studying digital library use

if we build it, will they come?
and what will they do when they get (virtually) here?
• background (formative/summative, weak vs. strong UCD, Variations(2))
• method descriptions
  – questionnaires
  – user action logging
  – contextual inquiry
• method comparison
• discussion
why study usage?

• inform design (formative)
  – during iterative development
  – after a version to help with the next

• assess implementation (summative)
  – resource allocation decisions
  – dissemination
context of user needs

user needs

business objectives

require-

financial

technical

schedule

analysis & prioritization

constraints & capabilities
user-centered design

weak version
- follow user-centered guidelines
- read prior user studies
- follow UCD best practices

strong version
- meet our own users
- watch their tasks
- experience their context (and)
- follow user-centered guidelines
- read prior studies
- follow best practices
“With rare exception, libraries appear to view think-aloud protocols as the premier research method for assessing the usability of OPACs, Web pages, local digital collections, and vendor products.”

- Covey, 2002, DLF report
usage and testing

strong UCD
- meet our own users
- watch their tasks
- experience their context

usability testing
- whomever we can recruit
- watch our tasks
- watch them experience our context
usage and testing

strong UCD
- meet our own users
- watch their tasks
- experience their context

usability testing
- whomever we can recruit
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- watch them experience our context

doing these can help us improve these
usage and testing

strong UCD
• meet our own users
• watch their tasks
• experience their context

usability testing
• whomever we can recruit
• watch our tasks
• watch them experience our context

doing these can help us improve these
discovering user needs

designer

users
discovering user needs

- ask users’ mgmt
- ask users what they like or want
- ask users what they do
- ask users what they did
- study real artifacts & data
- watch users work & discuss

make it up—we’re smart!

ask marketing

read pubs
target studies

• Variations - questionnaire study, contextual inquiry study
• Variations2 - questionnaire study, activity logging study
Variations

> 8000 recordings

> 250 scores in web-based viewer

usage limited to 90 PCs in music library

music students use weekly if not daily

used since 1996
new research
testbed system
audio player
score viewer
bookmarking
separate search
three looks at usage

- user satisfaction questionnaire (2 studies)
- session activity logging
- contextual inquiry
questionnaire 1

- Variations usage in library
- Users recruited to fill out survey immediately after use
- n = 30
- Paper-based survey including demographic questions and satisfaction rating items
results (n = 30)

use frequency :: once a week (26); more than 5 times per week (7 of the 26)

purpose :: studying for an exam or completing an assignment for class (17); personal listening (5)

satisfaction (1 low, 7 high) :: 5.56 overall mean; all items averaged above 5 except for “slow...fast” (4.77)

likes :: “very useful” (2); “simply tremendous to use...a veritable heaven for all musicians here”

dislikes :: waiting to retrieve recordings, serialized retrievals (7); navigation difficulties, playback delay (2); sound skipping or cutting off (2)

recommendations :: more detail (liner notes, track times, etc.) (3); more music or types of music (2); improved search (2)
questionnaire 2

- Variations2 usage by a class of 30
- Users recruited to fill out survey immediately after use
- 12 responses
- Web-based survey including demographic questions and satisfaction rating items
results (n = 12)

Variations use frequency :: 2x/week (all); > 5x/week (3 of the 12)

typical purposes :: exam prep, class assignment (11);
recital or performance prep (11); personal listening (4)
satisfaction (1 low, 7 high) :: 5.38 overall mean; all items
> 5 except for “number of screens/windows: confusing...very clear” (4.86)
likes :: availability of scores & song texts (5); speed
improvement over Variations (2)
dislikes :: difficulty of handling the many windows (2);
many unique responses
recommendations :: want the “repeat” option from Variations (2)
session activity logging

- Variations2 usage by a class of 30 for a 7-song listening assignment (listen to song, write a short paragraph of analysis)
- software logged user actions
- quantitative analysis by scripts
- detailed manual analysis
results

sessions :: 128, 30 minutes average length
items retrieved :: 3.5 average
maxima :: 7 simultaneous windows; 11 sessions in a day
feature usage ::
  bookmarking - 11%
  menubar - 17%
  view record details - 23%
total button presses ::
  stop - 200
  pause - 385
  play - 588
total manual slider adjustments :: 295
18:00:28 Search#1: window opened
18:00:40 Search#1: button clicked - basic search, with creator=Bartok
18:01:13 Search#1: hyperlink click - link info=work#IU/Work/11158#IU/Work/11158
18:01:26 Search#1: hyperlink click - link
  info=container#IU/Container/10096#listen#IU/Container/10096#IU/Instantiation/11246
18:01:27 Player#2: window opened - IU/Container/10096
18:02:32 Player#2: treenode click - recordings tab tree, node - Track 17. 2. Moderato (0:52)
18:02:58 Search#1: button clicked - basic search, with creator=Vert
18:03:04 Search#1: button clicked - basic search, with creator=Verti
18:03:17 Search#1: button clicked - basic search, with creator=Rachaminov
18:03:56 Search#1: button clicked - basic search, with creator=Beethoven
18:04:13 Player#2: treenode click - recordings tab tree, node - Track 1. 1. Allegro molto e
  con brio (5:22)
18:04:47 Search#1: hyperlink click - link info=work#IU/Work/7960#IU/Work/7960
18:04:52 Search#1: hyperlink click - link
  info=container#IU/Container/7657#view#IU/Container/7657#IU/Instantiation/7995
18:04:53 Viewer#3: window opened - IU/Container/7657
18:05:10 Viewer#3: window closed - remaining open window count - 2
18:05:22 Search#1: button clicked - basic search, with creator=Debussy
18:05:29 Search#1: hyperlink click - link info=work#IU/Work/6247#IU/Work/6247
18:05:35 Search#1: hyperlink click - link
  info=work#IU/Work/6247#listen#IU/Container/5888#IU/Instantiation/6409
18:05:35 Player#4: window opened - IU/Container/5888
18:06:12 Player#4: treenode click - recordings tab tree, node - Track 3. Dialogue of the
  Wind and the Sea (7:54)
18:06:42 Search#1: button clicked - basic search, with creator=John Cage
18:07:03 Search#1: window closed - remaining open window count - 2
18:07:06 Player#4: window closed - remaining open window count - 1
18:07:07 Player#2: - saving 1 bookmarks
18:07:07 Player#2: window closed - remaining open window count - 0

(a session log)
detailed analysis results

“Karita” began her session by clicking on the first song (3:02 in length) on the pilot assignment web page. It took 28 seconds for her to log in, see the audio player, and hear the song. 16 seconds later, she paused the audio. 81 seconds later Karita clicked on the hyperlink in the audio player to view the detailed bibliographic information of the recording. After 6 seconds, she clicked on the score link on the assignment web page. The score viewer took 11 seconds to appear. 45 seconds later, she closed the "view details" window and maximized the score viewer... etc.

- only analyzed one full session
- revealed no significant issues
- many unanswered questions
more recent (6 week period) log file analysis
data about searches in Variations2

<table>
<thead>
<tr>
<th>Basic Searches</th>
<th>678</th>
</tr>
</thead>
<tbody>
<tr>
<td>creator</td>
<td>241</td>
</tr>
<tr>
<td>performer (or conductor)</td>
<td>72</td>
</tr>
<tr>
<td>work title</td>
<td>98</td>
</tr>
<tr>
<td>creator + performer</td>
<td>15</td>
</tr>
<tr>
<td>creator + work title</td>
<td>192</td>
</tr>
<tr>
<td>performer + work title</td>
<td>49</td>
</tr>
<tr>
<td>creator + performer + work title</td>
<td>11</td>
</tr>
<tr>
<td>no creator, performer, or work title</td>
<td>1</td>
</tr>
<tr>
<td>with any of the above searches, use of</td>
<td></td>
</tr>
<tr>
<td>key letter + accidental</td>
<td>2</td>
</tr>
<tr>
<td>media format</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advanced Searches</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td>only criteria also available on basic tab</td>
<td>26</td>
</tr>
<tr>
<td>included container title</td>
<td>13</td>
</tr>
</tbody>
</table>

**Keyword Searches**

<table>
<thead>
<tr>
<th>Only criteria also available on basic tab</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>subject heading</td>
<td>2</td>
</tr>
<tr>
<td>container title</td>
<td>1</td>
</tr>
</tbody>
</table>

**Browses**

| creators | 14 |
| performers | 5 |
| works     | 4  |
| containers | 8 |
library vs. lab

<table>
<thead>
<tr>
<th>Search Type</th>
<th>Library Use (n=744)</th>
<th>User Testing (n=278)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>91%</td>
<td>20%</td>
</tr>
<tr>
<td>Advanced</td>
<td>5%</td>
<td>46%</td>
</tr>
<tr>
<td>Keyword</td>
<td>4%</td>
<td>34%</td>
</tr>
</tbody>
</table>
contextual inquiry

- 14 observations of normal user activity; 10 were in music library
  - listening assignments for class
  - recital planning assignment
  - preparing personal audition “package”
  - studying a piece for private lesson
  - detailed history/analysis of one song
  - exam preparation
- researcher took notes, discussed w/user
- analyzed data using contextual design work models
contextual inquiry

observe real users doing real work in their real context

take notes, sketch pictures, photocopy artifacts

ask questions to clarify theories

co-interpret the work to elicit tacit knowledge

work
contextual inquiry

notes

sample
work modeling

represent many dimensions of work using five work models

flow of communication and artifacts between roles

sequence of task steps

culture influences and attitudes between groups

artifact structure and use

physical environment structure and use
flow of communication and artifacts between roles

sequence of task steps

culture influences and attitudes between groups

artifact structure and use

physical environment structure and use

flow model

how people cooperate to get work done

Peer
- help my peers

Teacher
- direct learning
- stimulate growth

Librarian
- help patrons use resources

U1 (Student)
- learn music

Asks question

Assigns pieces

Provides training

Doesn’t know answer
<table>
<thead>
<tr>
<th>Sequence of Task Steps</th>
<th>Flow of Communication and Artifacts Between Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD: hard to scan for piece</td>
<td>cultural influences and attitudes between groups</td>
</tr>
<tr>
<td>Intent: identify 2nd performer - where received training</td>
<td>artifact structure and use</td>
</tr>
<tr>
<td>BD: misunderstands database search; doesn’t remember how to use it; librarian showed her once</td>
<td>physical environment structure and use</td>
</tr>
<tr>
<td>Adjusts volume up by hand during quiet part</td>
<td>sequence of task steps</td>
</tr>
<tr>
<td>Adjusts Master Volume up by hand</td>
<td>what prompts tasks &amp; the steps involved</td>
</tr>
<tr>
<td>Moves slider back a bit to listen to section again</td>
<td></td>
</tr>
<tr>
<td>Looks for second recital piece (&quot;shubert and piano and sonatas and http&quot;)</td>
<td></td>
</tr>
<tr>
<td>Finds only one in Variations - teacher said this isn’t a good one</td>
<td></td>
</tr>
<tr>
<td>Loads it</td>
<td></td>
</tr>
<tr>
<td>While loading, looks at some other recordings</td>
<td></td>
</tr>
<tr>
<td>Scans &quot;Contents&quot; field to see if it includes the right piece</td>
<td></td>
</tr>
<tr>
<td>Finds another one</td>
<td></td>
</tr>
<tr>
<td>Also loads it</td>
<td></td>
</tr>
<tr>
<td>Starts listening to first one</td>
<td></td>
</tr>
<tr>
<td>Goes to library database search page</td>
<td></td>
</tr>
<tr>
<td>Types in performer’s name</td>
<td></td>
</tr>
<tr>
<td>Decides 1st recording is too slow</td>
<td></td>
</tr>
<tr>
<td>Switches to second recording</td>
<td></td>
</tr>
<tr>
<td>Goes to google</td>
<td></td>
</tr>
</tbody>
</table>
culture model

how power, influence, pressures and emotions impact work

flow of communication and artifacts between roles

sequence of task steps

culture influences and attitudes between groups

artifact structure and use

physical environment structure and use
artifact models

how documents support the work

flow of communication and artifacts between roles

sequence of task steps

culture influences and attitudes between groups

artifact structure and use

physical environment structure and use

Three movements of piece

Moderato
no rit.
Bass melody
Sing
PPP

Timing

I 7:30
II
III metronome

Notes to self as reminder on a half-sheet of paper.
physical models

how workspace layout, window layout, etc. impact work

flow of communication and artifacts between roles

sequence of task steps

culture influences and attitudes between groups

artifact structure and use

physical environment structure and use
physical models

how workspace layout, window layout, etc. impact work

flow of communication and artifacts between roles
sequence of task steps
culture influences and attitudes between groups
artifact structure and use
physical environment structure and use

Full-screen web browser, usually with IUCAT
BD: Have to scan Contents field to look for a piece
BD: Slider is hard to control accurately.
Variations player in corner
<table>
<thead>
<tr>
<th>Activity</th>
<th>&quot;Study in Detail&quot;</th>
<th>&quot;Collect and Select&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare to do library work</td>
<td>- get headphones&lt;br&gt;- find available carrel&lt;br&gt;- locate assignment&lt;br&gt;- log in and locate on-line tools</td>
<td>- select piece to study&lt;br&gt;- retrieve known recording&lt;br&gt;- retrieve known auxiliary materials (scores, texts, reference works)</td>
</tr>
<tr>
<td>Work with library materials</td>
<td>- study material (listen, and follow along in score and/or text; repeat whole piece or key parts)&lt;br&gt;- make personal notes to capture key points gleaned from studying</td>
<td>- find candidate materials&lt;br&gt;- examine many details quickly to decide which to select (listen, check length, performer, key, etc.)&lt;br&gt;- make personal notes to guide selection</td>
</tr>
<tr>
<td>Wrap-up the work</td>
<td>- write assignment deliverable</td>
<td>- preserve notes and/or assignment deliverable (email to self, save on Zip disk or network drive, print)&lt;br&gt;- log out&lt;br&gt;- pack up&lt;br&gt;- return reserve materials&lt;br&gt;- return headphones</td>
</tr>
</tbody>
</table>
alternatives for “retrieve known recording”

<table>
<thead>
<tr>
<th>Option 1:</th>
<th>Option 2:</th>
<th>Option 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Find course reserve list</td>
<td>- Looking at assignment sheet, type Variations URL for item in browser field</td>
<td>- Enter search terms in online catalog</td>
</tr>
<tr>
<td>- Scroll to desired recording (BD: reserve list may be very long)</td>
<td>- Scroll through search results to find desired item (BD: easy to pick wrong item due to title similarities and lack of distinct visited-link color)</td>
<td>- Scroll through search results to find desired item (BD: easy to pick wrong item due to title similarities and lack of distinct visited-link color)</td>
</tr>
<tr>
<td>- Select item (BD: easy to pick wrong item due to title similarities)</td>
<td>- Select item</td>
<td>- Select item</td>
</tr>
</tbody>
</table>

Common final step:
- Select CD/Side within Variations web page to retrieve item
consolidated flow model

Course Faculty
- teach class
- give assignments
- assess student work
- improve class

Voice Teacher
- guide student practice, learning

ASSIGNMENT SHEETS
EXAM STUDY GUIDES
EXAMS
GRADED WORK

Voice Student
- complete assignments
- prepare for lesson
- prepare for audition/recital

Questions, responses to prof’s questions

Library circ. desk staff
- track borrowing

Non-Major Undergrad Voice Student
- prepare for lesson

EXAMS

homework, papers

BD: Can’t find it where you said it was

HEADPHONES
RESERVE MATERIAL

Student ID

COPIES OF MUSIC

recommend pieces to look at
Voice Student

Whatever it takes to achieve my goal.

Voice Teacher

Do these assignments

Community of famous performers

How WE perform it

Other Library Patron

BD: No way to know who needs it most

Listen outside the singer box.

Course Faculty

Work on interpretation, not just technique

I respect your need for library items.
BD: small spaces, many items

BD: Plug/jack and headphone issues

consolidated physical model
1. The context I work in
   a. I have to work in a campus computer lab
   b. I have to learn the library
   c. Why I like Variations
   d. Problems I have with Variations
   e. I have to deal with my workspace
   f. How I manage my windows
   g. I have to manage lots of stuff
   h. I copy what I need

2. How I find
   a. How I find my tools
   b. I need the right song
   c. Search tools are clumsy and unforgiving
   d. I have to sift through results
   e. I try to find materials by browsing
   f. I use the web to find

3. Physical vs. Online Materials
   a. Why I won’t/don’t use physical materials
   b. Why I use physical materials

4. How I examine
   a. I need song length
   b. I have to assimilate lots of details
   c. How I decide what to sing
   d. How I prepare a song

5. What I have to do “for a piece of paper” [degree]
   a. [no subcategories]
### Method Comparison

<table>
<thead>
<tr>
<th></th>
<th><strong>Satisfaction Questionnaire</strong></th>
<th><strong>Session Activity Logging</strong></th>
<th><strong>Contextual Inquiry</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expertise</strong></td>
<td>survey design</td>
<td>technical (programming, scripting)</td>
<td>observation, interviewing, work modelling</td>
</tr>
<tr>
<td><strong>Time to set up</strong></td>
<td>moderate</td>
<td>low</td>
<td>moderate</td>
</tr>
<tr>
<td><strong>Time to conduct</strong></td>
<td>none (online) to moderate (recruit &amp; use paper survey)</td>
<td>none</td>
<td>high, longitudinal</td>
</tr>
<tr>
<td><strong>Time to analyze</strong></td>
<td>low (4 hrs)</td>
<td>moderate (metrics generation) to very high (manual analysis of all files)</td>
<td>high (less if you skip the work modeling)</td>
</tr>
<tr>
<td><strong>Benefit</strong></td>
<td>primarily summative; can uncover some topics for further investigation</td>
<td>summative (metrics generation) and formative (manual analysis)</td>
<td>primarily formative; rich data useful throughout project</td>
</tr>
</tbody>
</table>
questions? comments?

- how have you explored usage for the project(s) you’re involved with?
- how successful have those efforts been?
- how do you represent and share understanding of user need?
- what methods would you like more experience with?
- ...
a meta-project using contextual inquiry

- **participants**: people from different DLP projects, interested people from SLIS or elsewhere (12, max)
- **inquiries**: conduct 20-30, of a broad range DL-pertinent activities
  - syllabus construction, lecture prep - faculty
  - search, retrieval, use – students
  - digital ingest, cataloging, etc. ... others?
- **modeling**: build work models and consolidate across users
benefits

- we learn the contextual inquiry process
- we can use what we learn to help unify our DL framework or toolset
- we all get a shared understanding of DL user needs
- it will provide a strong foundation for future DL grant proposals
- we can take representations of that understanding and use it to educate others
- it’s fun!
12 people, fall semester
- 2-3 weeks total time per person (some do more than others)
- office supplies
- possibly some incentive $ for student participants
for further information

http://variations2.indiana.edu

http://mypage.iu.edu/~mnotess

mnotess@indiana.edu
This material is based upon work supported by the National Science Foundation under Grant No. 9909068. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.