Update on the U.S. Census Bureau’s GSS Initiative

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U.S. Census Bureau
NGAC Meeting – June 8, 2011
What is the GSS Initiative?

• An integrated program of improved address coverage, continual spatial feature updates, and enhanced quality assessment and measurement
  – All activities contribute to Master Address File (MAF) and TIGER database improvement
  – Builds on the accomplishments of this decade’s MAF/TIGER Enhancement Program (MTEP)

• Supports the goal of a targeted (vs. nationwide) address canvassing for the 2020 Decennial Census

• Continual updates throughout the decade support current surveys (ex: American Community Survey)

• A budget increase over our base Geographic Support System funding for a 10-year lifecycle program
Why do we need the GSS Initiative?

• A response to stakeholder and oversight recommendations
  – The Government Accountability office, the Office of the Inspector General, and the National Academies of Science have reported deficiencies of the Geographic Support System in their evaluations
    • The lack of a comprehensive geographic update program between censuses
    • Associated negative impact on ongoing programs such as the American Community Survey, other current surveys, and small areas estimates programs

• A logical next step, building upon
  – The accomplishments of the MAF/TIGER Enhancement Program (MTEP); including the significant investment of the MAF/TIGER Accuracy Improvement Project (MTAIP) and the improved positional accuracy of TIGER
  – The contributions (GIS files & imagery) of our partners between 2003 to 2008 and their participation in the MTAIP in preparation for the 2010 Census
A Key Component of this Initiative is…

- An integrated program that utilizes partnerships for:
  - Improved address coverage
  - Continual spatial feature updates
  - Enhanced quality assessment and measurement
Who are the major players?

• US Census Bureau
• Federal partners
  – USPS, USGS, NOAA/NGS, DHS, EPA
• State partners
• Local partners
• Tribal partners
• Contractor partners
• Professional organizations
GSSI Impacts

• 2020
  – Targeted Address canvassing
  – Complete, accurate, and maintained MAF
  – Overall support for mobile computing

• Current Surveys and ACS

• National resource
Mission Need for the Data

• “The Census Bureau serves as the leading source of quality data about the nation's people and economy. “

• To fulfill this mission a complete and accurate MAF/TIGER db is necessary
A Shift in Focus for the 2020 Census

- From a **complete** address canvassing to a **targeted** address canvassing
  - Hinges on establishing an acceptable address list for each level of government

- What defines “acceptable” will be a partnership collaboration between government partners and the Census Bureau
## Program Overview

### Street/Feature Updates

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Preparatory Steps

• The following GSS Initiative documents were developed as part of the budget approval process:
  – 10-year lifecycle budget
  – Program key decision points / milestones
  – Operational Plan
  – Risk Management Plan / Risk Register
  – FY11 Detailed Tasks Listing with cost estimates
  – Research & development, resulting in the following reports:
    • “Rural Structure Change Detection Report for the Census Bureau”
    • “Post 2010 MAF Maintenance: Final Environment Scan”
    • “Project Summary Work Breakdown Structure for: Post-2010 MAF Maintenance Recommendations”
  – Fact Sheet
Addresses

- Continuous update of the MAF
- Complete and current address coverage with emphasis in areas without city-style addresses
  - Focus on rural areas
  - Puerto Rico
  - Group Quarters
- Expanded address sources
  - Current primary sources for address updates are the USPS Delivery Sequence File (DSF) and field updates from censuses and surveys
  - FY11 and beyond will focus on identifying and using best available data from partnership and commercial files
- Beyond the annual ACS, current surveys will be using the MAF to support their statistical frames and surveys
Is the address…

• Mail-able
• Deliverable
• Locatable
• Geocode-able
MAF Challenges

• No national addressing system
• Lack of addressing standards – these are just now coming into place
• Data updates previously limited to:
  – US Postal Service Delivery Sequence File
  – Local of Census Addresses (LUCA)
  – Census field operations
MAF Challenges (continued)

• Not all addresses in the Census are in the USPS Delivery Sequence File (DSF):
  – 13% of the addresses in the final census universe have never appeared on any DSF since 1997

• Not all addresses in the DSF can be geocoded to the MAF
MAF Challenges (continued)

• Constraints in working with partners to build and maintain the MAF
  – Requires close collaboration with the U.S. Postal Service
  – Requires substantial partnership program with tribal, state, and local governments (approximately 40,000)
  – Two-way address sharing is difficult and tenuous under confidentiality constraints of Title 13
MAF Challenges (continued)

• MAF use under Title 13
  – Restricted access for viewing
  – Restricted access for updating
  – Sharing to review and improve address list significantly restricted
    • Requires Title 13 compliance by partner
    • Address information for census use only
    • Limited partner participation
    • Difficult to manage
Maintaining Our Feature Network

- Continuous update of street network and attributes
  - Sharing results with USGS and DOT
- Sources focus on best available data from government partners and commercial files
- Extensive use of imagery
  - Source for spatial data
  - Used for data verification
  - Used for data quality assurance
An Early Example of Collaborating on Transportation Data

- Proposed a meeting on Geospatial Transportation Data Needs for Federal Agencies in October 2009
- Coordinated with DOT and USGS
- Goal: To identify federal needs for roads and related transportation data
- 39 attendees from 15 agencies
- Results
  - Strawman for federal transportation data needs
Spatial Challenges

- **Change Detection**
  - Determining change detection options
  - Incorporating change detection techniques into our business process
- **An annual MAF/TIGER db**
  - How to maintain the data over time
- **Inconsistent attributes**
  - Feature codes
  - Feature names
Spatial Challenges (continued)

• Requirement for persistent topology
  – Direct impact on updating activities

• Web services
  – It is clear users want large data sets more quickly
  – Currently several efforts in development to provide web services

• User demands
  – Generalization
  – Combination
  – Simplification
Boundary improvements

• Continue to develop state and county level partnerships
• Improve our training and outreach for the annual Boundary and Annexation Survey (BAS)
Working with Parcels

• Learning the benefits and challenges of parcel data
• Initial stage of acquiring sample parcel data
  – Seeking King County, WA’s parcel files
  – Evaluating CoreLogic’s data
Quality

- Quality improvements apply to
  - Address and spatial data
  - IT processes
  - Geographic products

- Quantitative measures of address and spatial data quality are needed
Quality Challenges

• Source
  – Authoritative
  – Best available
  – Non-restricted

• Resolution
  – Address level?
  – Feature level?
Quality Challenges (continued)

• Completeness
  – Coverage
  – Comprehensive attribution

• Consistency
  – Value
  – Priority

• Accuracy
  – Positional
  – Actual vs. planned
Ongoing Work
Research

• 5 reports by external geospatial experts
  – The State and Anticipated Future of Addresses and Addressing
  – Identifying the Current State and Anticipated Future Direction of Potentially Useful Developing Technologies
  – Measuring Data Quality
  – Use of Handheld Computers and the Display/Capture of Geospatial Data
  – Researching Address and Spatial Data Digital Exchange

• To download these reports:
  – http://www2.census.gov/geo/research/
Ongoing GSS Work
GEO-lead Census Bureau Teams

Teams comprised of Census Bureau staff and other federal agencies (USPS, USGS, NOAA/NGS) were formed to address specific aspects of the GSS Initiative

- Address Coverage and Sources
- Feature Coverage and Sources
- Quality, Assessments/Evaluations
- Partnerships
- Research and Development
- Geocoding
- MAF/TIGER Integration/Linkage
- Global Positioning Systems (GPS)
- Project and Contract Management
- Policy
Progress of GSS Working Groups

• FY2011 focus is research and development activities

• Working groups are:
  – Developing standards that reflect our requirements
  – Evaluating our current data
  – Determining how partners will contribute data
  – Exploiting technology
## FY11 High-Level Activities Summary

<table>
<thead>
<tr>
<th>Component</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Updates</td>
<td>Develop GPS collection capability and enhance software functionality for the Community Address Update System (CAUS)</td>
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<tr>
<td>Address Updates</td>
<td>Develop functioning tracking, processing and reporting systems in support of receiving and processing partner-supplied address lists</td>
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<tr>
<td>Address Updates</td>
<td>Develop an improved geocoding system</td>
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<td>Address Updates</td>
<td>Identify Group Quarters address data sources and develop acquisition methods</td>
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<tr>
<td>Street/Feature Updates</td>
<td>Develop functioning management, acquisition, distribution and reporting systems in support of receiving and processing partner-supplied feature updates</td>
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<tr>
<td>Street/Feature Updates</td>
<td>Identify a viable change detection technique; either acquire the software for in-house use or contract for services</td>
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<tr>
<td>Quality Measurement</td>
<td>Utilize inventory of GPS control points to assess the positional accuracy of street locations in a minimum of 1/8 of the United States counties</td>
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How We Are Evaluating Our Data

• Evaluating address updates made as a part of census and survey activities

• Evaluating inconsistencies and deficiencies of features within the MTDB and quantifying the potential impacts

• Evaluating GPS data collected during Census 2010 and current GPS collection procedures

• Defining a methodology to capture quality metrics for defined geographic units
How We Are Utilizing Partnerships

• Encouraging partners to update NSGIC’s GIS Inventory – www.gisinventory.net
• Meeting with government officials and commercial vendors
  – Recently met with USPS, USGS, DHS, EPA, and others
• Planning an address symposium
• Taking a corporate view by coordinating address list review and development activities with other Census Bureau Divisions (sharing of sources and resources)
How We Are Exploiting Technology

• Researching and recommending a secure (web) exchange process for address and spatial data
• Researching improved ways to ingest address and address data from partners (the conflation conundrum)
• Recommending products and services that may facilitate the exchange of address and spatial data from Census to partners
• Working with Esri to stand up new web mapping and web feature services that will support our efforts on the GSS Initiative
• Initiated a system upgrade to Oracle 11G with topology manager, upgrade to Redhat Linux.
• Researching and testing performance improvements in hardware replacement
Industry

• Visits to industry leaders in spatial data and spatial data management
  – TeleAtlas
  – Navteq
  – Google
  – 1Spatial
  – Ordnance Survey, UK

• Future visits planned
GSSI Oversight

- Department of Commerce Office of the Inspector General (OIG)
- OMB
- GAO
- NAS panels
- Commerce IT Investment Review Board
For the Geographic Support System Initiative to be Successful

- Partners are important
  - Federal, state, local, and tribal governments
  - Commercial vendors (data and service providers)
  - Professional organizations

- Working relationships must be:
  - Least intrusive
  - Most efficient
  - Ensure complete and quality data
Questions?