



The Road Ahead: Using ArcPad Maps in Census Bureau Field Activities

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Note: This presentation reports the results of research and analysis undertaken by the U.S. Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

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Abstract



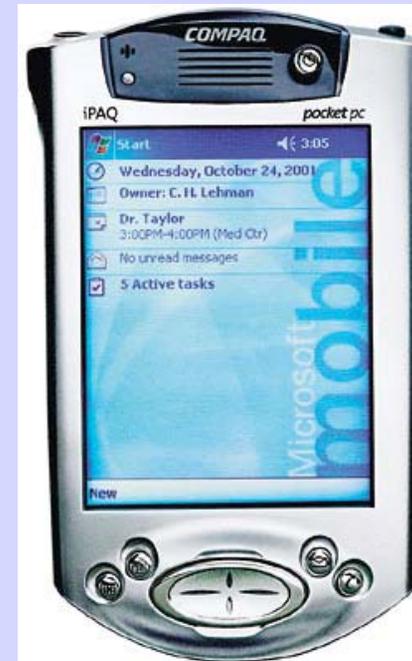
The U.S. Census Bureau is exploring the feasibility of using handheld computers in future enumeration activities. Recently in Sussex Co, DE, the Census Bureau tested the feasibility of using maps on a handheld computer and examined the changes in productivity that resulted from the addition of a GPS receiver, a route display, and turn-by-turn directions to the maps. This session will describe the objectives and implementation of the test, discuss our findings on the interaction between field staff and handheld mobile mapping, and describe plans for the future development and testing of mobile mapping at the U.S. Census Bureau.

What is an MCD?



➤ MCD = Mobile Computing Device

- Currently refers to hand held computer such as an Compaq IPAQ.
- Also commonly referred to as a:
 - ✓ Census Hand-Held Computer,
 - ✓ Personal Digital Assistant (PDA)
 - ✓ Pocket PC



MCDs in the 2010 Census



- The Census Bureau plans to use a small, hand-held computer for field data collection in the 2010 Census.

- This will allow for:
 - Paper Reduction
 - Processing efficiency
 - GPS Coordinate Capture



MCDs in the 2004 Census Test



- Using an MCD in the 2004 test will also enable us to investigate:
 - Logistics of using an MCD for decennial data collection:
 - ✓ Technical Preparation
 - ✓ Workflow
 - ✓ Training
 - ✓ Staffing and Infrastructure Issues
 - Enumerator Usability
 - ✓ Use of MCD for Data Collection (Non Response Interviews)
 - ✓ Use of Electronic (ArcPad) Maps on a MCD w/ GPS
 - ✓ GPS Coordinate Capture

MCD Feasibility Tests



➤ Three MCD feasibility tests were conducted in 2002.

- To evaluate the feasibility of using an MCD in a decennial environment.
- Inform current plans and activities

1. Map Feasibility Test

- Can enumerators use a map on an MCD?

2. Interview Feasibility Test

- Can enumerators conduct an interview using an MCD?

3. Route and Navigation Feasibility Test

- Do route and navigation tools aid in the use of maps on an MCD?

MCD Route and Navigation Test



➤ Test Objectives:

- To continue feasibility research on MCD map use.
- To evaluate how the addition of route and navigation tools aid field staff in locating addresses:
 - ✓ Route tracing on the map with turn-by-turn driving directions
 - ✓ GPS signal “you are here” indicator on map
 - ✓ Voice delivery of route instructions

➤ Location: Sussex County, DE in Fall of 2002

➤ Testers: 14 permanent field staff from the area.

MCD Feasibility Test Components



Training



Assignments



Observations



Facilitated
Debriefings

Feasibility Test Hardware



➤ Compaq IPAQ 3970s with:

- Compact Flash(SF)/ Battery Expansion Pack
- 256K Secure Digital (SD) Removable Storage Card
- 12V Auto Adapter
- Compact Flash (CF) Recreation Grade GPS Receiver

Technical Details: Software



➤ Arc Pad: Primary field map software



- Displayed maps created from shape files extracted from TIGER.
- Used ArcPad Studio to customize/simplify user Interface
- Static route tracing created in ArcGIS
- Turn-by-turn directions created in MS Word

➤ CoPilot - voice guided navigation software

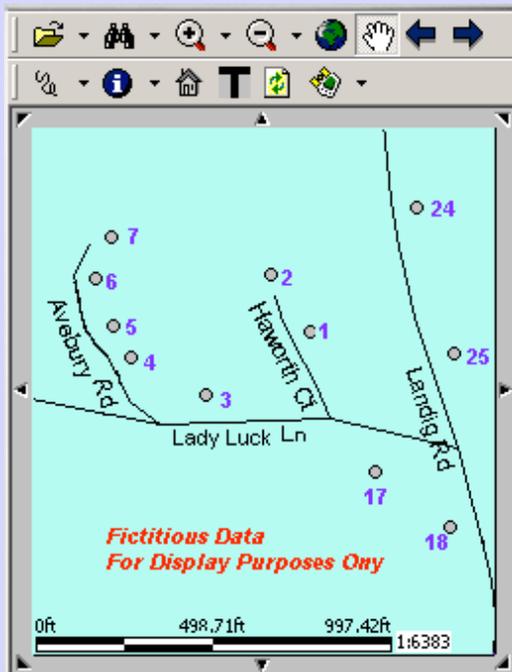


- Commercial GPS navigation package featuring:
 - ✓ Voice commanded navigation
 - ✓ On the fly routing and re-routing to way points.
 - ✓ Does NOT use TIGER as a map base.

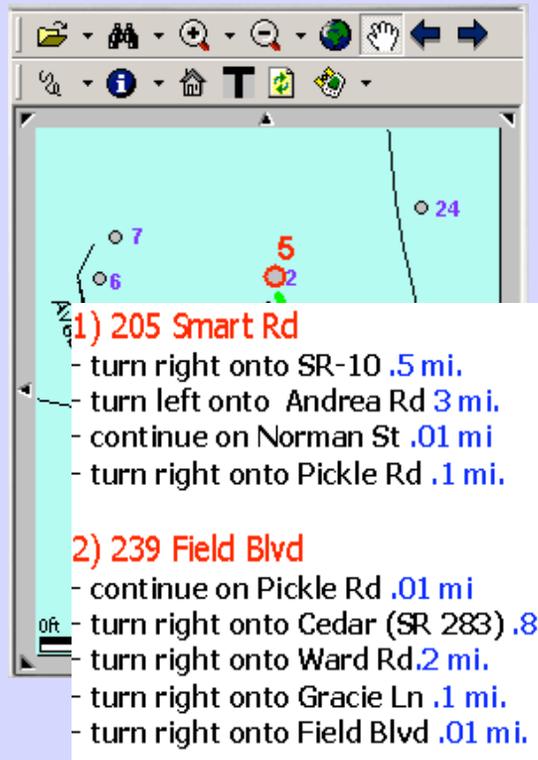
ArcPad Maps From Sussex Co Test



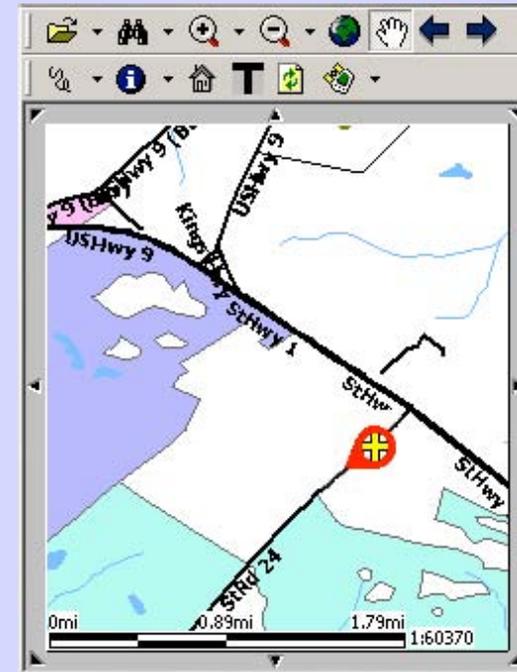
Base Map



Base Map w/Route and Directions



Base Map w/ GPS



Overall Feasibility Test Findings



1. Field staff were able to successfully use ArcPad maps on an MCD.
2. The addition of any of the navigation tools reduced the amount of time it took to locate assignments in the field.
 - Access to GPS and route information improved consistency in finding addresses between staff.
4. MCD Voice navigation as it is today, requires more research for inclusion in Census field activities.
5. The use of maps on an MCD introduced new challenges:
 - ✓ Screen real estate
 - ✓ Glare
 - ✓ Battery Life
 - ✓ Training was longer and more intense.

Lessons Learned



Wires



Kits



MCD
Setup



Training
Logistics

2004 Census Test Map Process



- For parts of the 2004 Census Test ArcPad maps will replace traditional paper field maps:
- The 2004 map process will also be modified to include:
 - Customized/ scaled down user interface/map design.
 - Automated process to extract data from TIGER into shape files.
 - Automated process to load all necessary files on to the 1,100+ MCDs we will use in the field in 2004

2004 Census Test Maps



- Base ArcPad map from feasibility tests
- GPS “You are Here” Indicator
- New Features:
 - Simplified find function
 - Simplified identify function
 - Show workload tool
 - Map legend
 - Customized help

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Thank You

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