

# Data Science Workshop

## Lecture 12: Usability testing and acceptance testing

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# Usability



Credits: Amazon

# Usability

- The primary notion of usability is that an object designed with a generalised users' psychology is:
  - more efficient to use
    - takes less time to accomplish a particular task,
  - easier to learn
    - operation can be learned by observing the object
  - more satisfying to use

## Usability in design

- During the design process, usability helps to answer the following questions:
  - Can people use the product?
  - Can the user form a correct mental model of the system?
  - Do they enjoy using it?

## Usability - what it is not?

- Quality assurance
  - Quality management was discussed before as one of the business aspects.
- User acceptance testing
  - User acceptance testing is the final tests that allow the client to accept the product.
  - The test is limited to measurements of previously defined product features.

## Usability Heuristics for User Interface Design

- Jakob Nielsen's 10 general principles for interaction design.
  1. Visibility of system status
  2. Match between system and the real world
  3. User control and freedom
  4. Consistency and standards
  5. Error prevention
  6. Recognition rather than recall
  7. Flexibility and efficiency of use
  8. Aesthetic and minimalist design
  9. Help users recognise, diagnose, and recover from errors
  10. Help and documentation

<https://www.nngroup.com/articles/ten-usability-heuristics/>

## Discussion of heuristics I

1. Visibility of system status
  - The system should always keep users informed about what is going on.
2. Match between system and the real world
  - The system should speak the users' language with words, phrases, and concepts familiar to the user.
3. User control and freedom
  - Support undo and redo.
4. Consistency and standards
  - Users should not have to wonder whether different words, situations, or actions mean the same thing.
5. Error prevention
  - Even better than good error messages is a careful design which prevents a problem from occurring in the first place.

<https://www.nngroup.com/articles/ten-usability-heuristics/>



## Discussion of heuristics II

6. Recognition rather than recall
  - The user should not have to remember information from one part of the dialogue to another.
7. Flexibility and efficiency of use
  - Allow users to tailor frequent actions.
8. Aesthetic and minimalist design
  - Dialogues should not contain information which is irrelevant or rarely needed.
9. Help users recognise, diagnose, and recover from errors
  - Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
10. Help and documentation
  - Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation.

<https://www.nngroup.com/articles/ten-usability-heuristics/>

## Phase of usability testing

1. Self-review
2. Expert review
3. Low fidelity prototyping
4. High fidelity prototyping

## Example of usability testing - mobile app

1. Self-review
  - Were the internal requirements for the design team fulfilled?
2. Expert review
  - Are any remarks from UI or branch experts?
3. Low fidelity prototyping
  - A wireframe is presented to the potential users.
4. High fidelity prototyping
  - An Axure clickable prototype is presented to the potential users.

## Main ideas during usability testing

### 1. Intended behaviour

- What should the subject t
- do to complete the task?

### 2. Observed behaviour

- What is the subject doing?

### 3. Rationalisation

- What is the difference between the subject mental model and the designer intended?

# Conducting Usability Test

1. Recruit Subjects
2. Create a Pre-test questionnaire
3. Create a Post-test questionnaire
4. Prepare a test scenario
5. Set up a test environment

## Recruit Subjects

- Define whom to recruit
  - Required and desired testers' features.
    - smartphones users.
- Define the following groups of the testers.
  - Start with "easy" group and finish with "demanding" users.
    - friends from a student group.
    - grandmother/ grandfather.

## Pre-test questionnaire

- What do you want to know about each person, specifically, before they have tested the system:
  - demographic information,
  - knowledge of the topic,
  - experience.

## Post-test questionnaire

- Subjective ratings:
  - likability,
  - usability,
  - comprehension.
- Suggestions/ideas
  - What improvement do they suggest?



## Test preparation

- A test scenario
  - A task list.
  - A scenario should be focused on selected aspects only. You cannot test the whole system st once.
- A test environment
  - The place will affect the user's mental state.
  - The surrounding must ensure a casual test atmosphere and a good observation opportunity.

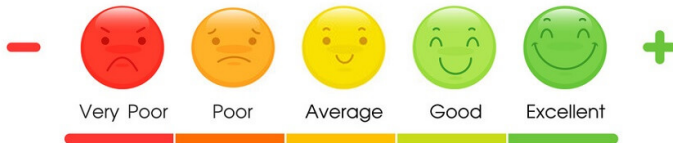
## Likert scale

- The Likert scale is a 5 point scale.

- |                               |                                      |
|-------------------------------|--------------------------------------|
| 1. Strongly disagree          | 1. Very easy to use                  |
| 2. Disagree                   | 2. Somewhat easy to use              |
| 3. Neither agree nor disagree | 3. Neither easy nor difficult to use |
| 4. Agree                      | 4. Somewhat difficult to use         |
| 5. Strongly agree             | 5. Very difficult to use             |

## Likert scale types

### CUSTOMER SATISFACTION



<https://www.formpl.us/blog/point-likert-scale>

- 5 point scale.
  - The base scale.
  - Tendency to select the average option.
- 4 point scale.
  - The scale forces declarations.
  - A polarisation of the results.
- 7 point scale.
  - Increases the precision of the responses.
  - The differences between the answers may be unclear.

## Usability Testing Protocol

1. Dry-run the usability test before you use real-subjects
2. Ensure users are comfortable
3. Tell them what you're doing
4. Try to prevent yourself from being perceived as the designer
5. Ensure subjects do not feel responsible for any errors
6. Administer the pre-test questionnaire
7. Provide tasks, ask users to confirm understanding
8. Ask users to talk-aloud while they perform actions
9. Stop the test if it gets too hard for the user
10. Administer the post-test questionnaire and wrap up

## Usability Testing Protocol - remarks

- The dry-run tests are necessary to work out problems.
- The user should have water on hand, a comfortable chair, quiet environment, etc.
- Talking about the product don't prime it.
  - ~~break-through, innovative, comfy.~~
- Talking-aloud during the test helps understand users' motivations.

## Recording observations

- Take notes but do it quickly to avoid missing an important observation.
- Organise the issues into categories after the test.
- Prepare a usability-test report

## Usability-test report

Issue #	Description	UX Severity (1-5)	Complexity to Fix (1-5)	Resolution
1	User didn't see the the "next" button, said they expected a button to be at the bottom "like the Continue button on the previous page"	4 (high)	1 (low)	consider changing the button color, or moving the position of the button
2	User expected that the system would know amount in their bank account, but didn't need it to complete task	1	5	(?) not sure we can attach those account data

*Mastering Innovation & Design-Thinking* by Blade Kotelly & Joel Schindall

## Usability-test story

The image shows two side-by-side panels titled "Filter & Sort Options". Both panels have a "Filter by Department" dropdown menu. Below this, there are two columns: "Show Only:" and "Sort By:". Under "Show Only:", there are three checkboxes: "In Stock Now", "Free Shipping", and "Platinum Offer". Under "Sort By:", there are four radio buttons: "Price" (selected), "Brand", "Best Selling", and "Top Rated". The right panel has a large blue button labeled "Done" at the bottom.

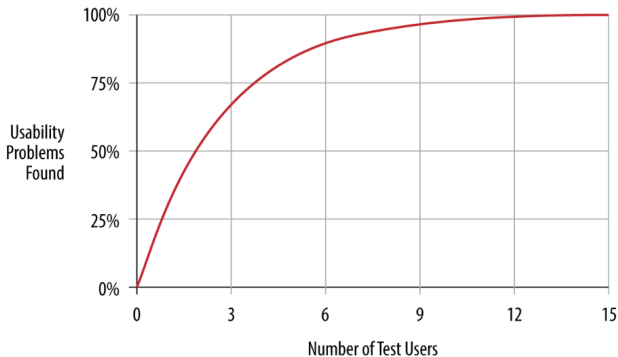
- A Done button just close the panel.
- *We had a mom using the app in-store with her kids. She was distracted and didn't notice the results updating, so she tapped multiple times and became frustrated that it didn't appear to respond. Giving her this Done button will make it more clear and show her products more quickly.*

*Articulating Design Decisions* by Tom Greever



## Number of tester

$$N(1-(1-L)^n)$$



- During the usability tests, new information you gain from each subsequent user declines.
- NNG recommends stopping at five selected users.

*Designing with Data* by Rochelle King, Elizabeth F Churchill & Caitlin Tan

## Use case - digital camera tests

- We want to examine the usability of a digital camera.
- Today, many people prefer the smartphone over the camera.
- Therefore, we invite the smartphone users for the test.
- The test will focus on verification of the taken photos.
- For that, it will be necessary to take a picture.
- Therefore, the taking picture process will also be tested.

## Pre-test questionnaire - example

- *Have you ever before used a camera?*
- *Do you take pictures on your smartphone?*
- *Optional. Can you name both devices pros and cons both approaches?*

## Tests scenario - example

1. Take a photo of the landscape out of the window.
2. Check if the photo is well-framed.
3. Take a photo of flowers on the table.
4. Check if the photo is sharp.

## Post-test questionnaire - example

- *Was using the camera intuitive?*
- *Have you got any problems with framing?*
- *Have you taken a sharp picture?*
- *How do you assess taking picture comfort?*
- *How do you assess the quality of the photos?*

# Task

- In group
  - Prepare usability tests of your product.

1. Pre-test questionnaire
2. Tests scenario
3. Post-test questionnaire

## Acceptance test



*Tragic Design* by Jonathan Shariat and Cynthia Savard Saucier

## Christmas tree specification

- HEIGHT 7.5', WIDTH Full 50"
- 100% PVC needles make up this standout tree that even Santa would be jealous of.
- Resilient, radiant branch tips crafted from flame-retardant materials.
- With its sleek but lush profile, this tree can easily fit any sized home or apartment.



<https://www.treetopia.com>



## Quality review technique

- A quality review is a technique of assessment that the product is complete and created according to standards.
- It verifies the acceptance criteria.
- The technique has some formal structure and assigns roles to participants.
- The participants are selected according to their competences to present the product and assessment of its quality.

## Review objectives

- To assess the conformity of a product which takes the form of a document against set criteria.
- To involve key interested parties in checking the product's quality and in promoting wider acceptance of the product.
- To provide confirmation that the product is complete and ready for approval.
- To baseline the product for change control purposes.

## Roles in review

**Chair** is responsible for the overall conduct of the review.

**Presenter** introduces the product for review and represents the producer. Also, coordinates and tracks the work after the review (i.e applying the changes).

**Reviewer** reviews the product, submits questions, and confirms corrections and/or improvements.

**Administrator** provides administrative support for the chair and records the results and actions.

## Review meeting agenda

1. Personal introductions
2. Product introduction
3. Major/global questions
4. Product 'talk-through'
5. Read back actions
6. Determine the review results
  - Complete
  - Conditionally complete
  - Incomplete
7. Close the review
8. Inform interested parties of the results

## Review benefits

- An early identification of product's lacks.
  - A reduction of production and exploitation costs.
- A progress assessment
  - A better knowledge of the project state.
  - An opportunity for stage management.
- A higher involvement of the stakeholders in the project
  - Especially, the users that play a role in the review.

## References



*Managing Successful Projects with PRINCE2®*.  
TSO, 2009.



T. Greever.  
*Articulating Design Decisions*.  
O'Reilly Media, Inc., 2015.



R. King, E. F. Churchill, and C. Tan.  
*Designing with Data*.  
O'Reilly Media, Inc., 2017.



J. Shariat.  
*Tragic Design*.  
O'Reilly Media, 2017.



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