Applying Usability Practices and Principles to Data Archives/Repositories

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GRADUATE SCHOOL OF LIBRARY AND INFORMATION SCIENCE
The iSchool at Illinois

Agenda

- **Introduction:** Usability Evaluation of Data Archives and Repositories

- **Background:** Usability Concepts and Usability Evaluation Techniques

- **Methodology:** Literature Review, Cognitive Walkthrough and Selection of Data Archives/Repositories

- **Results:** Usability Issues and Potential Fixes

- **Future Work:** Expanding Sample Size, Correlating to Age of Archive/Repository, Starting ESIP Usability Cluster

- **Discussion**

Introduction:

Usability Evaluation of Data Archives and Repositories

Project Introduction

- **Key Objectives:**
  - Investigate the usability of the dataset submission process from data archives/repositories by comparing such process from five different data archives/repositories with Earth/geoscience as the focused discipline.

  - Reveal the types of usability issues that users might encounter during a data submission process.

  - Share the discovery of potential resolutions of the usability issues in order to lower the barrier to use, and subsequently, possibly increase user participation in the data submission process.

  - Demonstrate how user interface/experience analysis and design need not be burdensome and can yield immediate results.
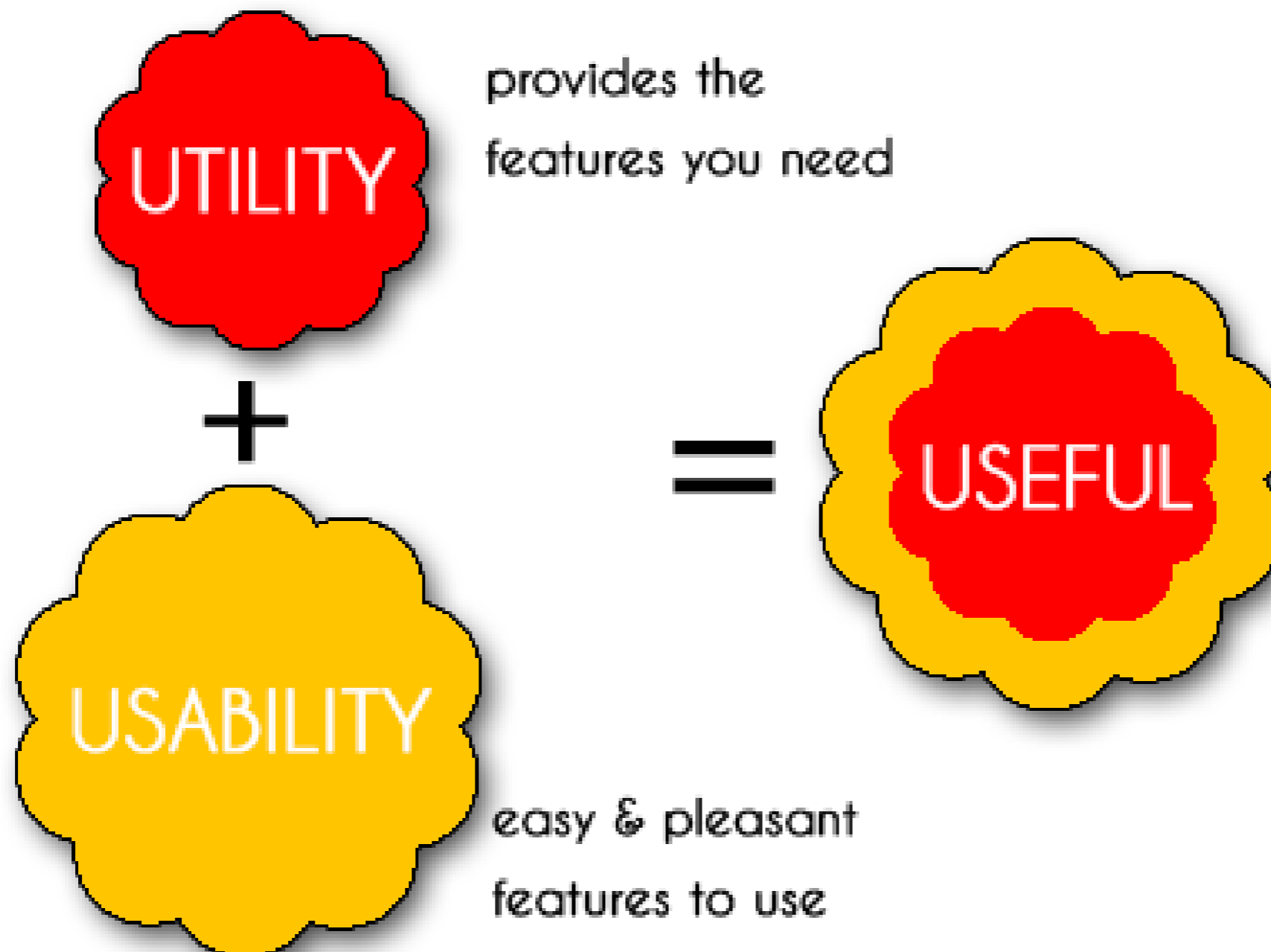
Background:

Usability Concepts and Usability Evaluation Techniques

Usability Concepts

- ## Definition of Usability:

  - "Quality attribute that assesses how easy user interfaces are to use."
  - "Methods for improving ease-of-use during the design process."

- ## 5 Quality Components:

  - Learnability - How easy is it for users to accomplish basic tasks the first time they encounter the design?

  - Efficiency - Once users have learned the design, how quickly can they perform tasks?

  - Memorability - When users return to the design after a period of not using it, how easily can they reestablish proficiency?

  - Errors - How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

  - Satisfaction - How pleasant is it to use the design?

Nielsen, Jakob. (2012, January 4). *Usability 101: Introduction to usability*. Retrieved from
https://www.nngroup.com/articles/usability-101-introduction-to-usability/

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Usability Concepts - Continued

UTILITY — provides the features you need

+

USABILITY — easy & pleasant features to use

= USEFUL

Nimit. (2013, September 19). *What is usability*. Retrieved from https://nimitmangal.wordpress.com/2013/09/19/what-is-usability/

Usability Evaluation Techniques

- A Sample List:
  - Usability Testing
    - In person vs. Remote
    - Think aloud vs. Observed

  - Cognitive Walkthrough

  - Heuristics Evaluations / Expert Reviews

  - Competitive Analyses

  - Interviews / Surveys

  - Eye Tracking / Heatmapping

  - Paper Prototyping

  - Wireframes

UX Mastery. (N. D.). *UX techniques*. Retrieved from http://uxmastery.com/resources/techniques/

Methodology:

Literature Review, Cognitive Walkthrough, and Selection of Data Archives/Repositories

Evaluation Process

- ## Literature Review:
  - Part 1:
    - What has been done that relates to any kind of usability evaluation of data archives/repositories?
      - For any kind of data archives/repositories?
      - For scientific data archives/repositories?
      - For Earth/geoscience data archives/repositories?

  - Part 2:
    - Examples of how the cognitive walkthrough (CW) has been used and adapted for usability evaluations in different contexts.
    - Since its development, have there been improvements in the method?
    - What are some lessons we can learn from older CWs that can inform the doing of a CW in this context?

Evaluation Process - Continued

- ## Literature Review – Key Findings:
  - More than 1000 articles were reviewed in Google Scholar and more than 150 in the Virtual Library from the University of Illinois, Urbana-Champaign.

  - While articles that demonstrate the application of usability to the library environment and the evaluation of tools/services/interfaces could be found, only one article was found to have direct relevance to the evaluation of data archives/repositories.

  - Likewise, while there are articles discussing scientific data archives/repositories, including those for Earth/geoscience discipline, only three articles were found to be relevant to area/focus of usability.

  - The subject area that is most closely related to our project was the evaluation of digital libraries through the use of usability studies.
    - However, the usability methods used are more in the forms of formal usability tests, survey, or heuristic evaluation than cognitive walkthrough.

Evaluation Process - Continued

- ## Cognitive Walkthrough:
  - "A usability evaluation method in which one or more evaluators work through a series of tasks and ask a set of questions from the perspective of the user."

  - Focuses "on understanding the system's learnability for new or infrequent users."

  - An efficient and compatible usability evaluation process for the data submission process from the data archives/repositories.

- ## Selection of Data Archives/Repositories:
  - 5 data archives/repositories with Earth/geoscience focus were selected to represent US and international organizations as well as different organization types, such as non-profit, research center affiliated, and community supported.

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Additional Evaluation Setup Conditions

- ## Targeted Tasks for CW Evaluation:
  - User wants to find the document/webpage that:
    - Provides the overview or the description of the data submission process.
    - Enables the actual data submission.
    - Describes the next steps after the data submission process has been completed.

- ## Evaluation Personas:
  - Novice user (Early career)
  - Experienced user (Mid career)

Results:

Usability Issues and Potential Fixes

Top Usability Issues

- Using language/dialogue that is not simple or natural to the targeted users .
  - Link / Tab labels, section titles, sequence of actions.

- Having Inconsistency in the vocabularies used.

- Overloading graphic design / information content.
  - Home page, related resources.

- Requiring users to remember/acquire information outside of the workflow that is currently in progress.

- Having confusing "Help" and documentation.

- Lacking error prevention measures.

Potential Fixes

- ## "Low Hanging Fruit" with great impact:
  - Have a straightforward Home page design with distinctly marked starting points.

  - Provide step-by-step overview of the work process with clear language/simple descriptions.

  - Associate specific terms and their respective definitions directly to each other.
    - This includes clearly identify the relationships among the different archives/repositories that can be accessible via the same Home page/portal.

  - Give emphasis for the texts that requires more attention from the users.
    - Help each page/step of the work process to be more easily readable and scannable for users.

  - Remove label variations for the same function.

  - Ensure the same link names always lead the users to the same respective resulting pages.

  - Place contact information at consistent and noticeable locations.

  - Enable human assistance, if applicable.

Future Work:

Expanding Sample Size, Correlating to Other Characteristics of the Archive/Repository, Starting ESIP Usability Cluster

Potential Next Steps

- Expand the evaluation to a larger sample size as well as testing with different techniques.

- Explore any possible correlation between other characteristics of the data archive/repository, such as the age of the archive/repository, to the usability evaluation result.

- Interests in starting up an ESIP Usability Cluster?

Discussion:

Questions to Consider

Discussion Questions

1. Are usability evaluations currently being applied at your data archive/repositories?

   - If yes:
     a) What are the evaluation techniques used?
     b) What are the services areas that have been evaluated?
     c) What are the key lessons learned?

   - If not:
     a) What are the reasons?

2. What are some of the key motivators that could help in integrating usability tests with the evaluation of data archive/repositories' services?

3. How can low-cost high-speed usability approaches be integrated into a design process?

Discussion Questions - Continued

1. How can you perform 'usability triage' (focusing on important but easy to fix issues)?

2. How can you demonstrate the benefits of improving usability?

Thank You!

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