Verse Chorus Verse:
Iterative Usability Studies for the *IN Harmony: Sheet Music from Indiana* Project

Or, How I spent too much time in Exc(H)ell!

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Talk Objectives

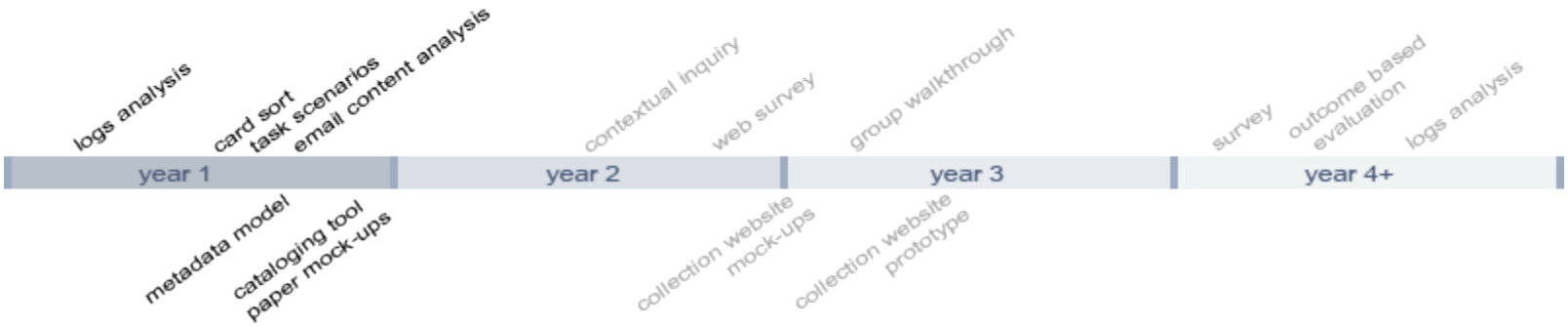
- Focus on the usability process (methods for data gathering and analysis), not findings
- Show that conducting usability studies can impact more than software development; they impact the design of the metadata model and further usability studies
- Explore how methodologies fit in the development cycle of a project
- Discuss the strengths and weakness of the methods to be summarized

IN Harmony Project Background

- IMLS funded 3-year project to digitize ~10,000 pieces of Indiana-related sheet music
- Collaboration between Indiana State Library, Indiana State Museum, Indiana Historical Society and Indiana University
- Project deliverables include:
  - **Creation of shared metadata model/guidelines and sheet music cataloging tool** (year 1 & 2)
  - Creation of shared digitization standards and image processing system (year 1)
  - Collection website (year 2 & 3)

Overview of the Usability Studies

- Website/Server Query Logs Analysis
- Card Sort
- Email Content Analysis



Website/Server Logs Analysis: Introduction

- Server logs provide details about file requests to a server and the server response to those requests
  - Transaction Logs, often processed by server-side software such as Apache's Webalyzer
    - Focus on page hits, referrers, hostname, browser type, querystring capture, etc
  - Query Logs, often custom logging of queries using technologies like Java's "log4j"
    - Focus on discovery patterns (browse links, search terms entered in simple v. advanced search pages, etc.)
- Used to monitor on-going website usage and inform design changes depending on patterns uncovered

Logs Analysis : Purpose of Study (General)

- Need to design a metadata model (and in turn, a cataloging tool) that meets user needs.
- Example scenarios under investigation:
  - **Known item searching**: how are titles and names searched? Represent all aspects of this in the metadata model.
  - **Subject searching**: Music subject description is complicated; topical, genre, style, form, etc. are often not mutually exclusive. Understand how users conduct subject-related searches in order to define appropriate fields and controlled vocabularies.
  - **Uncover unanticipated search parameters** that should be represented in the metadata model (e.g. key or catalog/sheet music plate ID numbers)

Logs Analysis: Purpose of Study (Specific)

- Harvest real-life queries and discovery patterns in order to understand:
  - How often users conduct a browse, search or advanced search for sheet music
  - How often users conduct known-item versus unknown-item searching
  - What kinds of searches are being conducted (keyword, title, name, subject, etc.)
  - **What kinds of subject-related queries are being conducted (e.g. topical, genre, style, etc.)**

Logs Analysis: Background Information

- Collected a 10% random sample of query logs from a 6 month period from 2 sheet music collections (2,542 total log entries)
  - IU Sheet Music (Homogeneous collection)
  - Sheet Music Consortium (Heterogeneous collection delivered via OAI-PMH)
- Different interfaces affect usage patterns and therefore affect the data.
  - Comparative analysis must be conducted in light of the differences (reconcile data, discard data or provide context for the data)

Logs Analysis: Methodology

- Establish parse rules for logs
- Establish data analysis goals:
  - Determine relative frequency of browse, search and advanced searches conducted
  - Compare number of known-item to unknown-item queries
  - Sort queries into identifiable access points for further evaluation: creator, title, subject, etc.
    - Determine further categories for subject-related search strings (topical, form, etc.)

Logs Analysis: Data Analysis

- Establish data analysis rules/guidelines:
  - Coding underwent two passes: by researcher and domain expert
  - Define known (name, title and publisher) v. unknown items (subject, year, keyword)
  - **Define subject types for encoding: instrumentation, genre/form/style, topical, geographic, temporal, language …**
  - Define how and when queries can be encoded with two or more distinct fields (e.g. “Statue of Liberty” could be subject or title).
  - And so on …

Logs Analysis: Data Analysis^2

- Excel works for quantitative analysis (duh!)
  - Non-numeric data is easily sorted and counted using Excel's advanced filter features
  - Generate graphs and charts for those who don't want to "read" the final report

Logs Analysis: Strengths and Weaknesses

- Strengths
  - **Provides a good foundation** – Overview of usage and discovery patterns
  - **Objective** – "real" data
  - **Quick capture** – Data collection is automatic
  - **Straightforward** – In general, quantitative data is easy to analyze using tools like Excel
- Weaknesses
  - **Analysis can be time consuming** – Not all data is straightforward, interpretation requires rules and consistent application
  - **User context and motivations unknown** – User's information need not clear, problems encountered with the interface not clear, etc.
  - **Data is constrained** – By the interface and functionality (ties into user's motivations as unknown)
  - **Longitudinal Tracking Difficult** – More difficult to track an individual's usage pattern beyond a session

Logs Analysis: Summary

- Probably one of the more complicated logs analysis I ever performed because of the amount of interpretation
- Used logs to affirm/negate published research and our own hypotheses regarding diverse use of sheet music (performance, cover art, exhibits, historical context, etc.)
- Serves as a good starting point, provides a generalized, even if contrived, overview of like-systems
- Questions about the Logs Analysis Study?

Card Sort : Introduction

- Categorization method where users sort cards representing concepts into meaningful groupings
  - **Open**: concepts provided but categories assigned by users
  - **Closed**: concepts *and* a set of categories are provided for users to group
- Used to determine “content areas” and navigational elements of a website but also good for metadata model development
  - Open card sort good for early stages of the development cycle (exploratory, provides certain design ideas, etc.)
  - Closed card sort good for later stages (adding new content areas to an existing structure, re-organizing current structure, etc.)
- Quantitative data (cluster analysis) or Qualitative data (affinity diagramming/card re-sort) analysis

Card Sort : Purpose of Study

- Need to **refine** metadata model to accommodate complexities of subject-related searches for sheet music
- Main objectives:
  - Do users really make distinctions between the generic category subject and more specific categories like genre/form/style, instrumentation, etc.?
  - How do the users' categorical labels differ from the ones assigned by the researcher for the Logs Analysis study?

Card Sort : Background Info

- Built upon the Query Logs Analysis Study by:
  - Using actual queries harvested as card sort terms/concepts
  - Testing our own categorical constructs of subjects such as topical, genre/form/style, etc. against users' constructs

Card Sort : Methodology

- Open Card Sort
  - Users grouped pre-defined concepts and self-assigned categories
- 55 cards to sort, some contained definitions on the back (genre, styles, etc.) for clarification
- Blank cards given for labeling
- Directions are deliberately basic:
  - Organize cards into meaningful groupings
  - Groupings have no maximum membership requirement, minimum requirement of 1
  - Label groupings

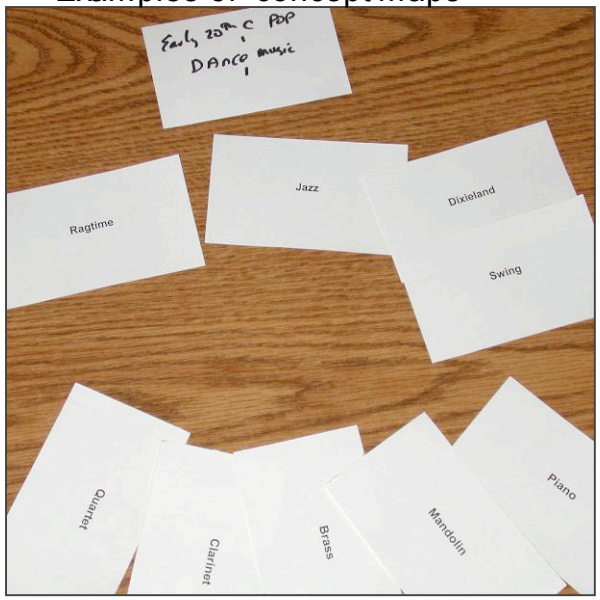
Card Sort : Data Analysis

- Establish data analysis goals:
  - What categories are identified by participants?
    - How often do “naturally” occurring categories overlap across participants?
    - How often do “normalized” categories overlap?
  - In which user-identified and normalized categories do the terms appear?
  - How often do terms appear in any given category?

Card Sort : Data Analysis[2]

- Open card sort more complex; need to “normalize” categories
- Users did not create neat, flat structures, instead most created:
  - Complex hierarchies 2+ levels deep
  - Polyhierarchies (establishing cross relationships between terms in overlapping categories)
  - “Concept maps”, a more radial, thematic (less linear) grouping (e.g. Patriotism in War and Peace Marches)

Examples of “concept maps”



Card Sort : Data Analysis[3]

- Excel was used initially to store data but difficult to capture complex, non-linear groupings.
  - Useful for documenting levels of hierarchies and cross-relationships
  - Useful for comparing categories before and after normalization
- Opted for a combination approach: re-card sort to determine “normalized” categories and basic statistical analysis using Excel (e.g. frequency concepts appeared in normalized category)

Card Sort : Strengths and Weaknesses

- Strengths
  - **User participation** – Based on actual user input, good source to test a design team's opinions and expectations
  - **Understand the User's Language** – Open card sorts places an emphasis on labels understood by users
  - **Provides Reliable Foundation** – Findings can help create a basis for website structure and organization as well as metadata model
  - **Simple to administer** – Relatively easy for the organizer and the participants, highly portable
- Weaknesses
  - **Analysis can be time consuming** – This is especially true of open card sorts that would require category normalization, especially for statistical analysis. Even for closed card sorts, results will vary across users.
  - **Content-centric** – The emphasis is on content and not necessarily on user tasks or information needs.
  - **Design Limitations** – More difficult to assess features and functionality of a website using card sort

Card Sort : Summary

- Probably the most exhilarating card sort I ever conducted!
- Card sorts can provide the context missing in logs analysis if the right questions are asked
- Affirmed that representative users (music teaching faculty, performers, K-12 music teachers, etc.) **do not** adopt the "intellectual" distinction between genre, form and style
- Cross-relationships and facets are extremely important for discovery – especially to suit the wide ranging needs of sheet music users.
  - Informed a modular metadata model in order to support …
  - Faceted discovery functionality for the collection website
- Explore other card sort tools for administration and analysis
  - iPragma's "xSort" which supports electronic card sorting and built-in analysis; exports data in XML or CSV for Excel ingestion …
- Questions about the card sort study?

Content Analysis : Introduction

- Evaluation and encoding of human recorded communications, in this case reference questions sent via email
- Requires the standardization of data for analysis
  - **Manifest Content Analysis** (e.g. how many times does “x” word appear, no interpretation required)
  - **Latent Content Analysis** (requires some assessment of underlying meaning based on context or other cues)
- Used to determine user’s information needs and behavioral patterns and attitudes
  - Depending on content, can be useful throughout a project’s development cycle
    - **Reference questions** provide a basis to explore design questions and issues in the early stages
    - **Talk-aloud** comments resulting in traditional usability test provide recommendations for design changes in the later stages
- Relies on quantitative data analysis (e.g. cluster analysis, frequency ratings, etc.)

Content Analysis : Purpose of Study

- **Continual refinement** of metadata model to accommodate other access points not necessarily captured by logs due to constraints of an interface
- Main objective:
  - Understand why the population-at-large searches for sheet music and how do they search for sheet music:
    - What is the nature of the sheet music request – academic, personal interest, etc.?
    - What are the requesters search parameters?
    - Are the requesters interested in musical content or cover art?

Content Analysis : Background Info

- Analyzed approximately 50 reference email requests directed at the Lilly Library, which is home to several sheet music collections
  - Lilly staff stripped all personal identifier information (name, addresses, etc.) before analysis

Content Analysis : Methodology

- Establish encoding rules:
  - Coding underwent two passes: by researcher and domain expert
  - Develop analytic encoding scheme based on 3 dimensions:
    - Content (e.g. nature of inquiry)
    - Search and retrieval strategy (e.g. what/where/how of search and retrieval)
    - Profile (e.g. teacher)

Content Analysis : Methodology[2]

- **Content**: What type of information is the user requesting?
  - Information need (lyrics, music to perform, etc.)
  - Type of inquiry (based on lyrics, title, etc.)
- **Search & Retrieval Strategy:** What is the discovery approach taken by the user? How does the user expect to gain access to the content?
  - Resources consulted (e.g. sheet music website, OAI record, OPAC, film, etc.)
  - Nature of query
  - Copy request (print, digital, etc.) and how (mail, fax, download, email, etc.)
- **Profile**: Who are the users in terms of profession and why are they looking for sheet music?
  - Academic, research or scholarly use
  - Personal use (event such as wedding, birthday, etc.)
  - Professional affiliation (teacher)

Content Analysis : Data Analysis

- Each email message was given a unique identifier
- Content broken down into discrete terms or phrases for encoding with tie to identifier
- Users requests can be complicated by "Googling" before posing reference questions:
  - Interpretation is required to determine if reference question resulted Before Electronic Discovery (BED) or After Electronic Discovery (AED)
- Excel works amazingly well for discrete units of qualitative data analysis

Content Analysis : Strengths & Weaknesses

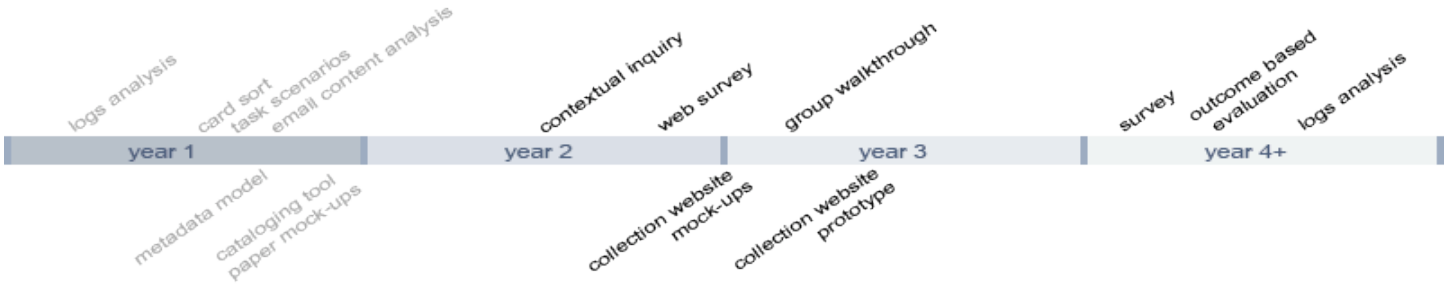
- Strengths
  - **Cast a wider net** – Can assess a greater user population's information needs for particular items
  - **Provides Context** – Typically email reference questions extend beyond a direct information need. Users tend to provide why they are looking for a piece of sheet music.
  - **Requires minimal resources** – Content, electronic spreadsheet and researcher's time
- Weaknesses
  - **Analysis can be time consuming** – Especially if latent content analysis is applied.
  - **Users intentions not always known** – Difficult to clarify user intentions therefore complicating analysis.
  - **Content-centric** – Emphasis on user information needs but not necessarily tasks.

Content Analysis : Summary

- Provided a wider profile of potential users of an online sheet music collection
- Affirmed certain aspects of the metadata model (e.g. titles and names) and informed new aspects of the metadata model (e.g. searching by lyrics – chorus and first line is **extremely** important)
- Raised explicit issues regarding copyright, fee-based sheet music delivery services, etc. that will need to addressed in the collection website

What's Next?

- You guessed it … more user studies for the IN Harmony project!
  - Several studies to be conducted during years 2 and 3 and beyond
- For me …
  - Standardize on ways I process data for analysis using Excel; while keeping in mind that data analysis for most usability studies is part science, part magic!
  - Explore other tools for data analysis beyond Excel



References

- Server Logs Assessment:
  - <http://www.usability.gov/serverlog/>
  - <http://www.clir.org/pubs/reports/pub105/section3.html>
  - <http://deyalexander.com/resources/search-logs.html>
- Card Sort:
  - <http://www.boxesandarrows.com/view/card_sorting_a_definitive_guide>
  - <http://www.boxesandarrows.com/view/card_based_classification_evaluation>
  - <http://www.useit.com/alertbox/20040719.html>
  - <http://www.hostserver150.com/usabilit/tools/cardsorting.htm>
- Content Analysis:
  - <http://www.hostserver150.com/usabilit/tools/r_content.htm>

More Information

- IN Harmony Project Website:
  - <http://www.dlib.indiana.edu/projects/inharmony/>
- Usability Documentation for the studies covered in this talk:
  - <http://www.dlib.indiana.edu/projects/inharmony/projectDoc/usability/logs/index.shtml>
  - <http://www.dlib.indiana.edu/projects/inharmony/projectDoc/usability/cardSortTasks/index.shtml>
  - <http://www.dlib.indiana.edu/projects/inharmony/projectDoc/usability/email/index.shtml>
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