Wire framing and Prototyping
Module 4

116U01E734

User Experience Design

July-Dec 2024

Wire framing & Prototyping

- Visual design principles, Interaction design, Information design and data visualization, Information architecture
- Wire framing and storyboards, Digital Designs, Elements and Widgets, Screen design and layout, prototyping tools.
- Usability testing – types and process.

Visual Design Principles

- **Size and Scale:**
  - Based on the importance ; use the size of objects or vice-a – versa
  - Larger the size more important is the object
  - Size and scale aid in balancing out elements based on their relevance and importance.

- **Hierarchy**
  - An optimal arrangement of screen elements, in such a way that they appear to be balanced, organized, functional, and aesthetically pleasing to the human eye.

Visual Design Principles

- **Emphasis**
  - **Scale** – By rescaling elements to make them appear larger and bigger as more the size, the better it grabs the attention.
  - **Positioning** – Placement of the element also comes under putting emphasis and can be centered aligned, or peripheral
  - **Highlighting** using color, patterns, or texture
  - Use of font weights such as **bold**, semi-bold, or even extra bold.
  - **Underlining** the information
  - Putting pieces of information in **CAPITAL LETTERS** or sometimes under “inverted commas”.
  - Using **lines** and **arrows** to grab attention

Visual Design Principles

- **Proportion**
  - Larger the size; important is the feature
  - Based on the values , objects size, colour share will be decided

- **Negative Space**
  - Cluttered interface reduce the ability to scan and read information effectively, whereas a dense interface has information evenly spread with the help of proper spacing between multiple screen elements.
  - Without the proper use of white or negative spacing, it makes the content looks flooded, unorganized, and overwhelming to the user

Visual Design Principles

- **Colour and Contrast**
  - Used to make elements stand out
  - makes the **design pop and grabs the user's attention** on a specific element on the screen
  - Always put important information in bright colors (as per the theme and color scheme) to make the design or information pop, to easily capture user attention
  - warm colors will stand out against dark backgrounds, making them appear closer than cool colors on a dark background.
  - Cool colors stand out over a light background, making them appear closer than warm colors on a light background.
  - Use these colors, in accordance with your color scheme.

Visual Design Principles

- **Repetition (Consistency)**
  - Repetition in design refers to employing the same elements repeatedly throughout a piece of work, including colors, patterns, typefaces, images, textures, and more
  - **Creates better consistency and ease for the user** to know what to do and where to find something
  - Consistent logos, icons, and colors throughout the product also creates brand identity
  - Repetitive information also stays long in user memory, using a repetitive app over a long period of time makes the muscle memory strong and thus users are very attached to the app/website.

Visual Design Principles

- **Balance and Alignment**
  - The symmetric distribution of elements in designs.
  - Alignment helps **create a structure in design and information**
  - Having balance and hierarchy in all types of screen elements such as images, text, and icons.
  - With the help of alignment, users know where to look, where to read, and how to interact.
  - Balancing out the textual content is very important, this can be done with the help of *font weight, increasing heading font size, bold or underlining important details, and adding color to the text*.

Visual Design Principles

- **Movement**
  - Movement refers to how a user or a reader scans through the content. **How do they move from one point to another?**
  - The importance of movement **gives a traceable path** of how users have scanned through the app while approaching a goal.
  - It helps users to move forward as well as come back if they are lost in between the process.
  - Movement lead's a user eye to a particular content or element on a big screen, marking the focal point

Visual Design Principles

- **Reading Patterns**
  - There is always a pattern in how users scan and read any information.
  - It is found that human is read from top to bottom and based on cultural writing it can be right to left(like Hebrew and Urdu) or left to right(like English)
  - **Z-Shaped**: Scan the website from the top left to the bottom right of the page. Making a z shape while scanning through content.
  - **F-Shaped:** When a user starts scanning data in F shape they start by reading the top line from left to right and then going straight to the bottom. Such as Google's search result page.
  - **Layered Cake:** When users only focus on the top heading and title while leaving the rest of the content unread. Just like a frosted cake – where frosting is the heading and cake walls are leftover content.
  - **Spotted:** When the user focused on specific content scanning in a random manner.

Visual Design Principles

- **Variety**
  - Creating variety in presentation will keep the interface interesting
  - Monotony may lead to missing put some important information
  - Providing exciting and unusual but expected interaction styles might improve user experience

Visual Design Principles

- **Unity**
  - Relates to design elements
  - Present the information in the most logical and cohesive way possible, in a conceptually unified manner.
  - Is pleasing to the eye.
  - Can aid comprehension.
  - Can highlight a key message.
  - Creates balance.
  - Promotes creativity
- **Unity applied in design through**
  - Choosing harmonious colors
  - Using similar shapes
  - Adding complementary textures
  - Placing elements with care

Visual Design Principles

- **White/Negative Spacing**
  - Refers to any blank or empty space surrounding all the other elements in a design composition
  - Effective use of space can greatly contribute to an attractive, harmonious, and successful design.
  - structures and organizes content
  - improves text readability and legibility
  - increases user interaction
  - draws focus on important elements
  - promotes balance and visual order

Visual Design Principles

- **Proximity**
  - **Group similar or related items together** to emphasize their relationship.
  - **Space unlike or unrelated items further apart** to emphasize their lack of relationship.
  - **Create visual hierarchy** by using proximity to guide the viewer's eyes through the design.

Interaction Design

- The design of the interaction between users and products.
- goal of interaction design is to create products that enable the user to achieve their objective(s) in the best way possible
- Often involves elements like aesthetics, motion, sound, space, and many more

Interaction Design

- **5 Dimensions of Interaction Designs**
  - **1D: Words**
    - Especially those used in interactions, like button labels—should be meaningful and simple to understand.
    - They should communicate information to users, but not too much information to overwhelm the user.
  - **2D: Visual representations**
    - This concerns graphical elements like images, typography and icons that users interact with.
    - These usually supplement the words used to communicate information to users.

Interaction Design

- **5 Dimensions of Interaction Designs**
  - **3D: Physical objects or space**
    - Through what physical objects do users interact with the product? (Device based control)
    - Affect the interaction between the user and the product.
  - **4D: Time**
    - While this dimension sounds a little abstract, it mostly refers to media that changes with time (animation, videos, sounds).
    - Motion and sounds play a crucial role in giving visual and audio feedback to users' interactions.
    - Also of concern is the amount of time a user spends interacting with the product: can users track their progress, or resume their interaction some time later?

Interaction Design

- **5 Dimensions of Interaction Designs**
  - **5D: Behavior**
    - Includes the mechanism of a product: how do users perform actions on the website?
    - How do users operate the product?
    - Includes the reactions—for instance emotional responses or feedback—of users and the product.

Information Design

Information Design

- The practice of presenting information in a way that fosters an efficient and effective understanding of the information
- displaying information effectively, rather than just attractively or for artistic expression.

Data Visualization

Information Architecture

Wire framing & Storyboards

- Wire framing and storyboards, Digital Designs, Elements and Widgets, Screen design and layout, prototyping tools.
- Usability testing – types and process.

Digital Designs: Elements & Widgets

Screen Design and Layout

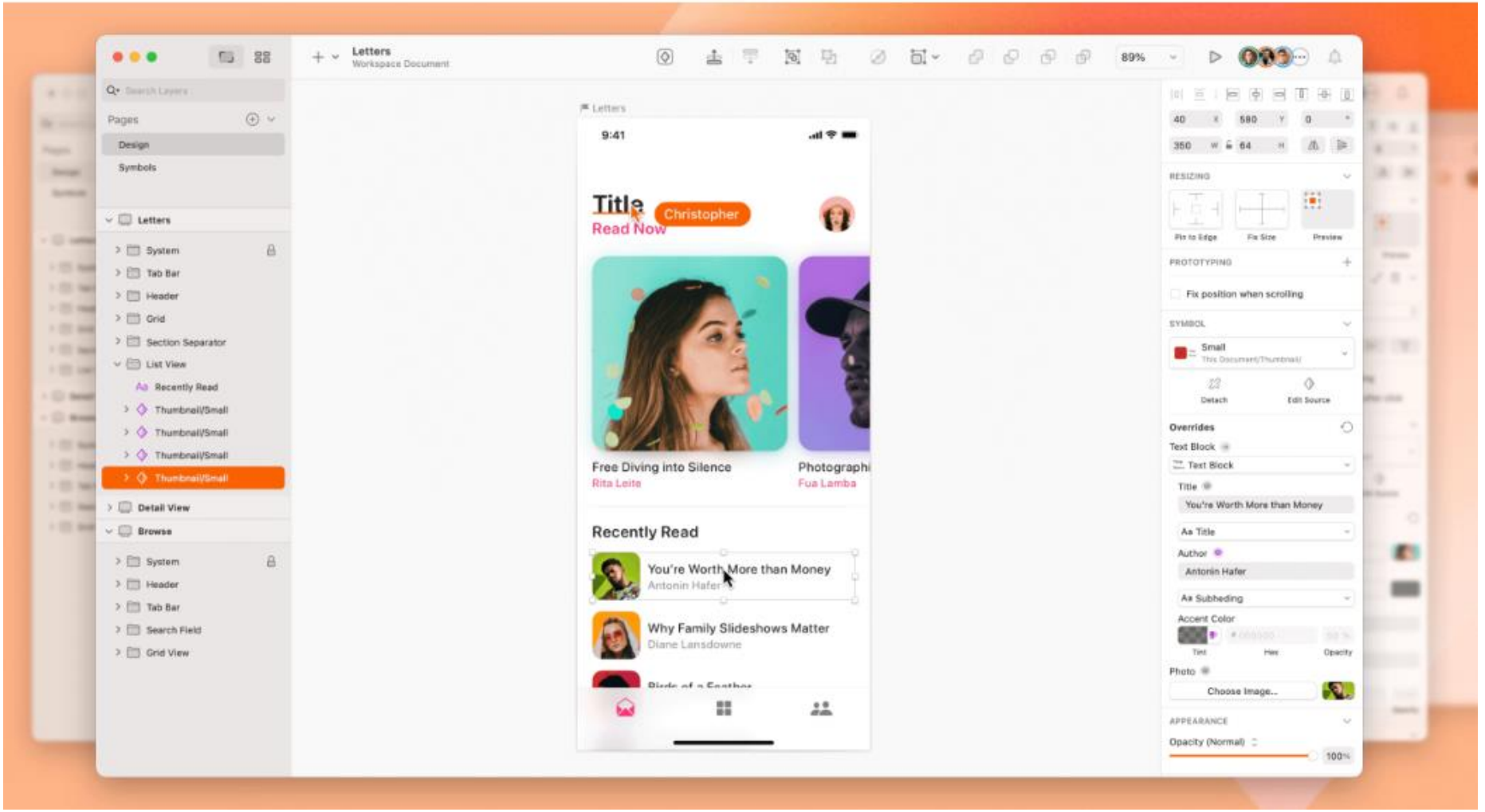
Prototyping Tools

1. Sketch

- A vector graphics editor used for drawing, wireframing, prototyping and design handoff—essentially everything you need to bring your designs to life.
- **Key features:**
  - Intuitive vector editing tools and editable boolean operations for flexible and iterative design
  - Infinite design canvas with flexible Artboards, design presets, customisable grids and simple resizing tools, allowing you to scale your designs to any screen size
  - Shorthand and math operators to speed up the design process
  - Variable and OpenType fonts for infinite control over your interface typography
  - Cross-platform tools for real-time collaboration, feedback, sharing and developer handoff

Prototyping Tools

1. Sketch



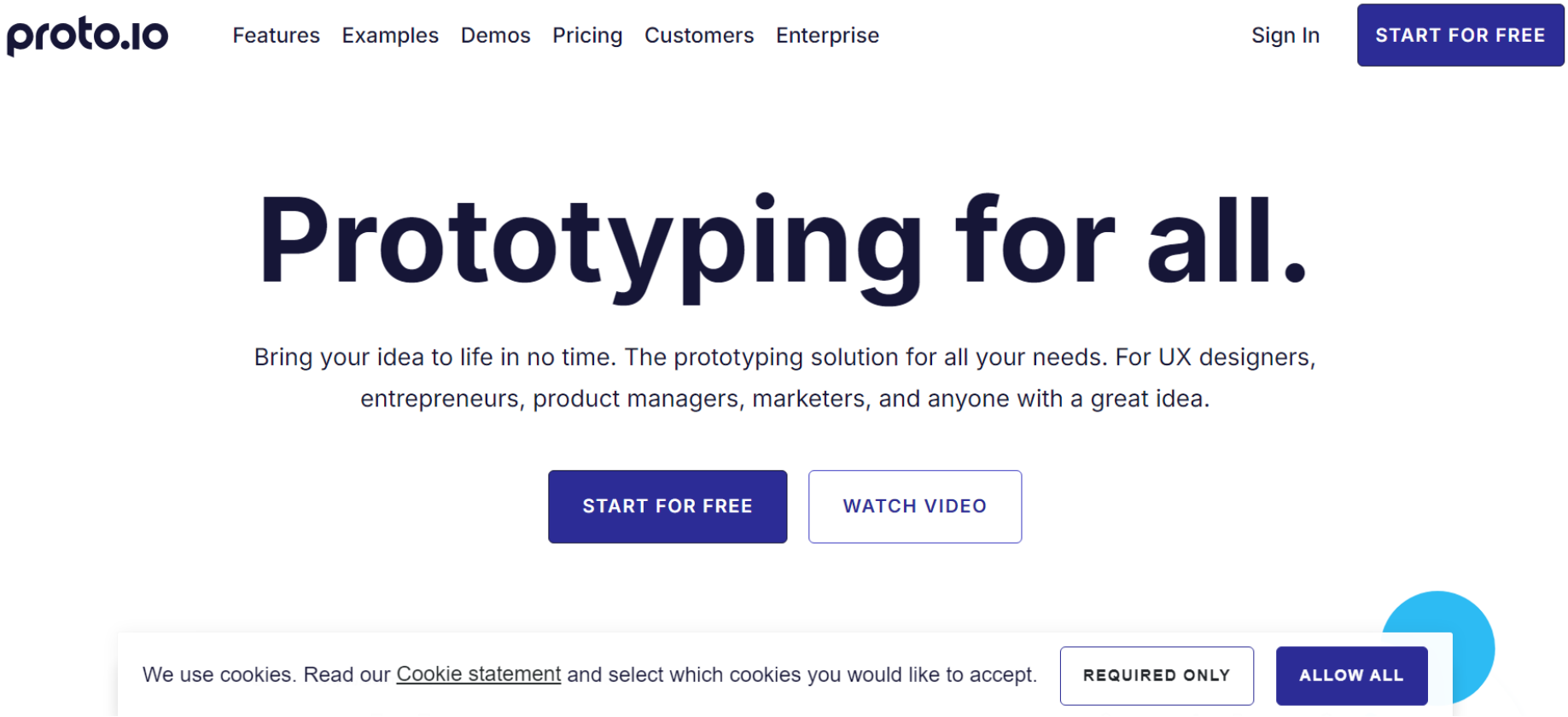
Prototyping Tools

2. Proto.io

- Proto.io is a web-based, no-code prototyping tool that allows you to create high-fidelity, interactive prototypes in record time.
- **Key features:**
  - Drag-and-drop interface
  - 250+ UI components for iOS, Android, and web
  - 1,000+ fully customisable templates for web and mobile app design, including templates for onboarding, e-commerce, product sign-in, and more
  - 6,000+ digital assets to add to your prototypes, including static and animated icons, stock images, and sound effects
  - Powerful animation features to bring your prototypes to life, including screen transitions, timeline-based state animations, and advanced animation effects
  - Seamless integration with popular design tools such as Figma, Sketch, Adobe XD, and Photoshop
  - Preview and test your prototypes in real-time with the built-in preview feature
  - Easy export in multiple formats, including PDF, HTML, and video

Prototyping Tools

Porto.jo



Usability Testing and Process

What Makes Something Usable?

- What Is Usability Testing?
- When Should You Test?
- Skills for Test Moderators

The Process for Conducting a Test:

- Develop the Test Plan
- Set Up a Testing Environment
- Find and Select Participants
- Prepare Test Materials
- Conduct the Test Sessions
- Debrief the Participant and Observers
- Analyze Data and Observations
- Report Findings and Recommendations

Usability Testing: An overview

- Usability: “What makes something usable is the absence of frustration in using it”
- When a product or service is truly usable, the user can do what he or she wants to do the way he or she expects to be able to do it, without hindrance, hesitation, or questions.
- To be usable, a product or service should be useful, efficient, effective, satisfying, learnable, and accessible.

Usability

Typically measured in terms of :

- Usefulness
- Efficiency
- Effectiveness
- Learnability
- Satisfaction
- Accessibility

Usability

- **Usefulness** concerns the degree to which a product enables a user to achieve his or her goals and an assessment of the user's willingness to use the product at all
- **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.**
- During early stage of system/ product designing the features desirable and necessary for the system are needed to be identified

Usability

- **Efficiency**
  - is represented by the quickness with which the user's goal can be accomplished accurately and completely measured in terms of time.
  - **Even a small amount of time saved at every usage will drastically save the time and will be appreciated**
- **Effectiveness**
  - is the extent to which the product behaves in the way that users expect it to.
  - The ease with which users can use it to do what they intend.
  - Measured quantitatively with error rate would be represented in terms of percentage of total usage

Usability

- **Learnability**
  - a part of effectiveness
  - The user's ability to operate the system to some defined level of competence after some predetermined amount and period of training (*ideally* no time at all).
  - The **ability of infrequent users** to relearn the system after periods of inactivity.
- **Satisfaction**
  - 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
  - users are asked to rate and rank products that they try, and this can often reveal causes and reasons for problems that occur

Usability

- **Accessibility**
  - about having access to the products needed to accomplish a goal
  - what makes products usable by people who have disabilities
  - Making a product usable for people with disabilities— or who are in special contexts, or both— almost always benefits people who do not have disabilities.
  - Considering accessibility for people with disabilities can clarify and simplify design for people who face temporary limitations (for example, injury) or situational ones (such as divided attention or bad environmental conditions, such as bright light or not enough light).

Usability Testing

What makes something usable:

Appropriate blend of

- **Usefulness**
- **Efficiency**
- **Effectiveness**
- **Learnability**
- **Satisfaction**
- **Accessibility**

Reasons of something less usable

- Development focuses on the machine or 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.

Reasons of something less usable

1. Development focuses on the machine or system:

- The emphasis and focus on the machine or system, not on the person who is the ultimate end user.
- More focus on the activity to be completed than the context and human factors due to assumptions
  - human will adapt to the changed environment seamlessly
  - binary (black – white/ true-false) development neglecting intermediate stages of development
  - more focus on technical aspects of solution than humane aspects;
  - similar technical and other background of end users as developers themselves.

Reasons of something less usable

2. Target audiences change and adapt

- Huge gap between continuously expanding and changing customers (end users) and development organization
- Developers and end users **worked together** in past and the end users accepted (learned or adapted) the way in which system was developed (very less choice or options, pride in using **new technology**)
- The gap is widen due to users have little technical knowledge of computers and mechanical devices, little patience for getting accustomed with the product just purchased, and completely different expectations from those of the designer.

Reasons of something less usable

3. Designing usable products is difficult

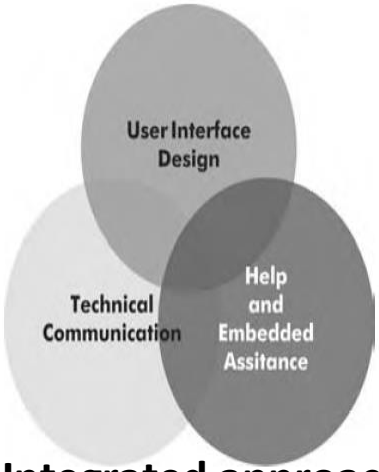
- Though assumed as commonsense, for designers, without a background in either the behavioral or social sciences, very difficult to design the system

Reasons of something less usable

4. Team specialists don't always work in integrated ways

- Organizations employ very specialized teams and approaches to product and system development, yet fail to integrate them with each other.
- Components of a software product include the user interface, the help system, and the written materials are developed by different teams and hence may not synchronize their efforts

Non Integrated approach



Integrated approach

Reasons of something less usable

5. Design and implementation don't always match.

- Design, in this case, relates to how the product communicates, whereas implementation refers to how it works
- Design expertise look at the system from communication and human-oriented analysis point of view, while technical expertise from programming and machine-oriented analysis
- With the advent of new-generation programming languages and tools to automatically develop program code, the challenge of technical implementation has diminished.
- 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

Usability Testing

Thus to makes something usable:

- Focus on end user
- Research users
- Pay to user's need while designing
- Bridge the gap between designing and implementation
- Follow integrated approach
- Early focus on users and their tasks
- Evaluation and measurement of product usage
- Iterated design

The usability Testing

- **Usability Testing:**

  - A research tool that refers to a process that employs people as testing participants who are representative of the target audience to evaluate the degree to which a product meets specific usability criteria
  - inclusion of representative users eliminates labeling as usability testing such techniques as expert evaluations, walk-throughs, and the like that do not require representative users as part of the process

The usability Testing

- **Goals of Testing:**
  - Improve the profitability of products by satisfying what user needs
  - Design decisions are informed by data gathered from representative users to expose design issues so they can be remedied, thus minimizing or eliminating frustration for users

The usability Testing

- **Goals of Testing:**
  - **Informing Design:**
  - inform design by gathering data from which to identify and rectify usability deficiencies existing in products and their accompanying support materials prior to release.
  - To ensure the creation of products that:
    - Are useful to and valued by the target audience
    - Are easy to learn
    - Help people be effective and efficient at what they want to do
    - Are satisfying (and possibly even delightful) to use

The usability Testing

- Goals of Testing:
  - **Eliminating Design Problems and Frustration**
  - the ease with which customers can use the product will increase the profitability
  - minimize the frustration of using a product for target audience by remedying flaws in the design ahead of product release by:
    - Set the stage for a positive relationship between organization and customers.
    - Establish the expectation that the products organization sells are high quality and easy to use.
    - Demonstrate that the organization considers the goals and priorities of its customers to be important.
    - Release a product that customers find useful, effective, efficient, and satisfying.

The usability Testing

- Goals of Testing:
  - **Improving Profitability by:**
  - Creating a historical record of usability benchmarks for future releases. By keeping track of test results, a company can ensure that future products either improve on or at least maintain current usability standards.
  - Minimizing the cost of service and support calls. A more usable product will require fewer service calls and less support from the company.
  - Increasing sales and the probability of repeat sales. Usable products create happy customers who talk to other potential buyers or users. Happy customers also tend to stick with future releases of the product, rather than purchase a competitor's product
  - Acquiring a competitive edge because usability has become a market separator for products.
  - Minimizing risk.

Basics of Methodology

- **Formulate a hypothesis**
- **Chose randomly (using a very systematic method) participants and assign them to experimental conditions which truly represent the entire set of customers**
- **Apply tight control during testing**
- **Employ control groups**
- **Consider sufficient size of samples to measure statistically significant differences between groups.**

Basics of Methodology

- **Basic Elements of Usability Testing**
  - Development of research questions or test objectives rather than hypotheses.
  - Use of a representative sample of end users which may or may not be randomly chosen.
  - Representation of the actual work environment.
  - Observation of end users who either use or review a representation of the product.
  - Controlled and sometimes extensive interviewing and probing of the participants by the test moderator.
  - Collection of quantitative and qualitative performance and preference measures.
  - Recommendation of improvements to the design of the product.

Basics of Methodology

- **Limitations of Usability Testing**
  - Testing is always an artificial situation.

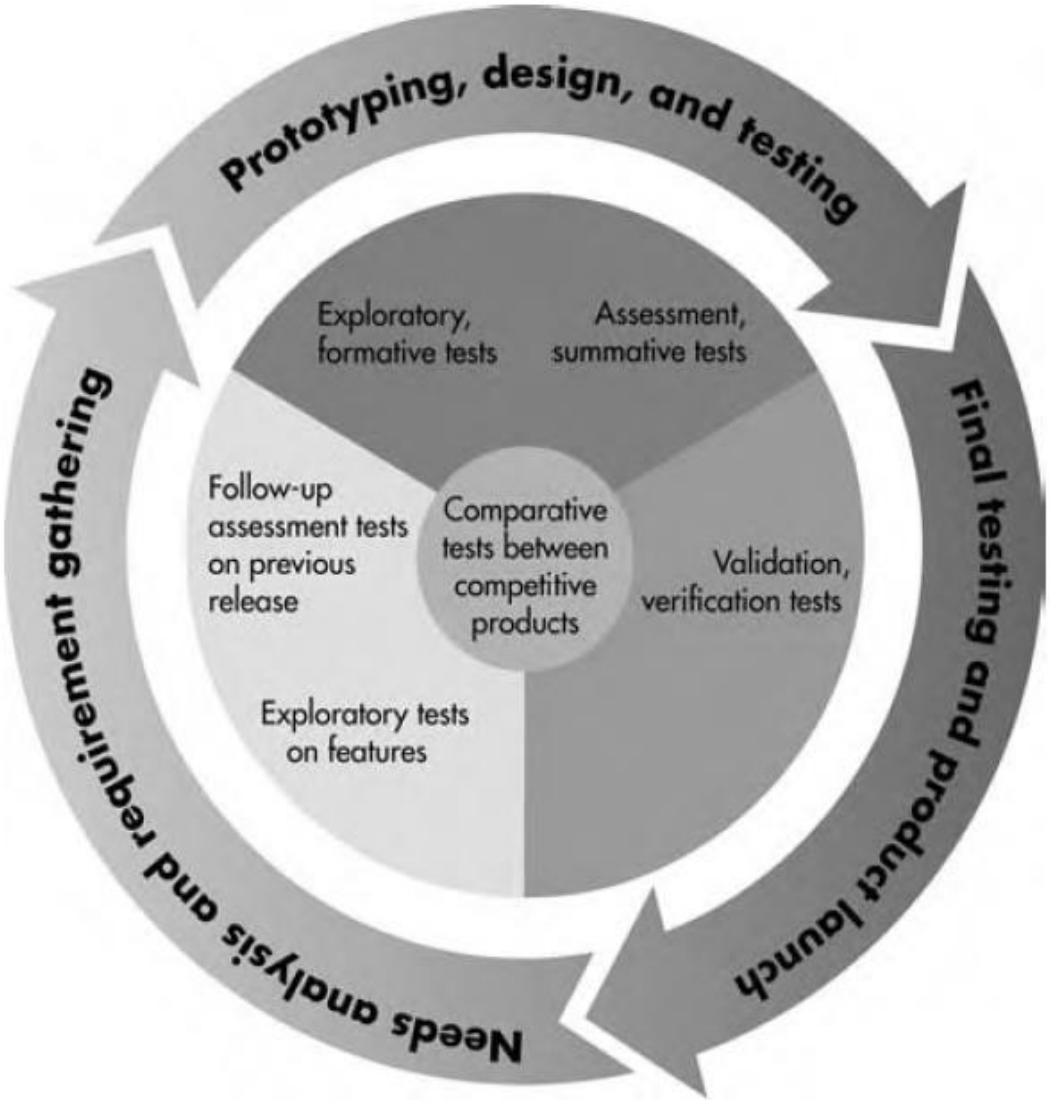
    Testing in the lab, or even testing in the field, still represents a depiction of the actual situation of usage and not the situation itself
  - Test results do not prove that a product works

    Statistical significance is simply a measure of the probability that one's results were not due to chance.
  - Participants are rarely fully representative of the target population

    Participants are only as representative
  - Testing is not always the best technique to use

    many techniques intended to evaluate and improve products

When should you test



When should you test

Types of Tests conducted depending on approximate point in the product development :

- Exploratory (or formative)
- Assessment (or summative)
- Validation (or verification)
- Comparison test (integral part of any of the other three tests and is not associated with any specific lifecycle phase)
- **each test will vary in its emphasis on qualitative vs. quantitative measures, and by the amount of interaction between test moderator and participant**
- **Usability testing is most powerful and most effective when implemented as part of an iterative product development process**

Exploratory or Formative Study

When:

- Conducted quite early in the development cycle, when a product is still in the preliminary stages of being defined and designed (hence called formative)
- The user profile and usage model (or task analysis) of the product will have (or should have) been defined
- the requirements and specifications phase is completed, and the design phase is just about to begin.

Exploratory or Formative Study

Objectives:

- To examine the effectiveness of preliminary design concepts
- Would check how well the interface:
  - Supports users' tasks within a goal.
  - Communicates the intended workflow.
  - Allows the user to navigate from screen to screen and within a screen
- Using the task-oriented user guide of a software product :
  - Overall organization of subject matter
  - Whether to use a graphic or verbal approach
  - How well the proposed format supports findability
  - Anticipated points of assistance and messaging
  - How to address reference information
  - Being early analysis and research cannot be over emphasized, for this is the point in time when critical design decisions set the stage for all that will follow.

Exploratory or Formative Study

Methodology:

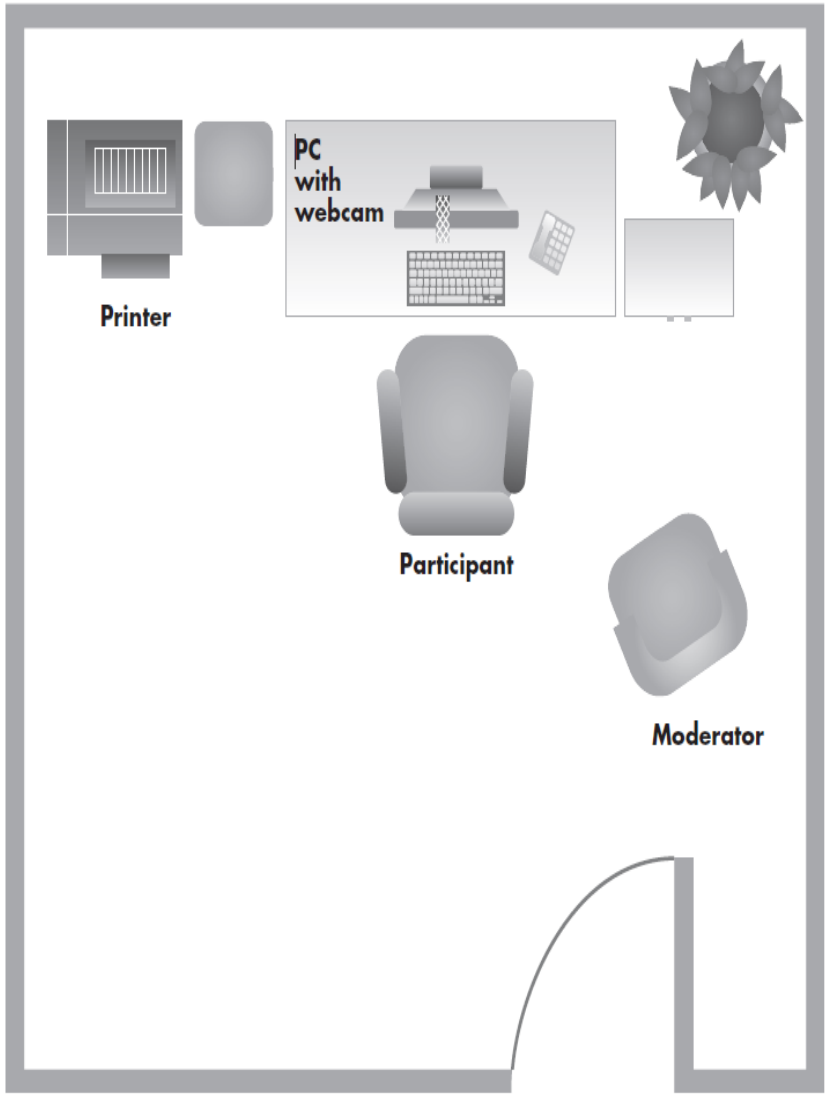
- Dictate extensive interaction between the participant and test moderator to establish the efficacy of preliminary design concepts
- Develop preliminary versions of the product's interface and/or its support materials for evaluation by representative users
- Involve a prototype simulation or mockup of the product that represents its basic layout, organization of functions, and high-level operations
- Prior to a working prototype, one might use static screen representations or even paper drafts of screens
- Need not represent the entire functionality of the product, need only show enough functionality to address the particular test objective

Exploratory or Formative Study

Process:

- Usually quite informal and almost a collaboration between participant and test moderator, with much interaction between the two.
- The test moderator and participant might explore the product together, with the test moderator conducting an almost ongoing interview or encouraging the participant to ‘‘think aloud’’ about his or her thought process as much as possible

Exploratory or Formative Study



Assessment or Summative Test

When:

- The most typical type of usability test conducted.
- The simplest and most straightforward for the novice usability professional to design and conduct
- Tests are conducted either early or midway into the product development cycle, usually after the fundamental or high-level design or organization of the product has been established

Assessment or Summative Test

Objective:

- To expand the findings of the exploratory test by evaluating the usability of lower-level operations and aspects of the Product
- The assessment test begins to work on the meat and the flesh

Assessment or Summative Test

Overview of the Methodology:

- An information-gathering or evidence-gathering test, the methodology for an assessment test is a cross between the informal exploration of the exploratory test and the more tightly controlled measurement of the validation test
- The user will always perform tasks rather than simply walking through and commenting upon screens, pages, and so on.
- The test moderator will lessen his or her interaction with the participant because there is less emphasis on thought processes and more on actual behaviors.
- Quantitative measures will be collected.

Validation or Verification Test

When:

- The validation test, also referred to as the verification test, is usually conducted late in the development cycle
- Intended to measure usability of a product against established benchmarks or, in the case of a verification test, to confirm that problems discovered earlier have been remedied and that new ones have not been introduced.
- The validation test typically takes place much closer to the release of the product

Validation or Verification Test

Objective:

- To evaluate how the product compares to some predetermined usability standard or benchmark, either a project-related performance standard, an internal company or historical standard, or even a competitor's standard of performance
- The intent is to establish that the product meets such a standard prior to release, and if it does not, to establish the reason(s).

Validation or Verification Test

Overview of the Methodology:

- The validation test is conducted in similar fashion to the assessment test with three major exceptions.
  1. Prior to the test, benchmarks or standards for the tasks of the test are either developed or identified. This can be specific error or time measures, or as simple as eliminating the problems identified in earlier exploratory tests.
  2. Participants are given tasks to perform with either very little or no interaction with a test moderator. (And they are probably not asked to ‘‘think aloud.’’)
  3. The collection of quantitative data is the central focus, although reasons for substandard performance are identified

Compared to an assessment test, a validation test requires more emphasis on experimental rigor and consistency

Comparison Test

When:

- Not associated with any specific point in the product development lifecycle.
- In the early stages, it can be used to compare several radically different interface styles via an exploratory test, to see which has the greatest potential with the proposed target population
- Toward the middle of the lifecycle, a comparison test can be used to measure the effectiveness of a single element
- Toward the end of the lifecycle, a comparison test can be used to see how the released product stacks up against a competitor's product

Comparison Test

Objective:

- Can be used in conjunction with any of the other three tests
- Used to compare two or more designs, such as two different interface styles, or the current design of a manual with a proposed new design, or to compare your product with a competitor's
- Typically used to establish which design is easier to use or learn, or to better understand the advantages and disadvantages of different designs

Comparison Test

Overview of the Methodology:

- Involves the side-by-side comparison of two or more clearly different designs
- Performance data and preference data are collected for each alternative, and the results are compared
- Conducted informally as an exploratory test or it can be conducted as a tightly controlled classical experiment

The Process of Conducting a Test

- Develop the Test Plan
- Set Up a Testing Environment
- Find and Select Participants
- Prepare Test Materials
- Conduct the Test Sessions
- Debrief the Participant and Observers
- Analyze Data and Observations
- Report Findings and Recommendations

Develop the Test Plan

- **Need of the Test Plan:**
- **Serves as a Blueprint for the Test:**
  - Serves as a Blueprint for the Test
  - sets the stage for all that will follow
- **Serves as the Main Communication Vehicle**
  - Bridge between the main designer and developer, the test moderator, and the rest of the team
  - the document that all involved members of the development team, as well as management (if it is interested and involved), should review in order to

Develop the Test Plan

- **Need of the Test Plan:**
- **Defines or Implies Required Resources**
  - both internal and external
  - What , when, where, who, why ; how and how much
- **Provides a Focal Point for the Test and a Milestone**
  - testing systematically
  - understand more of the test objectives

Develop the Test Plan

- **The Parts of a Test Plan**
  - **Purpose, goals, and objectives of the test**
  - **Research questions**
  - **Participant characteristics**
  - **Method (test design)**
  - **Task list**
  - **Test environment, equipment, and logistics**
  - **Test moderator role**
  - **Data to be collected and evaluation measures**
  - **Report contents and presentation**

Set Up a Testing Environment

Once the test plan is finalized the next step is to Find and Select Participants

- **Decide on a Location and Space**
  - most usability testing was done on products used in office
  - not all testing should be done in a lab setting
  - sometimes doing testing in a lab simply is not practical
  - The location of the test sessions is intricately linked with the design of the study and who the users are
  - Consider carefully from what location you want the observers to observe

Set Up a Testing Environment

Lab or at the users' site:

- **Decide on:**
  - Your test design and measures: type of test exploratory/ formative, summative, validation)
  - Logistics: extra space available in organization, Is the location accessible to participants?
  - Public relations within your company: internal users or real sample

Set Up a Testing Environment

Lab or at the users' site:

- **Decide on:**
  - Availability of participants: How easy is it for participants to leave their daily routines to take part in the study?
  - Test in Multiple Geographic Locations: depends upon the product and the market
  - Arranging Sessions at a User's Site: requires some special planning because the logistics are not trivial

Set Up a Testing Environment

Lab or at the users' site:

- **Decide on:**
  - Minimalist Portable Test Lab: the testing equipment, such as cameras and PCs, is carted around to different available locations.
  - **Advantages**: You get to see the user's context, It makes it easier typically for participants to take part, cost effective solution as can be easily reconfigured, because the equipment is portable, can bring the test to the field
  - **Disadvantages:** Planning and logistics can be complex compared to doing all the testing in one place, Field sessions can take more time (all must LEARN about test environment), limited space for observers/ participants

Set Up a Testing Environment

Lab or at the users' site:

- **Decide on:**
  - Permanent / Fixed Test Lab: Simple Single-Room Setup
  - **Advantages**: The test moderator has an excellent sense of what is going on with the Participant, allows the moderator to interact closely with participants, allows participants to try difficult situation as they are at ease
  - **Disadvantages:** more comfort for moderator, participant may create unreal (more comfort zone) misleading the results, There is very limited space for observers,

Set Up a Testing Environment

Gather and Check Equipment, Artifacts, and Tools:

- **Basic Equipment, Tools, and Props**
- **Gathering Biometric Data**
- **Identify Co-Researchers, Assistants, and Observers**
  - Data Gatherer/Note Taker
  - Product/Technical Expert(s)
  - Additional Testing Roles
  - Test Observers

Find and Select Participants

- Find and Select Participants
  - **Characterize Users**
    - Lack of a clear delineation of the characteristics of the end user that contributes to usability deficiencies of products
    - product team members do not know or do not agree on the characteristics of the end user, it is difficult for them to develop a consistent, well-designed product that meets the end user's need
  - **Visualize the Test Participant**
  - **Differentiate between Client and End User**
  - **Look for Information about Users**

- **Define the Criteria for Each User Group**
  - **Define Expertise**
  - **Specify Requirements and Classifiers for Selection**

- **Document the User Profile**

- **Divide the User Profile into Distinct Categories (Persona)**

- **Determine the Number of Participants to Test**

Prepare Test Materials

- Prepare Test Materials
  - Orientation script
  - Background questionnaire
  - Data collection instruments
  - Nondisclosure agreement and recording consent form
  - Pre-test questionnaire
  - Task scenarios
  - Post-test questionnaire
  - Debriefing topics guide

Conduct the Test Sessions

- Conduct the Test Sessions

Debrief the Participant and Observers

- Debrief the Participant and Observers

Analyze Data and Observations

- Analyze Data and Observations

Report Findings and Recommendations

- Report Findings and Recommendations

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