

Tutorial Day at MobileHCI 2008, Amsterdam

Text input for mobile devices by Scott MacKenzie

Scott will give an overview of different input means (e.g. key-based, stylus, predictive, virtual keyboard), parameters relevant for designing and assessing mobile text input (e.g., writing speed, cognitive load) and issues related to the context of use (e.g., walking/standing).

Mobile GUIs and Mobile Visualization by Patrick Baudisch

Patrick will introduce different approaches for creating mobile graphical user interfaces. He will talk about the design process, prototyping and assessment of user interfaces, trade-offs related to the design of mobile GUIs and different possible interaction styles. As one specific topic in mobile GUIs he will address concept for mobile interactive visualization (e.g. maps).

Understanding Mobile User Experience by Mirjana Spasojevic

Mirjana will discuss different means for studying mobile user needs and evaluating the user experience. This includes explorative studies and formal evaluations (in the lab vs. in the field), including longitudinal pilot deployments. The lecture will discuss traditional HCI methods of user research and how they need to be adapted for different mobile contexts and products.

Context-Aware Communication and Interaction by Albrecht Schmidt

Albrecht will give an overview of work in context-awareness and activity recognition that is related to mobile HCI. He will discuss how sharing of context in communication applications can improve the user experience. The lecture will explain how perception and sensing can be used to acquire context and activity information and show examples how such information can be exploited.

Haptics, audio output and sensor input in mobile HCI by Stephen Brewster

Stephen will discuss the design space for haptics, audio output as well as sensor and gesture input in mobile HCI. Furthermore he will assess resulting interaction methods and implications for the interactive experience.

Camera-based interaction and interaction with public displays by Michael Rohs

Michael will introduce you camera based interaction with mobile devices; this includes a assessment of optical markers, 2D-barcodes and optical flow as well as techniques related to augmented reality. In this context he will address interaction with public displays, too.

The copyright is with the authors

Understanding Mobile User Experience

Mobile HCI 2008 Conference Tutorial

September 2, 2008

Mirjana Spasojevic

Senior Principal Scientist, Nokia Research



NOKIA

1

Content

- Goals of the tutorial
- Background: user-centered design (UCD) and user experience (UX)
- UX research methods
 - Qualitative vs. Quantitative
 - Contextual inquiry, diary studies
 - Storyboards and concept evaluations
 - Participatory design
 - Pilot deployments and Wizard of Oz
 - Longitudinal studies
- Discussion: UX method tradeoffs

Mirjana Spasojevic

- Senior Principal Scientist and Team Lead, Nokia Research Palo Alto
 - At Nokia since 2006
 - Leading IDEA (Innovate, Design, Experience, Animate) team
http://research.nokia.com/research/labs/teams/innovate_design_experience_animate
 - Multidisciplinary research focused on UI/UX for mobile devices
- Prior positions:
 - Senior design researcher, Yahoo! Mobile BU
 - Led user research on Yahoo!'s WAP products and Yahoo! Go
 - Senior Scientist and Project Manager, HP Labs
 - Cooltown Program
 - Camera Phone research

Goals of the tutorial

What we will address in this tutorial:

- New developments and thinking regarding UCD and UX
- How is mobile experience pushing the limit of existing methods
- Details of applying specific methods to mobile UX research questions with case studies
- Discuss tradeoffs in selecting methods for the mobile domain

What this tutorial assumes:

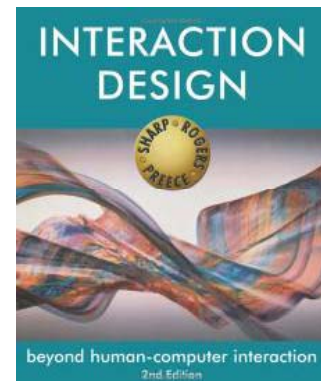
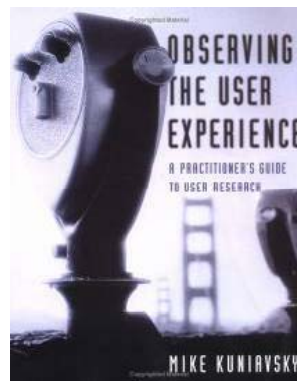
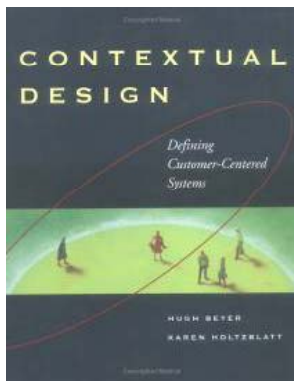
- General background on UCD and UX
- General UX research methodology (e.g. contextual inquiry, usability testing, ...)

Background: UCD and UX

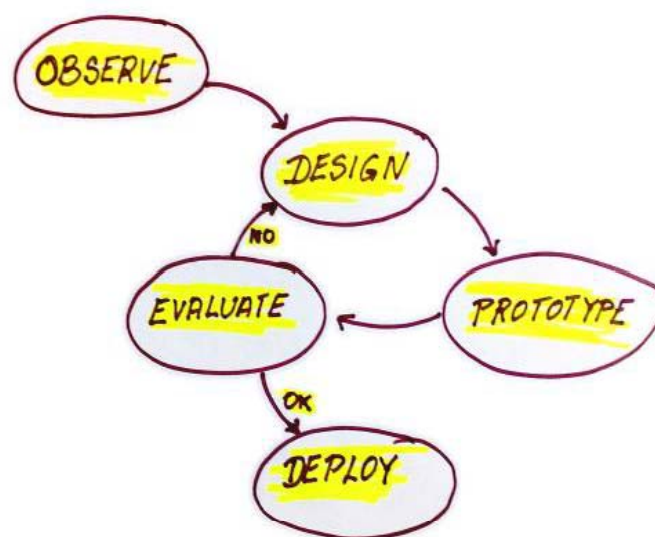
Why apply user-centered design process?

Why do user research?

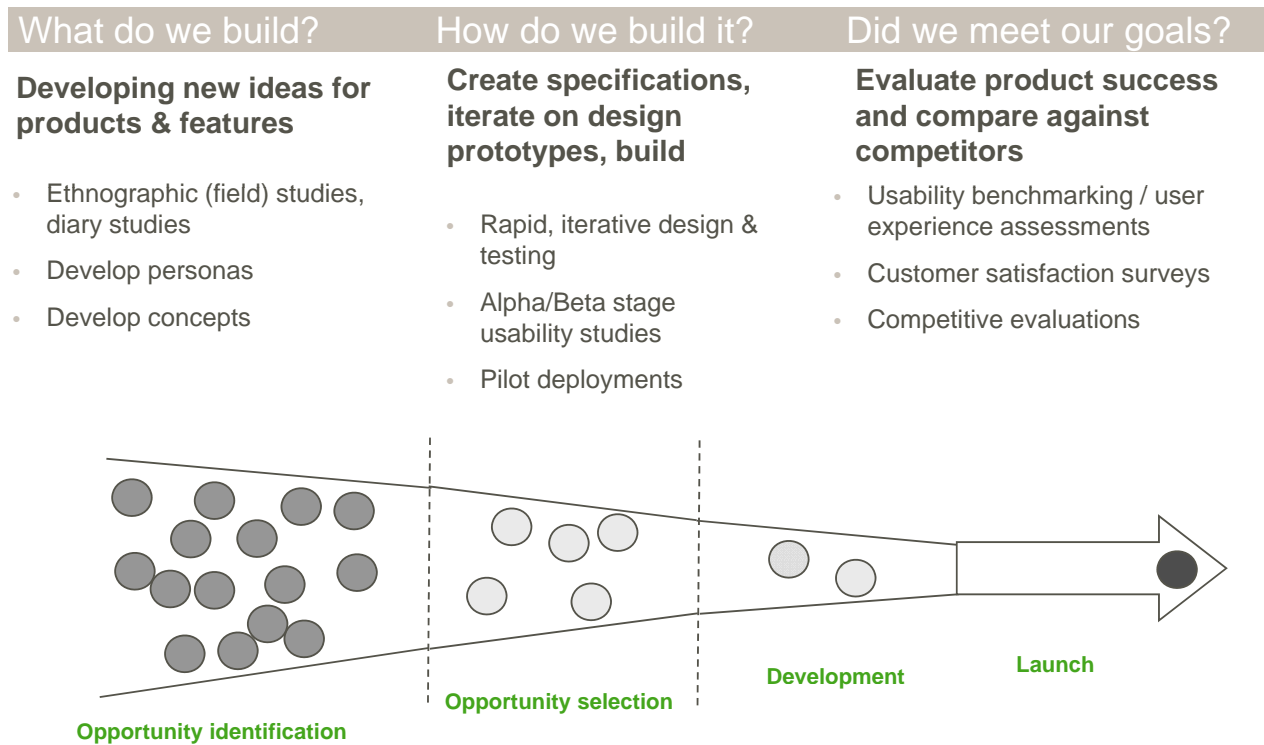
- We are not our users
- Users don't always share our assumptions, values, or interests
- Technologists are early adopters and visionaries
- Main stream users are pragmatic and conservative



User-Centered Design Process



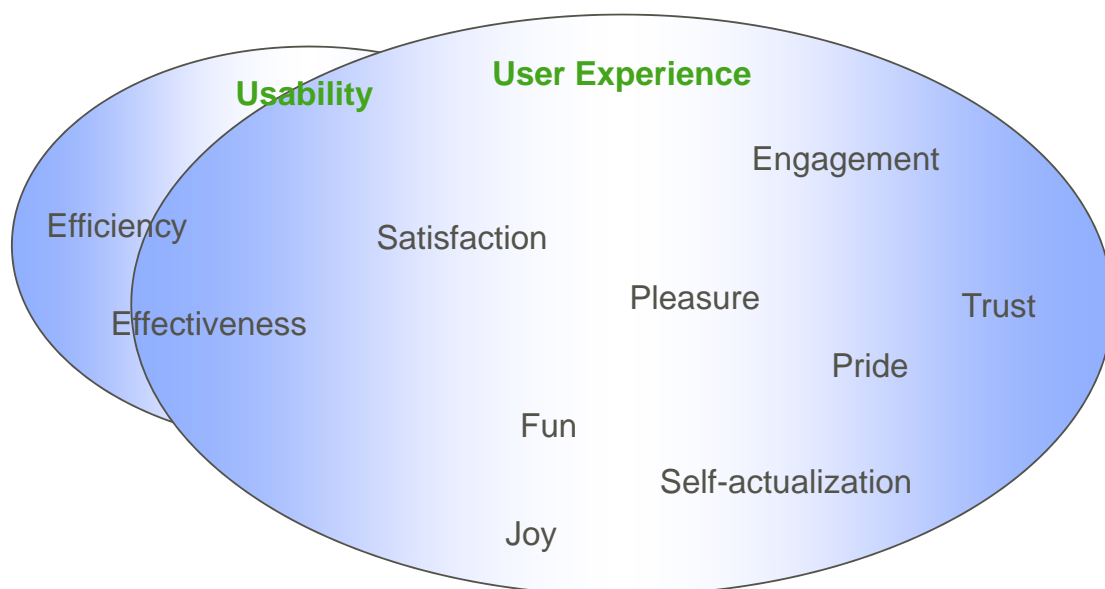
UX Research: Inform decisions throughout the research, design and development cycle



User Experience ➔ Values

What matters?

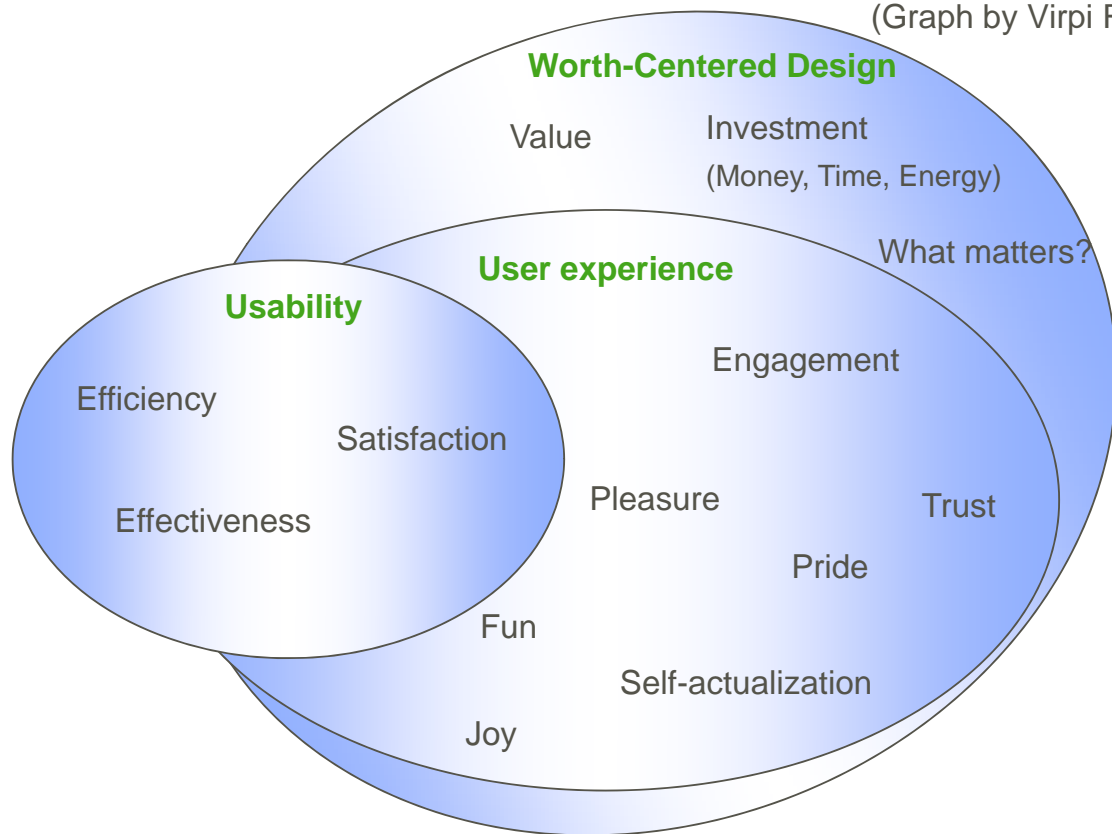
What users will value sufficiently to engage and invest in a technology?



(Courtesy: Virpi Roto)

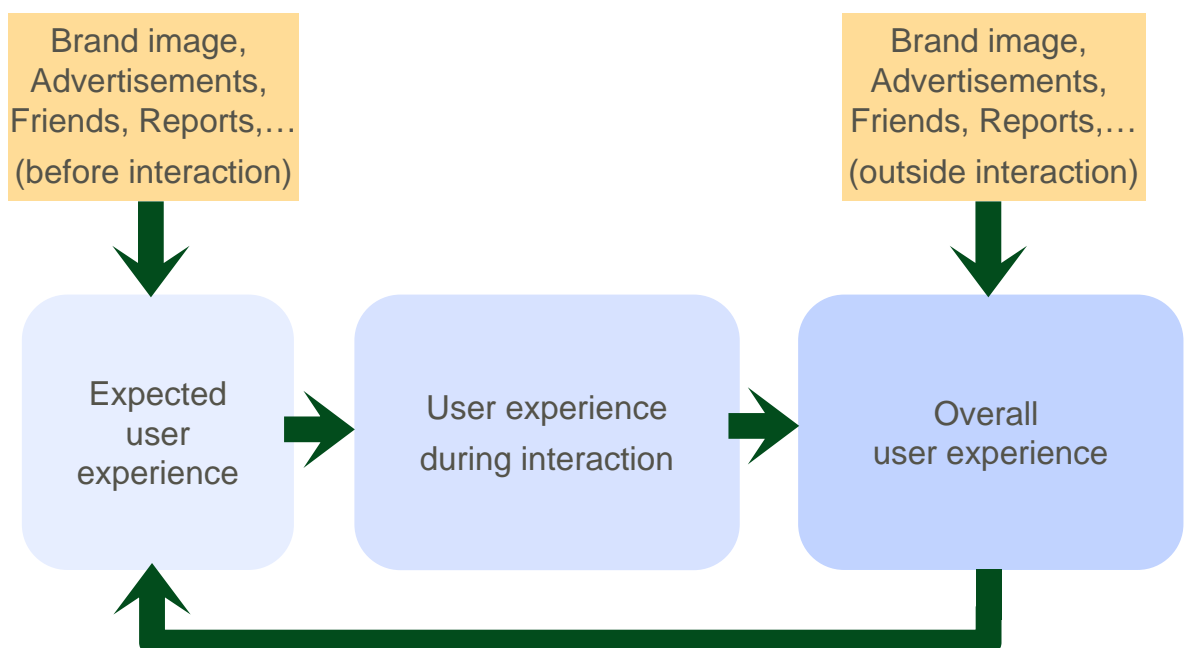
Worth-Centred Design vs. traditional UX

(Graph by Virpi Roto)



Beyond Interaction

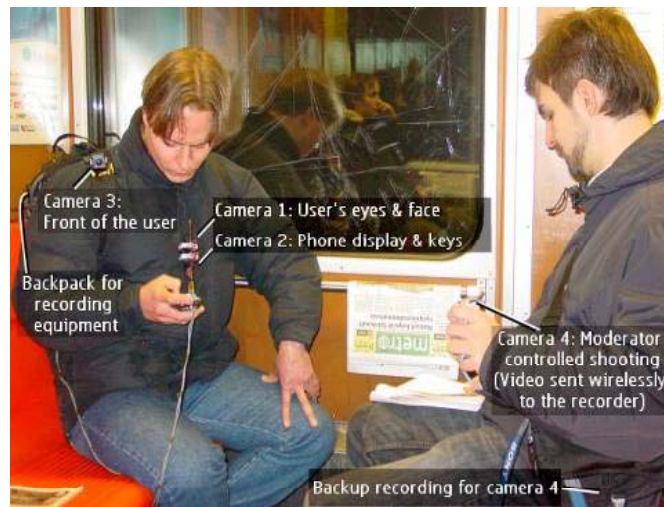
User experience forms not only during but also outside the interaction phase



(Courtesy: Virpi Roto)

Beyond traditional user study methods

Focus shifting away from lab tests



Radically new user study methods needed!

UX Research Methodology

- **Qualitative vs. Quantitative**
- Contextual inquiry, diary studies
- Storyboards and concept evaluations
- Participatory design
- Pilot deployments and Wizard of Oz
- Longitudinal studies

Qualitative vs. Quantitative data gathering

Organizational boundaries	Qualitative data	Quantitative data
UX Research (a.k.a. Design Research)	-Context of UX -Motivations, end goals -User requirements -How to design	-Validation of qualitative research -Usage patterns -Formal experiments
Data Mining		-Benchmarking -Fall-off analysis -Loyalty and customer lifecycle
Market Research	-Motivations, what people want and need -Opportunities for new products	-Customer satisfaction -High level requirements -Brand tracking

UX Research Methodology

- Qualitative vs. Quantitative
- Contextual inquiry, diary studies
- Storyboards and concept evaluations
- Participatory design
- Pilot deployments and Wizard of Oz
- Longitudinal studies

Contextual Inquiry (a.k.a. Ethnographic Research, Field Studies, Diaries and Shadowing)

- Collect information about usage
 - Directly observe actual use
 - Diaries completed by representative users
- In-depth “discussion” (unstructured or semi-structured interviews)
- Result: deep and rich stories of users’ experiences
- Foundation for creating design principles and personas



Data Collection and Analysis



Case Studies: Mobile Web Field Research

Target users

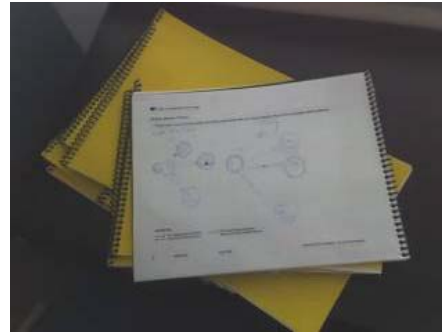
- Mobile web users
- Heavy users of internet services (mail, messenger, ...)
- Ages: 18-34, gender balance

Qualitative study

- Diary study of mobile and computer use
- In-depth interviews to understand relevance, current use patterns and unmet needs

Broad research questions:

- What are users doing on mobile web, what they value and where are the pain points?
- What are additional unmet needs?
- What are users doing on the internet (PC) that could be augmented or replaced by services on the mobile?

[illegible]

Design Principle

Think uniquely mobile, not mini PC



Emerging Insight

Research confirmed the obvious - browsing content on a mobile phone is difficult.



video

Users cited several obstacles to internet usage via their mobile phones:

- phone's interface makes it difficult to enter URL
- text input through keys
- network speed/latency
- network reception
- small screen size
- perception of cost (perceived value)
- lack of cost transparency
- sites are not optimized for mobile phones
- scrolling is a pain

Despite the challenges, people ARE accessing the internet via their mobile phones

Here are a few things they are doing...

Emerging Insight

What are people doing on the mobile web?



Jeanine

What she does:

Accesses Yellowpages.com from the Sprint carrier deck to find phone numbers and addresses of businesses.

Why she does it:

It is cheaper than 411 (\$1.49)



Fred

What he does:

Checks and trades stocks while at work on his Treo.

Why she does it:

His work computer is monitored and he doesn't want people to know what he is doing.



Christina

What she does:

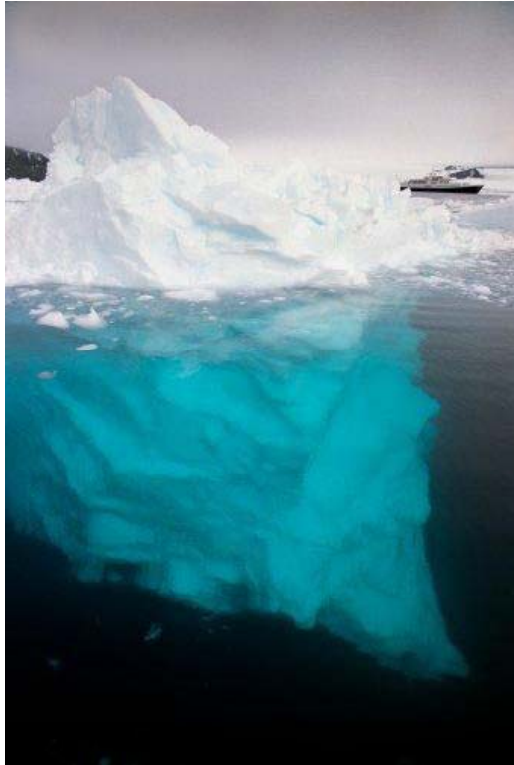
Orders pizza while on her way home from work.

Why she does it:

So that she doesn't have to talk on the phone and waste her minutes

Emerging Insight

Current behavior is the tip of the iceberg...



"If I would have asked people what they wanted, the would have said a faster horse." - Henry Ford

Current mobile internet use cases indicate what people are doing given the current mobile landscape. It is the tip of the iceberg; an indication of the basic needs this technology can fill.

"eBay on my phone... that would be deadly."

A working hypothesis is that what is relevant to people on their PC will be relevant to them on a mobile device. And users indicated that access to their favorite PC sites on their phones was desirable.

Emerging Insight

... but availability is not enough in a PC-centric world.



People are tethered to their PCs

Whether at work or home, all participants had access to more than one PC. Proximity to a PC is a key factor in whether or not users are willing to endure the challenges of internet access via their phone. If what they need can wait, then they do and prefer to access most info via a PC.

Information related to highly popular topics and events is ubiquitous

Big sporting events and breaking world news are ubiquitously represented by all media. Mobile Web competes against established channels of information with superior user experience.

Emerging Insight

People are apathetic about current mobile internet services.

"I'm lost!"

"I need to be prepared." "I'm a fan!"

"I need to save my minutes!"

"I need to check my MySpace
account."
"Where's the train?!!"

"I'm bored!"

"I need to find an address."

"I need a drink recipe."

"I wonder what my day will
bring?"

"I need proof!"

"I want to rock!"

"I need to coordinate with
friends."

I'll eat what I'm fed, but I won't love it

Participants browse news and weather on their carrier decks, but did not communicate that these were essential rituals in their life. There was little affinity or emotional investment in what is currently being offered.

A square peg in a round hole

Several users expressed that using internet on their phone would be the choice when all other options failed. The "internet" is too broad and open when you are driving to an interview and need directions.

Design Principle

Think uniquely mobile, not mini PC

Content is the main source for the mobile web building blocks.

Content is what people want, not PC applications and web sites originally designed for desktop access. Creatively combining content through mash-ups or organizing content by common tasks will be more useful to people than a list of links to web sites.

Mobile form factor an advantage, not a liability

With a "browsing" model, the entire form factor of the phone becomes a liability. The screen is too small, it's difficult to scroll, the input is cumbersome. Leverage the inherent properties of the phone instead of fight them.

New models, new metaphors

Miniaturizing what is available on the PC is not the answer. In order to create products that people love, we should move towards models that are quick, easy and packageable.



QR Codes

The inclusion of QR Code reading software on camera phones in Japan has led to a wide variety of new, consumer-oriented applications, aimed at relieving the user of the tedious task of entering data into their mobile phone. QR Codes storing addresses and URLs are becoming increasingly common in magazines and advertisements in Japan. The addition of QR Codes on business cards is also becoming common, greatly simplifying the task of entering the personal details of a new acquaintance into the address book of one's mobile phone.



Design Principle

Think building
and reinforcing common ground and identity

Emerging Insight

People use mobile phones to make solo activities social.

DAY 2 - Mobile Phone Afternoon and Evening

Time	Activity	Location	Notes
1:30pm - 2:00pm	resting	bedroom	chatting with a friend
2:00pm - 2:30pm	resting	bedroom	chatting with a friend
2:30pm - 3:00pm	resting	bedroom	chatting with a friend
3:00pm - 3:30pm	work	work	chatting via SMS with a friend
3:30pm - 4:00pm	resting	bedroom	chatting via SMS with a friend
4:00pm - 4:30pm	resting	bedroom	chatting via SMS with a friend
4:30pm - 5:00pm	resting	bedroom	chatting via SMS with a friend
5:00pm - 5:30pm	resting	bedroom	chatting via SMS with a friend
5:30pm - 6:00pm	resting	bedroom	chatting via SMS with a friend
6:00pm - 6:30pm	resting	bedroom	chatting via SMS with a friend
6:30pm - 7:00pm	resting	bedroom	chatting via SMS with a friend
7:00pm - 7:30pm	resting	bedroom	chatting via SMS with a friend
7:30pm - 8:00pm	resting	bedroom	chatting via SMS with a friend
8:00pm - 8:30pm	resting	bedroom	chatting via SMS with a friend
8:30pm - 9:00pm	resting	bedroom	chatting via SMS with a friend
9:00pm - 9:30pm	resting	bedroom	chatting via SMS with a friend
9:30pm - 10:00pm	resting	bedroom	chatting via SMS with a friend
10:00pm - 10:30pm	resting	bedroom	chatting via SMS with a friend
10:30pm - 11:00pm	resting	bedroom	chatting via SMS with a friend
11:00pm - 11:30pm	resting	bedroom	chatting via SMS with a friend
11:30pm - 12:00am	resting	bedroom	chatting via SMS with a friend

“Should I buy this shirt?” - Jonathan

Several of our participants described using their camera phone to get friends' advice on purchases. They would take a photo of themselves in a piece of clothing and send it to a friend for an opinion.

Texting as a remedy for loneliness

Participants describe texting as a quick and easy way to bring people into an experience or to feel less alone.

“I usually text my friends on the tube coming home from work. It's mostly gossip, really. It makes the ride go quicker... it's the next best thing to having them there.” - Josephine

5 Taken a photo of myself wearing a new T-shirt to share with a friend.

↓ chatting via SMS with a friend.

Emerging Insight

The phone acts as a signifier to ourselves, reinforcing who we think we are and who we aspire to be...



Phone as a signifier

Whether adorning their phones with jewels or using meaningful photos as screensavers, participants use their phone as signifiers and reminders to reinforce their own sense of their identity.



Phone as a digital scrapbook

Participants also use their phones as digital photo albums, keeping pictures on their phone to remind them of the people or things they care about.

"... this was a picture taken of me and my friends at Valley Fair. My friend, Nitty, took it with a disposable camera so I scanned the photo at work and emailed it to my Sidekick."

Photos act as visual reminders of who we are:

Friend, parent, sibling, lover, spouse, child.

Emerging Insight

... and as a way to share a story. People are reinforcing existing relationships and shared understandings.



video

"We're having a smashing time!" - Vanessa

Participants use text and photos for storytelling. But these are not complex stories with a beginning, middle and end. They serve to reinforce a shared understanding of an event, as running commentary on the happenings of one's life.

They reinforce *common ground*.

Not a task

Unlike filling out a form on a web site, these types of activities are not tasks with a discrete beginning, middle and end. Like relationships, this behavior is continuous and ritualistic. There is a compelling emotional link that motivates people.

Emerging Insight

Mobile phones are unique in that they allow you to capture a moment in time.



Capture a slice in time

Phones are always with you, so they provide a level of immediacy. You can capture a slice in time in voice, text, image or video.

Identity management

Phones are being used as a tool for identity management.

Uniquely mobile

Other devices provide these features, but few put them together in such a unique way - and none are as portable and provide the immediacy.

Design Principle

Think building and reinforcing common ground and identity

Think continuous; not task

These conversations among people are continuous and they rely upon "common ground": what each person knows about the other person and the state of their relationship. The mobile device helps storytelling – there is an opportunity to better interweave images, voice, text for easier storytelling and easier interpretation of the story in the common context.

Think present and represent.

Sending images, choosing an avatar or a login name – these are all acts of presentation and self-representation. Consider how a mobile device helps reinforce one's sense of identity - to both themselves and to the world.



MyAdhan

MyAdhan has launched its prayer and fasting times SMS text message alert service to Muslims in the UK. After signing up to the website and configuring your account, you then start receiving daily text message prayer and fasting time specific to your location.

"Muslims in the UK can also get prayer times by request, without subscription. **MyAdhan** TEXT back service can be used to receive accurate postcode-specific fasting and prayer times, sent directly to your mobile, when you need it."

<http://www.myadhan.com/index.php?cid=Adverts-Textback&pid=1&tid=0>

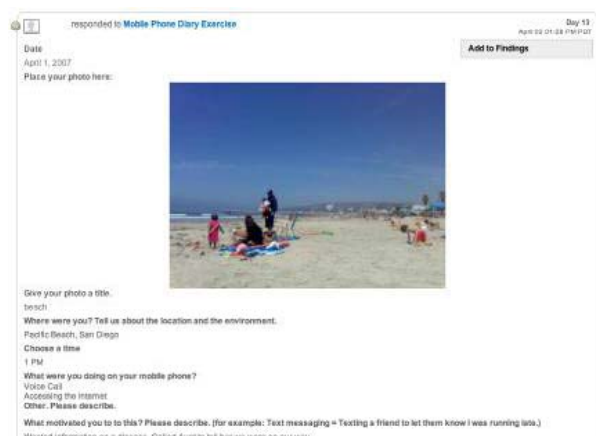
Summary

Design Principles

1. Think uniquely mobile, not mini PC
2. Think always with you, not just on the go
3. Think building and reinforcing common ground and identity
4. Think access to what's essential, not browsing

Deprivation study: Capturing context of use and unmet needs

- If current usage is low how to get people to give you relevant information about needs and opportunities?
- Solution: deprive them of the alternatives!
- Study design:
 - 8 users (4 men, 4 women)
 - Equipped with Nokia N93 and N80 phones
 - 3 days of reporting internet use
 - 4 day deprived of internet on a PC (only mobile!)
 - “Cheating vouchers” to allow for needed PC use



A screenshot of a web-based diary entry form. The form is titled "responded to Mobile Phone Diary Exercise" and "Day 13". It includes a "Date" field with "April 1, 2007" and a "Place your photo here:" label. A photo of a beach scene is uploaded. Below the photo, there are several text prompts: "Give your photo a title.", "Where were you? Tell us about the location and the environment.", "What were you doing on your mobile phone?", "What motivated you to do this? Please describe.", and "Wanted information on a classmate. Called Aunt to let her we were on our way." There is also an "Add to Findings" button.

Sample entry from an on-line diary tool

video

Shopping Study: Collecting contextual information and needs

Diary study of existing shopping needs and behaviors

- 12 participants (9 female) aged 21-40
- **txt4l8r**: tool for capturing snippets in situ and then longer description later
- 116 entries (56 photos) over 1 month
- Pre- and post-study interviews to understand typical shopping behaviors and specific instances with full context



UX Research Methodology

- Qualitative vs. Quantitative
- Contextual inquiry, diary studies
- Storyboards and concept evaluations
- Participatory design
- Pilot deployments and Wizard of Oz
- Longitudinal studies

Storyboards and Concept Evaluation

Goal: get feedback on concepts from participants in 1-1 sessions or focus groups

Focus on realistic scenario and value, rather than UI

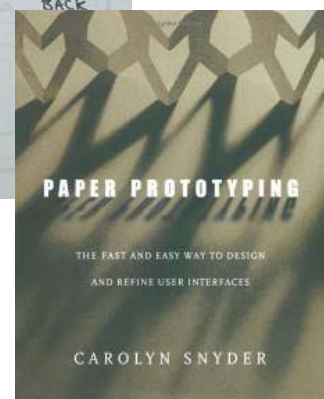
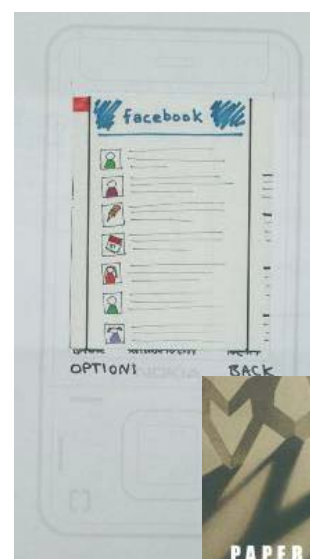
Participants able to modify concepts, suggest realistic scenarios based on their own experience



Sketch: Erika Reponen

Participatory Design: Co-Designing with Users

- Rapid iteration between design and testing of ideas with low fidelity prototypes for quick feedback
- Move design forward and minimize risk of “bigger” usability problems later
- Established practice in web design but have not been used as much in the mobile domain – “muscle memory” issues



UX Research Methodology

- Qualitative vs. Quantitative
- Contextual inquiry, diary studies
- Storyboards and concept evaluations
- Participatory design
- Pilot deployments and Wizard of Oz
- Longitudinal studies

Pilot deployments and Wizard of Oz

Tech centric vs. User-centric: new technical ideas and solutions are frequently embodied as initial prototypes, user population and context of use not certain.

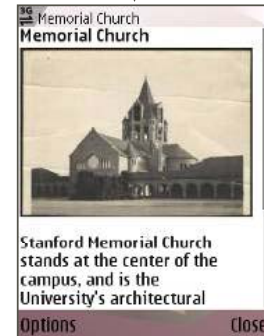
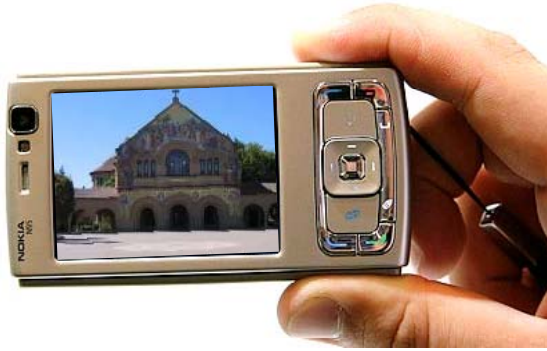
Challenge: follow the user-centered design approach with a high fidelity prototype already present, fill-in-the-gaps.

Potential solutions:

- Pilot deployment of a prototype (when possible)
- Wizard of Oz: human in the loop to simulate the end-to-end solution



Case study: Mobile Augmented Reality



Post-capture matching

- User captures an image
- If successful, results are provided

UX Research Methodology

- Qualitative vs. Quantitative
- Contextual inquiry, diary studies
- Storyboards and concept evaluations
- Participatory design
- Pilot deployments and Wizard of Oz
- Longitudinal studies

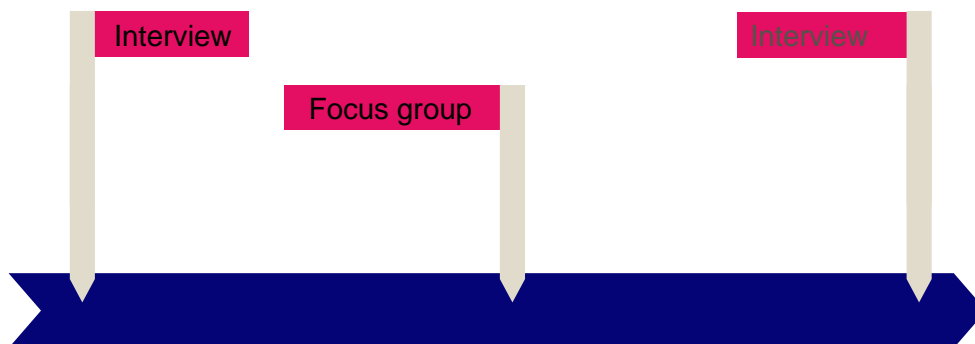
Case Study: Longitudinal deployment of ZoneTag and Zurfer

- 26 participants in 5 social groups for 3-6 months
- Nokia N80
 - Participant's SIM, covered data plan
- Flickr pro account for 6 months
- ZoneTag phone client
 - 2-click upload to Flickr
 - Geotagging
 - Suggests tags for each photo
- Zurfer phone client
 - View and comment on Flickr photos while mobile



Study method: Qualitative and Quantitative

One person's participation (3-6 months)



Quantitative data collection

- **SmartPhone 360 logs** (all activity on phone, including photo taking)
- **ZoneTag server logs** (tagging behavior, privacy settings)

Outcome: Requirements for Mobile Photoware

- Capture
- Editing
- Upload and storage
- Sharing and Privacy
- Annotation and organization
- Viewing
- Technological considerations

Discussion: UX research method tradeoffs

Recap: Methodology choices and tradeoffs

Method	When appropriate	Pros	Cons
Diary/Interview	Pre-concept, persona generation	Rich data, realistic feedback on current tasks and needs	Self-reported, instructions to participants need to be crafted carefully
Shadowing/Interview	Pre-concept/personas/gather detailed data about tasks	Most reliable data about context of use	High overhead to conduct with many participants
Survey (web based)	All stages, validation of qualitative data	High number verification, confidence	Self reported, Self selected participants
Story boards	Concept development and testing	Detailed feedback, easy modifications	No feedback about in-context use, need some drawing skills
Wizard of Oz	Get feedback on use in context, focus on value	Feedback on value for in-context use	Some overhead, delays in the system
Pilot deployments	Get feedback on use in context, focus on value, feedback on UI issues	Detailed feedback on a system when used over a period of time	High overhead to set up, participants will focus on UI and specific use cases

Final thoughts...

- Research method is not a substitute for a **good research question**
- Mobility makes everything more difficult and more interesting
- You are at the forefront of a new research domain!

Thank you!

References

- G. Cuellar, D. Eckles, M. Spasojevic. Photos for Information: A Field Study of Cameraphone Computer Vision Interactions in Tourism. Proc. CHI 2008 Extended Abstracts. April 2008.
- R. Hinman, M. Spasojevic, P. Isomursu. They call it "surfing" for a reason: Identifying mobile Internet needs through PC deprivation. Proc. of CHI 2008, Florence, Italy, April 2008.
- M. Spasojevic, R. Hinman, W. Dzierson. Mobile Persuasion Design Principles. Mobile Persuasion: 20 Perspectives on the Future of Behavior Change (Persuasive Technology Lab, BJ Fogg, D. Eckles, eds.)
- J. Gao, M. Spasojevic, M. Jacob, V. Setlur, E. Reponen, M. Pulkkinen, P. Schloter, K. Pulli. Intelligent Visual Matching for Providing Context-Aware Information to Mobile Users. Supplemental proceedings of the Ubicomp 2007.
- Y. Xu, M. Spasojevic, J. Gao. Designing and Evaluating a Vision-based Mobile Interface for Shopping. Proc. NordiCHI 2008.
- M. Ames, D. Eckles, M. Naaman, M. Spasojevic, N. Van House. Requirements for Mobile Photoware. (under review).
- T. Sohn, K. Li, W. Griswold, and J. Hollan. A Diary Study of Mobile Information Needs. Proc of CHI 2008, Florence, Italy, April 2008.
- Revelation tool <http://www.revelationglobal.com/about>
- J. Brandt, N. Weiss, S. Klemmer, txt 4 l8r: lowering the burden for diary studies under mobile conditions. Ext. abstracts CHI'07