Methods for Usability Testing
of interactive and web-based mapping applications

outline:

I. What is Usability Testing:
   (& some questions for you folks)

II. Some Methodologies:
   a. Quantitative:
   b. Qualitative:
   c. More???

III. The Lakeshore Nature Preserve Interactive Map
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some definitions of **Usability Testing**:

Cooper & Reimann (2003):

> “usability, or user testing, focuses on measurable characteristics of a user’s interaction with a product. Assessing the usability of a product focuses on standardized tests that yield quantifiable data.”

Krug (2000):

> “one user at a time is shown something and asked to either (a) figure out what it is or (b) try to use it to do a typical task”

Robinson et al. (2005):

> formal or informal techniques for assessing design prototypes

Saraiya et al. (2004)

> “evaluation of visualizations to identify and solve user interface problems”

Shneiderman et al. (2003):

> “understanding, stating, and serving user needs”
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some schematics:

Theory

User-Testing

Applications
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some schematics:

Theory
User-Testing
Applications

Theory
Applications
User Testing
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some schematics:

![Diagram showing the relationship between Theory, Applications, and User Testing]

![Diagram showing the cycle of Theory, Evaluation, Applications, and Permits]

23 October 2007
Information Visualization Subgroup
Robert Roth
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some schematics:

- Theory
- User-Testing
- Applications

- GISCIENCE THEORY
- APPLICATIONS
- EVALUATION

Informs
Alters
Permits

DOMAIN THEORY

Theory
Applications
User Testing

- THEORY
- EVALUATION
- APPLICATIONS
- EVALUATION

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Q1 evaluation versus usability testing:

Plaisant (2004): user-testing/user-evaluation/user-assessment = controlled experimentation + usability testing

Hardisty et al. (2001): cognitive testing versus usability assessment?
utility versus usability testing:

utility: usefulness
usability: ease of use

Hubona & Blanton (1996): usability trumps utility
Liao & Landry (2000): utility trumps usability
Yuen & Ma (2002): importance is gender specific

Plaisant (2004):

*On the Sedgway: “Usability studies and formal comparison of speed characteristics and incident data might help worried potential drivers but it is their judgment of utility that will likely trigger adoption”*
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methodologies:

quantitative:
- controlled experimentation
  - accuracy (precision, error rates, correctness)
  - efficiency
- usability metrics
  - interface workload
    - GOMS - Card et al. (1983)
    - mouse mileage/# clicks - Harrower & Sheesley (2005)
  - data density/information-to-interface ratio
- insight metrics
  - Saraiya et al. (2004)

qualitative:
- questionnaires/surveys/informal assessment
  - Kobsa (2001), Robinson et al. (2005)
- card sorting
  - Nielson 1993, Robinson et al. (2005)
- interaction logs
  - Howard and MacEachren (1996)
- verbal protocol analysis (VPA) (talk aloud)
- interviews/focus groups
  - Howard & MacEachren (1996), Robinson et al. (2005)
- ethnographic case studies & longitudinal studies
Q3 methodologies...

are there any more?

is usability testing scientific?

Universal Usability - Plaisant (2004):

“designing visualization tools so that they are accessible to diverse users regardless of their backgrounds, technical disadvantages, or personal disabilities”
The Lakeshore Nature Preserve Interactive Map

http://www.lakeshorepreserve.wisc.edu/imap/LakeshoreNaturePreserve.html
**utility:**

* **cascading interface density:** - providing multiple levels of user interface (e.g. novice versus expert mode) to match the varying level of user motivation

(1) **The Newbie:** a user that has no knowledge about The Preserve  
   * purpose: publicity and awareness

(2) **The Regular:** a user that regularly visits The Preserve  
   * purpose: education and entertainment

(3) **The Researcher:** a user who studies the Preserve  
   * purpose: hypothesis generation and analysis

**usability:**

* **The Lorem Ipsum Map:** - (after Krug 2000) design the interface for the data you are mapping, don’t only map the data that matches your interface

* **Panning & Zooming** – almost all tested users didn’t get direct manipulation (so be flexible)

* **The Tufte Critique** - while Tufte’s principles of minimal data ink work excellently with data graphics, they do not work well for interface design:
  
  Ware (2004): “adding marks to highlight something is generally better than taking them away”