Mining Usability for Web Sites:
How to Use the Wealth of Data You May Already Have in Building the Site Your Customers Want

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Agenda

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- Mining usability methodology
  - Introduction and definitions
  - Usability engineering and the development lifecycle
  - Usability mining framework/approach
- IRS.gov case study
  - Background/tasking scope
  - Findings
  - Recommendations
- Summary/Q&A

Introduction:
Definitions

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- Usability is "the extent to which a product can be used by specified users to achieve specified goals in a specified context of use with effectiveness, efficiency, and satisfaction." – ISO standard 9241-11
- Usability Engineering (UE) integrates usability into all phases of the development lifecycle, and leverages observation and testing to provide structured methods for achieving usability in user interface design

Introduction:
Problem Statement

- How can web site stakeholders assess the effectiveness of their product in meeting user needs, much less improve the product?
- Usability Engineering (UE) plays a pivotal role in answering these questions
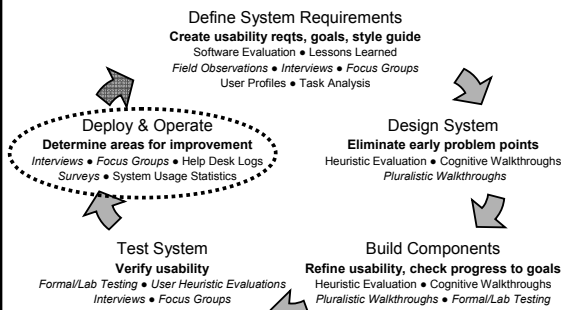- We noted that the potential wealth of usability-related data clients have on hand is often neglected

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Introduction:
Proposed Solution

- When this usability data is "mined" it can be an invaluable input to the development lifecycle by informing UE priorities and initiatives
- This kind of meta-analysis draws on a number of data sources with the joint goals of:
  - identifying usability issues and trends
  - gathering empirical support for potential areas of improvement and/or further usability study or action

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Usability Engineering Lifecycle:
Overview

Define System Requirements
Create usability reqts, goals, style guide
Software Evaluation ● Lessons Learned
Field Observations ● Interviews ● Focus Groups
User Profiles ● Task Analysis

Deploy & Operate
Determine areas for improvement
Interviews ● Focus Groups ● Help Desk Logs
Surveys ● System Usage Statistics

Design System
Eliminate early problem points
Heuristic Evaluation ● Cognitive Walkthroughs
Pluralistic Walkthroughs

Test System
Verify usability
Formal/Lab Testing ● User Heuristic Evaluations
Interviews ● Focus Groups

Build Components
Refine usability, check progress to goals
Heuristic Evaluation ● Cognitive Walkthroughs
Pluralistic Walkthroughs ● Formal/Lab Testing

Italics indicate end user involvement

Usability Engineering Lifecycle: Information Gathering Toolkit

- **Lessons learned**: System usage statistics and user feedback from current/prior releases yield possible improvements and functionality
- **Software evaluations**: Other software users currently interact with suggest implementations users may expect or understand
- **Field observations**: Evaluators observe users while they perform relevant tasks and note process, actions, systems, problems, needs, etc.
- **Interviews & Focus groups**: Evaluators use varying levels of structured inquiry with users about their opinions and experiences
- **Task analysis**: Evaluators investigate typical tasks users will perform on the system
- **User profiles**: Representative identities for user subgroups are created
- **Help desk logs**: Information gathered from help requests indicates areas for improvement or additional functionality
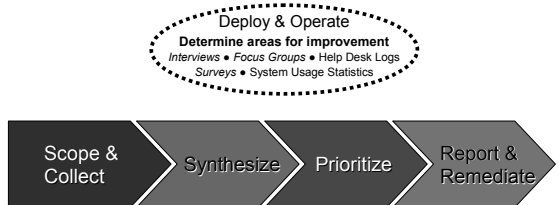

Usability Engineering Lifecycle: Evaluation Toolkit

- **Cognitive walkthrough**: Evaluators construct task scenarios based on task analysis and user profiles and then "walk through" the interface as a typical user working with that interface
- **Heuristic evaluation**: Evaluators or users inspect elements of the interface based on established usability principles
- **Pluralistic walkthrough**: Users, developers and usability professionals step through task scenarios together, discussing and evaluating each element of interaction
- **Scripted observation (Formal usability testing)**: Evaluators present users with tasks and observe their interactions with the system, minimizing intervention

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Mining Usability Approach: Overview

Deploy & Operate
Determine areas for improvement
Interviews ● *Focus Groups* ● Help Desk Logs
Surveys ● System Usage Statistics

Scope & Collect → Synthesize → Prioritize → Report & Remediate

Mining Usability Approach: Scope & Collect

1. Survey organization for potential sources of feedback:
   - ☐ Call/email/chat logs from customer contact centers/help desk
   - ☐ Search engine logs (e.g., top terms, terms with no results)
   - ☐ Web quality assurance tool reports
   - ☐ Web statistics and site usage data
   - ☐ Satisfaction surveys
   - ☐ External studies, market surveys
   - ☐ Emails to webmaster/points of contact
   - ☐ Bug reports and feature requests
   - ☐ Previous usability studies

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Mining Usability Approach: Scope & Collect

2. Obtain access to sources, collect data
   - ☐ Usually available in some sort of user-readable report (though access to raw data may be desirable in some cases)
   - ☐ In larger or bureaucratic organizations, data sharing may require memoranda of understanding to address logistical, technical, security/privacy concerns, etc.
   - ☐ Identify who will approve, and who will actually provide data
   - ☐ Define what data delivery format(s) are usable, but may initially need to just ingest whatever is given/available

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Mining Usability Approach: Synthesize

3. Clean up, aggregate, and synthesize data
   - ☐ Ask data "owner" about accuracy, reliability of data and any known quirks or trends
   - ☐ Combine data in a spreadsheet, database, or tool of choice
   - ☐ Elbow grease and/or automated tools to clean up data and put in user-readable format (search, sort, filter, categorize)

4. Identify trends/issues
   - ☐ Scan/read through data (or a representative sample for very large data sets) to get familiar with nature of feedback
   - ☐ Note items of interest, begin formulating hypotheses and identifying trends
   - ☐ Utilize manual analysis, tools (e.g., frequency counts, sorting/filtering, search) to evaluate hypotheses and trends

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Mining Usability Approach: Prioritize

5. Define priority for identified issues

- For usability mining, issues include not only the expected usability problems, but also those items/trends that merit further investigation or study (i.e., to fully define them)
- Use your preferred usability severity rating scale for issues that are sufficiently defined as to be evaluated that way
- Remember: Because these issues were derived from customers, the frequency count for a given issue is a good indicator of the magnitude of the issue (in terms of exposure, or number of customers affected)

Mining Usability Approach: Report & Remediate

6. Prepare report of prioritized issues with supporting data

- Use the preferred reporting method/template
- Where appropriate, indicate the frequency of occurrence for issues
- Overarching recommendations:
  - Incorporate usability engineering efforts for issues requiring further study in next cycle/iteration
  - Formalize the data mining process, including incorporating lessons learned
  - Consider tweaking/adding to feedback data that is captured (may include instrumenting the software solution to automatically log/collect desired usability-related data) to facilitate future use

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Mining Usability Approach: Report & Remediate

7. Develop remediation plan

- Use report to prioritize activities
- Draw on your usability toolkit to address code/chrome/content issues
- Because users are increasingly using search (and not just the engine on your site) to accomplish their goals, consider:
  - Content engineering (e.g., descriptive titles/headings, correct spelling, consistent nomenclature and naming conventions, minimized jargon, thoughtful structure metadata use)
  - Search engine enhancements (e.g., adjusting weightings, prioritizing results, enabling semantic capabilities such as synonyms and related terms, categorizing results)

Agenda

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  - Usability mining framework/approach
- IRS.gov "usability data assessment" case study
  - Background/tasking scope
  - Findings
  - Recommendations

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IRS.gov Case Study: Background

- IRS.gov one of most visited Federal websites
- Distributed authoring environment: 100s of contributors and editors
- More than 100,000 content objects

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IRS.gov Case Study: Background

- The MITRE Corporation is a not-for-profit that operates three Federally Funded Research and Development Centers (FFRDCs) that were chartered by Congress to provide the United States government with systems engineering advisory assistance and oversight
- MITRE has provided advisory assistance for IRS.gov:
  - Conducting evaluations of search performance and user experience
  - Evaluating candidate software solutions for the site
  - Advising on and facilitating a range of usability evaluations
  - Validating §508 compliance and proposing related strategies
  - Advising on the optimal use of measurement tools (e.g., web statistics and quality assurance)

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IRS.gov Case Study: Tasking

- Task: Review and analyze a wide variety of data sources to identify overarching usability issues and priorities
- Joint effort with IRS-Public Portal Branch (manages IRS.gov) and IRS Ogden Usability Lab
- Data sources included:
  - Help desk reports
  - WebTrends weekly and monthly site usage reports
  - ACSI satisfaction and open ended comment reports
  - Maxamine reports
  - Previous MITRE studies
  - Usability test reports
- Note: all figures for case study are YTD through 4/1/06 unless otherwise noted

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IRS.gov Case Study: User Profiles

- 34% of the users visit IRS.gov less than once every 6 months
- 29% are first-time users
- 12% visit once a month
- First-time users gave IRS.gov the lowest score (68) of all groups arranged by frequency of use

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IRS.gov Case Study: Illustrative Search Findings

- ACSI shows more than half of users use search on IRS.gov
- Searches for the following yielded poor experience:
  - Prior years' forms
  - Where to file
  - Copy of return, W-2
  - 1040x, 1040ez
- Users are confused by seeing "Keyword/Search Terms" in the search box (300,000+ users through 6/06)
- Feedback indicates users can't find search on the home page
- Unexpectedly high help desk contacts on quicklinked (administrator-prioritized result) topics implies users don't see/use quicklinks (e.g., for prior year's forms)

IRS.gov Case Study: Illustrative Service Findings

- E-file and Free file (12,000+ help desk contacts YTD through 6/18/06 and almost 200 comments in the 4/06 ACSI report):
  - □ Users think that e-file and free filing means you can go to IRS.gov and file on the site; they do not trust giving their personal information to commercial companies
  - □ Some states have online filing; users expect the same at IRS
  - □ Differing software requirements and specific 1099s from different companies are not apparent until the user has started the e-filing process
  - □ Free filing is not always free!

    Senate Finance Committee study: "Taxpayers who…free file…are confronted by…surprise fees, expensive add-ons, loan solicitations and other marketing pitches."

IRS.gov Case Study: Illustrative Content Findings

- Inconsistent terminology: EIN, Employer Identification Number (100,000s of users)
- 46% of ACSI Survey respondents used FAQs but 45% of those did not find all the information they needed, or they did but had a hard time doing so, with an average satisfaction score of 52
- Copy of return had 6,700+ help desk contacts (through 6/18/06)
- Where to file had 2,100+ help desk contacts
- 1099 form expected on site (440,000+ help desk contacts), but not available as such

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IRS.gov Case Study: Illustrative Help Findings

- 28% of help desk contacts are forwarded to a different program help line
  - □ There is a brand new page that does direct users to specific help lines
  - □ But the Help link at the top of the Home Page directs users to the Telephone Assistance page or to How to Contact Us page, neither of which has the same information

IRS.gov Case Study: Illustrative Forms Findings

- Based on the January 2006 ACSI survey, about 15% of those primarily looking for a form had a problem finding it
- Comments indicate users are looking on the Home Page for a highly visible, quick way to get forms
- Obtaining a form requires at least 5 clicks from the Home Page, careful reading of the busy F&P landing page, and knowledge of how to use the F&P picklist, which also has usability issues:
  - Often cannot be seen above the fold
  - Order is unintuitive/unclear
  - Users do not know how to select multiple items or print
  - Not searchable

IRS.gov Case Study: Illustrative Recommendations

- Recommendations to address discrete issues with plausible solutions such as:
  - Provide content that helps people find form 1099 content
  - Make new content with specific help line information more prominent and duplicate on Telephone Assistance page and elsewhere
  - Redesign navigation to Forms and Pubs, including the landing page and the picklist as the selection mechanism
- Recommendations for future usability testing such as:
  - "Copy of return" content
  - "Where to file addresses" content
  - Quicklink usage
  - Search design

IRS.gov Case Study: Illustrative Outcomes

- Although SPLY 2003/2004 site visits increased by ~ 50%
  - Total contacts to the help desk decreased by 47%
  - Average decrease in contacts for 4 issues (previous year forms, where to file, W-9, 1040ez) was 68%:
    - Thesaurus updates improved search precision
    - Content engineering improved findability
    - Quicklinks elevated key documents to the top of the results page
- ForeSee ACSI showed:
  - Significant SPLY 2005/2006 increases in satisfaction across all criteria
  - A record satisfaction score for the site
- The mining usability methodology has played a key role in site improvements at IRS

Summary: Mining Usability

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- Hard numbers from the real world are compelling
  - □ Can jumpstart action where more focused studies or studies with smaller samples failed to initiate follow-up
  - □ Can be useful in demonstrating qualitative or quantitative return (#users affected translates into time, money, or satisfaction) and/or justifying importance
- As a part of a development lifecycle integrating usability engineering, mining usability:
  - □ Facilitates continuous improvement
  - □ Provides a well-informed basis for prioritizing usability efforts and foci in upcoming cycles/iterations
  - □ Yields a grounded, repeatable way to evaluate the impact of site evolution and changing user expectations

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See also: Kerchner, M. (2006) *A Dynamic Methodology for Improving the Search Experience*. Journal of Information Technology and Libraries. June, 2006. pp. 78-87.