Wide commercial adoption of improvements in Mobile HCI

- Enabling simply great mobile phones

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Contents (six themes)

1. Reaching the mass-market
   … Beyond good ideas

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   … The special significance of the mobile phone

3. Breakthrough applications, services, and user models
   … Picking the drivers of change

4. Risks and challenges
   … Issues that could spoil the party (executive worries)

5. The role of an operating system
   … Why HCI specialists should care about operating systems

6. Next steps
   … Further reading – and more
Personal context: Three brains

- My **biological brain**
  - ... 45 years of data
  - ... In need of a very serious de-frag (and lots more besides)
- My Psion Series 5mx PDA
  - ... 10 years of data
  - ... Closest to my heart
- My Samsung SGH-D710 **smartphone**
  - ... Communications, content, commerce – and convenience
  - ... Mobile window to the digital world (Opera, Google, BBC, EBay…)
- Forgetting my Compaq Evo N400c laptop
  - ... Love-hate relation
  - ... In some ways the most powerful, in many ways the least immediate

Before long, most people will have two active brains
“Smartphones” defined?

- Kitchen-sink included?
- Complex phones?
- Awkward phones?
- Expensive phones?
- Phones that are computers?
“Smartphones” defined

• Mobile phones with significantly increased capability –
  … Greater on-board intelligence (software & hardware)
  … Larger on-device data storage
  … Better connectivity to networks & to other devices
  … Larger, clearer, colourful screens
  … Easier input of data (via pens, keys, voice…)

• With easier programming of the on-board intelligence

• – And retaining their original phone attributes
  … Pocketable, reliable, long battery life, inexpensive, simple
  … Great integrated mobile voice communications
Three waves of mobile telephones

Voice centric

Rich experience

Open phones

Phone functionality

~2000

~2004

- Great communications
- Voice (& text)
- Pocketability
- Size
- Weight
- Battery life
- Robustness
- Reliability

- Graphics display
- Colour
- Camera
- Audio: Ringtones+
- Video
- Memory
- Information
- Personalisation

- Rich programmability
- Innovation
- Virtuous cycle
- Applications & services
- Personal productivity
- Business productivity
- Mobile commerce
- Customisability

MobileHCI 04

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The smartphone market virtuous cycle

Next generation open mobile OS
Rich component technologies
(hardware and software)

Consumers & enterprises
Develop mobile services, content & applications, boost ARPU (data & voice)

Developers
Roll out 2.5G & 3G networks
(packet, high bandwidth, roaming, low latency)

Handset manufacturers
Deliver large volumes of advanced open mobile phones

Networks
Infrastructure Architecture Open standards
Aside: More on network effects

- “The slow pace of fast change
  …Bringing innovations to market in a connected world”
  …By Bhaskar Chakravorti

- Disruptive innovations have to precipitate the dismantling of an existing equilibrium
  …And help orchestrate the transition to a new equilibrium
  …(Supply the “activation energy”)

- Demi-Moore’s Law :-)
  …Disruptive change takes twice as long as Moore’s Law predicts
The single most important strategic driver

• **Volume phone sales**

  …Sales volume is the biggest driver of confidence – success breeds success

  …The value network (“ecosystem”) naturally invests in volume platforms

  …Volume sales takes the best advantage of the fixed cost nature of software development

• **So, how will volume sales happen…?**
Smartphone BOM cost decline

*BOM Cost ($)

- 2002: $132*
- 2003: $115*
- 2004: $78*

*Minimum BOM cost for implementation of Symbian OS – software costs subsumed into Semiconductor items

Source: Symbian analysis based on published data and industry interviews
Smartphone addressable market

Unit sales (Millions)

2002 2003 2004 2005 2006 2007 2008

BOM cost ($)

$132 $115 $78

Minimum specification bill of materials
Addressable market
Total handset sales

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Smartphones will sell well provided...

• They allow users to build on & do more of the things that caused users to buy phones in the first place
  …Communication (and messaging)
  …Fashion & fun (personalisation)
  …Safety & connection (timely info in context)

• AND they allow users to do these things **simply**
  …(Even though the phones themselves are increasingly complex)

  …It’s easy to make something **hard**
  • **It’s hard to make something easy**
Six dimensions of meeting extra user needs
(building upon core phone features)

1. **Gaming capabilities**
   ...Multi-player games; mobile access to online worlds

2. **Entertainment**: Filling “slack time” enjoyably
   ...Audio, Graphics, Video, Quizzes, Horoscopes

3. **Personal productivity**: Scheduling, jotter, to-do’s

4. **Business productivity**: Access to corporate data

5. **Easy access to tailored information**
   ...Location, navigation, presence, neighbourhood, education

6. **Electronic commerce (electronic wallet)**
   ...Buying, selling, banking, gambling...
Accelerating the future: Network effects, Viral marketing, Super-distribution

- Peer-to-peer: not just client-server
- Communications via Bluetooth/WiFi too
- If you don’t have one of these phones:
  ... You don’t just feel Envious
  ... You get Excluded
A hint of the future: Japan

• “Mobile disruption
  …The technologies and applications driving
  the mobile internet”
  …By Jeffrey L. Funk
• Successful industry coordination
• Portable entertainment players
• Mobile marketing
  …Discount coupons
• Mobile shopping – catalogs etc
• Navigation services
• Phones as tickets & money
• Mobile Intranet Applications
  …Mail, Groupware, SFA…
Degrees of openness

- Java provides restricted access to upper levels of phone functionality
- C++ provides much richer access
  - Native programming interfaces greatly multiply the overall opportunity
- C++ enables ecosystem of middleware suppliers
- Rich openness assists
  - Add-on applications and services
  - Enterprise customisation
  - Operator differentiated service creation
  - Differentiated device creation
Challenges and risks – 1

• **Users’ concerns**
  
  ... “I do not want bad surprises when I receive my telephone bill”
  
  ... “I want my personal data to stay personal”
  
  ... “No viruses please!”
  
  ... “And keep things that way!”

• **Operators’ concerns**
  
  ... “I want my network to be safe, and my users to be happy”

• **Developers’ concerns**
  
  ... “I want it to be easy to develop innovative successful apps”

• **My concern**
  
  ... “I want to keep phones open to add-on innovative apps”
Response – Signing program

• Signing program for software authors
  … Users can be confident about the source of software
  … Smaller companies (or individuals) can distribute their software via publishers who take the responsibility

• Signing program for individual apps and services
  … Must be from a signed software author
  … Must pass through a certain minimum of tests (easily administered)
  … Unsigned apps prevented from accessing the more powerful APIs
  … Signed apps receive preferential marketing

• Tests indicate basic roadworthiness
  … Not conformance to any style guidelines

• Core requirements agreed by the industry as a whole
Challenges and risks – 2

- Overwhelming complexity
  - Users are bamboozled and perplexed
- Alternatively, Underwhelming tediocrity
  - Savvy users are frustrated and perplexed
- Who can say what the best HCI is for such phones?
- There is no one right answer!
  - Let the market decide
  - Let one hundred flowers blossom
- But doesn’t this create wide market fragmentation?
  - How to achieve the required high volumes of sales?
Differentiation without fragmentation

Real choice for end-users

OS enables multiple rich visions

User Interface e.g. UIQ, Series 60

symbian OS
the mobile operating system
Platformisation for differentiation

Striking variation in individual products

Common in a device family

Common to all Symbian mobile phones

UI platform A

UI platform B

Common OS APIs & technologies
The role of an operating system

• Tame the underlying technological complexities
  …Abstract out the “accidental differences”
• Allow myriad software components to co-exist & collaborate
  …Present-day components and future components
• Make it look simple
  …The end user should find it straightforward & natural
• A good OS works very hard on behalf of the user
  …Even though the user is unaware of the OS
• The best phone will be perceived as:
  …A simply better phone
  …(Even though it’s a very smart phone)
Making complex software simple

• Interaction Design has a key role to play

• But … Good Interaction Design for complex software itself relies on the substrate containing sophisticated software
  … Meaning, changeable software

• Usually, Interaction Design has ideas which the software cannot implement
  … Because the ideas come later in the project
  … When the software is already too fixed
  … When the software can no longer be changed

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Principle: “Design for change”

• Don’t design your software only to meet the requirements that you understand today
• The requirements will inevitably change

  … New market expectations
  … New technology possibilities
  … Competitor breakthroughs
  … New ideas, feeding off other unexpected trends - “obvious in retrospect”
  … New ideas in HCI
Complexity needs architecture

• **Software in separated modules**
  
  … With clear interfaces
  
  … Support change & evolution

• **The alternative is spaghetti**

  … No one fully understands “the big picture”
  
  … Everything connected to everything else
  
  … “Obvious improvements” break previous working software

• **Most modern software is spaghetti…**
The process of spaghettification

- Original design copes with the originally envisaged amount of complexity
  - First generation of (good) software usually has low spaghetti coefficient
- Over time, more and more technology requirements emerge
  - eg Browsing, Bluetooth, Security, SyncML…
  - The original design doesn’t cope
  - More features are squeezed into the design
  - Spaghetti coefficient rises sharply
Development costs rise with functionality

Over time, more and more phones will be smartphones

Learn to take advantage of advanced open OS and its ecosystem
Reprise of Contents (six themes)

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Picking the drivers for change

• “Let 100 flowers blossom”
  … We don’t choose the HCI – we believe in Darwinian selection
• But what do we choose as the fertiliser?
  … What HCI enablers do we put into the next version of the OS?
• Just because customers ask for it, isn’t sufficient
  … Or necessary
• We must see a clear commercial case
  … Beyond a good idea
• We need a compelling picture of an end-to-end solution
  … Key user scenarios must be spelt out and debugged
Key forthcoming enablers (12-24 months)

- Constant improvements in performance
  - It’s not sufficient to rely on Moore’s Law
- New graphics libraries
  - Animations, Unified 2D/3D graphics pipeline
- Security, security, security
  - Digital Rights Management, support for Mobile Commerce
  - Ensuring that only trusted apps can call dangerous APIs
- Bluetooth comes of age
  - Personal Area Networking
- Device Management – reducing Total Cost of Ownership
  - Remote support, configuration, customisation, upgrades
- Framework for Location-Based Services
- Rich voice (doing more with voice)
  - Voice communications is the first killer app for phones
Find your place in the smartphone ecosystem

Silicon supplier  OS supplier  Wireless supplier

Component suppliers  UI supplier

Integrators  Phone manufacturer

Innovator  Distributors & retailers  Network operator

Consultants  Consumers  Enterprises
Further discussion…

- **Symbian Expo – The Smartphone Show**
  - October 5th and 6th (Tuesday & Wednesday)
  - ExCeL centre, London
- **Open-to-all tradeshow event for 2,000+ people**
  - Free entry to all qualified pre-registered attendees
  - Includes keynotes, educational seminars, and the main exhibition
- 70+ exhibition stands from partners and ISVs
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