design project's budget on usability

  On average, this will more than double a website's desired quality metrics and slightly less than double an intranet's quality metrics

  For software and physical products, the improvements are typically smaller but still substantial when you emphasize usability in the design process

Why should we care?

- e-Commerce

  Think of…

  doubling sales

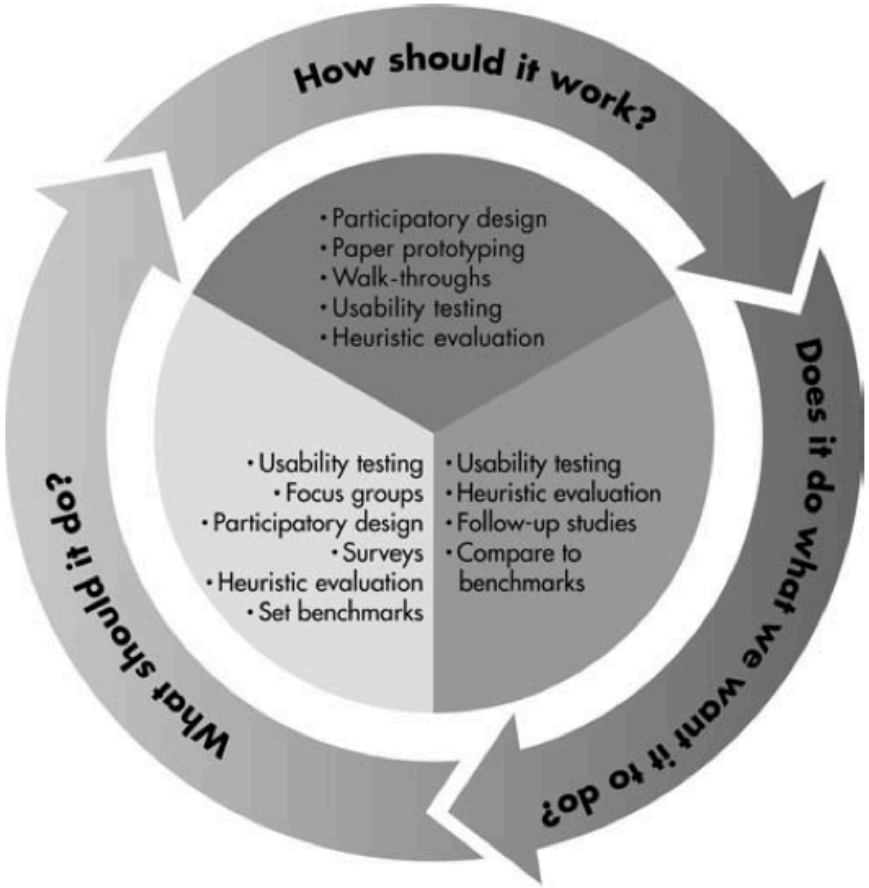
  doubling the number of registered users or customer leads

  or doubling whatever other desired goal motivated your project

- Intranet

  In this case, think of doubling usability as cutting training budgets in half and doubling the number of transactions employees perform per hour

When should we go about it?



When should we go about it?

- Usability plays a role in each stage of the design process resulting in a need for multiple studies

  These are some of the the main usability testing opportunities:

  - Before starting a new design, test the old design to identify the good parts that you should keep or emphasize, and the bad parts that give users trouble
  - Unless you're working on an intranet, test your competitors' designs to get cheap data on a range of alternative interfaces that have similar features to your own
  - Conduct a field study to see how users behave in their natural habitat
  - Make paper prototypes of one or more new design ideas and test them
    - The less time you invest in these design ideas the better, because you'll need to change them all based on the test results.

When should we go about it?

And yet more of the the main usability testing opportunities:

- Refine the design ideas that test best through multiple iterations, gradually moving from low-fidelity prototyping to high-fidelity representations
  - Test each iteration
- Inspect the design relative to established usability guidelines, whether from your own earlier studies or published standards and research
- Once you decide on and implement the final design, test it again
  - Subtle usability problems always creep in during implementation
- Don't defer user testing until you have a fully implemented design
  - If you do, it will be difficult to fix the vast majority of the critical usability problems that the test uncovers.
    - Many of these problems are likely to be structural, and fixing them would require major work
- The only way to a high-quality user experience is to start user testing early in the design process and to keep testing every step of the way.

Where?

- If usability tests are run at least once a week, it's worth building a dedicated usability laboratory

  For most companies, however, it's fine to conduct tests in a conference room or an office

  As long as you can close the door to keep out distractions

  What matters is that you get hold of real users and sit with them while they use the design

  A notepad is the only equipment you need.

Usability testing

Usability testing

- Usability testing refers to the systematic experimental evaluation of the interaction between people and the products, equipment, environments, and services they use
  (McClelland 1995)
- It evaluates how easy a product is to use and whether it is functional and acceptable
  (Bogner 1998)
- Usability test results may not be valid unless the conditions of the test closely match those of actual product use
  (Cushman & Rosenberg 1991)
- Therefore, the operating characteristics of the prototype, the tasks, the duration of the test, and the environmental conditions must be realistic
  Both extreme and typical conditions should be included in the test

Planning usability testing

- The first decision is to establish the usability testing goal and options are…
  - Formative usability testing
    - Formative usability testing is iterative by nature
      - Question might be about…
        - The most significant usability issues preventing users from completing their tasks
        - What works and what do they find frustrating
        - What are the most common errors or mistakes users are making
        - Assessing the improvements being made from one design interaction to the next
        - What usability issues are expected to remain after the product is launched
  - Summative usability testing
    - Summative testing might focus on
      - assessing the usability of a finished product; or
      - comparing the usability of similar products
        - In this case, questions are normally about…
        - How some specific usability goals where meet
        - How does one product compare against the competition
        - Assessing improvements from one product release to the next

Planning usability testing

- Then, user goals must be identified and tasks devised
  - Performance
    - Performance is about what a user does when interacting with a product
      - It is about how useful, efficient, effective, learnable and accessible a product is
  - Satisfaction
    - Its all about what a user says or thinks about her interaction with a product
      - This is something that should especially be accounted for on the user as something to say about using or not a specific product

Planning usability testing

- Selecting the right kind of metrics is the third step

  Selection of usability metrics should depend on the goal of the study as well as on the user's goals

Planning usability testing

Usability Study Scenario X type of usability metrics	Task Success	Task Time	Errors	Efficiency	Learn ability	Issues base metrics	Self-reported metrics	Behavioral and physiological metrics	Combined and comparative metrics	Live Website metrics	Card-sorting data
Completing a transaction	X			X		X	X			X	
Comparing products	X			X			X		X		
Evaluating frequent use of the same product	X	X		X	X		X				
Evaluating navigation and information architecture	X		X	X							X
Increasing awareness							X	X		X	
Problem discovery						X	X				
Maximizing usability for a critical product	X		X	X				X			
Creating an overall positive user experience							X				
Evaluating the impact of subtle changes										X	
Comparing alternative designs	X	X					X		X		

Planning usability testing

- Finally, evaluation methods, participants and tools must be selected

  Evaluation method options are…

  - Lab tests
    - A lab test involves one-on-one sessions between a moderator and the test participants
      - The moderator asks questions and assigns tasks and notes the participant's behaviour and responses
    - Lab usability tests are normally formative in nature
  - Onsite tests; and
  - Online tests

Planning usability testing

- As for participants,
  - They have a major impact on usability testing findings
    - It is critical that you plan how to include the most representative participants as possible in your study
      - The steps you will go through in recruiting participants are essentially the same whether you are collecting metrics or not
      - If personas were used in de design process, then recruited participants should fall within the perceived user group
      - Otherwise, a general profile should be outlined and the participants should be recruited accordingly
    - If a formative usability test is being run, a small number of participants is required
      - Six are usually enough if no distinct user groups are foreseen, otherwise, each group should have at least 4 members
    - If a summative usability test is being run, then the recommended number of participants number fall between 50 and 100
      - A valid test might still be run with 20 participants but results can be pale in comparison to running the test with a larger set of users

Planning usability testing

- As tools are concerned, they should be selected bearing in mind the data cleanup and data analysis tasks ahead

Metrics

- Performance metrics
  - Task success
    - Binary or graded
      - Success or Failure
      - Complete success (with or without assistance), partial success (with or without assistance),
  - Time on task
    - Is normally recorded for successfully accomplished tasks
  - Errors
  - Efficiency
    - Normally a ratio between accomplishment and effort
      - Different authors have established context specific formulas that should be accounted for before deciding on how to measure efficiency
  - Learnability
    - Performance metrics collected over time on distinct product trials
      - At least two should be run in order to assess some lernability inicator

Metrics

- Issues-based metrics
  - What is an issue?
    - Anything that prevents task completion
    - Anything that takes someone off-course
    - Anything that creates some level of confusion
    - Anything that produces an error
    - Not seeing something that should be noticed
    - Assuming something is correct when it is not
    - Performing the wrong action
    - Misinterpreting some piece of content
    - Not understanding the navigation
  - How are they identified
    - Normally by analysing performance metric data eventually combined

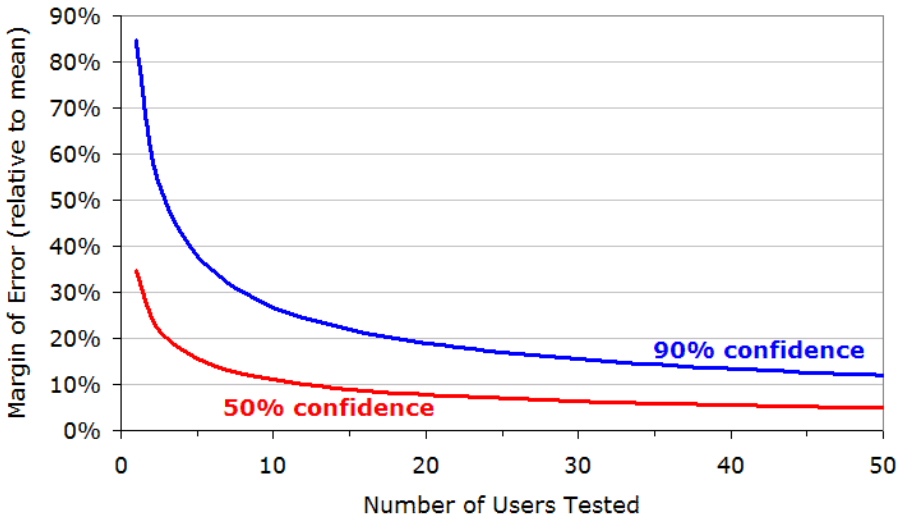
- Issues-based metrics
  - After identified, issues usually classified according to their severity
    - Small impact on user experience, few users experiencing issue
      - Low severity
    - Small impact on user experience, many users experiencing issue
      - Medium severity
    - Large impact on user experience, few users experiencing issue
      - Medium severity
    - Large impact on user experience, many users experiencing issue
      - High severity

Metrics

- And others exist such as
  - Self-reported metrics, used for assessing satisfaction among other participant perceived measures
  - Behavioural and physiological metrics
    - of which eye-tracking is one of the most used ones as far as Web usability testing is concerned
  - Combined and comparative metrics
    - based on combinations of the previously mentioned siblings
  - And others such as…
    - Server logs
    - Card-sorting data
      - Open card sorting
      - Closed card sorting
    - Accessibility indicators

How many users?

- When collecting usability metrics, testing 20 users typically offers a reasonably tight confidence interval
  - Many users are required because of the substantial individual differences in user performance
    - When you measure people, you'll always get some who are really fast and some who are really slow
    - Given this, you need to average these measures across a fairly large number of observations to smooth over the variability



Large scale usability testing

- Having said that testing on the region of 20 users offers a significant degree of confidence, in some cases you might want or need to run the test with a larger group of participants

  The main advantage of running a test with more participants is that as your sample size increases, so does your confidence in the data

  Large scale usability testing is normally summative in nature

  Large scale usability testing is normally conducted remotely

    Using some sort of an online tool for task setting, user monitoring and data collection

Large scale usability testing

- Large scale usability testing procedure should probably be

  Carefully planned; and

  Should probably be itself usability tested

Tools

- ClickTale

  ClickTale is a paid hosted service that tracks user keystrokes, mouse clicks and moves and the time it takes for users to move around a web page

  Single user sessions are saved as a movie with a large round circle around the user's cursor so it's easier to see

  A nice feature is the ability to show aggregated data in the form of heat maps or as reports

  The heat maps display red hot zones where most users spend longer periods, and blue or cold areas where your users spend the least amount of time

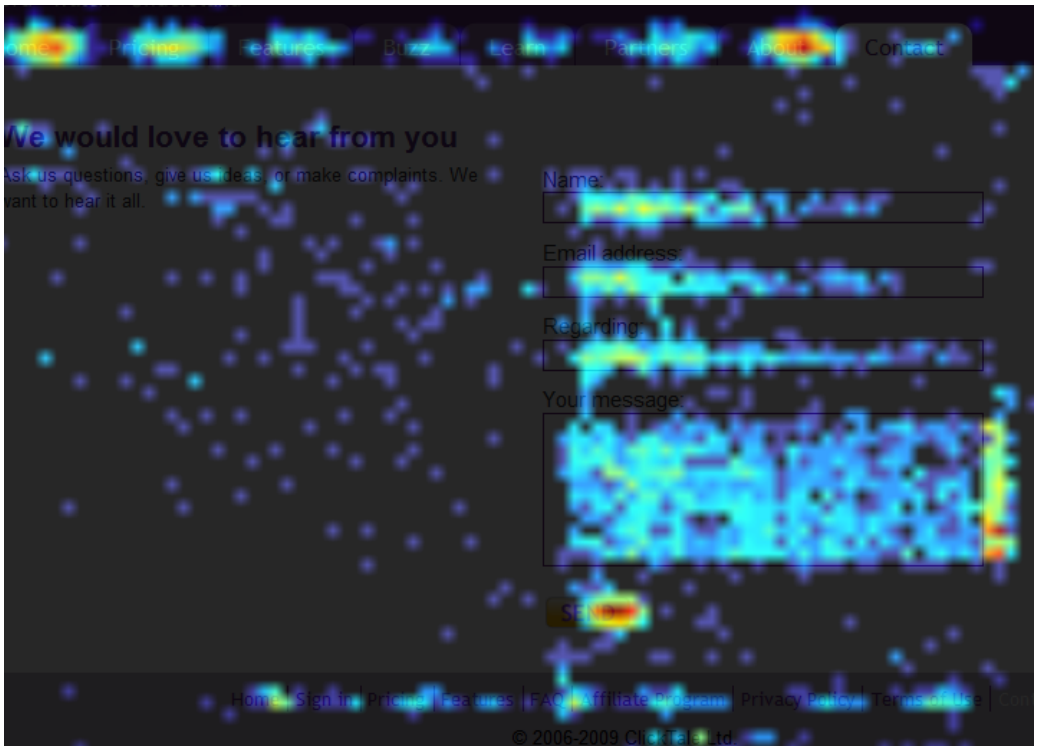
  Another nice feature is the Form Analytics tool which displays aggregate form field information

  This information includes time of field completion, the number of entries and clicks as well as which form fields have the highest abandonments, or take the longest to complete, or have the most back-tracks due to errors or confusion.

Tools

- ClickTale

  Click heat map



Tools

- ClickTale

  Attention heat map

Tools

- Loop11

  Loop11 is a unique usability testing tool in that it allows unmoderated remote usability testing using actual users

  A researcher provides a simple task to a user, for example, finding a particular type of gift book for a relative on a book site, then tracking user interaction

  The data is presented via reports of task completion rate, time on task, common fail pages, paths and a nice detailed path analysis for each users.

  Loop11 does not require software to be loaded on a web site

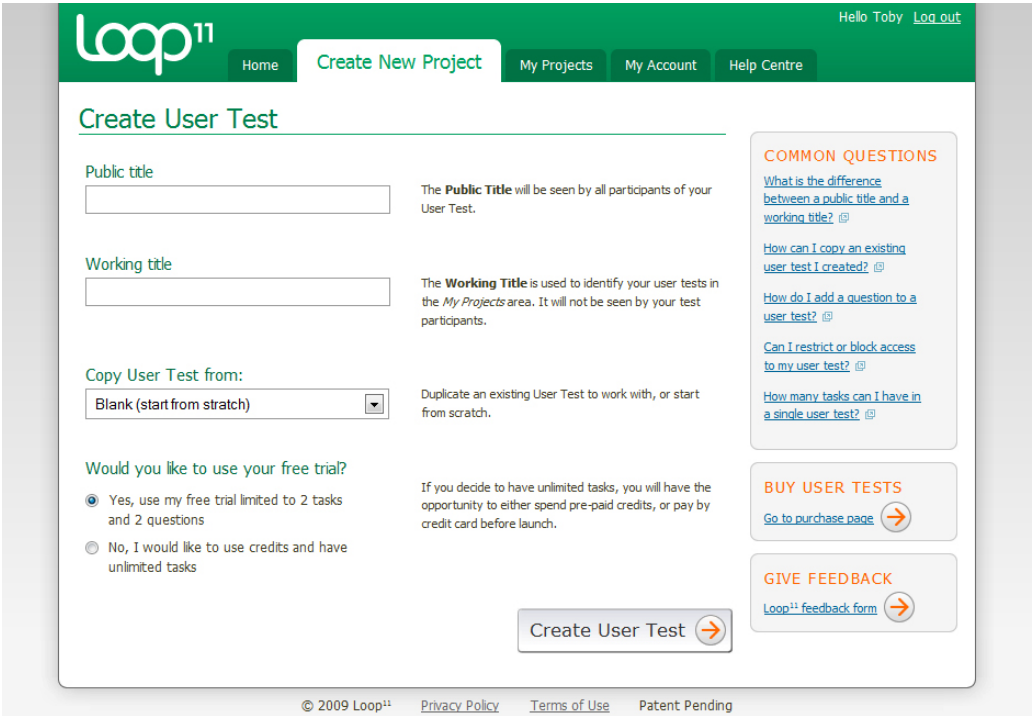
  As is mentioned on the Loop11 web site, this means remote unmoderated usability testing can be done on your competitor's web site

  Because real users are being tested, Loop11's results will be accurate, or at least as accurate as the real users are.

Tools

- Loop11

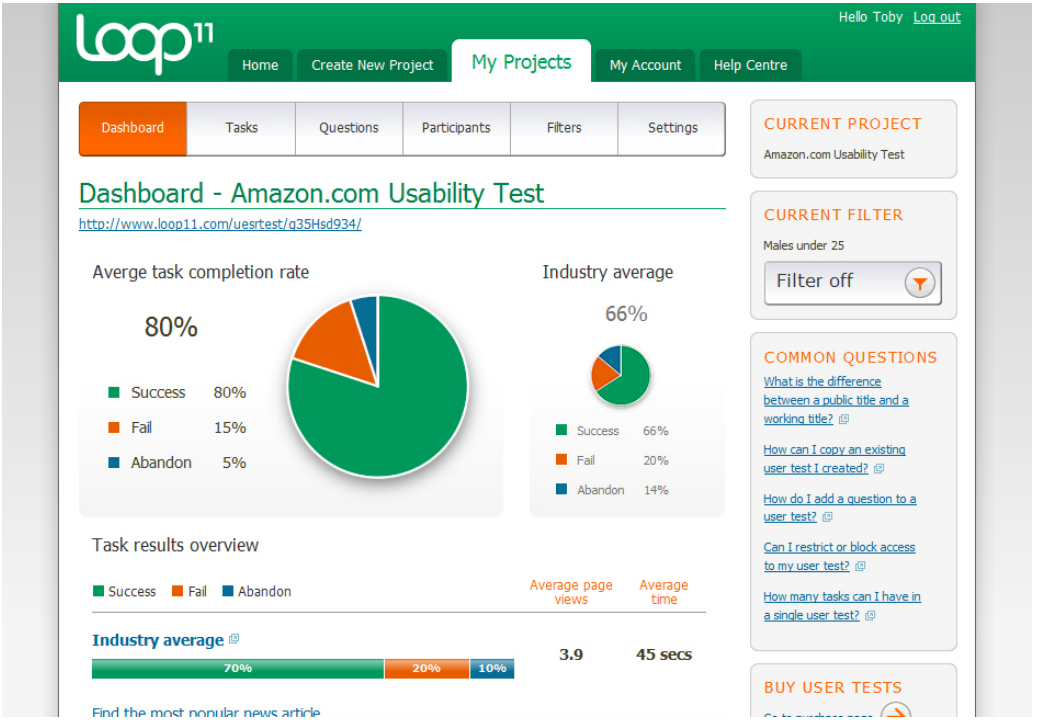
  Creating tests



Tools

- Loop11

  Getting results



Tools

- And many others are available

  Check Craig Tomlin's list at

  http://www.usefulusability.com/24-usability-testing-tools/

Discount usability

Discount usability

- Usability specialists will often propose using the best possible methodology

  This is what they have been trained to do

  Unfortunately, it seems that the best is the enemy of the good to the extent that insisting on using only the best methods may result in having no methods used at all

Discount usability

- The alternative is to use discount usability or… guerrilla usability

  Guerrilla usability is based on the use of the following three techniques

  Scenarios

  Simplified thinking aloud

  Heuristic evaluation

  Additionally, the basic principle of early focus on users should of course be followed

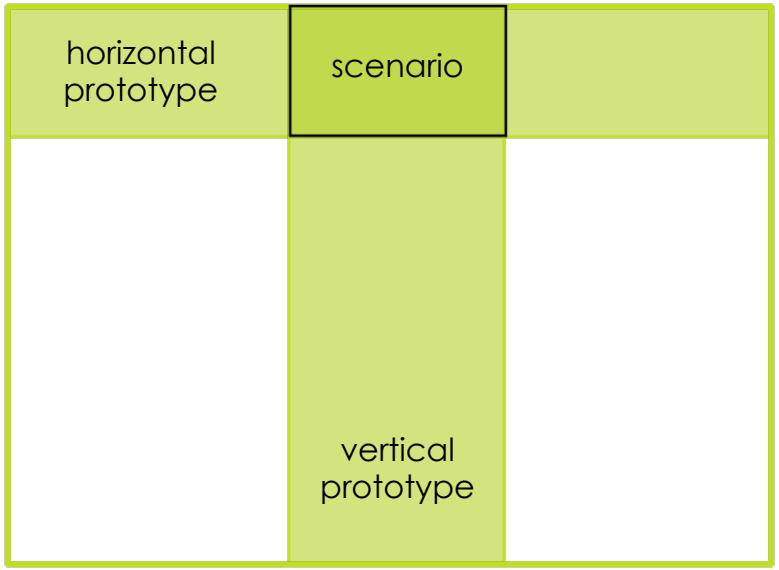
  It can be achieved in various ways, including simple visits to potential or future user locations

Scenarios

- Scenarios are a kind of prototyping

  The entire idea behind prototyping is to cut down on the complexity of implementation by eliminating parts of the full system

  Horizontal prototypes reduce the level of functionality and result in a user interface surface layer, while vertical prototypes reduce the number of features and implement the full functionality of those chosen



Scenarios

- Scenarios take prototyping to the extreme by reducing both the level of functionality and the number of features

  By reducing the part of interface being considered to the minimum, a scenario can be very cheap to design and implement, but it is only able to simulate the user interface as long as a test user follows a previously planned path

- Since the scenario is small, we can afford to change it frequently, and if we use cheap, small thinking aloud studies, we can also afford to test each of the versions

  Therefore scenarios are a way of getting quick and frequent feedback from users.

- Scenarios can be implemented as paper mock-ups or in simple prototyping environments

  This is an additional savings compared to more complex prototypes requiring the use of advanced software tools

Simplified thinking aloud

- Thinking aloud studies are conducted with psychologists or user interface experts as experimenters who record the subjects actions and perform detailed protocol analysis

  However, it is possible to run user tests without sophisticated labs, simply by bringing in some real users, giving them some typical test tasks, and asking them to think out loud while they perform the tasks

  Besides reducing the number of subjects, another major difference between simplified and traditional thinking aloud is that data analysis can be done on the basis of the notes taken by the experimenter instead of by video footage

Heuristic Evaluation

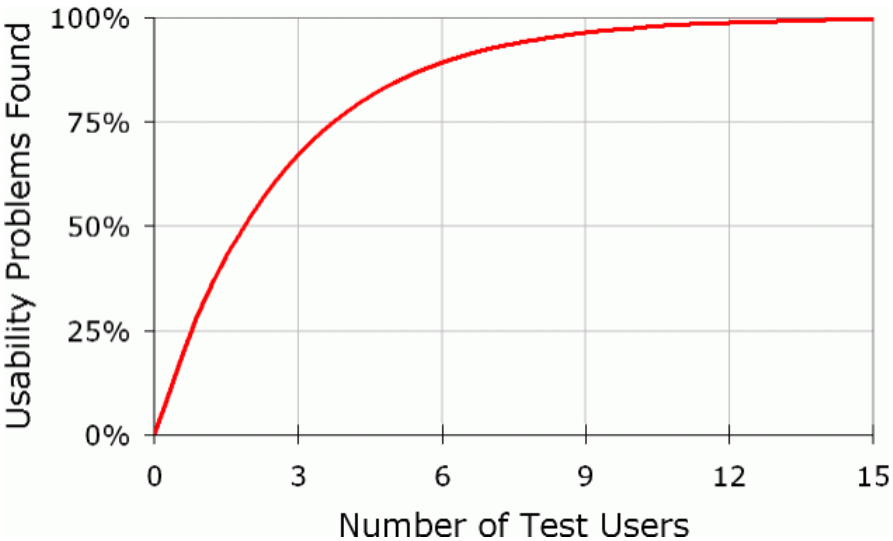
- Current standards and usability guidelines typically have on the order of one thousand rules to follow and are normally seen as intimidating by developers
- A discount alternative would be to use a small set of heuristics such as Jakob Nielsen's ten basic usability principles

Heuristic evaluation

- Jakob Nielsen´s ten basic usability heuristics
  - 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

How many users?

- With this approach, the best results come from testing no more than 5 users and running as many small tests as you can afford



Tools

- Mac

  Silverback

  http://silverbackapp.com/

- PC

  Camtasia

  http://www.techsmith.com/camtasia.asp

  (there is also a Mac version)

Usability adoption stages

Jakob Nielsen

Stage 1

- Usability does not matter

  The main focus is to bring every last bit of performance from the iron

Stage 2

- Usability is important

  but good interfaces can surely be designed by the regular development staff as part of their general system design

  At this stage, no attempt is made at user testing or at acquiring staff with usability expertise

Stage 3

- The desire to have the interface blessed by the magic wand of a usability engineer

  Developers recognize that they may not know everything about usability, so they call in a usability specialist to look over their design and comment on it

  The involvement of the usability specialist is often too late to do much good in the project, and the usability specialist often has to provide advice on the interface without the benefit of access to real users

Stage 4

- Panic strikes, causing a sudden desire to learn about user interface issues

  Unfortunately, the main concern is the to bring in usability specialists to advise on the graphic side of the user interfaces from the start

  Some usability specialists resent this attitude and maintain that it is more important to provide an appropriate interface for the task than to blindly go with a graphic design without prior task analysis

  Even so, this is an opportunity for usability specialists to get involved in the design process at an earlier stage than the traditional last-minute blessing of a design that cannot be changed much

Stage 5

- Discount usability engineering sporadically used

  Typically, some projects use a few discount usability methods, though the methods are often used too late in the development lifecycle to do maximum good

  Projects that do use usability methods often differ from others in having managers who have experienced the benefit of usability methods on earlier projects

  Thus, usability acts as a kind of virus, infecting progressively more projects as more people experience its benefits

Stage 6

- Discount usability engineering systematically used

  At some point in time, most projects involve some simple usability methods, and some projects even use usability methods in the early stages of system development

  Scenarios and inexpensive prototyping techniques seem to be very effective weapons for guerrilla usability at this stage

Stage 7

- Usability group or usability lab founded

  Many companies decide to expand to a full scale usability approach after having experienced the benefits of discount usability engineering

  Typically at this time, companies go about

  setting up usability laboratories; or

  forming dedicated groups of usability specialists

Stage 8

- Usability permeates the lifecycle

  The final stage is rarely reached since even companies with usability groups and usability labs normally do not have enough usability resources to employ all the methods one could wish for at all the stages of the development lifecycle

  However, there are some, often important, projects that have usability plans defined as part of their early project planning and where usability methods are used throughout the development lifecycle

Usability

- In the end

  understanding what usability is all about fosters the development of a *working for the greater good* sense in all involved in a product's life cycle

  Usability specialist or not

Contents

- Usability?
- Usability testing
- Discount usability
- Usability adoption stages

Suggested viewing

- The Design of Future Things
  http://www.youtube.com/watch?v=wQmwEjL6K1U&feature=PlayList&p=8C50465DE4A494CF&playnext_from=PL&playnext=1&index=11

  Don Norman talk at Stanford University (one of the gurus)

- Sketching and Experience Design

  http://www.youtube.com/watch?v=xx1WveKV7aE&feature=channel

  Bill Buxton talk at Stanford University (not as good a presenter as Don Norman but very interesting and relevant)

Elective readings

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Further readings

- Niesen and Loranger 2006. **Prioritizing Web usability**, New Riders
- Tullis and Albert 2008. **Measuring the user experience**, Morgan Kaufmann
- Albert et al. 2010. **Beyond the usability lab**, Morgan Kaufmann

Relevant links

- Donald Norman's website
  http://www.jnd.org/books.html
- Jakob Nielsen's site on usability
  http://www.useit.com/
  (not always consensual)
- Jared Spool's company
  http://www.uie.com/
  (with links to interesting case studies)
- Steve Krug's consultancy website
  http://www.sensible.com/
- Bill Buxton's website
  http://www.billbuxton.com/
- US governmental usability support service
  http://www.usability.gov/
  (as dull as a governmental service but rather useful)