Mobile Maps Application for Field Surveys

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Overview

- Why do we need maps?
- Paper Problem
- Solution: Electronic maps
- Software Requirements
- COTS vs custom
- MobileMaps app
- Field Test
Maps support area household surveys

- Show location of sample dwelling units (SDUs)
- Assist with applying a frame supplementation procedures
  - Half-Open Interval
  - Check for Housing Units Missed (CHUM).
- Used to build field-enumerated (FE) frames – record address & location / DU in sampled area
Paper Problem

Hard copy maps use a lot of paper!

- 1 project: ~2 tons of maps / year
  (not including materials destroyed in the field)
- Address-based sampling frames use large geographic areas as area sampling units - requires ># of maps / sampled area
Solution: Electronic Maps

Cost-efficient, state-of-the-art, and relevant in today’s marketplace.

- Electronic maps are ubiquitous
- Viewed on any device (tablet, phone) or computer
- Provide better oversight of field work, improved data quality
Software Requirements

- Low/No “per device” software cost
- User-friendly interface
- Full featured off-line capabilities
- Load custom generated maps
- Consume maps from an automated workflow
- Show current location on map
- Draw point features (i.e., dwelling units)
- Draw line features (i.e., missing roads)
- Save and export new data
- Link image(s) with a dwelling unit
Commercial off-the-shelf (COTS) apps

- TerraGo Applications (Publisher and Mobile)
- PDF Maps (Avenza Systems)
- SODA (Techneos)
- Google Earth
- Other (asset management software, ESRI software kit, Collector for ArcGIS, Mappt, GIS2go)
- Rapidly changing - products improving & new app available frequently
# COTS vs requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>TerraGo</th>
<th>PDF Maps</th>
<th>SODA</th>
<th>Google Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runs on tablet</td>
<td>√ (Android only)</td>
<td>√ (IOS only)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Read RTI-generated maps</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>Show current location</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>Add point feature</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>Add line feature</td>
<td>√</td>
<td>√ (no polygons)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Save and export data</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Link a photo</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
## COTS vs requirements (continued)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>TerraGo</th>
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<th>Google Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doesn’t require a license</td>
<td>√</td>
<td>√</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>Has a simple interface</td>
<td>X</td>
<td>√</td>
<td>?</td>
<td>√</td>
</tr>
<tr>
<td>Consumes maps generated by automated workflow</td>
<td>X</td>
<td>√</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>Customizable</td>
<td>w/contract</td>
<td>X</td>
<td>w/contract</td>
<td>X</td>
</tr>
<tr>
<td>Operates under a disconnected environment</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>X</td>
</tr>
</tbody>
</table>
MobileMaps

- Cross-platform app, built using open source software
  - PhoneGap
  - HTML5
  - CSS3
  - Bootstrap
  - jQuery
  - Leaflet

- Simple User-interface
MobileMaps Features

- Wireless data transmission
  - Consumes custom maps (ArcGIS)
MobileMaps Features (continued)

- Save and export new data
MobileMaps Features (continued)

- Show SDUs, current location
- Add/remove point features
- Add/remove line features
Field Test

- Assess MobileMaps usability
  - 8 staff enumerated DUs in two sampled areas
  - Samsung Galaxy 10” tablets
  - Overlap in area assignments; staff worked independently
  - Assignment represented rural and urban areas, and multi-unit structures
  - Usability calculated using System Usability Scale (SUS)
  - Debriefing session to gather feedback
Field Test Results

- SUS scores varied greatly
  - 32.5 - 87.5
  - 50% above average (>68)
  - Mean score of 61.25 was below average

- Generally positive feedback

- Most difficult: placement of point features

- Enhancements suggested:
  - Larger map extents (zoom)
  - Add point feature at current location
Field Test Results (continued)
More Information

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