21w.789: Communicating With Mobile Technology
Spring 2015 - Class 1

Frank Bentley
Edward Barrett

Teaching Staff

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  - Principal Research Associate at Yahoo Labs in San Francisco and Visiting Lecturer at MIT
  - 14 years creating new mobile experiences based on data from ethnographic field studies
- Ed Barrett (ebarrett)
  - Senior Lecturer in Writing and Humanistic Studies
  - Background in web, non-linear narrative, poetry, usability, social media
- TAs: Graduate Researchers in Comparative Media Studies
  - Sean Flynn (spf)
  - Heather Craig (hhcraig)
  - Gordon Mangum (wgmangum)

Project – Based Class

- Teams of 3-4
- Guide you from a domain of interest to a functional, field-tested application
- Understanding how mobile services fit into people's daily lives
- Building things that will make people's lives better!

Online Class

- 21w.789x – On edX with 13,000+ students
- A few sample chapters of the textbook posted there
- Discussion forums

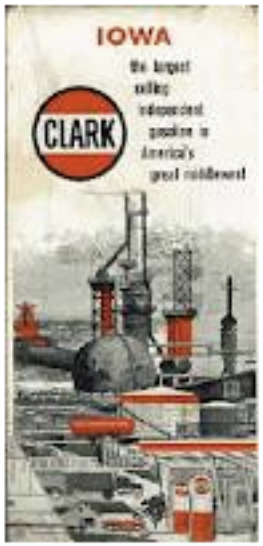
- All students should register for this course online to access the forums and readings
- Assignments will differ – everything to be submitted in person during class, not online

Imagine the world in 1995…


Phone
Phone


HIGHWAY MAP
IOWA
STANDARD SERVICE

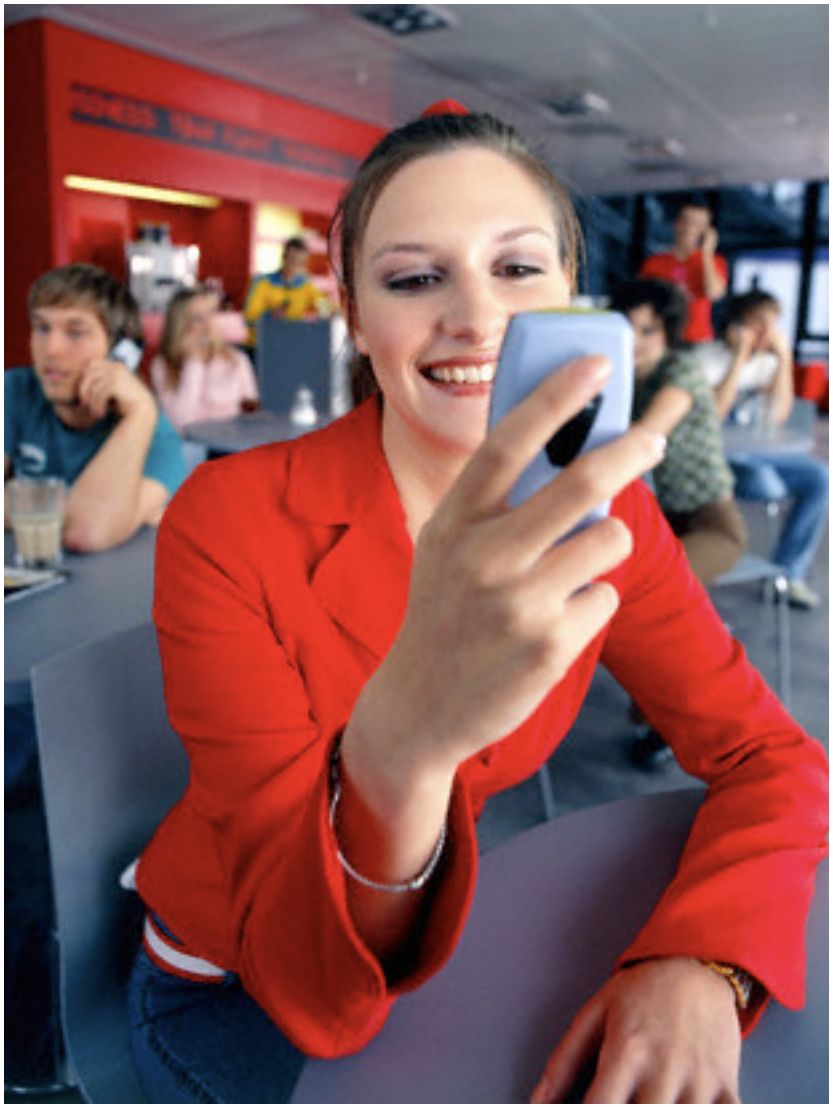

IDAHO

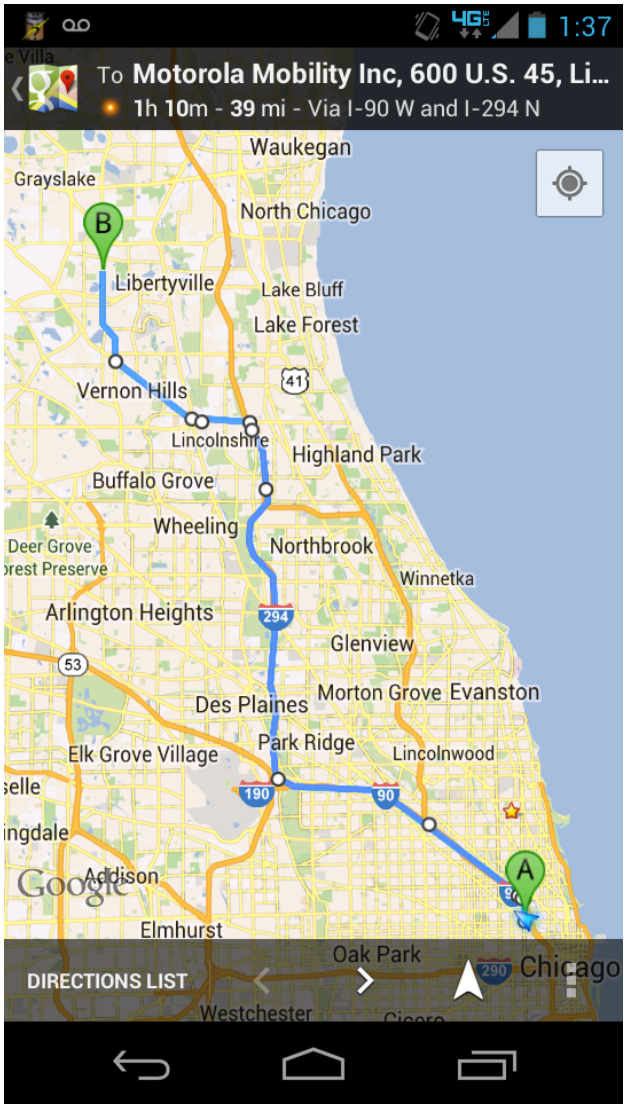

IOWA
CLARK


NEVADA
UTAH
SHELL
SHELL
Tour with Confidence


NEBRASKA
STANDARD
STANDARD OIL COMPANY

Think of today …

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Highland Park
Buffalo Grove
Wheeling
Deer Grove
Northbrook
Winnetka
Arlington Heights
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Glenview
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Des Plaines
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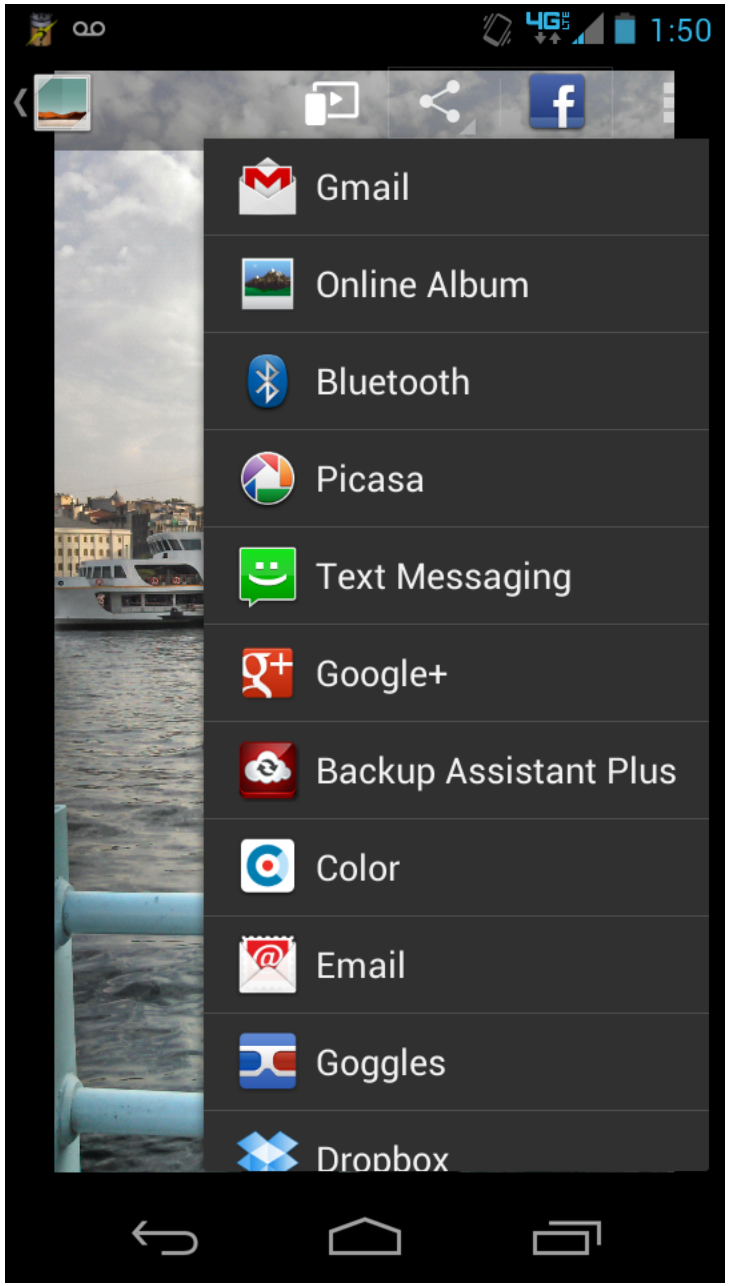

1:50
Gmail
Online Album
Bluetooth
Picasa
Text Messaging
Google+
Backup Assistant Plus
Color
Email
Goggles
Dropbox

bambuser


Happy days!


Start
Justin
Harrison
Wendy Teo
RE: Dinner tonight? Sounds good. How about the new place with the back patio?
Soccer practice
Rec Center
5:30 PM - 8:00 PM
8
Monday
Internet Explorer
Store
Bing
Maps
SkyDrive
Sports
Messaging
71°
Seattle
Mostly sunny 53° / 72°
Weather
Hot air balloon festival takes off in the valley this weekend
Music
Video

Mobile Computing Has Brought:

- Anywhere/anytime voice and data connectivity
- Ubiquitous photo capture and sharing
- Environmental sensing
  - Location
  - Motion
  - Temperature
  - Altitude
  - Etc.
- Contextually-relevant services

Computing is now out in our world, not easily studied in the lab

What mobility means for design…

- Concepts can take advantage of context and contacts
  - Location, status updates, photos, etc. all afford radically new experiences with those we care about
- Concepts must work in daily life
  - Not a task to do at a computer screen
  - Interactions must flow with the rest of life
  - Concepts must be evaluated in daily use over long periods of time to judge their usefulness

Human-Computer Interaction (HCI)

- The field at the intersection of Computer Science, Psychology, Design, and Anthropology
- Understanding and defining how people interact with digital systems
- Large (~3000 person) research community
- Driving the design/interaction of most digital products on the market today

3 Waves of HCI (Harrison et al 2007)

- First Wave (~1980s)
  - Roots in psychology and human factors
  - Studying characteristics of humans that enable efficient interaction with computing systems (e.g. Fitt's Law)
- Second Wave (~1990s)
  - Influences from cognitive science
  - Focused on tasks, usability, and efficiency
  - Controlled lab experiments to measure performance
- Third Wave (~2000+)
  - Focused on creating compelling and engaging solutions
  - Understanding use in the real world and how systems fit into the contexts of daily life

How can we understand how new mobile services are adopted and integrated into everyday life?

How can we use this knowledge to design new mobile experiences that improve everyday life?

Research Philosophy

Learn From People

Build Concepts Quickly

Get them in the field for long-term use

Iterate

A typical project

Generative Research

- Choose a domain of interest
- Conduct ethnographic-style field work, diary studies, contextual inquiries, etc.

Concept Generation

- Invent new concepts directly from field observations / themes
- Create concept models / initial paper prototypes

Rapid Prototyping and Evaluation

- Build a quick version of the most relevant concepts
- Test for weeks or months in the daily life of users
- Iterate

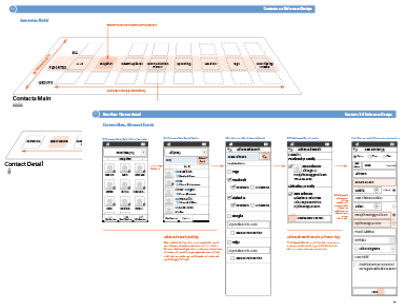
Commercialization

- Take successful concepts forward to market
- Public Betas
- Products

Much more than just writing the code

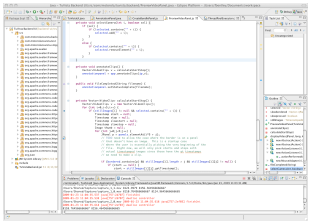
Observation

Ideation



Design

Build



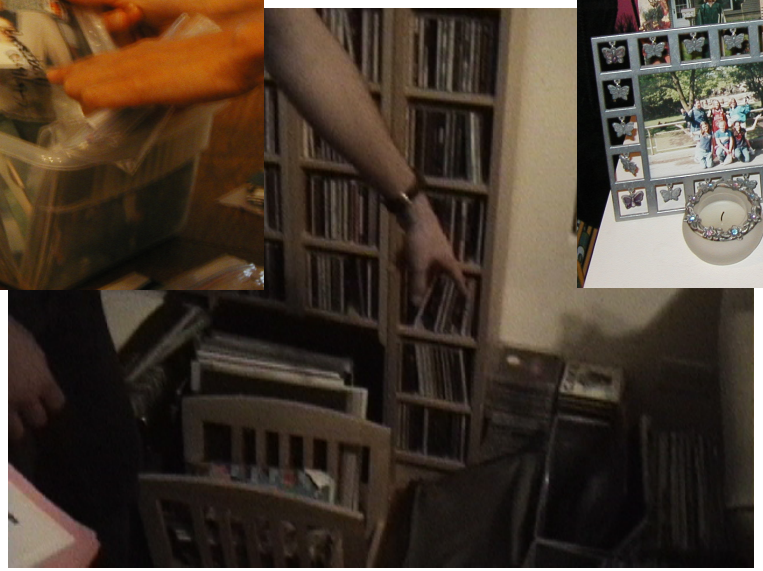
Test

Experience Design

- Goal is to enable people to do things that were not possible before (i.e. have new experiences)
- More than just designing and implementing an interface to solve a task
- What people do with it, how they appropriate it to their lives is what really interests us

Inspiration for design

- Learning from people
- In-situ observations of related practices
- Grounding new designs in real-world behavior

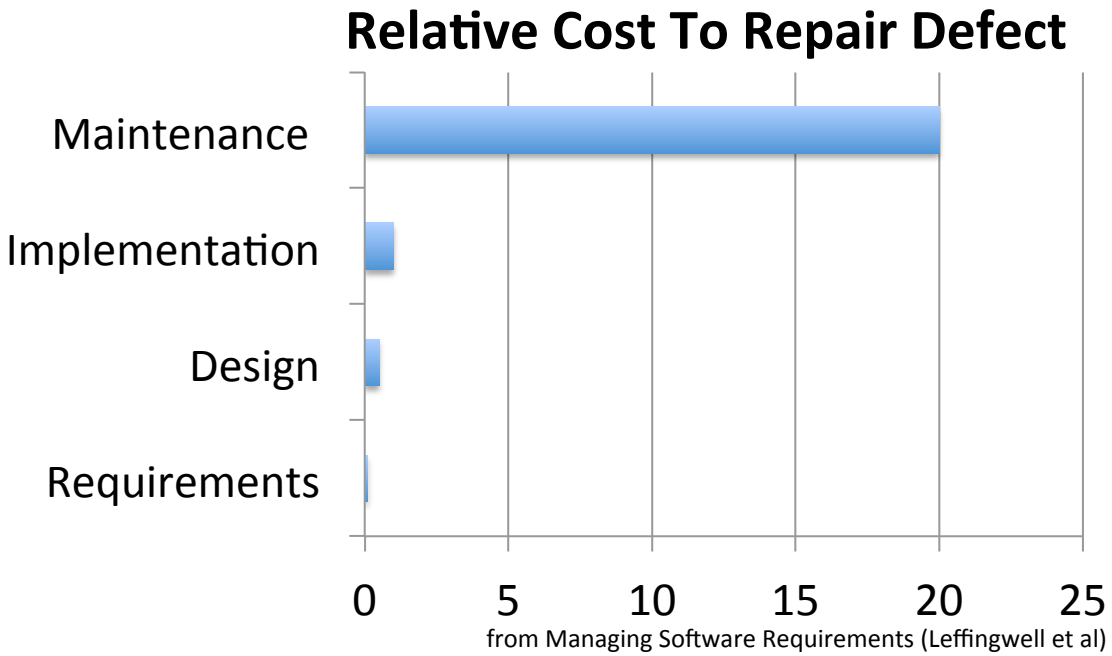


Coherent Design

- Design is a process from the beginning
- Ensure interaction flows for a user
- Especially important on a small-screen mobile device!

Building and Testing are Iterative

- Increasing fidelity with quick tests along the way
- From paper to working in the world
- Catch mistakes early when it's easy to change



What is the class about?

- Investigating the interaction between people and mobile computing devices
- Creating compelling mobile applications and services to improve daily life
- Group project-based class
  - Design, build, and document a novel mobile application
  - Final conference-style paper
- Other small assignments along the way
  - Location exploration, network characterization
- Classes split into lecture and studio/sharing/review time
  - Attendance and participation required!

Semester Project

- Choose a domain area and form a team of 3-4 (TONIGHT!)
- Perform a field study investigating current practices in that domain (this week!)
- Analyze data and develop concepts based in data (next class)
- Propose project (after next class)

- Later weeks will involve design, implementation, and field evaluation of your concept.

Date	Lecture	Reading (before class!)	Recitation/Studio	Assignment Out	Notes
2/3	**Mobile Applications Overview/Generative Research Methods** Overview of research areas in mobile computing. Discussion of the domains and structures of mobile applications and a model for mobile user-centered design. Overview of methods used to create new concepts based in field observations.	None	Share interests, form project groups, plan generative research.	Mobile observation study (10%)	
2/10	**Qualitative Data Analysis / Android Fundamentals:** Performing analysis of user data to generate concept ideas. Fundamentals of programming on Android devices. Differences from desktop Java. Small overview of iPhone programming. Outline for proposals.	Contextual Design	Affinity analysis of observation study, concept generation, informal report on observations	Proposal (15%), HelloWorld on device (5%)	
2/24	**Proposal Presentations:** Students present proposals for semester projects.	Applying UCD to Mobile Application Development			
3/3	**Mobile Design / Paper Prototyping:** Going from requirements to an interaction model down to the design of screens. Rapid prototyping and evaluation. Discovering usability problems early.	Prototyping For Tiny Fingers References: [1] [2] [3] [4] [5]	Create concept models, flows, and screen designs.	Complete paper prototype (10%)	
3/10	**Usability:** Usability testing of paper prototypes.		Testing of paper prototypes. Informal presentation of key findings and improvements.		
3/17	**Mobile Persuasion / Urban Computing / Location / Networking:** Mobile applications that encourage positivie behavior changes (exercise, diet, social, etc.). Systems that combine physical interaction in the world with mobile technology. Novel applications of location in social, media tagging, and public safety applications. Mobile location technology including GPS/CellID/Wifi localization. Networking capabilities of mobile devices. Best practices in writing mobile networking code.	UbiFit Garden, Persuasive Games	Present findings from usability study. Plan location and networking assignments.	Location/Networking Assignment (10%, due 3/31)	
3/31	**Field Evaluation and Deployment:** Methods for evaluating mobile computing concepts through everyday use. Diary studies, logging, understanding long-term use. Large-scale deployments through app stores, analytics, and business models.	Chapter 8 of Building Mobile Experiences (available free here)	Present reults of location and networking assignment. Plan methods and logistics of your field study.	Prepare poster/demo on current project state (15%, due 4/7)	
4/7	**Poster/Demo Session:** Share current progress on project with the class.		Present posters and demos.		
4/14	**Instructions for Final Reports/Presentations:** Formatting and content requirements for final reports. Expected topics in final presentation.	None	Review field study progress. Triage meetings with staff.	Gather data from other users of your application. Continue working on final project and iterating based on data from your field study. Final report instructions and templates can be found here	
4/28, 5/5, 5/12	**Final Presentations**	None	None	Final written report (25%, due 5/15 @ noon on Stellar)	

All work in the class is produced collaboratively and all students are expected to comment on, revise, and agree to the work of other team members. Each team member will be responsible for detailing the portions of reports and presentations that they authored, and all students are required to document a minimum of 20 pages of writing to which they contributed the first draft across all assignments.

Devices

- Develop on your own devices
- Class will focus mostly on non-platform specific topics, some examples will be given for Android and iPhone
- One assignment requires data access. T-Mobile has good pay-as-you-go plans for data (<$20).

Today's Class

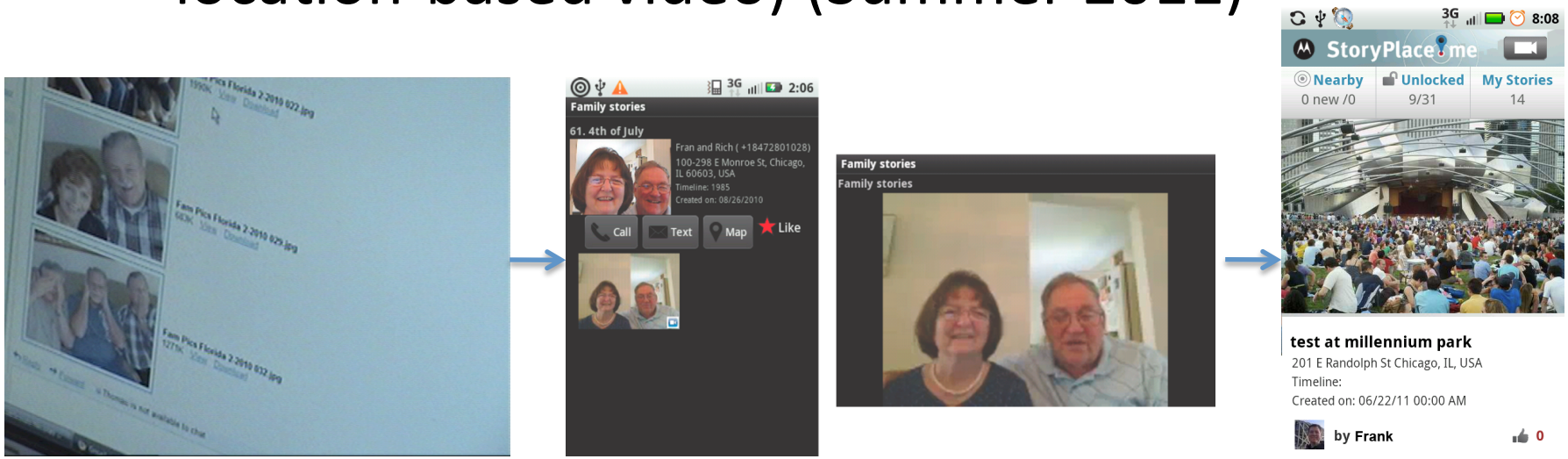
- Case Study of Process: StoryPlace.me
- Mobile ecosystem background
- Active research domains

- Field methods for generative research (assignment for next week)

- In studio sections:
  - Solidify domains of interest and teams
  - Develop plan for field study

Case Study: StoryPlace.me

- Initial study to investigate communication between generations across distance (Spring 2010)
- Serendipitous Family Stories prototype and field trial (location-based video sharing) (Fall 2010)
- StoryPlace.me public beta (broader concept of location-based video) (Summer 2011)

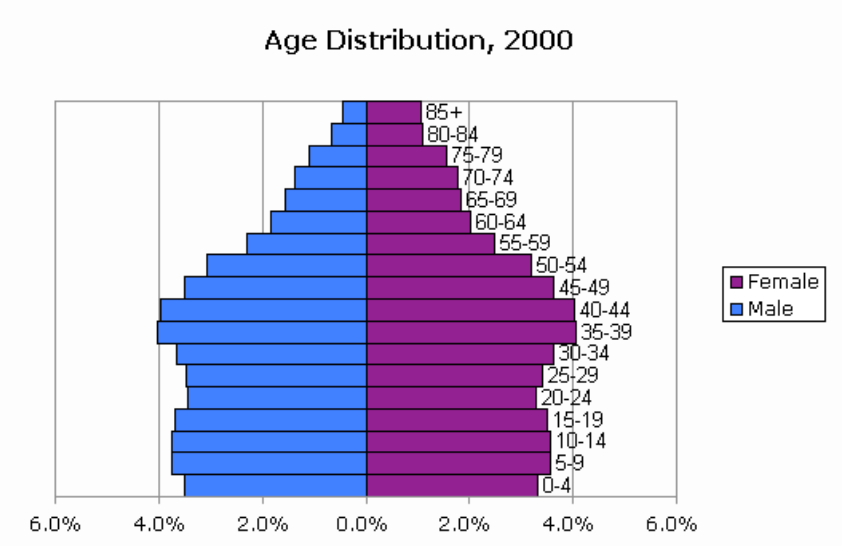


Elder Communication Study

- Understand aging at a distance, communication needs
- Develop knowledge in this area for Motorola – prepare for future product needs
- Identify potential high-impact products/services in this space
  - Validate them through rapid prototyping/field evaluation

Motivation

- **Aging Population**
  - 2030, 20% of Americans over 65
  - 2009, 20% of Europeans were retired
  - 2009, 22% of Japanese over 65



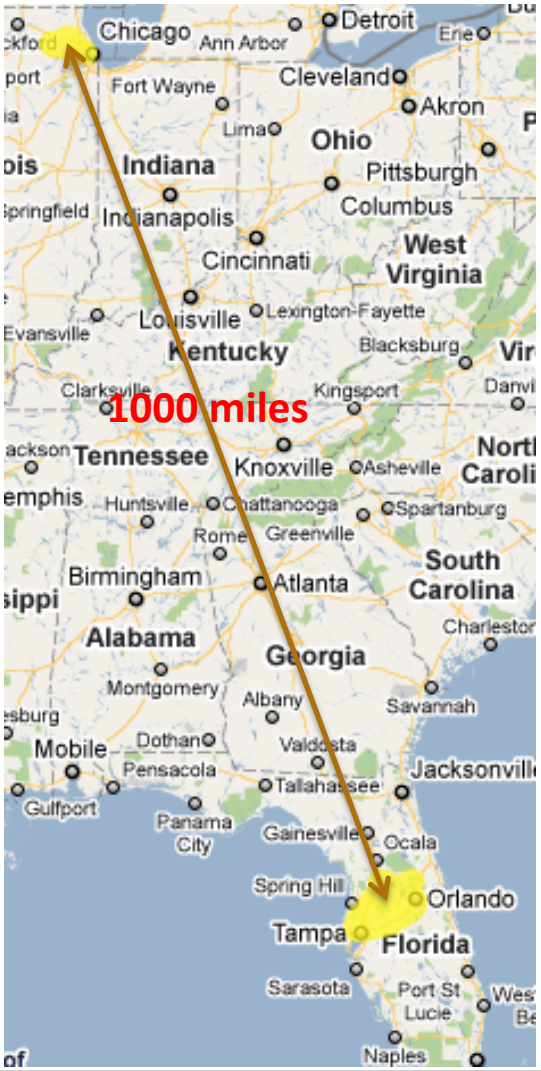
- **Distributed Population**
  - 43% of Americans live > 1 hour from parents
  - Growth of retirement destinations in FL, AZ, NV

The Villages®

8,000 to 80,000 in 8 years

Recruiting

- 5 pairs of participants
  - Parents > 60 in Central FL
  - Adult Children in Chicago area
  - ~1000 miles
- Recruited through email to the Chicagoland Club in one community and through a professional recruiting agency



Study Design

- **Initial Interview**
  - Home Tours
  - Questions about recent communication
- **Communication logging**
  - 3 weeks
  - Any communication or remembrance of other participant
  - Photographs of places communication occurred, physical artifacts of communication
- **Final Interview**
  - Questions from logs
  - More general questions about communication / reflection

Concept of Family Roles/History

Ideal Family State

- Photos from weddings, graduations, whole family together prominently displayed
- EC4-FL: "[EC4-IL] came over to my other daughter's house and spent some time with us. … And then the next day we all went over to [3rd daughter's house] because [she] had Christmas. … And we all had a great time. A lot of fun."

Doing things together

- EC2-FL: "She likes to fish and I like to fish. She likes to work out and I like to work out. When she was here in January, we went to the gym together."

Family History

- EC2-IL: "My grandfather used to dance there, when he was in the army or whatever. And so I noted, and I put 'Where Pops used to dance' as the memo [subject line]."

Easy and Comfortable Communication Fits Best Into Daily Life

Communicate From Everywhere

EC2-IL: "I talk to them everywhere. Walking out of work, on the train, at the gym, in the car, when I'm at home, on the roof … In South Beach on the beach. I'll call them from inside the tanning bed. Unless I'm under water I'll pretty much use the phone and talk to people."

Communication From Comfortable Spaces

Couches, offices, floors. Spaces to write letters (EC3-IL), etc.

Fixed Communication Spaces

EC3-FL: "Where I communicate? You mean where the phone hangs on the wall?"

Video Conferencing in fixed spaces

Learning Stories of Daily Life Creates Togetherness over Distance

Details Build Up Over Time

EC4-FL: "It made me realize that through communication you stay in contact. And there's like a binding between you. And when you don't communicate, then you lose that. **And you know what's going on, and you get to talk to your grandkids even though they're not around**. And it builds up your relationship with them."

Sharing Media Of Daily Life

EC4-IL: "Because my mom is not here to celebrate things like this, she wants to be a part of it. We want her to be able to see it. … **Just so they can share in it and feel like at least they have a part, even though they are far away**."

Design Inspiration

Design Implications

- Evoke Family History/Shared Memories
- Communication Should Be Integrated Into Everyday Life
- Communication Technologies Should Recreate Feeling of Being Together

C2 was passing by a theater in Chicago and took a picture and sent it to her mother. “My grandfather used to dance there, when he was in the army or whatever. And so I noted, and I put ‘Where Pops used to dance’ as the memo [subject line].”

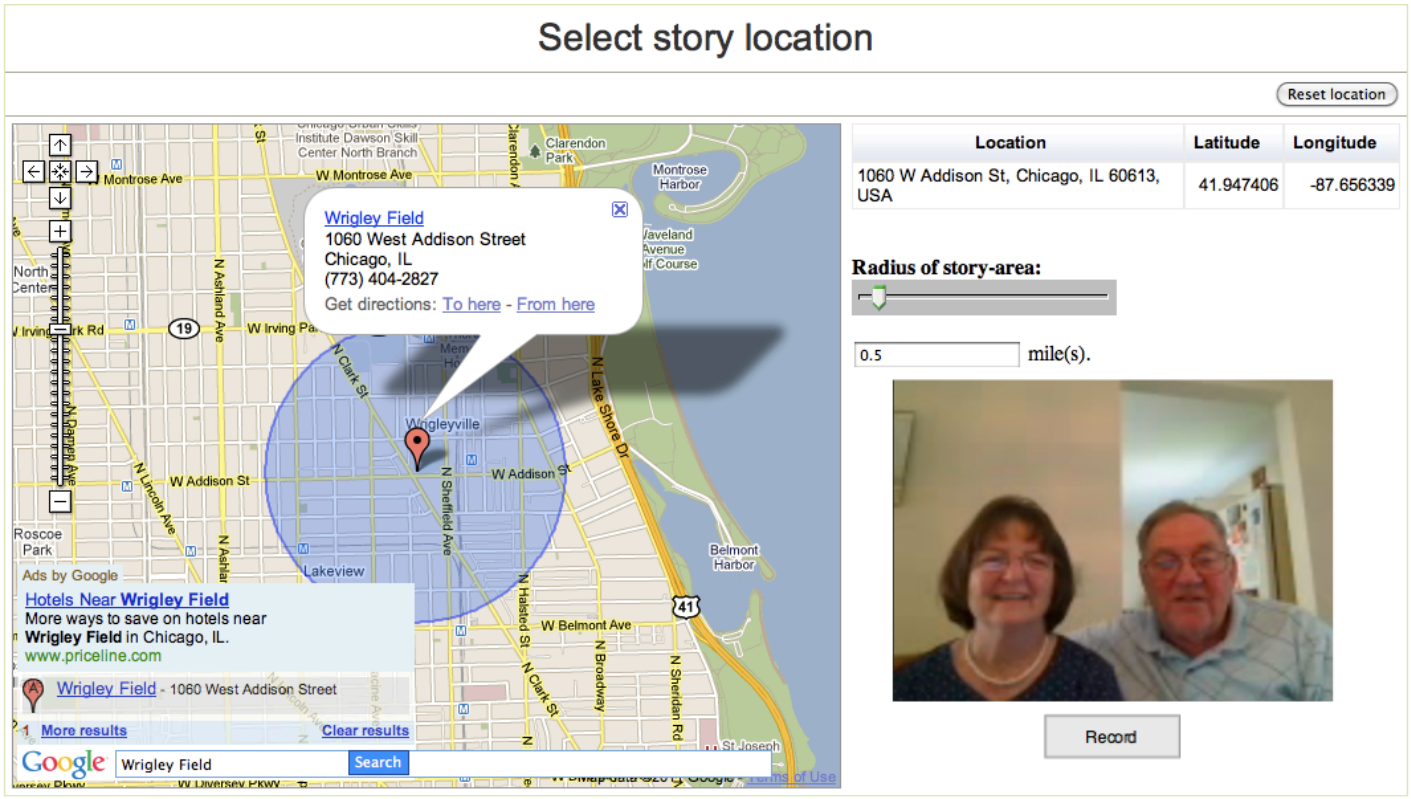
Serendipitous Family Stories Concept

- Parents/Grandparents can record videos about their lives growing up in Chicago
- Stories can be saved to the places where they occurred

- Kids/Grandkids will get notifications on their phones when they happen past one of these places and can “unlock” the videos

The Serendipitous Family Stories System

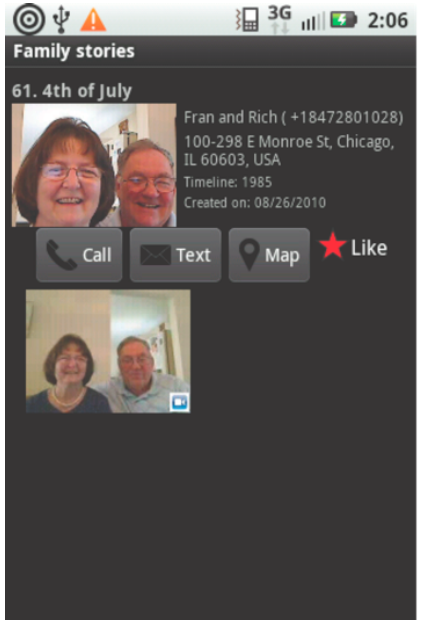
Web interface to create stories (webcam captured videos, with a location, a radius, and a recipient):



The Serendipitous Family Stories System

Mobile interface to receive stories serendipitously as you go about your day:

- Notifications (and vibrations) when approach a new story
- Another notification when you are within the story radius
- Ability to view any story that you've already found ("unlocked")
- "Compass" giving you heading and direction to closest new story



Evaluation Philosophy

- Get new concepts in the field as early as possible
  - Weeks after having idea!
  - Working functional prototype
- Field evaluations serve to:
  - Improve Concept
  - Mitigate Risk (kill unsuccessful concepts)
  - Build understanding of mobile interaction
- Make prototyping and field testing:
  - Cheap (incentives + your time)
  - Fast (~2 week implementation, ~3 week study)
  - Informative (interviews, home tours, diary logs, voicemails, photos, etc.)

SFS Field Study

10 parents and grandparents in Florida (55+)

10 adult children and grandchildren in Chicago (20s-40s)

- Met with older adults in their homes
  - Created 5-10 stories for their child/grandchild
  - Voicemail diaries during study
  - Final interview at end

- Met with children/grandchildren
  - Installed Serendipitous Family Stories app on their phones
  - Used app for 4 weeks in daily life
  - Voicemail diaries during study
  - Final interview at the end

Content of stories

What did people talk about?

- Family outings (boat rides, musicals, concerts, dinners)
- Holiday events (department store windows, festivals)
- Neighborhood events growing up (sports, picnics, movies, music)
- Dating (places where met husband/wife, amusement parks, meeting the parents)
- Work (old offices, colleagues)

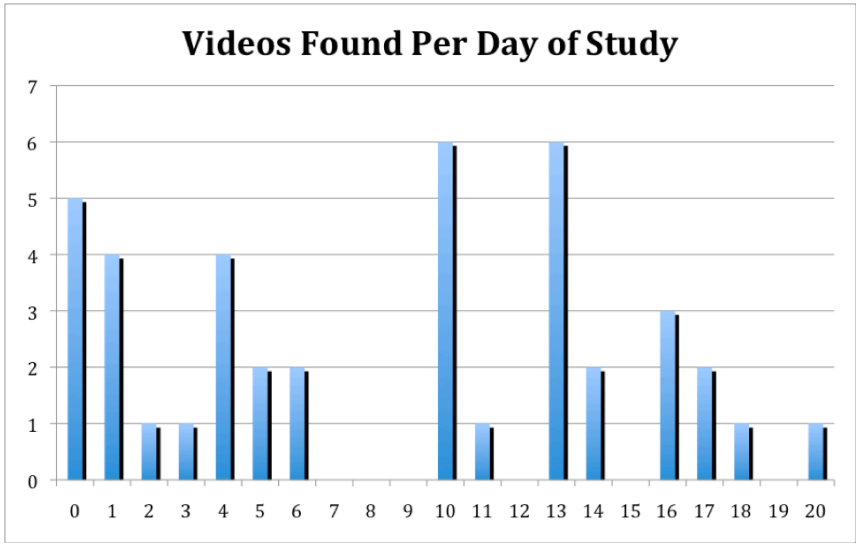
Place Type	Number of Videos
Home	14
Retail	10
Restaurant/Bar	10
Park/Zoo	7
Theater	7
Amusement Park/Racetrack	6
Church	6
Stadium	5
School	5
Street/Alley	5
River/Lake	5
Work	4
Hotel	4
Recording Studio	3
Museum	3
Car/Bus	2

Event Type	Number of Videos
Sports	11
Trip/Museum	11
Live Performance	9
Holiday/Birthday	7
Professional Life Events	6
Wedding/Engagement	5
Accident	4
Shopping	4
Moving	4
Eating	4
Date	4
Party	3
Boat Ride	3
Getting a Car	2
Crime	2
Prom	2
Dancing	2
Cooking	1

Finding Stories

83% of stories were found during the four weeks of the study

- Serendipitous discovery of stories was seen by participants as **“a cute little treat”** (C3) and **an experience “that will make you feel happy or bring a smile to your face**” (P6)
- Surprise: “I was surprised. I was not intentionally going to the location to see the story but it was a surprise for me ... and then this thing was right there!” (C2)
- Intentional Trips: “I went over to the Daley Center because that’s where he did a lot of his court cases.” (C7)
- But sometimes annoying: Continually getting a notification on the subway, with no way to get to the place of the story.



Strong Memories and Emotions

Experiencing media "together" and the strong emotions that come with remembering the past

- She called "to say that I made her cry that she was so touched by the stories. And she thought they were funny, the first ones I told her about." (P6)
- "After that [watching the two new stories] I called both my mom and my brother and I laughed about the situation cause it was pretty funny what they said." (C10)

Ramping Communication

Liking/Texting -> Phone Calls -> In-person Sharing

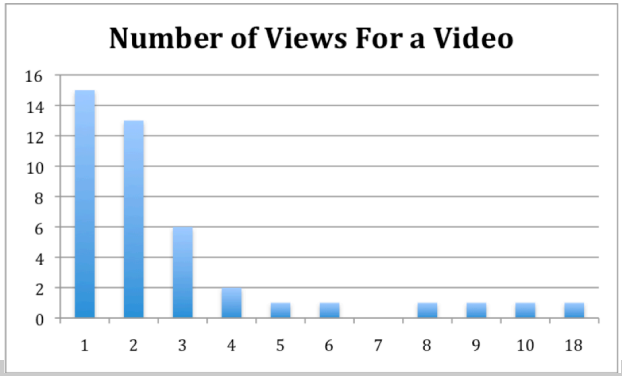
Overall increase in communication reported

- C6: I "did end up texting my mother and telling her how sweet it was. Brought back a lot of memories, which was nice. And she called me back and we actually laughed about it."
- P4: "This has really brought us closer together because we've been more communicative."
- P5 called the intergenerational communication that the system created "a minor miracle" since her daughter did not previously show an interest in family history.

Extending Storytelling to Family and Friends

Watching stories becomes a whole-family event

- "My husband was watching it with me, we were in the car. So we were in the car and he was watching it with me and was laughing. I don't remember word for word what we were talking about and **then my kids starting asking us questions about it, I know that. He wanted to see the video and they got all involved in it too**."
- C7 "watched them all one day when I was on the way home and **then I watched them again with [my wife].** Showed them to her cause she wanted to see them and wanted to see what her dad had said."
- C4: "Oh yeah, **I showed everyone at Thanksgiving**. Which was nice because it was Thanksgiving and everybody was together. My mom started talking about the stories then and it was great!"
- C5 "**was hanging out with my cousin**. And I was telling him about this app ... And I was like, look! **Look! It's mom and dad and they recorded stories** and they geolocated them. So I showed him the stories and he was like woah, that's cool."

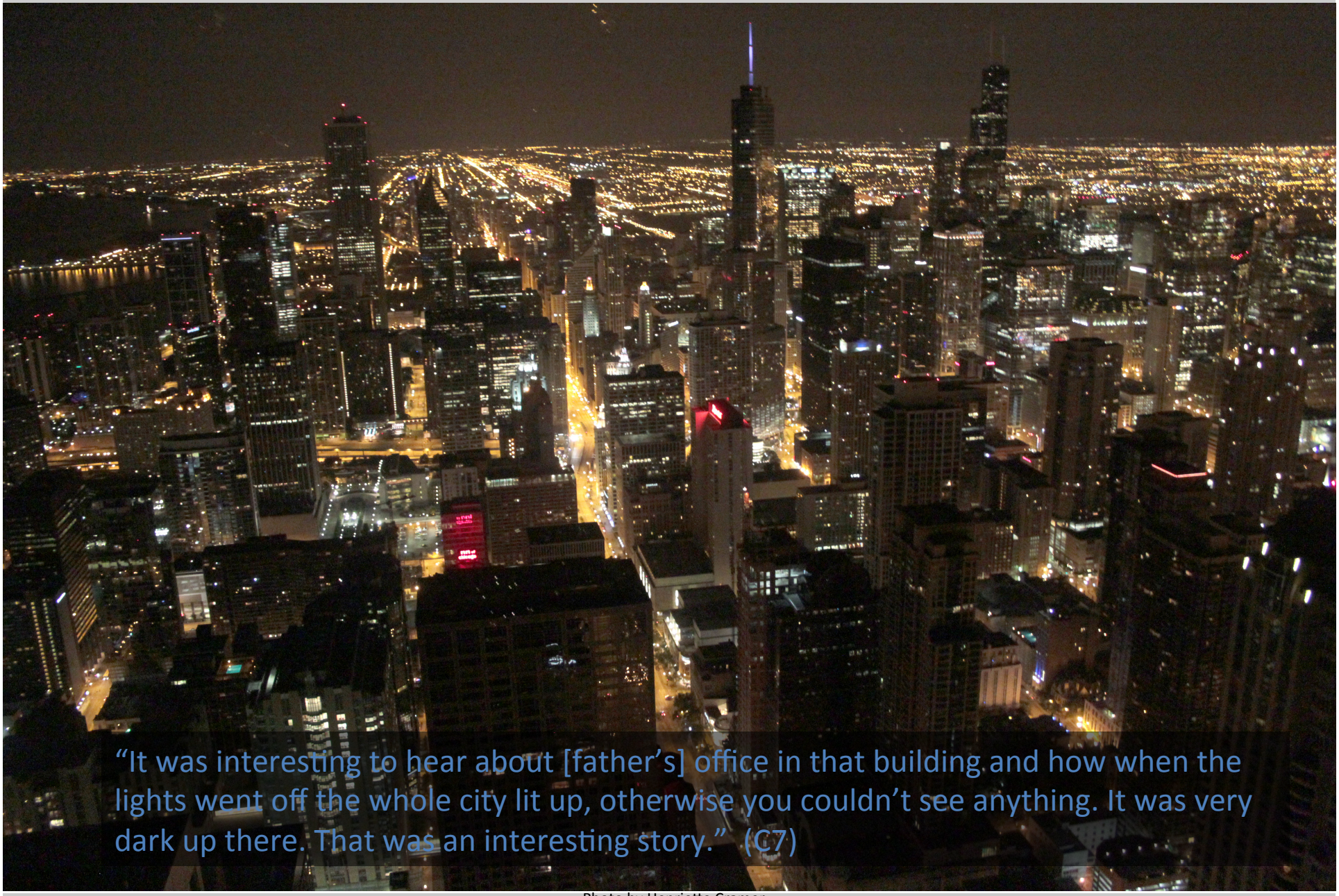


Engaging with the city through family history

Changed perspectives on everyday places: Learning about how the city has changed, or a different view from a loved one

- "Just **being other places that other people were is neat**." (C4)
- "It was a story about her being on the dance show and how they took video and used to go on boat rides. **I had never heard of Ray Reiner**, but I guess everybody else has because when I talked about it with people from my office they all said that oh yes, Ray Reiner is very popular. … **[My aunt and I] just talked about who Ray Reiner was** and how he was kind of like a Dick Clark." (C3)
- "**I had no idea there was even an amusement park there**." (C4)

- Seeing a visual of the city that was unknown…



"It was interesting to hear about [father's] office in that building and how when the lights went off the whole city lit up, otherwise you couldn't see anything. It was very dark up there. That was an interesting story." (C7)

Photo by Henriette Cramer

Seeing the family in new ways

Learning about the lives of others

- "**I didn't know that they didn't have a car**. She never had a car growing up. So everything they did they took a bus or the train and things like that." (C4)
- "She got a big kick out of the things that I did tell her though! And **I guess she never knew her grandmother was human**." (P4)
- "Yes, she said that she never realized that I worked at [department store]. And she said that she also didn't realize that I was pregnant when I worked there. She was so surprised to hear that. So she says, 'Were you married!?' ... **And said that she didn't realize that I was a Jr Executive with [department store]. She thought I was just always just a little sales clerk.**" (P3)
- "**I didn't know he was so into the architecture of things. I talked to him about it**. I talked to [my wife] about it too." (C7)

Summary

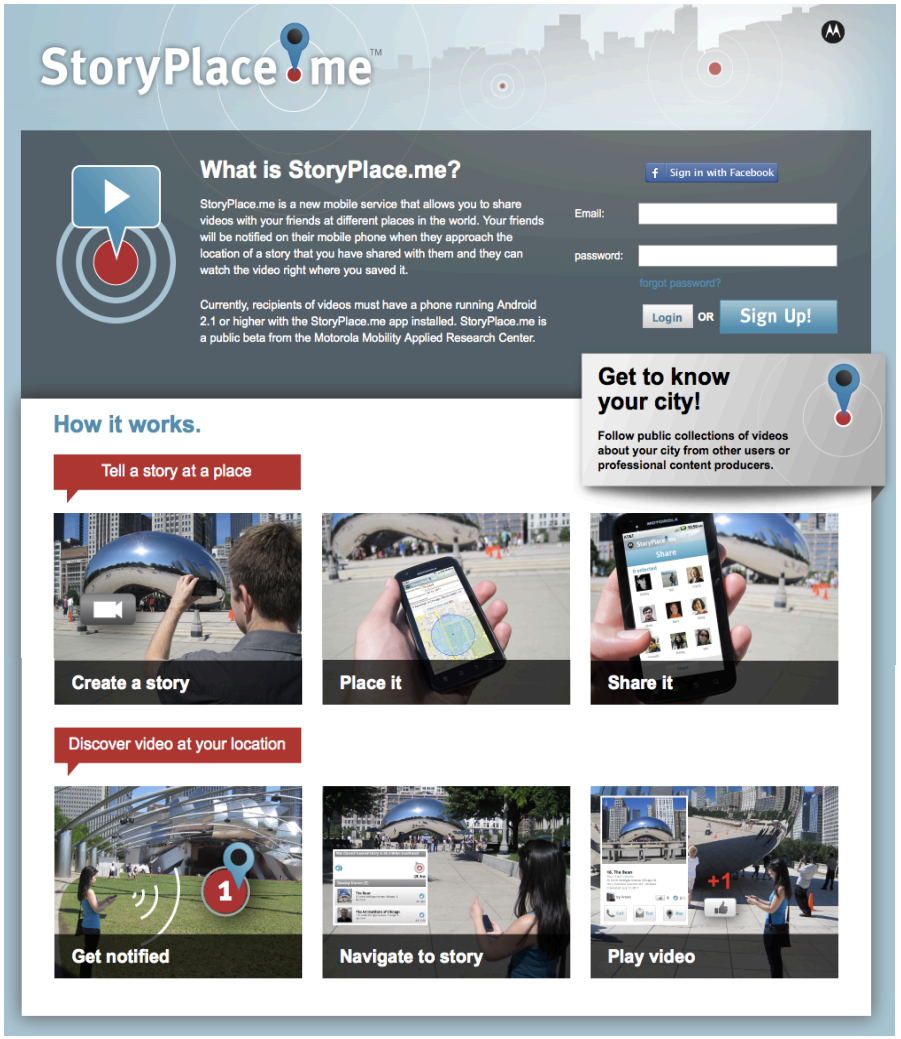
Location-based asynchronous video communication:

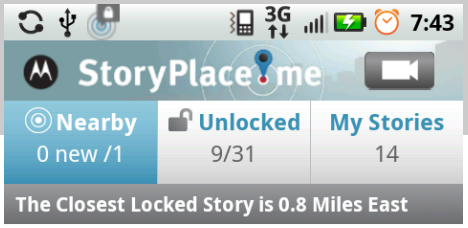
- Fits connection with relatives into everyday activities
- Bridges space and creates new opportunities for “being together” with relatives
- Encourages communication
- Creates deeper understanding of the lives of family members and the importance of everyday places in the city

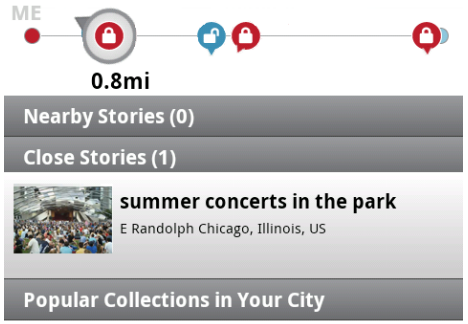
Moving to StoryPlace.me

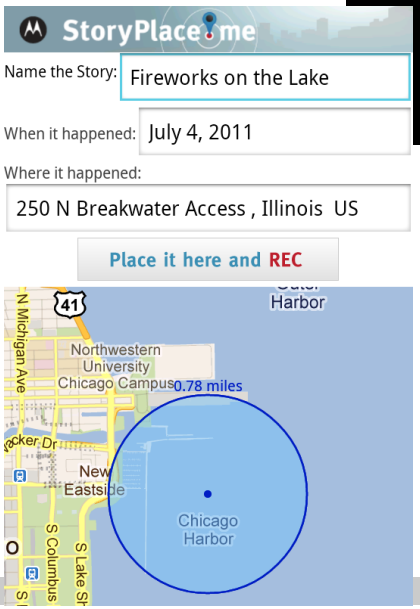
- Recognized we had a concept that worked for people, created compelling interactions in the city
- Needed a more robust, designed solution for public deployment (user management, access control, mobile content creation, etc.)
- Interested in how system would be used “in the wild”

StoryPlace.me







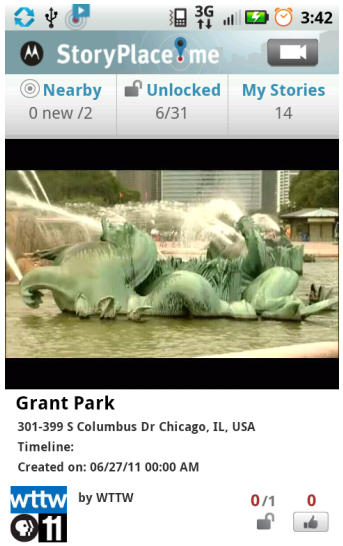


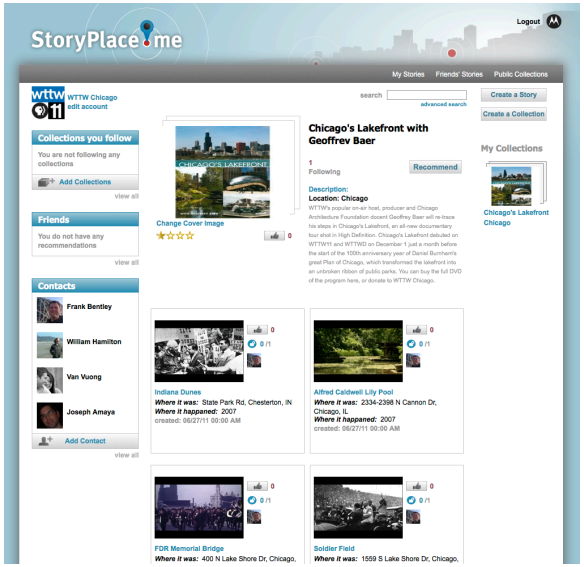
New Opportunities:

Professional Location Based Content

Participants loved getting history of locations they passed by in SFS trial

We partnered with WTTW (Chicago), City of Chicago, WNET (NYC), and others to offer professionally produced clips about city landmarks/events





Sharing with anyone

Participants in the SFS trial wanted to share with spouses, friends, family, public

Created access control per story to share with specific people, all friends, or publicly (in a collection that could be followed)

Following content in StoryPlace.me

Did not want users to be bombarded with content (ads/etc.) as they walked about the city

Notified for:

- Stories explicitly shared from friends
- Stories from friends' collections that you have explicitly followed
- Stories from public collections that you have explicitly followed

Can view other collections nearby in the mobile app and decide to follow them

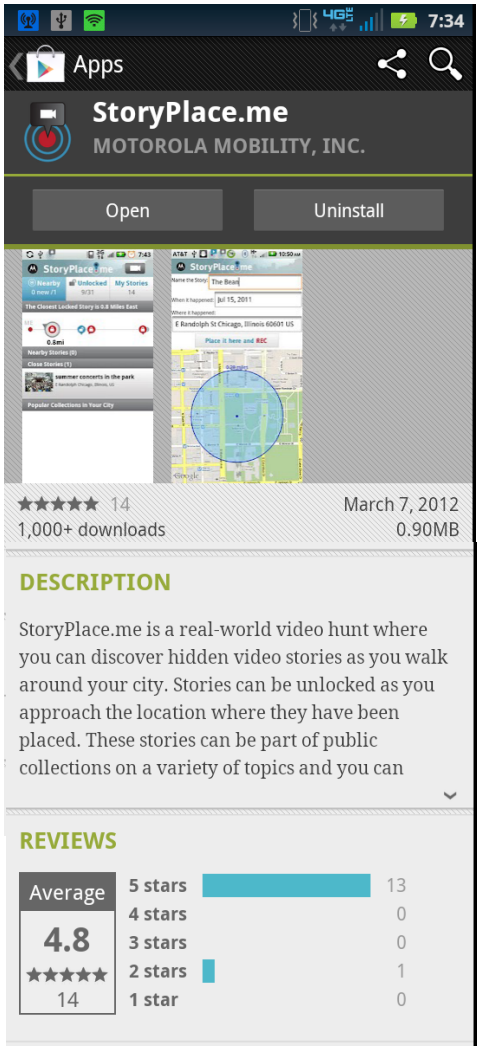
Deployment

Launched in Android Market

Anyone could use web interface (e.g. parents/ grandparents without smartphones, friends with iPhones, etc.)

Studying the places where content is created, sharing patterns, growth networks in users, etc.

~50/50 public vs. private content



StoryPlace.me: Summary

- Creating mobile user experiences is unique
- Involves interactions with the city, sensing, media, and contacts
- Most successful concepts are:
  - Inspired from real-world observations
  - Tested in real-world settings

Next Topics

- Current Mobile Ecosystem (web vs. mobile app)
- Current Mobile Research Topic Areas

Current State of Mobile Computing

- Three main platforms
  - Android, iPhone, Windows Phone
- Each platform has its own marketplace and own language/APIs for developing native applications
- Mobile websites can cater to all phone types, but for the most part cannot access the parts of the device that make it truly unique (background location, sensors, camera, phone book, file system, etc.)

- This class will focus on native applications for mobile

Mobile Ecosystem

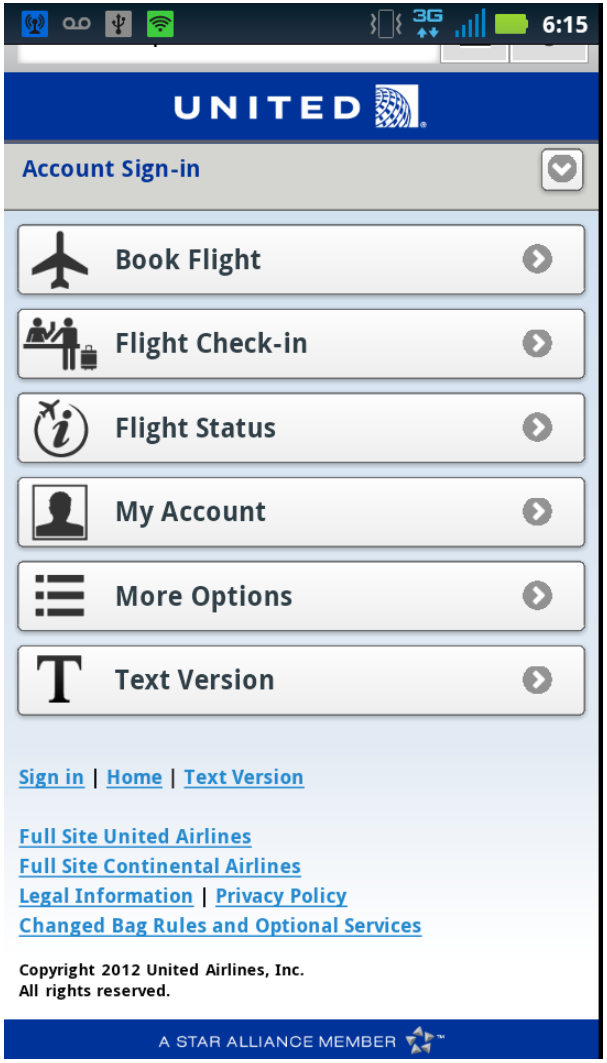
Web

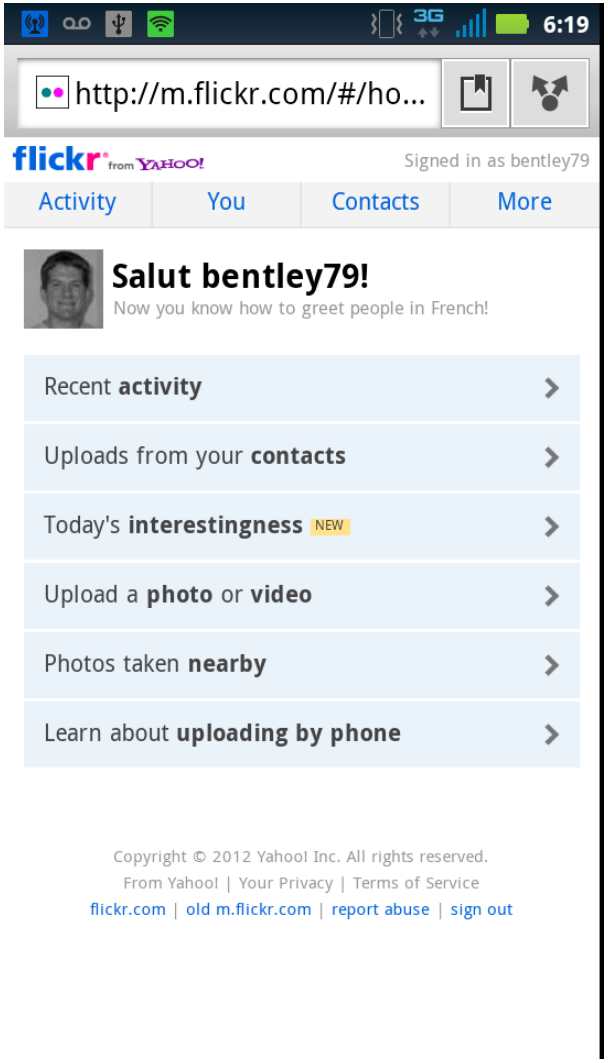
- No installation
- Limited interaction with phone platform
- Rendering issues on different handsets
- Some reach to almost every device
- No discoverability (e.g. market to find new apps)

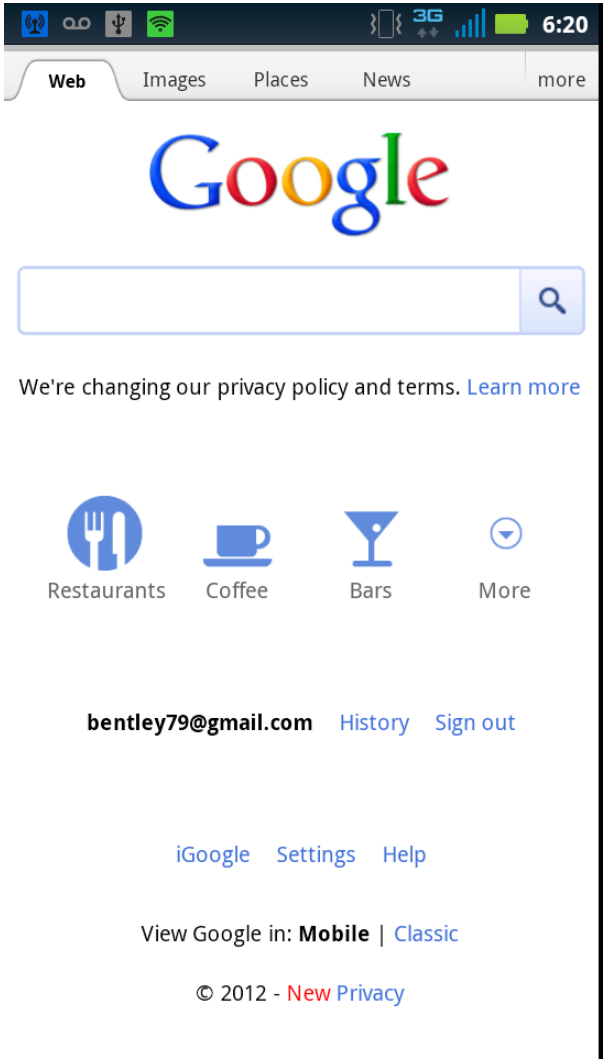
Native

- Written for a particular OS
- Deepest interaction with phone platform, sensors
- Supports complex interactions, animations, data cacheing, etc.
- Background Processes
- Popular marketplaces to release applications

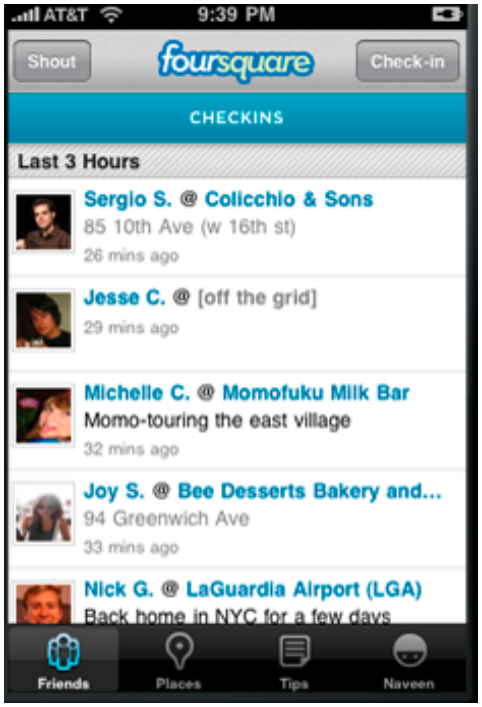
Mobile Web Applications

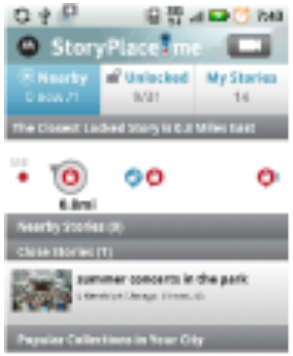




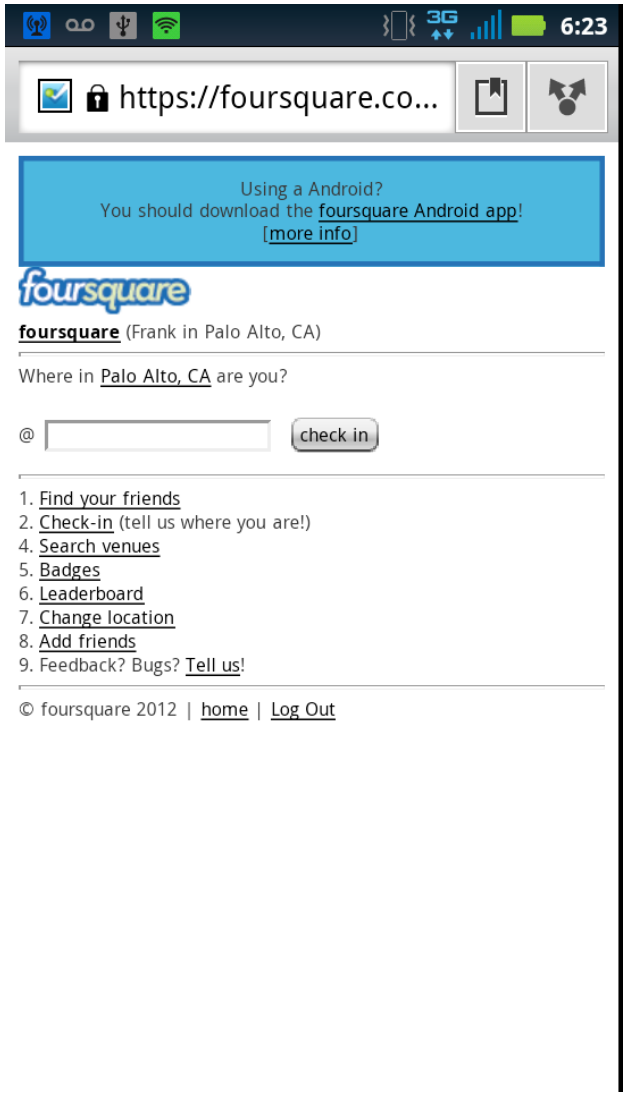


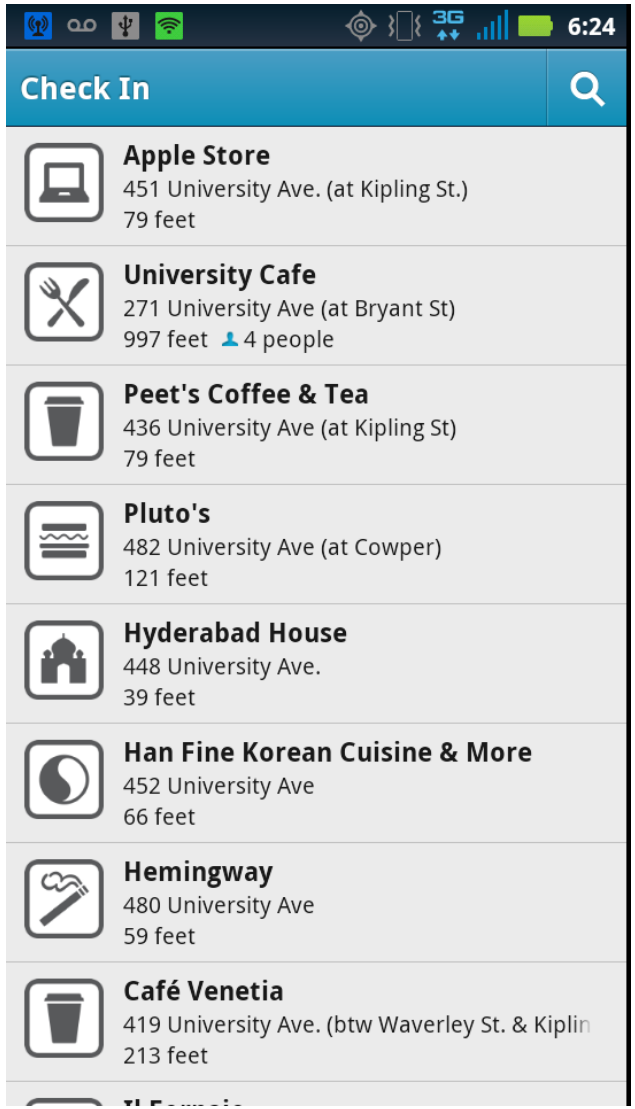
Native Applications





Web vs. Native: foursquare





Path to consumer

- Web:
  - Go to a URL (but they must know/find that URL)
  - Instant and updatable totally from server side
- Native:
  - Platform App Store (Apple, Google, Microsoft)
  - Updates can be placed in app stores / users notified on some schedule, but not instantly
- Native Wrapped Web:
  - Native "container" that's available in app store with HTML5 WebViews inside that serve content from a web server

Case Study: Facebook

- Originally thought HTML5 was "ready" enough to implement their mobile apps as Native Wrapped Web
- Discovered many performance issues
  - Cacheing, load times, scrolling, background processes, etc.
- Re-implemented Facebook Mobile natively for Android and iPhone

- Mark Zuckerberg: "Our Biggest Mistake Was Betting Too Much On HTML5"
  - http://techcrunch.com/2012/09/11/mark-zuckerberg-our-biggest-mistake-with-mobile-was-betting-too-much-on-html5/

This class:

- Focus on Native Applications
  - Richer experiences
  - Integration with on-device sensing / location / camera
  - Background processes
  - Easy discovery in mobile markets

Current Mobile Research Areas

- Location-Based Mobile Computing
- Persuasive Applications
- Urban Computing
- Mobile Social Computing
- Extending Experiences
- Personal Networks/Wearables
- Companion Devices
- Enterprise

Location-Aware Computing

- How can location help make any mobile task more efficient?
  - Finding restaurants
  - Getting movie tickets
  - Knowing which bus to take
  - Tagging photos
  - Finding friends
  - Know where to sell their crops
  - Mobile tour guide/games

REXplorer

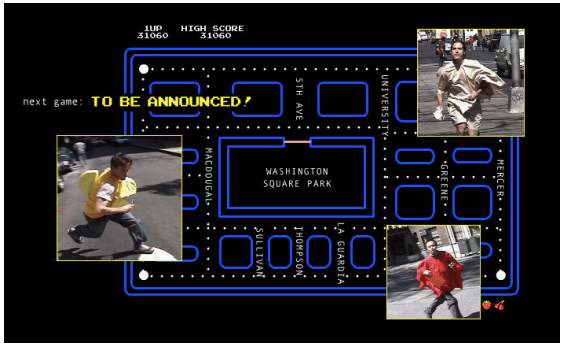
Mobile Persuasion/ Health

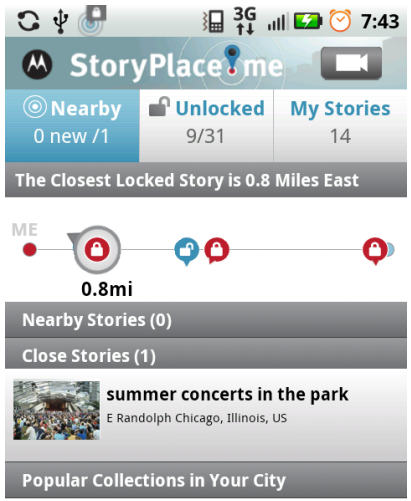
- How can mobile phones convince people to…
  - Eat healthy food
  - Work out
  - Use less energy
  - Help their friends and family
  - Volunteer
  - Be religious
  - Save the planet

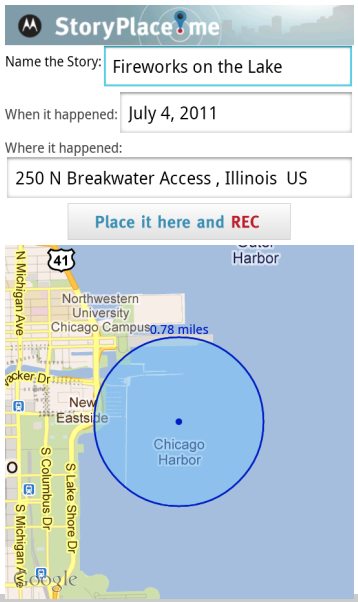
Figure 1. UbiFit Garden's glanceable display. a) at the beginning of the week—small butterflies indicate recent goal attainments; the absence of flowers means no activity this week; b) a garden with workout variety; c) the display on a mobile phone—the large butterfly indicates this week's goal was met.

Urban Computing

- Urban games (e.g. pacmanhattan)
- Interacting with city history (e.g. StoryPlace.me)
- Check-in/Location Sharing (e.g. Foursquare)

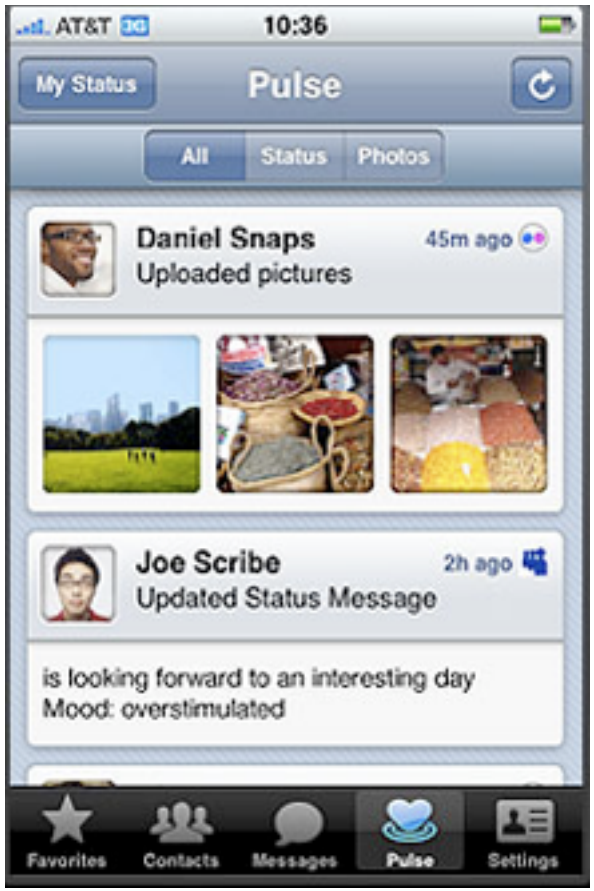






Social Computing

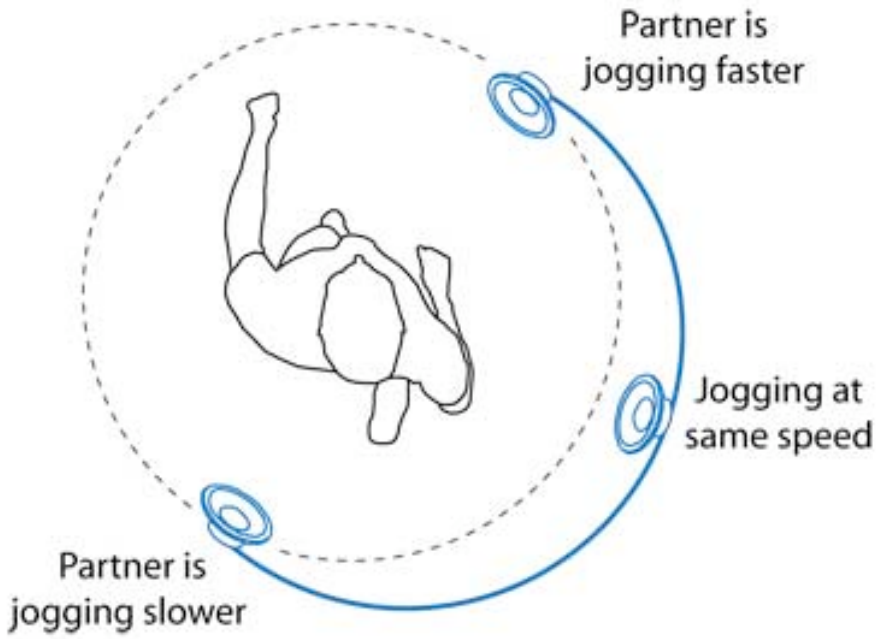
- How can phones link in data from online communities?
  - Status in contacts app
  - Micro-coordination (helping plan and meet up)
  - See photos from friends
  - Syncing online calendars
  - Selling goods/services
  - Managing group finances / microfinance



Yahoo! OneConnect

Extending Experiences

- How can an experience on a phone augment an in-person experience?
  - Sports – replays/stats on phone
  - Concerts/Festivals – see other people's photos/ videos in real time
  - Working out – virtual workouts with others

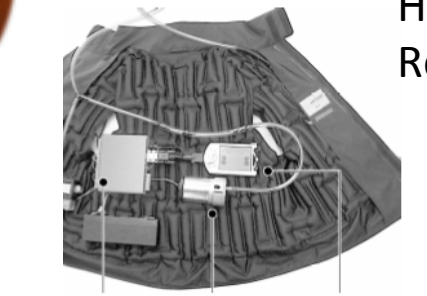


Jogging the Distance

Personal Networks/Wearables

- What can you do when you combine a phone with other sensors/actuators?
  - Step Counters
  - Pollution Sensors
  - Actuated Hugs

inAir (CMU)



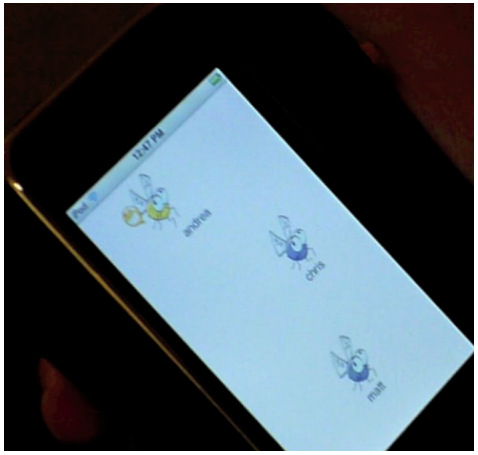
Hug Over a Distance (Melbourne)

Houston (Intel Research)

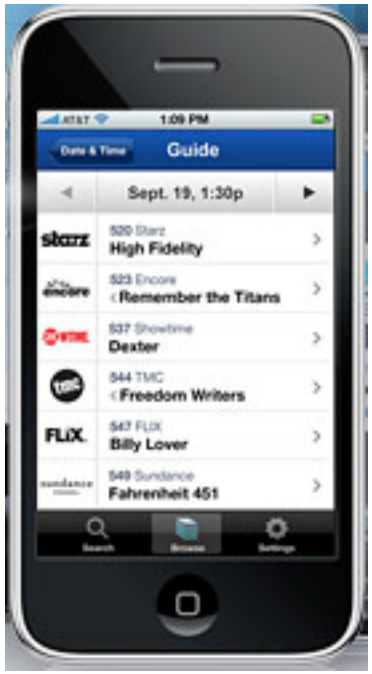
MOTOACTV Android Watch (Motorola)

Companion Devices

- How can mobile devices be used to complement other screens (TV/Computer/Games)?
  - Displaying “private” information
  - Interactions off-screen to not disturb others
  - Different content for different people
  - Twitter / other social interaction around TV



BackTalk (Media Lab)



DIRECTV iPhone app

Enterprise

- How can mobile devices be used in a work context?
  - Routing people more efficiently
  - Getting additional information about products from web / checking inventory
  - Automatic check-in based on Bluetooth ID

RFID Reader

QR Code for Wikipedia

Form teams

- 15 minutes

- Solidify your team and choose a topic area
- Topic ideas (don't feel limited!): Music, Photography, Video Sharing, Experience Sharing, Urban Computing, Mobile Persuasion, Health and Wellness, Fitness, Shopping, Alarm Clocks, Travel, Location Sharing, Social Computing, Coordination, …

- Use Google Doc to record team info: http://goo.gl/6iJ62l
- Sign up for a recitation/studio section on chalk board

- Lecture continues in 15 min on field methods for evaluation

Getting inspired by real data

- Best concept ideas come from observations of real people doing real activities
- Can see what does not work for them today
- Can understand what's the most important/ fun/relevant in what they do today

- At Yahoo, start all work from domain area before thinking of particular concepts

Pick a topic area and explore…

My group at Motorola studied:

- in-family communication (2002)
- photo sharing (2003 & 2007)
- music use (2005)
- location sharing (2006)
- social television (2007-2009)
- trips to sporting events (2008)
- intergenerational distance communication (2010)

At Yahoo, we're studying:

- teen use of communications apps (2013)
- social television (2013)
- personal finance (2013)

Inspiration for Design

- Design of a new application/service should be grounded in daily realities
- Should work with how people think about each other, their environments, and the world

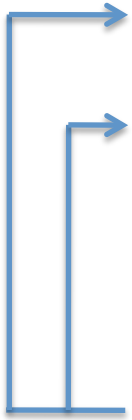
- Need to get out into the world to learn this…

Studying Mobile Interactions

- Interactions happen in the world
- Interactions are generally private and not directly observable
- Interactions are short and spread throughout the day

- You can't just invite someone to a lab and ask them to show you what they usually do

Rapid UCD Process



1. ethnographic-style investigations in a new space of interest
2. concept generation and prioritization
3. initial prototype implementation (days or weeks)
4. field test of new system
5. iterate
6. product decision
7. work with marketing, design, engineering, and sales teams to create product version

Can stop work at any time if value is not shown

Steps to initial ethnographic-style research

- Define research questions
  - What do you need to know to create your new service / application?
  - Focus on understanding current practices
- Choose appropriate methods to answer them
  - Observation, interviews, home tours, diary logging, etc.
- Recruit users
  - Generally 7-10 is sufficient, stop when you see repeat data
- Conduct Study
- Analyze Data (next class)
- Design! (first class in March)

Example Research Questions

Intergenerational Communication Over Distance

- How do participants communicate with remote family/closer relations? What tools do they use?
- What are the barriers to remote communication? What challenges do people face in maintaining or engaging in remote communication?
- What communication tensions and obligations exist surrounding remote communicate for the elderly?
- What are differences between communication at a distance and communication when remote relatives visit?
- What artifacts in the home serve to promote remembrance of and communication with distant family?

Use of Location in Phone Calls

- During communications with others, what location and activity information is provided?
- Under what circumstances is this activity and location information disclosed?
- Why do people disclose location and activity information?
- How are disclosures of activity and location similar? Different?

Music Usage

- What breakdowns exist in today's music experience in both independent and co-located situations?
- What contextual (from the past and the present) metadata can be used to address the breakdowns in today's music experience as identified in previous question?
- How can this contextual information be used to enhance today's music experience?

Methods

- Observation
- Home/Location Tours
- Contextual Inquiry
- Diary Logging
- Interviews

Methods: Observation

- Watch how users interact with a space/object/ each other
- Good for observing many people, findings patterns
- Good when interaction times/locations are predictable
- But only get what, not why

- Used by students for grocery store behaviors, wayfinding in public spaces, booking travel

Methods: Home/Location Tours

- Visit a home or work setting and see particular places of interaction
- Good for tasks which are very context dependent / rely on physical objects

- Used in Elder Communication study, music study (CDs), photo study (photos on display, use of computers, etc.)

Contextual Inquiry

- Having users perform specific tasks in their real context of use
- Used to study tax preparation, music playback behavior, travel booking, work processes, car and navigation tasks, etc.
- Choose specific tasks to observe, find out where people do them, ask them to put themselves in that scenario and act it out for you while “thinking aloud”

Methods: Diary Logging

- Have participants keep a log (paper, voicemail, voicenotes, photos, etc.) when they do particular things of interest
- Get data at time event happens. MUCH more reliable than recall some time later

- Used in almost all of our studies: Elder Communication, Location Sharing, etc.

Methods: Interviews

- Interviews complement direct observation
- Should focus on understanding current practice
  - Ask specifically about the last time they did something that you are interested in, and the time before that…
- NOT future concepts, "how would you like …," etc.
- Generally semi-structured with probes that follow up in interesting areas of use

- Used in every study we've done

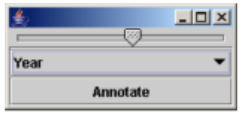
What to watch for…

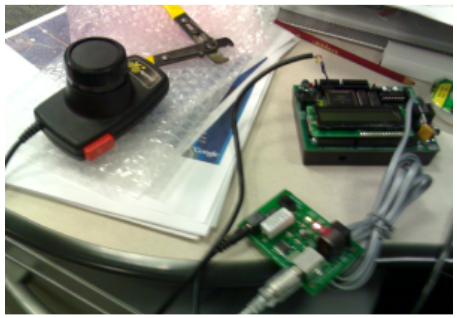
- What do people enjoy…what part of a task makes them smile?
- Where do they get hung up/frustrated?
- What is currently easy/hard for them to do?
- How does their environment appear to play into their use?

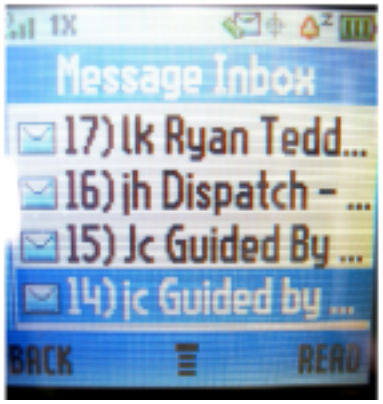
- Write down all of these observations on index cards/post-its

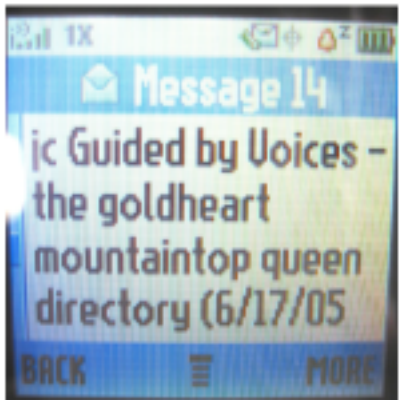
Examples: Music Usage

- Home tours, Interviews, Contextual Inquiry
- 12 participants
- Explored how they searched for, selected, played, and acquired music
- Findings: Satisficing, Ruts + Kicks, More like this
- Designs: Metadata Knob, Playtree, Music Presence





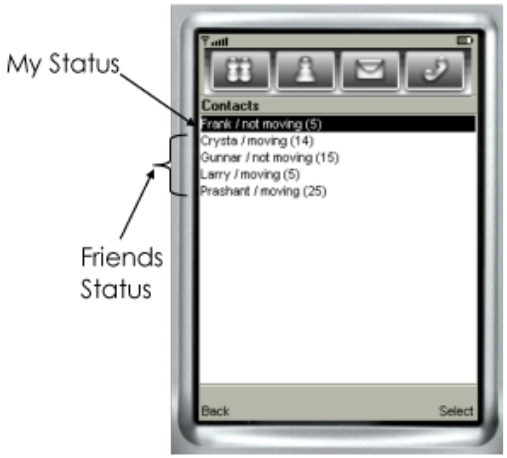


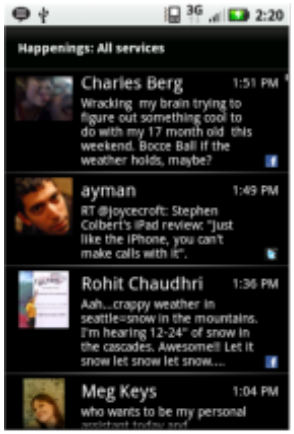


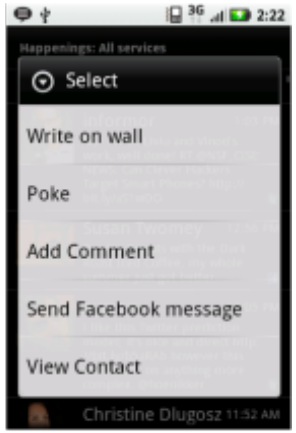
Examples: Location Sharing

- 5 participants
- Recorded phone calls for 1 week
- Interviews + Statistical data analysis of calls

- Findings: People already share basic location context, transition times mostly unknown, confirmation of context confirms availability
- Designs: Motion Presence, Contacts 3.0/MotoBLUR







How to ask questions…

- Don't ask people what they usually do, how they would use/like a particular application/feature, or what they would do in a given situation
- Do ask about specific instances of use ("the last time" and "the time before that" work nicely)
- Do ask questions you have after observing someone, but wait until they are done with what they are doing
- Follow up when you want more information… keep them talking

Assignment: Generative Research

- Goal: To develop understanding of area of interest – inspire design ideas for new applications

- Process: Come up with a few research questions. Choose appropriate methods to answer them. Recruit participants and conduct study by next Tuesday night.
- Write exact quotes or observations on post-it notes – a single idea to a note
- Capture > 75 notes

Examples of notes from Music Study:

P1: “Some of my CDs remind me of a time I had and I like to put it on and remember that time I had with it. Fall always gets me in the mood to play music I always listen to. Me and my sisters sitting on the porch and talking in our Nike sweatshirts. We used to play this song over and over when we went to her house”

P2: “I often don’t like listening to the old stuff because…it sometimes takes me back to somewhere I don’t want to be…”

P6: “She made this CD of music that related to them, she had this basket of CDs at the wedding and everyone took one and the bubbles…”

P1: Has CDs in a stack with no cases – sorts like playing cards

For next class...

- Bring in raw data on > 75 notecards or post-its, each quote or observation on a card
  - Do not start any analysis
  - Do not think of concepts/applications yet

- In class next week:
  - We'll be performing an affinity analysis based on your observations to help inspire new ideas, solutions based in real world problems
  - From analysis, we'll create design ideas for your semester project
  - Do not think of specific applications/services until next class

Questions?

- Let's talk now…
- Additional questions, please email us (sooner better than later!)
- Course website: http://web.mit.edu/21w.789/www/
  - Assignment for next week is posted!

- Ed available during the week
- Frank lives in San Francisco:
  - Available throughout week electronically (email, skype by appt)
  - In-person on Tuesday afternoons (by appt)

- Frank – bentley@mit
- Ed – ebarrett@mit
- TAs: Sean Flynn (spf), Heather Craig (hhcraig), Gordon Mangum (wgmangum)

Now…

- Break into recitation/studio sections
- Develop plan for field studies
- Share with other groups in your section

2 minutes!

- Team Name
- Domain of Interest
- Research Questions
- Methods