Evaluation of Application Platforms on Mobile Phones for NFC Applications

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- Research Topics
  - Software: Contactless Applications and Infrastructure
  - Hardware: Testing & Interoperability
  - Security
  - Usability

- Founded by Industry Partners
  - Mobilkom Austria (Vodafone Partner)
  - NXP Semiconductors
  - Omnikey/Assa Abloy (HID Global)

- NFC Forum Member
NFC Trial – Campus Hagenberg

- 75 Users (technological affine)
  - 50 Students
  - 25 Employees
- Device: Samsung X700n (not commercial)
- Applications (J2ME)
  - Micro-Payment (prepaid)
  - Access
  - Information service (P2P)
  - Loyalty Card
- Findings: good usability, well accepted by users
J2ME Application/Client

- Application on the Handset (Java)
- + Sophisticated interaction possible
- + possible for different secure elements
- - handset needs to support JSR177/ or SE/SIM Access
- - Security needs to be ensured (ACP)
- - Applications running on handset and SE/SIM
SIM Application Tool Kit (SAT)

- Application on SIM Card
- + Chance of Handset doesn‘t effect Application
- + OTA Capabilities of SIM can be used
- + No adoption to Handset required
- - very poor GUI
- - Development Effort high
In between: SmartCard Webserver (SCWS)

- Servlets run on the Webserver in the SIM
- SCWS comes with JC 3.0; specified also by OMA
- + nice GUI capabilities
- + runs on the SIM/use its capabilities
- - special handset/SIM needed
- - space on SIM costly
Experience with UIs & mobile Applications

- Goal: HTML vs. J2ME Interface
  - User Acceptance
  - Usability
  - User Experience

- Method
  - Personal Questionnaire (160 User Inputs, ~ 20 min, one at a time)
  - Assisted with Questions; Gave Details on Request
  - Hands on Experiments (Use J2ME app; Use Browser)
  - Field time: 07/2008

- Group Interview/Focus Group
  - Users of NFC Trial, IT-Students, Professors, R&D Stuff
  - Technological affine User group is more likely to use new services.
  - 32 Persons Interviewed (21 male vs. 11 female)
  - “First Movers”
Executive Summary – User Interviews

- Users
  - Think that using Browsers on mobile phones is not attractive
  - Are not willing to pay for mobile Services (OTA, SMS)
  - Enjoy J2ME Applications more than HTML Interfaces
  - Do not see the benefit of SCWS
  - SAT completely out of scope for applications (never used)

- SCWS is a sophisticated service platform...
  - But users see HTML Interfaces as too technical/less social
  - And users like the direct and intuitive interaction
  - And users are unsure about safety
Demographics

Total (n=32)

Email-Push: 2/32
Data-Card: 8/32
ARPU: 17.16 EUR

Age:
- 0 - 25: 64%
- 26 - 35: 26%
- 36 - 45: 10%

Phone:
- Nokia: 47%
- Sony Ericsson: 28%
- Samsung: 6%
- Motorola: 6%
- Siemens/BenQ: 9%
- Others: 3%

Profession:
- Student: 63%
- Freelancer: 6%
- Employee: 31%
Usage of Services

- Users know how to interact with services, but do not use them very often.
  - 41.6% do NOT know cost of mobile Internet (with their plan)
  - 28.2% do NOT know cost of mobile Email (with their plan)
  - 18.7% do NOT know when cost for mobile Internet occurred
  - 25% had to pay for mobile Internet/data transferred, although they did not (intend to) use it/had bad experience with costs related to m-internet.
  - 78.1% do NOT want to pay for services at all.
Safety Concerns with mobile Internet/Browser

- Users do have general concerns when entering URLs.
- Most users do NOT know where the URL in the mobile browser is displayed.
- When using m-Internet,
  - 75% use Bookmarks and of them 90% also use bookmarks, they saved their self
  - 68% do not trust a displayed lock in the browser

Do you have security concerns when entering the following URI on your mobile?

- www.myservice.com (28.13%)
- http://127.0.0.1:3516/ (71.88%)
- http://localhost:3516/ (65.63%)
User Experience: J2ME vs. SCWS

- Phone: Nokia 6131 NFC
- Nokia S40 (3rd Edition), does not support SCWS in commercial version.
- Use only one type of phone, in order that subjects do not rank phone/software (Sagem my700m failed in pre-tests)
- “Fake” SCWS Interaction
  - HTML (static) pages online
  - OTA/UTMS always on
  - Cache enabled for pages/graphics
User Experience: J2ME vs. SCWS (cont’)

- **Methods**
  - Measure Time until Task is completed
  - Semantic Differential

- **Tasks**
  - Open and Enter URLs
  - Use Bookmarks
  - Interact with Browser
  - Interact with J2ME Applications
User Experience: Setup of Phone

- SoftKey to Open J2ME Applications
- Quick Launch Bar
- SoftKey to SCWS Wallet
Results

- Open a Bookmark
  - Menu => Internet => Bookmarks => Google or
  - Select „Internet-Icon“ in Quick Launch bar
  - Time to open: Avg: ~ 26 Sec (2 persons failed*)

- Add new Bookmark
  - URL: www.orf.at | name: ORF
  - Time to add Bookmark: 47 Sec (8 persons failed*)

- Open a second Bookmark (SCWS Wallet)
  - Time to open: Avg: 17,9 Sec (none failed
  - Menu or Quick Launch or SoftKey

- Open a J2ME Application
  - Time to open: Avg: 17,6 Sec (none failed)
  - Menu or Quick Launch or SoftKey

* Took > 60 sek or gave up.
SCWS Wallet vs. J2ME Wallet

SCWS
- Fewer Steps
- Faster Top up (4 vs. 8 Sec)

* Try displaying on your phone: http://www.nfc-research.at/wallet/

** J2ME Wallet used during NFC Trial on Campus
SCWS - Semantic Differential (AttrakDiff™*):

- 28 impressions- (eg. Good – bad) ranked between 1 – 7

- Web Interfaces is ranked as
  - predictable
  - direct
  - clearly arranged

- … but also so …
  - Not representable
  - Not social
  - Not stylish
  - Technical/challenging (6 out of 32 were not able to close browser)

* http://www.attrakdiff.de/
Do you think the Web interface is …

… compared to the J2ME application

- Cooler
- More User Friendly
- Better
- More Secure
- More comfortable
- Faster

Persons agreeing
What is the best way to open an application?

(1 = best, 5 = worst)
Conclusion and interpretation

- SCWS can not (yet) compete with J2ME Apps from a User perspective, due to
  - Graphical capabilities
  - Interaction capabilities (e.g. no soft Keys)
  - Subjective security concerns/trust
  - Bad experience with the “I”-Key on their phone
  - Experience (Web is not local, Web is slow)
  - Limited User Interaction (e.g. SoftKeys not usable)

- Probably different results with other Focus Group
UI Rending Engines

Vodafone Live!
Wap.a1.net

SCWS Wallet

J2ME Wallet

Sagem my700x
SGH-X700n
Nokia 6131 NFC
Nokia 6220 Classic
Technology Status today

- Rendering of HTML across platforms difficult to overcome (Display Sizes, Browser Capabilities)
- Space on SIM costly (Graphics, Animations)
- Market Entry Barrier for SIM Development high in comparison to J2ME/Handset development
- Very few handsets and even fewer SIM for testing
- Deployment requires TSM or MNO
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congress.nfc-research.at

Happy to answer any questions
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