Applying Usability Practices and Principles to Data Archives/Repositories

Sophie Hou (hou@ucar.edu) – University of Illinois, Urbana-Champaign
   National Center for Atmospheric Research
   ESIP Data Stewardship Committee Student Fellow
Michael Twidale – University of Illinois, Urbana-Champaign
Matthew Mayernik – National Center for Atmospheric Research
Ruth Duerr – Ronin Institute

ESIP Summer Meeting
July 2016
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?

Usability Concepts - Continued

UTILITY + USABILITY = USEFUL
provides the features you need
easy & pleasant features to use

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

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.

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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