User Interface Design for Mobile Phones

Dr. Ulrich Leiner, Siemens ICM

Huajuapan de León, Oaxaca, Mexico, Nov. 2003

Overview

- Siemens Information and Communication mobile (ICM)
- UI Design at Siemens ICM
- Usability testing
- User Interface concepts for mobile phones
- User Interface innovations

Siemens a global player

- Siemens in general
- Information and Communications: Automation and Control
  - Power
  - Transportation
  - Medical
  - Lighting
- #3 company in Germany
- #7 company in Europe
- #23 worldwide
- Over 450,000 employees,
  - 75 Billion US$ revenues

Personal Presentation

- Dr. Ulrich Leiner
- 1976 - 84 Study of Mathematics and Computer Science, Technical University Munich (TUM)
- 84 - 89 PhD in applied mathematics TUM
- 89 - 98 Siemens Corporate Technology Topics: Computer graphics, multimedia, user interface tools and projects
- 98 - 99 User Interfaces for mobile phones
- 2000 - 03 Team manager UI-Concepts for mobile phones
- Current Team: 6 internals, 6 consultants, 3 students

1976 - 84 Study of Mathematics and Computer Communications

#7 company in Europe
Users Interface Design for Mobile Phones

Recent achievements
- First to market with Java-enabled devices
- First to launch cordless phones with SMS functionality
- First to launch a handset with built-in MP3 player and exchangeable multimedia card
- First to implement fully operational 3G networks in Europe

Recent achievements
- First to market with Java-enabled devices
- First to launch cordless phones with SMS functionality
- First to launch a handset with built-in MP3 player and exchangeable multimedia card
- First to implement fully operational 3G networks in Europe

ICM Products and Position

ICM is #1
- Cordless Phones
- Prepaid Solutions
- GSM Railway networks

ICM is #2
- Mobile Switching
- Wireless Modules

ICM is #3
- GSM/UMTS Networks

ICM is #4
- Mobile Phones

ICM Products and Position

Cordless Phones
- Cordless phones for voice services
- Cordless phones for voice and data
- Home-networking and cordless internet access
- Wireless modules

Mobile Phones
- Mobile phones for voice services
- PDAs for voice and data
- Accessories

Technology Drives Convergence

- Exponential growth in microelectronics
- Increasing bandwidth in communication
- New software paradigms
- New materials
The ICM Competence Center for User Interface Design

Founded in 1995, we are responsible for all user interface issues in the telephony domain, including:

User Interface Innovations:
- User innovation concepts for the future.

Conceptual User Interface Design Cordless Phones:
- In-house communication usable for everyone.

Conceptual User Interface Design Mobile Phones:
- Ensure easy-to-use mobile communication.

User Interface Alignment and Design for All:
- Harmonisation of user interfaces for all users.

Usability Evaluation:
- Testing of user interface and user guides; benchmarking and standardization.

The ICM Competence Center for User Interface Design

- 19 employees
- 13 consultants
- About 10 Students
- Electrical Engineers
- Computer Scientists
- Mathematicians
- Physicists
- Teachers
- Usability Engineers
- Technical Writers
- Designers
The ICM Competence Centre for User Interface Design

UI Innovations

Process of co-operation and feedback

Conceptual UI-Design CP / MP

UI Evaluation

Realization of new products

Goals and Obstacles of UI Design

Increase Usability

Increasing number and complexity of features

Reduce development time and resources

Cope with constraints like device size, costs or processor limits

How do we realize MP UIs

UI Concepts

Methods and Examples

Major challenges

- Division of work throughout departments
  - Consumer Marketing, Strategy & Marketing
  - Technology & Innovation, Research & Development in 4 Segments
  - Integration & Test, Applications & Services

- Cooperation with ODMs
  - Quanta, Microcell
  - Cellon, TTPCom

- Distribution over different locations
  - Munich, Kamp-Lintfort
  - Ulm, Salzgitter
  - Aalborg, San Diego
  - Beijing, Manaus?
Worksplit and Cooperation

Live a clear process with mutual review at the delivery points

Collect Requirements
Create Concepts
Implement the UI
Evaluate Concepts

How do users communicate? What functionality do they need?

Worksplit and Cooperation

Be clear and explicit

- All input options must be found and understood efficiently and clearly

Examples:
- Use icons only in combination with text labels
- Use direct access to features, do not rely on long press as the only access to any feature
- Use easy to understand wording, do not use a technology driven or high level language for feature description (e.g., network sync, inscriptions)

Basic UI Design Guidelines

ISO 9241-10

- suitability for the task
- controllability
- self-descriptiveness
- conformity with user expectations
- error tolerance
- suitability for individualization
- suitability for learning

- All solutions must use these basic goals as check-lists for compliance

Consistency

- Aspire a high level of consistency on these 4 essential levels:
- Do the same task the same way
  - throughout the device
  - in the next device generation
  - throughout Siemens devices
  - throughout the industry

- Actions which are logically identical or closely related to each other should be offered and performed in the same way.
- Interaction patterns shall be defined and implemented for these tasks.
- Each mobile phone shall support and realize the company-wide objective of UI-convergence and harmonization throughout all communication terminals
The user acts, the device reacts (user controled devices)
Device reactions are initiated and forced by preceding user actions, not vice versa.

Examples:
- Therefore timeouts, unsolicited hints or dialogs should be used in a reserved manner, if at all.
- Automations are based on assumptions about the user and his preferences. State-of-the-art technology is in most cases still not able to guess them right, hence it is preferable not to offer such features.

Timeout after 2 seconds

"Unfair" design in favor of the main applications and core scenarios

- The most important and most often used applications or usage sequences shall be preferred over more exotic and seldomly used ones.
- This applies to the number and positioning of steps to perform a task as well as its position in the menu hierarchy.

Examples:
- Access to phonebook directly from idle
- But alarm/wave setting in menu on level 5

Offer redundancy rather than one way only

- Mental models of users will be different, you will increase the change of hitting many of them by offering more than one way to perform a task.

Examples:
- Prefer redundancy over functionless keys
- Design for shortcut, speed ups and other power user functions

Don’t forget about the fun of use!

Miscellaneous

Examples:
- Inbox messages
- Outbox messages
- Other messages
- RSS feed
- Weather
- News
- My phone
- More...
How UI-Concepts are realized

- Example Camera
  1. Check Feature list for Camera features
  2. Collect user requirements
  3. Develop usage scenarios
  4. Design a solution for a given display and keypad
  5. Discuss the concept with as many people as possible
  6. Make as many usability tests as possible

Efficient Creation of UI-Specification

- Separate logic from layout
  - One logic — many layouts

Efficient Creation of UI-Specification

- Separate basic interaction patterns from feature description
  - Categorize common patterns of interaction
  - Develop default solutions for each interaction type
  - Reference them during feature description

New UI for

- Fewer keys offer less control ambiguity
- Only 1 navigation key (except X1)
- One model without a 12-keypad
- Radically simplified and consistent ‘flat’ menu
- Quick and simple-to-use features
- State-of-the-art voice recognition
- Graphics and displays with attractive animations
UI Innovation for Generation 65

- Center Selection
  - Easy and straight ‘Going into/OK’ function

- Themes - Skins
  - A downloadable set of resources (animations, sounds) which can be designed around one topic and can be set by a single click

- Avatar/Assistant
  - Offer a more emotional way of communication with the mobile phone

Tester’s Feedback

- Great feedback from magazines, web test sites

  - C55
    - GMBBOX.CO.UK: “Very simple, intuitive and fast in setting up”
    - Chip4Asia: “I am highly intuitive, as is often the case with Siemens handsets”
    - WWW.Xonio.com: “Concise menus, intuitive control keys, clear navigation paths”
    - Mobile bum.com: “Simple and logical menu navigation makes the C55 nice to use”

  - S55
    - Mobile Choice (UK 5/03): “has superlative looks and is extremely user friendly”
    - Menu reviews.infotabsonline.com: “UI is clearly modelled after the standard Siemens interface with a few excellent additions... simply brilliant”
    - Focus (focus.msn.de): “The S55 does hardly let any usability wish unsatisfied. Other manufacturers can take a leaf out of their book.”

Innovative Challenges in UI Design

- Miniaturisation
- Fun of use
- Featurism
- Hybrid devices and convergence products
- Target-group specific design
- International and global user interfaces
- Pressure to innovate
- Time to market
Challenge: Miniaturisation

- Touch the 3rd dimension...
  - Capacitive Touchscreen Sensor tracking x-, y- and z-co-ordinates of the user’s finger
  - Alphanumeric input: showing a large keyboard on a small display enlarging the approached key
  - User Interface: Menu and list browsing
  - Games

Challenge: Fun of Use

- The Living Device
  - Create a personality with emotional expression, which seems to live inside the device
  - Lasting appeal through variety and surprise
  - Utility and entertainment
    - Accompanying/explaining existing functions
    - Be a visual frontend for network agent and artificial intelligence applications
    - Represent the user in virtual environments (Avatar)
    - Autonomous acting in idle

Next steps
- Accessory
- Stand-alone pen phone (the pen is the phone)
- Beam pen phone (the pen is the user interface)

Examples
- Avatar acting as assistant explaining the use of the device and responding to system states
- Avatar reading messages via text-to-speech
- Avatar acting autonomously in idle with varying behaviours
Challenge: Fun of Use

- Virtuality and Reality become Indistinguishable
  - A New Gaming Concept
  - Bring Reality to Gaming
  - Enrich Surroundings with Gaming Content
  - Requires Only Integrated Camera and Image Processing
  - Perfect for Mobiles

Challenge: De-features a product

- The Web-Mate, a user interface tailored to surfing the web
  - Small device specially designed for web-surfing
  - Dedicated user interface
    - Browser buttons for easy access to frequently used functions
    - Landscape format
    - Scroll’n’Select-Wheel
  - Device type: Concept and user interface prototype

Challenge: Pressure to Innovate

- Electronic Paper
  - Flexible Displays offer freedom in design
  - The display can be rolled out of the mobile phone
  - Large displays can be used for electronic newspapers
  - New user-interface paradigms required

Summary

- Good User Interface Design is decisive for the acceptance of and satisfaction with a product
- Hence it is decisive for your revenues and economical success
- So it is worth studying, investigating and making progress!

¡Muchas Gracias por su atención!