Designing Mobile Interfaces for Novice and Low-Literate Users

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USID 2009
September 20, 2009
Mobile Phones in the Developing World

Population in Billion

- World Population: 6.7
- Cell Phone Users: 3.5
- Attained Secondary Education: 3.2
- Live to Age 60: 3.1
- Bank Account Holders: 1.0

1 D. Bloom, Measuring Global Educational Progress, 2006
2 World Bank, 2000
Usability Barriers
(Indrani Medhi)

• Conducted ethnographic observations of 125 people on traditional text-based interfaces

• Navigation difficulties:
  – Navigating hierarchical structures
  – Mapping soft-keys

• Input difficulties:
  – Using scroll bars
  – Using checkboxes
  – Constructing SMS and USSD syntaxes

• Language difficulties:
  – Specialized terms (e.g., transaction, jaundice) do not translate to local language
Design Recommendations
Case 1: Text-Based UI

• Provide local language support (in both text and audio)

• Minimize hierarchical structures

• Avoid requiring non-numeric text

• Avoid menus that require scrolling

• Minimize soft-key mappings
Design Space

Input method

- Free-form speech
- Structured speech
- Typing

Output method

- Text
- Audio
- Graphics [+ Audio]

Flexible

Flexible

Text-Based Forms, SMS, etc.

Live Operator

Spoken Dialog

IVR Interactive Voice Response

Graphical UI
Design Space

Input method

- Free-form speech
- Structured speech
- Typing

Output method

- Text
- Audio
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flexible

- Live Operator
- Spoken Dialog
- Text-Based Forms, SMS, etc.
- IVR Interactive Voice Response
- Graphical UI

inflexible
Focus 1: Text vs. Spoken Dialog, Graphical UI

Task: transfer money to a peer

Participants: 58 non-literate (up to 6th standard), Bangalore

<table>
<thead>
<tr>
<th></th>
<th>Text Based</th>
<th>Spoken Dialog</th>
<th>Graphical UI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task completion</td>
<td>0%</td>
<td>72%</td>
<td>100%</td>
</tr>
<tr>
<td>Time taken</td>
<td>—</td>
<td>5 min</td>
<td>13 min</td>
</tr>
<tr>
<td>Help needed</td>
<td>—</td>
<td>4 prompts</td>
<td>14 prompts</td>
</tr>
</tbody>
</table>

Conclusions:
- Non-text designs are strongly preferred over text-based designs
- While task-completion rates are better for rich multimedia UI, speed is faster and less assistance is required on spoken-dialog system
Design Recommendations
Case 2: Rich Client UI

- Recommendation: graphical UI with spoken input?
Focus 2: Text vs. Live Operator

Task: report patient health symptoms

Participants: 13 literate health workers and hospital staff, Gujarat

<table>
<thead>
<tr>
<th>Text (Menus)</th>
<th>Text (SMS)</th>
<th>Live Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error rate</td>
<td>4.2%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Time taken</td>
<td>1.7 min</td>
<td>1.6 min</td>
</tr>
</tbody>
</table>

Error rate:
- Text (Menus) 4.2%
- Text (SMS) 4.5%
- Live Operator 0.45%

Conclusions:
- Live operator interface is only one with sufficient accuracy for health data
- This model is also simple to adopt and cost-effective in India (call centers cheap)
- Results caused partner to switch upcoming TB program from text to operator
Design Recommendations
Case 3: Reporting Short Data

- **Recommendation (in India):** use a live operator

- **Our proposition:** Operators are under-utilized for mobile data collection

- **Benefits:**
  - Lowest error rate
  - Less education and training needed
  - Most flexible interface

- **Challenges:**
  - Servicing multiple callers
Peer-to-Peer Media Sharing

(Thomas Smyth)

• If users are properly incentivized, they will overcome many barriers

(slides abridged – more details to be published soon)
Enabling User-Generated Content

• User-Generated Content has come to define the Web
  – Original attraction of the Web….everyone can be a publisher
  – Now…Blogs, review sites, digital video, forums, news comments, …
  – Empowers ordinary citizens with a voice + a global audience

“75% of all content on the Web is user-generated.”
— Reggie Bradford, CEO of Vitrue

“35% of U.S. Internet users have posted some sort of user-generated content online.”
— Home Broadband Adoption 2006, Pew Internet & American Life Project

• How do you enable someone to generate content…
  – With a low-end phone?
  – With limited literacy?
  – In their local language?

Promising avenue: 
Leverage voice
Solution: An Audio Wiki

• Allow users to publish information:
  – Using a phone rather than a computer
  – Using voice rather than text

• Audio recording and playback, but keypad-driven navigation
  – Not attempting a dialogue-based system

• Rich space of applications spanning citizen’s journalism, political activism, dissemination of agriculture & health information, ...

• Research challenge: making it usable
  – Interactive voice response (IVR) typically frustrating
  – Research: adaptive interfaces, audio linking, flexible playback
Rich Space of Emerging Services

- **VoiKiosk / Spoken Web [IBM Research, ICTD 2009]**
  - 4 months; 1,000 users; 20,000 calls
  - Killer app: personal advertising
  - Toll-free number

- **Providing an audio frontend or analog to Twitter**
  - TwitWoop – MySay
  - AudioBoo – VoiceField
  - TwitSay – TweetCall
  - TwitterFone – TweetMic

  ➔ But not a single one is available in India

- Opportunity to redefine the “browser” for audio content
Conclusions

Mobile phones have usability barriers for novice and low-literate users
- Use voice and graphical interfaces
- Consider a call center when appropriate

If users are properly incentivized, they will overcome many barriers
- As evidenced by mobile video sharing
- Entertainment is a powerful motivator

Future opportunity in enabling user-generated content for novice users
- Can voice services mirror the Internet?
- Key challenges for user interface designers