MMI 2: Mobile Human-Computer Interaction

Mobile Applications

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Lectures

#	Date	Topic
1	19.10.2011	Introduction to Mobile Interaction, Mobile Device Platforms
2	26.10.2011	History of Mobile Interaction, Mobile Device Platforms
3	2.11.2011	Mobile Input and Output Technologies
4	9.11.2011	Mobile Input and Output Technologies, Mobile Device Platforms
5	16.11.2011	Mobile Communication
6	23.11.2011	Location and Context
7	30.11.2011	Mobile Interaction Design Process
8	7.12.2011	Mobile Prototyping
9	14.12.2011	Evaluation of Mobile Applications
10	21.12.2011	Visualization and Interaction Techniques for Small Displays
11	11.1.2012	Mobile Devices and Interactive Surfaces
12	18.1.2012	Camera-Based Mobile Interaction
13	25.1.2012	Sensor-Based Mobile Interaction
14	1.2.2012	Application Areas
15	**8.2.2012**	**Exam**

Klausur

- Organisatorisches
  - Datum: 8.2.2012
  - Zeit: 10:00 Uhr
  - Dauer: 90 Minuten
  - Ort: in diesem Raum

- Vorbereitung
  - Folien durchgehen
  - Review-Fragen beantworten können
  - Übungen durchgehen, wesentliche Aspekte klarmachen
  - Durchatmen und entspannen

- Fragen?

Review

- Examples of sensors in mobile devices?
- What sensor characteristics important for mobile interaction?
- What does DTW do?
- Why is DTW useful for gesture recognition?
- Use of distance sensors?
- Use of force/pressure sensors?
- Use of microphones?

Preview

- Persuasive computing
- Current and future application areas

PERSUASIVE TECHNOLOGY

Persuasive Technology

- Change attitudes and behaviors
- Motivating users to do something
- Raising awareness of a particular issue
- Change bad habits

B.J. Fogg: Persuasive Technology – Using Computers to Change What We Think and Do. Morgan Kaufmann Publishers, 2003.

Persuasive Technology Defined

- Persuasive technology: Interactive computing systems designed to change people's attitudes or behaviors (through persuasion and social influence, not through coercion or deception)

- Persuasion: An attempt to change attitudes or behaviors or both (without using coercion or deception)

- Difference between persuasion and
  - Coercion?
  - Deception?
  - Propaganda?

- Chances, but also ethical issues

B.J. Fogg: Persuasive Technology – Using Computers to Change What We Think and Do. Morgan Kaufmann Publishers, 2003.

History of Persuasion

- Rhetoric, Aristotle: the art of discourse, determining how to inform, persuade, or motivate in any given situation
    - Giving public speeches to influence listeners
    - Change moods, influence opinions, motivate to action
- Social psychology: Formal study of attitudes and behavior
    - Marketers and advertisers applied these findings
- Rhetoric needs ethical foundation
    - Politics

Examples of Persuasive Technology

- Amazon.com offers suggestions to persuade people to buy more products

- Shareware often tries to persuade users to register and get a license

- Wikipedia tries to persuade its users to support the Wikimedia foundation

- StackOverflow tries to motivate programmers to share knowledge through a reputation system (and persuades other programmers to trust your answers)

- FourSquare tries to motivate people to share information about locations through a reward system (badges, mayorship, points)

Offline Examples of Persuasive Technology

- Posters
- Signs
- Packaging

Source: © Schülerunion Niedersachsen

Source: Amazon, Funny Sign

Source: www.runter-vom-gas.de
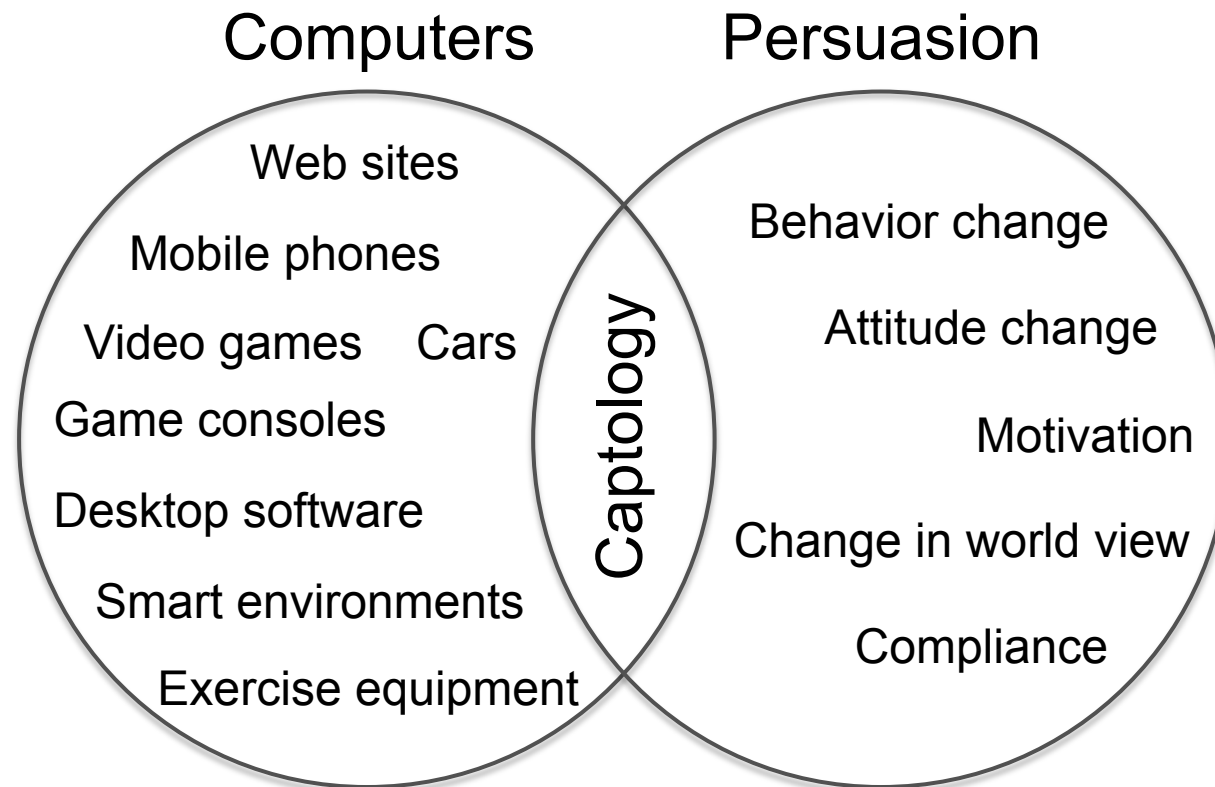

Source: Wikipedia, CrazyD, cc-by-sa

Source: © Rahmenlos

Other Forms of Persuasive Technology

- Advertising and marketing
- Smart toothbrushes that indicate duration & correctness
- Encourage kids to develop better study habits
- Persuade teams to set goals and meet deadlines
- Persuade people to vote
- Raise awareness on environmental concerns
- Preventive healthcare, e.g., quit smoking
- Fitness, motivate to exercise
- Community involvement

Captology (B.J. Fogg)

Captology: "focuses on the design, research, and analysis of interactive computing products created for the purpose of changing people's attitudes or behaviors." (B.J. Fogg)

Computers   Persuasion

Computers:
- Web sites
- Mobile phones
- Video games   Cars
- Game consoles
- Desktop software
- Smart environments
- Exercise equipment

Captology (overlap)

Persuasion:
- Behavior change
- Attitude change
- Motivation
- Change in world view
- Compliance

Computers as Persuasive Technology

- Interactivity
  - Adapt to user input, needs, context, observed behavior

- Persistence
  - Repeatedly (over time) trying to persuade

- Anonymity
  - Less embarrassing in sensitive areas of behavior change

- Access to huge volumes of data
  - Statistics inferred from behavior, recommendations

- Many modalities
  - Text, graphics, audio, video, animation, simulation

- Scale

- Ubiquity
  - Bathroom, bedroom, clothing, cars, toothbrush

Functional Triad (B.J. Fogg)

Persuasion depends on functional role

Tool
increases capability

Persuades by
- making target behavior easier
- lead through process
- perform calculations / measurements that motivate

Medium
provides experience

Persuades by
- allow to explore cause-and-effect relationships
- provide motivating experiences
- help to rehearse a behavior

Social actor
creates relationship

Persuades by
- reward with positive feedback
- "play" a target behavior
- provide social support

Persuasive Tools

- Reduction, simplification
    - Increase cost/benefit-ratio of behavior
    - Amazon "one-click buy"
    - Letter writing: Provide stamped envelope with new address
    - Simplify community participation, urban informatics
        - E.g., take pictures of broken objects in public space, submit to system

- Tailoring, customization
    - Healthcare: Match user's educational level, stage of disease, etc.
    - Vocabulary learning: Graph to compare your level to that of others
    - Fitness: Inform me about air quality where I jog

Persuasive Tools

- Timing is critical
  - Use opportune moment to be most effective
  - Example: Show "why-not-car-pool" to car drivers in traffic jam
  - Suggestion technologies: "now would be a good time to…"

- Self-monitoring

  - Heart rate monitor
  - Observe progress

Persuasive Media

- Simulated experiences

- Cause-and-effect simulations
  - Less threatening to try out new behaviors
  - Compress time to understand long-term processes

- Example: "Rocket's New School"
  - Game for learning social skills
  - A character placed in social situations
  - Player has to decide how to act
  - Player immediately sees effects
  - Accuracy of simulation?
  - Designer bias?
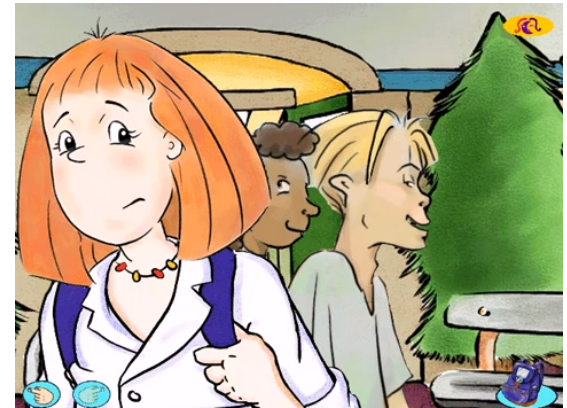
www.youtube.com/watch?v=UGeApdTQJxY

Persuasive Social Actors

Tamagotchi
Tomasz Sienicki, cc-by-sa

- Trigger social responses in humans
- Example: Tamagotchi (1996)
  - Handheld digital pet
  - Egg-shaped device, LCD screen, 3 buttons
  - Play with a virtual pet as though it was alive: play with, feed, bath it; life stages
- Example: Nintendo Pocket Pikachu
  - Digital pet and exercise toy
  - Pedometer measures user's activity
  - The more active the user the fitter the pet
  - Trade "watts" for game items
- Breakaway: Sculpture lumps over if no break, desk setting

Pokémon Pikachu

Jafarinaimi et al. Breakaway: An ambient display designed to change human behavior. CHI 2005 Extended Abstracts.

Social Cues

Aspects that lead us to infer social presence

Cue	Examples
Physical	Face, eyes, body, movement, attractiveness
Psychological	Preferences, humor, personality, feelings, empathy, apology, similarity
Language	Interactive language use, spoken language, language recognition
Social dynamics	Turn taking, cooperation, praise for good work, answering questions, reciprocity
Social roles	Doctor, teammate, opponent, teacher, pet, guide

B.J. Fogg: Persuasive Technology – Using Computers to Change What We Think and Do. Morgan Kaufmann Publishers, 2003.

Oscilloscopes with Personality?

- Company usability research (Fogg):
  How do engineers feel about
  oscilloscopes they use?

- Existing text and error messages
  somewhat harsh and unfriendly
  - Designers did not expect users to infer a "personality"

- Controlled study: original messages vs. improved ones
  (new "personality" = helpful senior engineer)
  - Test users judged new design as more accurate,
    more knowledgeable

B.J. Fogg: Persuasive Technology – Using Computers to Change
What We Think and Do. Morgan Kaufmann Publishers, 2003.

Persuading by Adopting Social Roles

- Joseph Weizenbaum's ELIZA (1966)
  - Simulated psychiatrist
  - Simple natural language processing, pattern matching, response generation
  - Example:
    User: "My head hurts"
    Eliza: "Why do you say your head hurts?"
  - Weizenbaum was surprised that system was believable to users

woman: Men are all alike.

eliza: In what way?

woman: They're always bugging us about something specific or other.

eliza: Can you think of a specific example?

woman: Well, my boyfriend made me come here.

eliza: Your boyfriend made you come here?

woman: He says I'm depressed much of the time.

eliza: I am sorry to hear you are depressed.

…

Source: http://www.stanford.edu/group/SHR/4-2/text/dialogues.html

Mobile Persuasive Computing

- With the user most of the time
  - Intervene at the right time and place
- Example scenario: "Study Buddy"
  - Pamela sits in college library, starts phone app "Study Buddy", congratulates her for studying the 3rd time today, shows term's goals, suggests vocabulary review, then reading assigned chapters, shows shapes of classmates who are also studying; Jean (Pamela's mentor) can send tactile cues to encourage her
- Example scenario: "HydroTech"
  - Phil trains for NYC marathon, Phil gets tiny device implanted under skin of forearm to measure hydration level, sends data to watch, watch tracks position and communicates with "HydroTech" backend system, recommends hydration level

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Opportunities for Mobile Persuasion

- Strategies: Tracking, analysis, reference material
- Support real-world tasks
- Intervene at the "opportune moment"
  - Location, routine, time of day, task
- Fill idle times
  - Device always available, instantly on, convenient
  - Example: simple game to train how to sort recyclables
- Be "companion" over longer time spans
  - Example: Device to help quit smoking, 1st week: press button every time smoking, 2nd to 6th week: only smoke when signal
  - Example: Pedometers, count steps over the day, report to Web

Application Areas of Mobile Persuasion

- Healthcare
- Safety
- Community involvement
- Personal improvement
- Education
- Raising awareness of a particular issue

Persuasion through Connected Technology

- Exchange date with remote devices and people
- More up-to-date information
- Virtual presence
- Social influence
  - Competition, cooperation, recognition
  - Compare to others
  - Compare to "in-group" (classmates, team, family, work group, etc.)
  - Example: reporting physical activity (e.g. jogging paths) to the world
  - Fish'n'Steps: Pedometer linked to virtual fish, displayed with fishes of other users
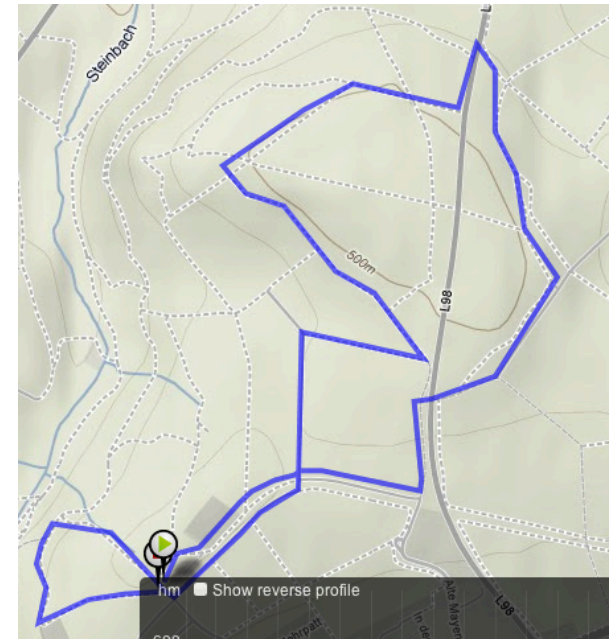
Lin et al. Fish'n'Steps: Encouraging Physical Activity with an Interactive Computer Game. UbiComp'06.

The UbiFit Garden System

- Support behavior change towards physical activity
  - Difficult to maintain new behavior long-term
- Design strategies
  - Abstract & Reflective
  - Unobtrusive
  - Public
  - Aesthetic
  - Positive
  - Controllable
  - Trending / Historical
  - Comprehensive

Consolvo, McDonald, Landay: Theory-Driven Design Strategies for Technologies that Support Behavior Change in Everyday Life. CHI 2009.

Application Areas of Mobile Systems

Emerging Application Areas

- Social web, mobile communities, and friend finders
  - Mobile messaging, mobile presence
- Location-based and context-aware gaming
- Mobile and context-aware advertising
- Mobile learning and educational applications
- Mobile health and mobile fitness

- Generic mobile devices as application platform
  - Apple's iPhone App Store
  - Android Market

Emerging Interaction Qualities

- Shift away from utilitarian interaction
  - Towards more playful forms of interaction
  - Towards more socially relevant forms of interaction

- Mobile interactions performed in leisure time and in the presence of others
  - Mobile interactions understood as a form of self expression
  - Aspects like the joy of doing, pleasure of interaction, emphasis on the contextual, as well as the social setting become important

- Characteristics of interaction with personal devices
  - Direct manipulation
  - Physically metaphors
  - Affective dimension

Mobile Social Networks

- Social networking was surprise growth area
- Facebook, Twitter, MySpace
- More people mobile so…

Mobile operators see 10 times more potential in social networking
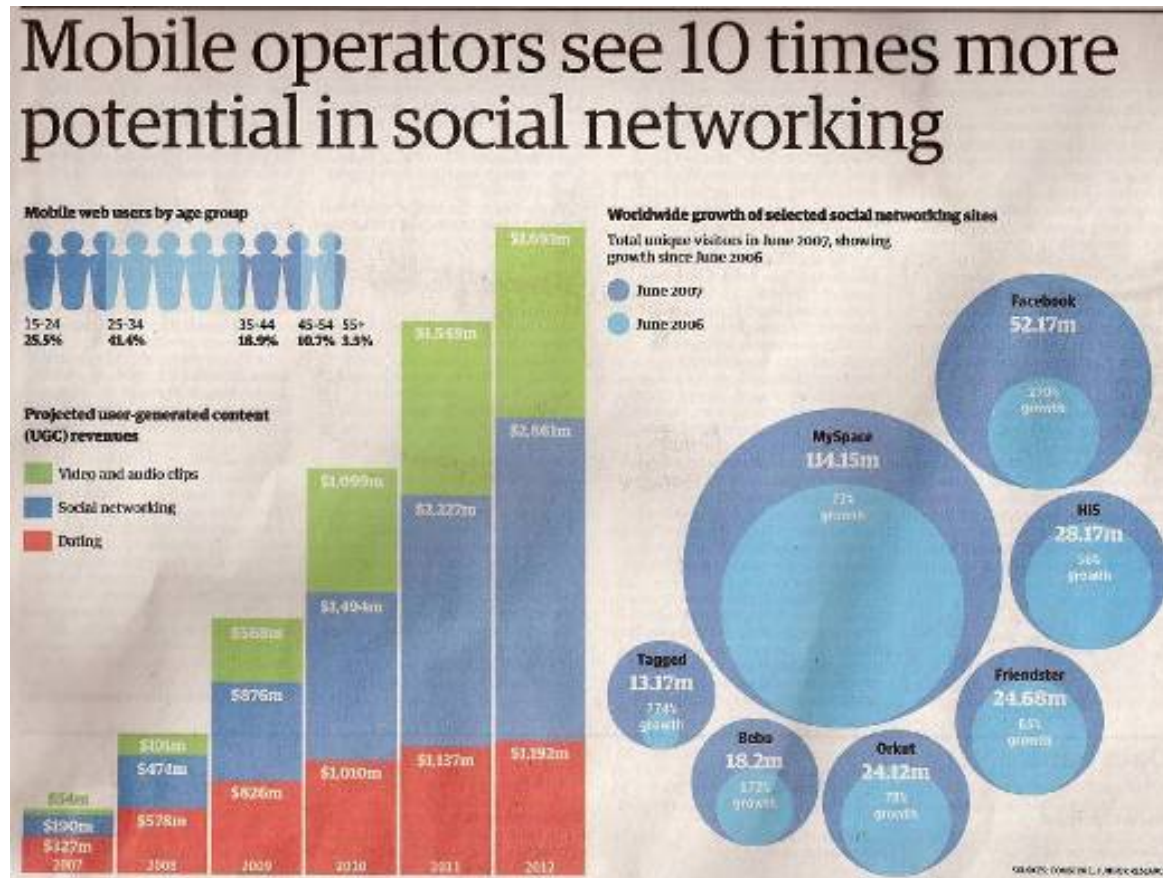
Foursquare

- "Make lists of your favorite things to do and let you share them with friends."

  – Points: foursquare check-in (+1), finding a new place (+5), dragging friends along with you (+1)

  – Badges: discovering new places, traveling to far-away places

  – Mayor: been to a place more than anyone else
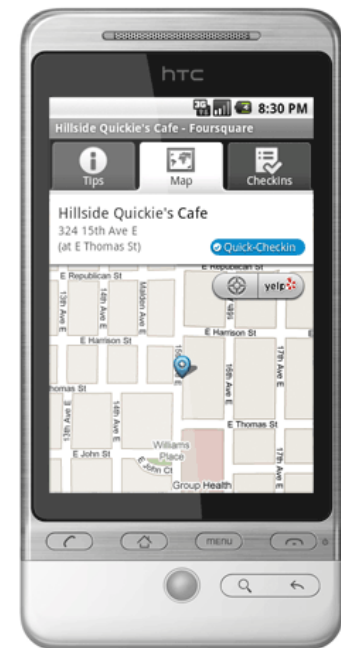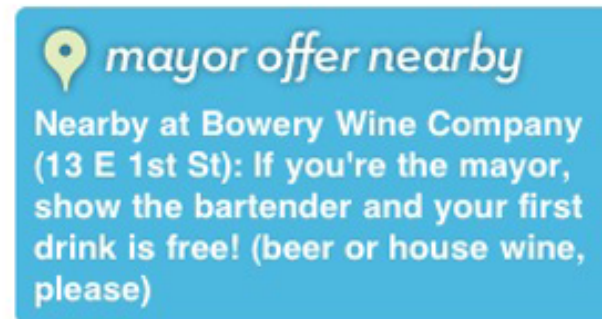
Mobile Gaming

- Rolando (iPhone)
  - Tilt-controlled game
  - Physics simulation
  - http://www.youtube.com/watch?v=Sd1tfTwWZtU

- Fieldrunner (iPhone)
  - Touch-controlled game
  - http://www.youtube.com/watch?v=4p_WhzB24ZU

Mobile Learning

- Mobile devices for ubiquitous media access
  - Streaming lectures
  - YouTube on iPhone
  - PodCasts
- Contextual learning
  - E.g. outdoor biology class
  - Connection to other learners
- Capturing data
  - Location, camera, sensors
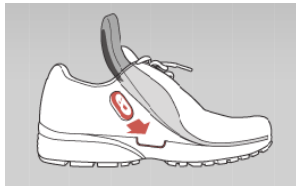- Lifelong learning
  - Using waiting situations for learning

ShareYourBoard

- Rapid sharing of whiteboard sketches
- Computer vision to help find border of whiteboards
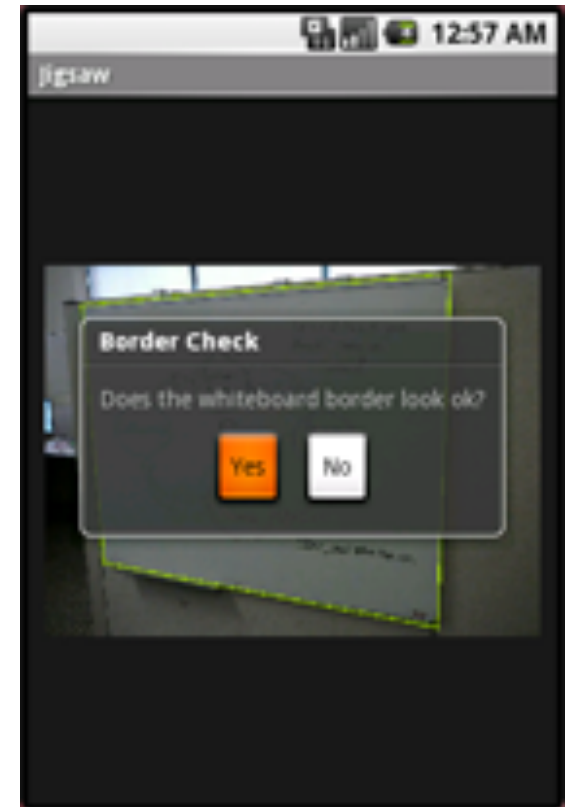
Mobile Health & Fitness

- Mobile applications
  - Absolute Fitness
- Mobile technology
  - Nike + iPod
- Persuasive technology

Mobile Info Guides

- Mobile content guides (museums, city tours)
- Deliver live, matched and interactive content to locative settings
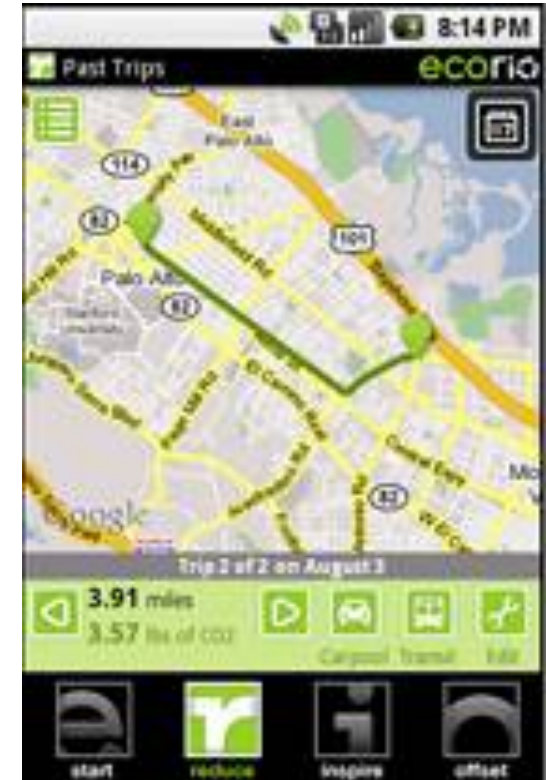- Incorporate information, interaction, entertainment, guidance

(REXplorer)

- http://hci.rwth-aachen.de/REXplorer

Ecorio – Track Carbon Footprint

- Make users aware of environmental impact

- Transit planner with a twist
- Records trips you take
- Suggests alternative transit models
- Calculates carbon emission & fuel cost
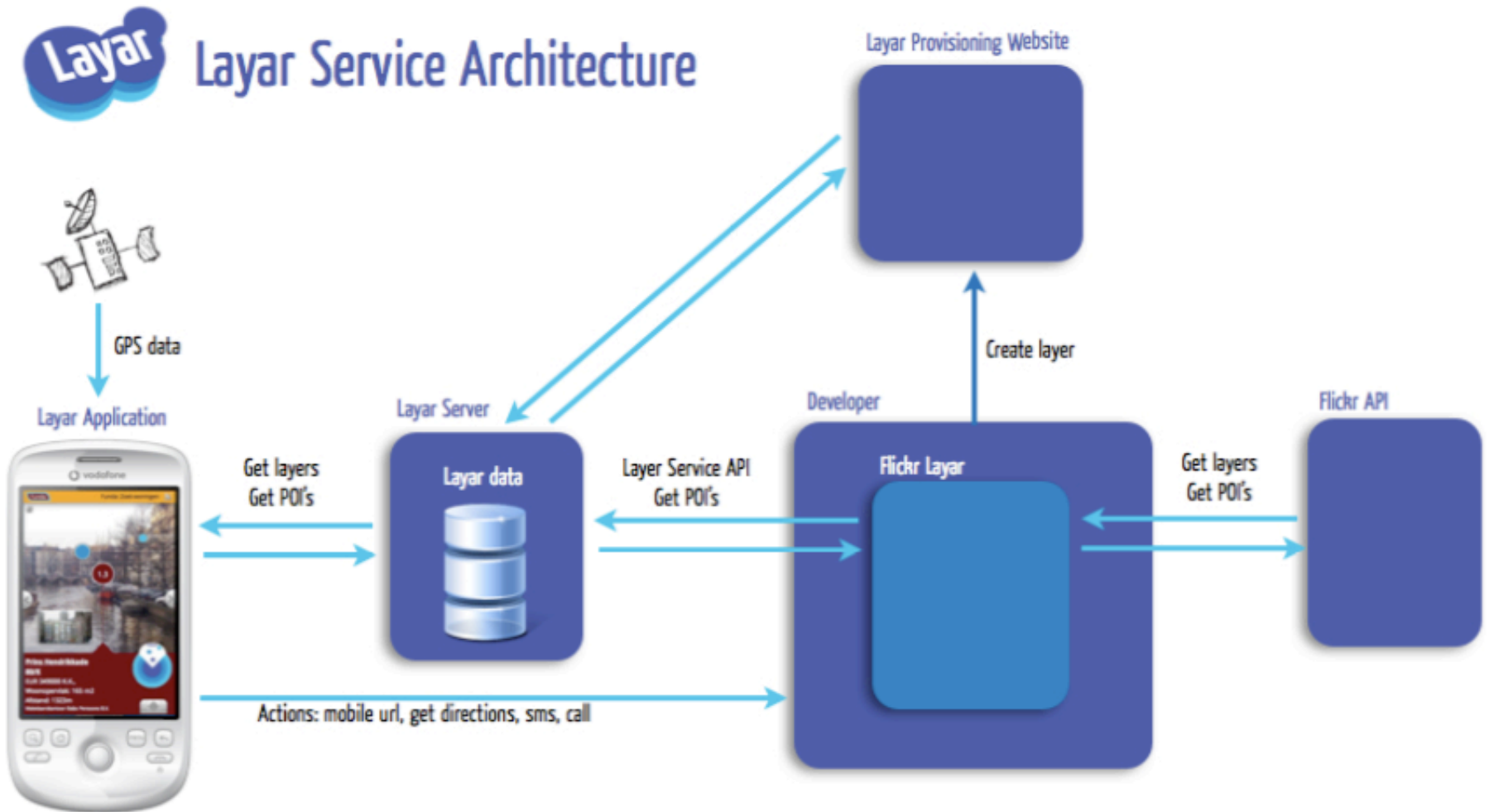- Estimates gains/losses from alternatives

Layar "Reality Browser"

- Position + orientation

  GPS, accelerometer, magnetometer

- Show POIs as overlays on viewfinder image

- Platform allows inserting new layers and POIs

- Layers

  – Real estate

  – Transportation

  – Tours / Guides

  – Eating & Drinking

- http://layar.com/

Layar Architecture

Layar Service Architecture

GPS data

Layar Application

Layar Provisioning Website

Layar Server

Create layer

Developer

Flickr API

Get layers
Get POI's

Layar data

Layer Service API
Get POI's

Flickr Layar

Get layers
Get POI's

Actions: mobile url, get directions, sms, call

Mobile Media Sharing

- Web based media sharing

- Upload data from mobile device

- Web service for storage and distribution

Live Video Streaming

- Stream video from mobile devices for live use

- 12SecondsTV, QIK, iReport (CNN)

- User-created content

- "Live" YouTube

- http://12seconds.tv/

- http://qik.com/

- http://www.ireport.com/index.jspa

Mobile Commerce (m-Commerce)

- Two types of commerce
- Mobile apps as marketplace
  - Apple's iPhone App Store
  - Google's Android Market
  - Nokia's Download Store

- Mobile devices as carriers of commercial exchange
  - Credit card, wallet, cash replacement
  - Wireless transaction
 - Billing via mobile phone bill

Application Genres

- Games
- Entertainment
- Services
- Social Networks
- Music
- Productivity
- Lifestyle
- References (Lexicons etc)
- Travel
- Sport

- Navigation
- Health & Fitness
- News
- Photography
- Finances
- Business
- Education
- Weather
- Books
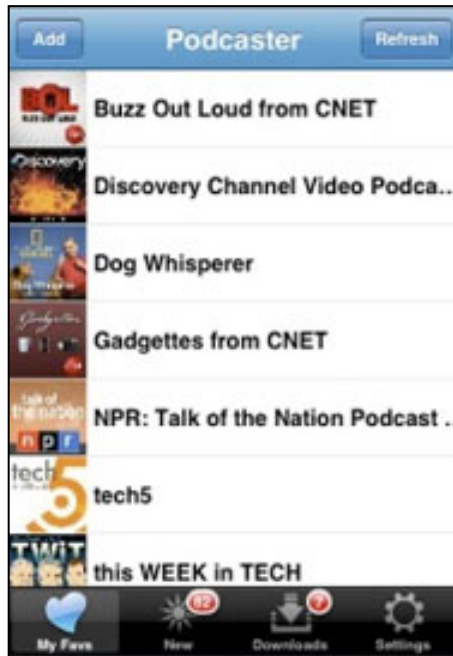- Medicine
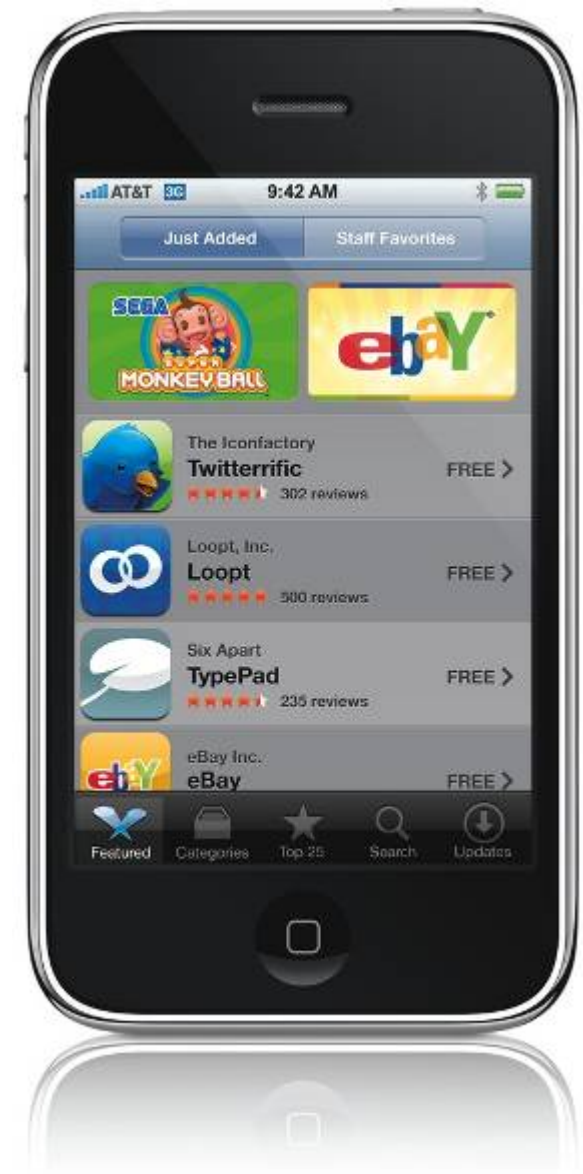
Apple App Store

- Opened July 10, 2008
  - January 2012:
  - 550000+ apps
  - 10 billion total downloads
- Third-party applications
  - 70% to developers
  - 30% to Apple
  - Annual fee: US$99
  - Approval by Apple (e.g., no duplication of built-in apps)
- iOS apps exclusively through App Store

$\times 10^3$

Available apps vs. Date

$\times 10^9$

Downloads to date vs. Date
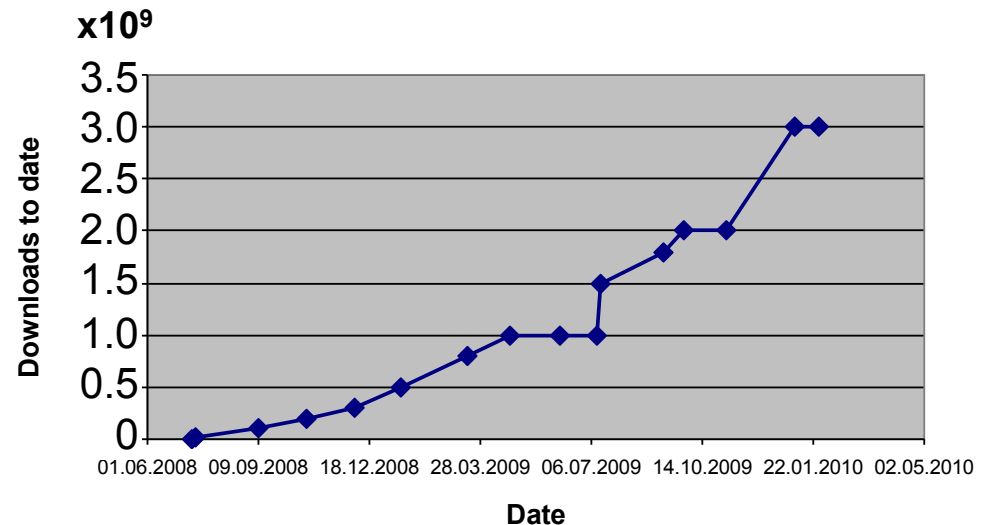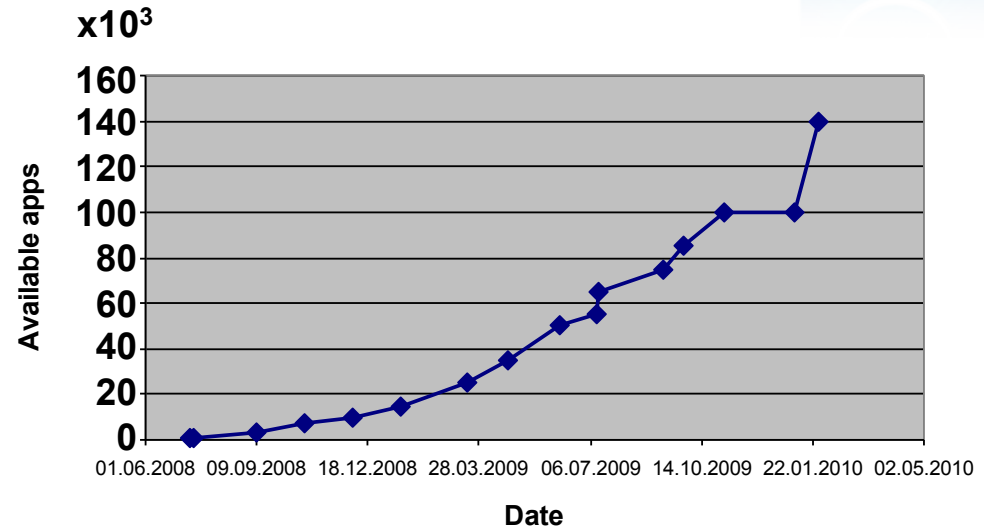
Approval by Apple

- No duplication of built-in functionality
  - No email clients, SMS client, etc.
- No offensive content

Armin Heinrich

I Am Rich
Category: Lifestyle
Released Aug 05, 2008
Seller: Armin Heinrich
© 2008 Armin Heinrich
Version: 1.0
0.1 MB

$999.99 BUY APP

"The red icon on your iPhone or iPod touch always reminds you (and others when you show it to them) that you were rich enough to afford this. It's a work of art with no hidden function at all."
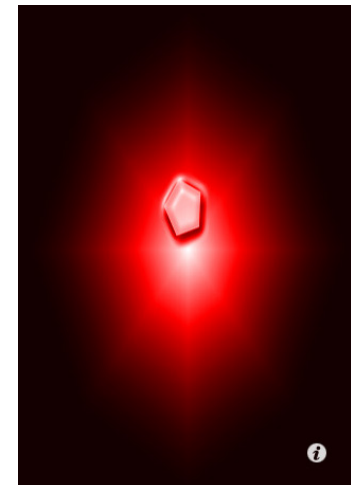
Android Market

- Operated by Google
- Opened 22 October 2008
  - Paid apps started February/March 2009
  - 400000+ apps (January 2012)
  - 10 billion downloads
- Third-party applications
  - 70% to developers
  - 30% distributed between carriers
  - Registration fee: US$25
  - Purchase refund: 15 minutes (was 24h)
- Android apps also through other sources

The End