

# **Usability and Beyond!**

## **Understanding Usefulness, Usability & Use**

**CHI 2003 Tutorial**

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# Table of Contents

<b><u>Topic</u></b>	<b><u>Page</u></b>
<b>Introduction</b>	<b>1</b>
• <b>A Primer on User Research Design</b>	<b>11</b>
<b>Methods, Measures &amp; More</b>	<b>19</b>
• <b>Self-Report &amp; Observational Methods</b>	<b>21</b>
• <b>“Quantifying” Data &amp; Communicating Results</b>	<b>47</b>
<b>Ethnographic Approaches to Usefulness, Usability &amp; Use</b>	<b>51</b>
• <b>Tools &amp; Tips</b>	<b>78</b>
<b>Appendix</b>	<b>86</b>
<b>Worksheets</b>	<b>89</b>
<b>References &amp; Resources</b>	<b>95</b>

# Instructor Biographies

*Diane J. Schiano* (<http://home.attbi.com/~diane.schiano/>) is a research psychologist who focuses on HCI issues. She is currently an industry consultant and visiting scholar at Center for the Study of Language and Information (CSLI), Stanford University. In addition to an extensive consultancy practice, she has held positions at NASA/Ames, Sun Microsystems, Interval Research Corporation and AT&T Labs. Recent project topics include: Instant Messaging at home and in the workplace, Internet search strategies, facial affect interfaces and online communities. Diane is highly published, and has substantial teaching and training experience.

*Bonnie A. Nardi* (<http://www.darrouzet-nardi.net/bonnie/>) is an anthropologist at Agilent Laboratories in Palo Alto, California. She has investigated human-computer interaction and collaborative work in offices, schools, libraries, hospitals, and laboratories. She is the editor of *Context and Consciousness: Activity Theory and Human Computer Interaction* (MIT Press, 1996). Her most recent book is *Information Ecologies: Using Technology with Heart* (MIT Press, 1999).

Diane and Bonnie co-teach a recurring course on user research methods in the Computer Science Department at Stanford University. Their previous tutorials include “Understanding Collaborative Activities and Applications: Methods for Studying Usefulness, Usability & Use of CSCW Systems” at CSCW 2002.

# Course Objective

- **To provide you with guidance and grounding in expanding your understanding of user research design and practice.**

## **Including:**

- **A principled yet pragmatic “convergent methods” approach to usefulness, usability and use studies.**
- **Guidelines, suggestions, tips & tools, readings, resources & references.**
- **Grounded examples from our own research.**
- **Hands-on experience and feedback (User Research Design Clinic).**

## **How Does One Do Effective User Research?**

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- **Prioritize. Focus on What You Want to Learn.**
- **Select Appropriate Methods based on:**
  - **Research Principles**
  - **& Pragmatic Considerations**
- **Conduct the Research Appropriately.**
- **Analyze & Interpret Findings Responsibly.**
- **Communicate Your Findings Effectively.**

5

## **Fundamental **User** Research Issues**

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- **Usefulness**
  - **Why--and how--could the product be useful to people? Design (& marketing) implications from current practice?**
- **Usability**
  - **How easily--and well--can the product be learned and used? Implications for re-design?**
- **Use**
  - **How do people actually use the product? Implications for re-design?**

6

## The Art (& Science) of User Research

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### The **Creative** Use of ....

- Research Principles
- & Pragmatics

...to Construct, Conduct & Communicate  
User Research Effectively.

7

## Key Decisions for User Research Design

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*To Address a Research Goal or Question:*

- What You Can Do:

**Ask (for Self-Report) < ----- > Observe Behavior**

- How (& Where) You Do It:

**Naturalistic < ----- > Controlled Context**

- Data Analyses & Deliverables:

**Qualitative < ----- > Quantitative**

8

## Two Classic Approaches to User Research

- Human Factors Engineering (**Usability**)
- Ethnographic (**Usefulness & Use**)

9

## The Human Factors Engineering Approach

### Traditional Emphases:

- **Usability**
- Observation (Task Performance)
- **Lab** Context, **High Control**
- “How often, how much?” Questions
  - (**Quantitative** Data & Deliverables)

10

## **The Ethnographic Approach**

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### **Traditional Emphases:**

- **Usefulness & Use** (Motivations, Practice)
- Self-Report w/ Contextualized Observation
- **Naturalistic** Context, **No (or Low) Control**
- “Why? How?” Questions
  - (**Qualitative** Data & Deliverables)

11

## **These Approaches are Now Converging...**

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### **Self-Report & Observation are complementary**

- Performance data + user comments, satisfaction, etc.
- Quantitative re-coding & analysis of qualitative data.

### **“Naturalistic” Observations increasingly common**

- “Ethnographically inspired” customer, site visits.
- Logfile & web “clickstream” analyses \*

### **Blending Usefulness, Usability & Use methods**

- Web pages & Internet use (*e.g.*, “[Google usability](#)”)
- Communication/collaboration tools (*LambdaMOO project*)

12



## Self-Report Methods

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- **Surveys, Questionnaires**
- **Interviews**
- Verbal Protocols
- Diaries & Personal Logs
- Other User Feedback

43

## Surveys, Questionnaires

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*What's Wrong with This Picture? - - >*

44

## Survey

01. How often do you use <Feature X>?
02. How good a user of MS Word do you consider yourself?
03. Which version of Word do you usually use?
04. When you need to find out how to do something using < Feature X >, what do you usually do first?
  - a) Run through the menus      c) Read the manual
  - b) Run through the toolbars    d) Access the easy-to-use help index
- ...
10. How do you feel about < Feature X >?
  - a) It's one of the best things Microsoft ever did
  - b) I like it                              d) I don't like it
  - c) Indifferent                          e) I hate it so much I turned it off
11. Why?

45

## Surveys, Questionnaires

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- + **Broad Bkgnd Information, Demographics**
  - Usability Testing often begins with User Bkgnd Survey
- + **Specific Questions, Often Quantitative**
  - Recent Usage Patterns, Preference Ratings
  - Frequency Estimates for "This Week", NOT "In General"
- + **Fairly Cheap and Easy to Conduct & Analyze**
  - Can Get Data from *LOTS* of People (incl. X studies)
  - Can Survey Many, Interview or Test a Few...
- + **Useful Pre- & Post- Task Comparisons**
  - Quick Feedback
- - **Limited, Not Natural**
- - **Response Biases; Memory & Opinion Effects**
  - Question Design is ***NOT COMMON SENSE!!!***

46

## Surveys: General Issues & Guidelines

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- Be Brief, Clear, Specific, Consistent & Easy
- Question Design:
  - Specific > General
    - How Often “This Week”, NOT “in General”
  - Forced-Choice > Agree/Disagree
    - Make sure choices are non-overlapping
  - Offer No Opinon/Not Applicable/Comment Options
  - Rating Scales for Measuring Intensity
    - Use Anchors, Neutral Points. 5- or 7-Point Scale
- Ease of Using Surveys Comes At a Price:
  - Measurement Errors & Biases; Sampling Issues
  - Open-Ended Qs Harder to Analyze, But More Valid?
- **ALWAYS** Pilot Test & Iterate on Questions!

47

## Example: LambdaMOO Survey

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- Goals: 1. Characterize Online Community  
2. Assess “Hype-otheses”*

- Ask (Self-Report) < ----- > Observe Behavior  
*XXX (Survey)*
- Naturalistic < ----- > Controlled Context  
*(in LambdaMOO; Structured) XXX*
- Qualitative < ----- > Quantitative Data  
*XXX (Both) XXX*

48

## LambdaMOO Survey

- **Survey**
  - **1 Week Call upon Login; 581 Respondents**
  - **~ 30 Questions, Various Formats, Online**
- **This survey provided a relatively quick and easy way to ask for a fairly large amount of self-report information from a large number of LambdaMOOers. The survey was structured, and response formats for several (but not all) questions were designed for ease of coding, analysis and comparison.**

49

## LambdaMOO Survey: Classic Questions

- **Demographics (including Experience Estimates)**

AGE						
GENDER	< 16	16-18	19-21	22-24	25-27	27+
Female	01%	09%	36%	23%	14%	14%
Male	04%	09%	36%	19%	13%	19%
ALL	03%	09%	36%	20%	13%	18%

**Table 1: Age and Gender Distribution**

EXPERIENCE (HRS IN CHARACTER)					
GENDER	<=10	10-100	100-500	500-1000	1000+
Female	09%	27%	23%	23%	14%
Male	06%	33%	28%	14%	18%
ALL	07%	32%	27%	16%	17%

**Table 2: Experience and Gender of Survey Respondents.**

- **Technology Use, Satisfaction & Preference Ratings, etc...**

50

## Interviews

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59

## Interviews

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- **+ Less Limited, More Naturalistic**
- **+ Greater Depth of Understanding of UE...**
  - Often More Flexible, Open, Qualitative
  - Yielding Explanations, Insights, Unexpected Information
- **- Difficult to Collect & Analyze Results**
  - Qualitative Results Need Coding, Extensive Analyses
  - Time-consuming, Resource-Intensive → Smaller Samples
- **- Response Biases; Memory, Opinion Effects**
  - Own Interpretations May Not Be Correct.
  - Contextualization, Feedback May Help

60

## Some Interview Issues & Guidelines

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- **Structured** <-----> **Unstructured**
  - Flexibility v Comparability
- **ALWAYS** Use a Guide Sheet
  - Issues, Probes (F/U), Critical Incidents
  - Some Open, Closed Questions
- **Logistics:**
  - Session Length: ~1-1.5 Hours Max or Provide Breaks.
- **Consider How to Take Notes, Record Data *Beforehand!***
  - Video Recording? Need Permission, Transcribing, Coding....
- **Consider How to Analyze, Present Results *Beforehand!***
  - Some Categorization (Coding) → Quantification
  - Some “Case Studies” w/Explanations, Quotes & Exemplars

61

## Example: LambdaMOO Interviews

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- Goals:** 1. *Characterize Online Community*  
2. *Assess “Hype-theses”*

- **Ask (for Self-Report)** < ----- > **Observe Behavior**  
*XXX (Interviews)*
- **Naturalistic** < ----- > **Controlled Context**  
*(Mostly in Lab; Conversational) XXX*
- **Qualitative** < ----- > **Quantitative Data**  
*XXX (Both; More Qual) X*

62

## LambdaMOO Interviews

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- **Interviews**
  - **12+ Real-Life, Long-Term Participants (In IRC Lab)**
    - Plus several in LambdaMOO, BayMOO mtgs
  - **1.5-2 hrs; In-Depth, Conversational (Semi-Structured)**
    - Plus Maps and Follow-ups
- **Interviews provided very detailed & nuanced self-report information from a few people. The conversations were natural and flexible in addressing how interviewees felt about various issues. The sessions were videotaped. Videotapes required extensive transcription & data coding, as well as video editing. A very compelling summary videotape was made for presentation.**

63

## LambdaMOO Interviews: Sociality “Hypothesis”

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- **Previous reports emphasized LambdaMOO sociality & importance of “social presence”, or “being there” together in cyberspace.**
  - “Great Good Place” >>> Club/pub analogy
- **Our survey and logfile data was mixed:**
  - Survey suggested most time spent **socializing**.
  - Logfile analysis showed most time spent **alone!**

64

## Connecting **Usefulness, Usability, and Use**

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1. Ethnography
2. ContactMap

An integrated long-term developmental approach  
focusing on real human activity

103

## What is ethnography?

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- Most closely associated with anthropology, but also sociology
- Develop understandings of the everyday activities of people in particular settings.
  - emphasis on local, particular
- Input: interviews, observations, informal interactions
- Output: descriptions that illuminate habitual patterns of human activity
  - vs a news story, novel....

104



## Outline

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- **Usefulness:** the netWORK study
- **Usability and Use:** ContactMap: Communication and Information in Personal Social Networks
- how the first informed the second

117

## The netWORK Study: Communication Activity Across Organizational Boundaries

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- Beyond teams
  - Customer-vendor relationships
  - Partnering, alliances across companies
  - Facilitators between and within organizations, e.g., tech transfer
  - High level managers
  - Experts, e.g., patent attorneys, reference librarians, HR
  - Contractors, consultants

*What's going on here? What kind of work is needed to establish and maintain these relationships?*

118

## **Sample: 22 People in 12 companies**

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- Public relations
- Law
- Management
- Creative media (Web design, commercials)
- High tech
- Telecommunications

*Technically savvy, use lots of different kinds of technology, cross boundaries*

119

## **Methods**

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- Lengthy open-ended in-depth audiotaped interviews in workplaces
  - 1000 pages transcript
- Questions:
  - What do you do here?
  - Who do you do it with?
  - What technologies do you use?
- Observations in workplaces

120

## Papers

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- Nardi, B., Whittaker, S., Isaacs, E., Creech, M., Johnson, J., Hainsworth, J., ContactMap: Integrating Communication and Information Through Visualizing Personal Social Networks. *Communications of the ACM*, April, 2002
- Nardi, B., Whittaker, Steve, Schwarz, Heinrich. (2002). NetWORKers and their Activity in Intensional Networks. *Journal of Journal of Computer-supported Cooperative Work*, 11, 2.
- S. Whittaker, Q. Jones, B. Nardi, M. Creech, L. Terveen, E. Isaacs, J. Hainsworth. ContactMap: using personal social networks to organize communication in a social desktop. Submitted to *Transactions on Computer Human Interface*.

143

## Usability: Testing ContactMap

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15 subjects in a research lab:  
researchers, managers, secretaries,  
marketing staff.

144

## First Test: Create a Map

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- Problem: difficult to set up map from scratch
- Solution:
  - extract contacts from email archives presented as a list
  - list is ordered by a sorting algorithm based on domain name, frequency of reply, folder structure, but user chooses contacts manually
    - ↗ attempts to automatically cluster met with dismal failure
  - after these improvements, took about 45 minutes to set up a map
- Future:
  - pull contacts out of existing address books, phone logs
  - web-based services for automatic update
  - share contacts among “buddies”

145

## Second Test: Task Performance

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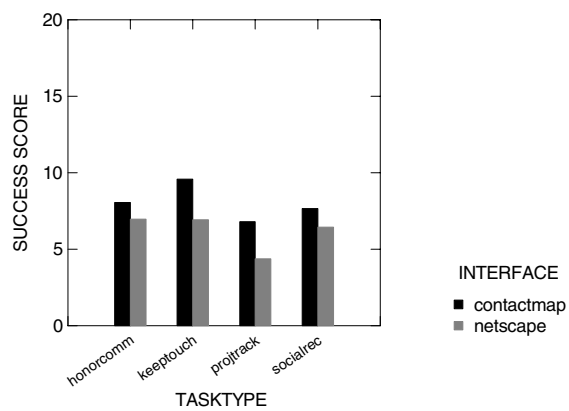
- Compare ContactMap and user’s current emailer (3+ years experience)
- Measures:
  - success at task completion
  - time to complete task
- 8 tasks **derived from the ethnographic study**, e.g.,
- *Communicative commitment tracking* - “You have become ill and have to go into quarantine for the next couple of days, send an email message to relevant people canceling all relevant meetings and social engagements”.
- *Keeping in touch* - “Congratulations! You have decided to get married! Send an email to all friends to let them know about this happy event.”
- *Exploiting the personal network for social recommendations* “You are looking for a new job. Send an email to as many people as you can who could write you a suitable reference for a new job or organizational role.”
- *Project tracking* - “You are trying to track the status of activity X: find recent 5 messages sent and 5 messages received about that activity.”

146

## Interpretation

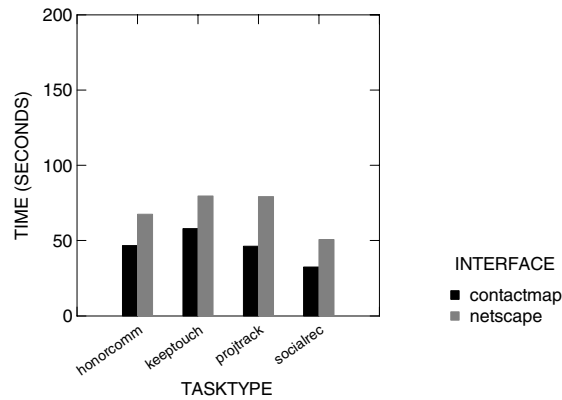
- Tasks are slightly artificial, but still results going in the right direction
- A strict test since users were much more familiar with their mailers than with ContactMap

147



**Success Scores** on Communication Tasks for ContactMap and email interfaces

148



**Task Completion Time** on Four Communication Tasks for ContactMap and Email Interfaces

149

## Subjective judgments

- “With ContactMap I could see all of my contacts at once and select them quickly. With Outlook, I had to scroll through the contact list to make sure I wasn’t missing anyone. In the end I missed one person.”
- “ContactMap helped me find the relevant people easily --I just looked in the relevant clusters to find them. I also got ideas by just scanning rather than searching for individual people.”
  - on the fly email aliasing
  - useful because of organizational flux
- People said they liked putting together their networks and thinking about group structure

150