User Study – User Experience (UX)

SAUL DELABRIDA

SLIDES BASED ON DR. ARINDAM DEY SLIDES (HTTPS://PT.SLIDESHARE.NET/ARIDEY1983/USER-EXPERIMENTS-IN-HUMANCOMPUTER-INTERACTION)
Why do we need User Study?

User Centered Design
User-Centered Design Process

Discover
- Stakeholder Interview
- User Research
- Creative Ideation
- Experience Mapping
- Requirement Gathering
- UX Design
- Usability Testing
- Production
- Launch

Define
- User Personas
- User Journey
- User Flow
- Sitemap & Prototype
- Validated Prototype
- Graphic Design
- Code

Design
- Business Requirement
- Goals & Objectives
- Stated Needs
- Triggers
- Campaign/Source
- CTA
- Core Mechanism
- Feature Analysis
- IA
- UI

Validate

Develop

Output
- Motivations
- Goals
- Needs
- Triggers
- Source
- CTA
- Core Mechanism
- Feature Analysis
- IA
- UI

Doing
User Study Goals

• Test your idea/Prototype with real users of application
• A particular case study should be done for assessment
• Usually the response is: The new method/prototype is better than older
• Understand how it can improve the user experience
User Experience - UX

• There is no a consensus about the UX concept

• Hassenzahl and Tractinsky (2006) define UX as "a consequence of a user’s internal state, the characteristics of the designed system and the context within which the interaction occurs“

• Other authors define UX as a market term

• In most latin authors make reference of User Experience as Usability

• This should be due to the traditional systems which have an UI for interaction
UX x Usability (Arindam Dey)

- The methods can be the same
- But, the goals often are different

Usability goals
- To identify Usability problems
- To identify system interface problems
- To solve issues of a product

User Experience Goal
- To answer a research question
- To discover new knowledge
- To improve user perception and add value of the new way to perform a task
### UX x Usability (Arindam Dey)

<table>
<thead>
<tr>
<th>Usability</th>
<th>UX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Products</td>
<td>Discover knowledge</td>
</tr>
<tr>
<td>Few Participants</td>
<td>Many participants</td>
</tr>
<tr>
<td>Results inform design</td>
<td>Results are validated statistically</td>
</tr>
<tr>
<td>Usually not Completely replicated</td>
<td>Must be replicable</td>
</tr>
<tr>
<td>- Specific case study</td>
<td>- Generalizable results</td>
</tr>
<tr>
<td>Conditions controlled as possible</td>
<td>Strongly controlled conditions</td>
</tr>
<tr>
<td>Procedure planned</td>
<td>Experimental design</td>
</tr>
<tr>
<td>Results reported to the product designer/developer</td>
<td>Scientific report to scientific community</td>
</tr>
</tbody>
</table>
UX vs. Usability

Usability
- Effectiveness
- Efficiency
- Learnability
- Error prevention
- Memorability

User Experience
- Satisfaction
- Enjoyment
- Pleasure
- Fun
- Value

Where usability is narrow and focused, UX is broad and holistic.
User Experience Evaluation

Challenge
How to measure the users’ feeling and their experiences?
Planning a UX Evaluation

- Define a Hypothesis
- Design a experimental task
- Independent Variables
- Dependent Variables
  - Subjective
  - Objective
- Other Variables
  - Random, controlled
- Experimental Design
  - Within-Subjects, between-subjects, mixed-factorial
Hypothesis

• Based on your research question, but narrower
• The research question can be tested in multiple hypothesis
• Should be specific and clear

Ex1: The system B (new system) is better than system A (old system)
  • What does mean better?
Hypothesis

• Based on your research question, but narrower

• The research question can be tested in multiple hypothesis

• Should be specific and clear

Ex1: The system B (new system) is better than system A (old system)
  • What does mean better?

Ex2: Users learn system B (new system) faster than system A (old system)
  • Time is a metric. This can means easier!

Ex3: System B provides a more accurate way to perform a task than System A
  • User mistakes are the metric.

Ex2 and Ex3 should complement the Ex1, when better means easier and more accurate.
Independent Variables (IV)

• Variables independent of participants behavior
• Manipulated by the experimenter
• Variables that the experimenter is interested
• You can have one or more IV on your study
Typical IVs

- Technology
  - Type of technology
  - Devices
  - Interface

- User
  - Physiology and physiological status
  - Social Status
    - Age, gender, previous experience, education, culture

- Context
  - Environment status
  - External influences (noise, light...)

## Conditions

- Combination of IVs

<table>
<thead>
<tr>
<th>IVs</th>
<th>Mouse</th>
<th>Touch Screen</th>
<th>Gesture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close</td>
<td></td>
<td>Conditions</td>
<td></td>
</tr>
<tr>
<td>Far</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dependent Variables (DV)

- Subjective
  - Dependent of users’ opinion
  - Point of view, emotion, previous experience, judgment
  - It can be collected by questionnaires
  - NASA-TLX
    - Workload assessment tool to allow users to perform subjective workload assessments on operator(s) working with various human-machine interface systems
    - Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, Frustration
Dependent Variables (DV)

- Objectives
  - More consistent
  - It can be logged by the system
  - E.g.: Time, error
  - Not influenced by user feeling or opinion
  - But, the emotional state can influence
Experimental Design

• Within-subjects
  • Each one performs under all conditions
  • Repeated-measure

• Between-subjects
  • Each one perform one condition
  • Independent samples
  • Matched groups

• Mixed-Factorial
  • Combination of both
  • More than one IV is necessary
## Within vs Between

<table>
<thead>
<tr>
<th>Within - Subjects</th>
<th>Between-subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning effect</td>
<td>Avoids interference effects</td>
</tr>
<tr>
<td>Long time for each participant</td>
<td>Short time for each participant</td>
</tr>
<tr>
<td>Individual difference can be isolated</td>
<td>Impact of individuals difference</td>
</tr>
<tr>
<td>Easy to detect difference among conditions</td>
<td>Hard to detect difference among conditions</td>
</tr>
<tr>
<td>Small sample</td>
<td>Large sample</td>
</tr>
<tr>
<td>Randomize the order of conditions</td>
<td>Randomized assignment to conditions or matched groups</td>
</tr>
</tbody>
</table>
Randomization

• Critical condition to validate an experiment

• Avoids addictions of a repetition of a condition

• No one can control the conditions sequence presented to users, including the experimenter
Counterbalancing

• Define the permutations
  • 2 Conditions = 2 permutations (1,2) (2,1)
  • 3 Conditions = 6 permutations (1,2,3) (1,3,2) (2,1,3) (2,3,1) (3,1,2) (3,2,1)
  • 4 Conditions = 24 permutations (1,2,3,4) (1,2,4,3) (1,3,2,4) ......

• The number of participants should be multiple of number of permutations

• This way, you ensure that each condition was tested the same number of times
Sample

• You should define participants who have requirements to your case study

• Is not easy to find participants

• Sample size
  • Within Subjects – 15-20 participants
  • Between Subjects – 15-20 participants per condition

• More variance, more users

•
Ethical Issues

• Some human and animal studies should be approved by the board ethical of your University (Brazilian rules)

• You should report in case of users exposition to risks

• The Conselho Nacional de Saúde define the regiment for human studies on CNS 510.

• If your study represents a public opinion without user identification you don’t need submit

• If you have questions, send a message to the local board members at UFOP
For Next Class

• You are 32
• Create 4 groups
• Define a Case Study
  • Wearable is not a restriction
• Plan your User study
• Before the class
  • Define the questionnaire (Google Forms? Printed? Excel?)
  • Execute the pilot study
• In the class
  • Each group should execute the experiments (~40 minutes, ~5 users)
  • Each group should compile the results (~20 minutes)
  • Each group should present the results (PPT) (about 10 minutes)
  • What is your goal?
  • How do you designed your study?
  • Results?
Thanks for your attention!
saul@sdelabrida.com