National Spatial Data Infrastructure: Coordinating Geographic Information

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www.fgdc.gov
Federal Geographic Data Committee (FGDC)

- A US Federal Interagency committee responsible for facilitating geospatial related activities and implementation of the NSDI across the Federal government
  - 19 Federal agencies are members
- Cooperate and coordinate with organizations from state, local and tribal governments, the academic community, and the private sector.
National Spatial Data Infrastructure (NSDI)

The vision of the NSDI: to assure that spatial data from multiple sources (Federal, State, and local governments, academia, and the private sector) are widely available and easily integrated to enhance knowledge and understanding of our physical and cultural world.
Introduction

• Organizations donot easily share geographic information – Fragmented
• Geographic Information - Taken for granted
• 80% of Government information has a geographic component
• Long History of Geographic Coordination toward New ways of Doing Business -- E-Gov and Geospatial One-Stop
Outline

• Historical Coordination Activities
• OMB Circular A-16
• FGDC
• CAP Grants
• E-Gov Geospatial Information One-Stop
• Crime Mapping example
• Conclusions/Roundtable
## Before A-16

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congress</td>
<td>1807</td>
<td>Created Survey of the Coast</td>
</tr>
<tr>
<td>Congress</td>
<td>1842</td>
<td>Coast Survey or Navy</td>
</tr>
<tr>
<td>AAAS</td>
<td>1858</td>
<td>Twenty leading scientist investigated the Coast Survey</td>
</tr>
<tr>
<td>NAS</td>
<td>1878</td>
<td>Investigated Surveys of the West by War Dept., Interior Dept., General Land Office</td>
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# Before A-16

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congress</td>
<td>1884</td>
<td>Allison Commission, looked at Coast Survey and Navy Hydro Office</td>
</tr>
<tr>
<td>Congress</td>
<td>1893</td>
<td>Dockery Commission, recommended “United States Survey”</td>
</tr>
<tr>
<td>EO Harrison</td>
<td>1890</td>
<td>Board of Geographic Names</td>
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<tr>
<td>Various</td>
<td>multi</td>
<td>Coordination</td>
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# Roots of A-16

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Description</th>
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<tbody>
<tr>
<td>EO T.R.</td>
<td>1906</td>
<td>Created U. S. Geographic Board.</td>
</tr>
<tr>
<td>EO 3206 Wilson</td>
<td>1919</td>
<td>Created a new Board of Surveys and Maps that took over the responsibilities of U.S. Geographic Board.</td>
</tr>
<tr>
<td>EO 9094 FDR</td>
<td>1942</td>
<td>Abolished Board of Surveys and Maps and authorizes Director of OMB to perform the functions of the Board.</td>
</tr>
<tr>
<td>OMB (BOB) A-16</td>
<td>1953</td>
<td>Describes responsibilities of Federal agencies with regard to the coordination of surveying and mapping activities.</td>
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### A-16 History

<table>
<thead>
<tr>
<th>Description</th>
<th>Date</th>
<th>Details</th>
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<tbody>
<tr>
<td>OMB M 83-12</td>
<td>1983</td>
<td>Establishes coordination of Federal digital cartographic data programs.</td>
</tr>
<tr>
<td>A-16 Revised</td>
<td>1990</td>
<td>Establishes Federal Geographic Data Committee and links more programs.</td>
</tr>
<tr>
<td>EO 12906</td>
<td>1994</td>
<td>Establishes the National Spatial Data Infrastructure (NSDI).</td>
</tr>
<tr>
<td>A-16 Revised</td>
<td>2002</td>
<td>Strengthens coordination responsibilities of Federal agencies and incorporates NSDI</td>
</tr>
<tr>
<td>Key reports</td>
<td>1934</td>
<td>Reviewed Mapping Services of the Federal Government</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>GAO</td>
<td>1969</td>
<td>Opportunities for savings &amp; better service to map users through improved coordination</td>
</tr>
<tr>
<td>OMB</td>
<td>1973</td>
<td>Federal Mapping Task Force: continued duplication</td>
</tr>
<tr>
<td>NRC</td>
<td>1981</td>
<td>Federal Surveying and Mapping: An organizational review</td>
</tr>
<tr>
<td>NRC</td>
<td>1993</td>
<td>Toward a Coordinated Spatial Data Infrastructure</td>
</tr>
</tbody>
</table>
**Policy: OMB Circular A-16**

- Calls for Creation of NSDI
- FGDC to provide leadership for NSDI
- Assigns of Roles and Responsibilities including Agency responsibility for a spatial data themes
- DOI is Chair & OMB is Vice Chair of FGDC
- Q/A Format
- Link to Budget
Is A-16 New policy?

- Avoid duplication of work and improve the standardization of maps (1906)
- Invite the "map using public" to meetings for "conference and advice" (1919)
- A central information office that was to furnish all map and survey data information within the government as well as from other sources (1919)
Is it Improved Policy?

- Interoperability of Federal information systems
- Enhance E-government
- Support Global Spatial Data Infrastructure
The Federal Geographic Data Committee (FGDC)

- Coordination of Geographic Data at Federal level
- Includes participation of many Stakeholders from State, Local and Tribal governments, private sector and academia (Open GIS Consortium)
- FGDC Staff supports daily operations
FGDC Federal Agencies

- USDA
- Commerce
- Defense
  - NIMA
  - USACE
- Energy
- HUD
- Interior
- Justice
- State

- Transportation
- EPA
- FEMA
- Library of Congress
- NARA
- NASA
- NSF
- TVA
- HHS
NSDI Vision

• Many organizations / people working towards a common goal: A geographic information resource for the 21st Century

• Current and accurate geographic information is readily available locally, nationally, and internationally…

• Improved use of geospatial data and better decisions and decision making
NSDI Components

- Clearinghouse (catalog)
- Metadata
- Framework
- GEOdata
- Standards

Partnerships
NSDI Components

Metadata

Explanation or textual description of data resources

FGDC Metadata Standard

0. Metadata
   1. Identification
   2. Data Quality
   3. Spatial Data Organization
   4. Spatial Reference
   5. Entity and Attribute
   6. Distribution
   7. Metadata Reference
   8. Citation
   9. Time Period
  10. Contact
NSDI Components

Clearinghouse (catalog)

Provide access and catalogue ability

Clearinghouse System

Gateways

Web Client

FGDC etc.

Clearinghouse Nodes

Database

Web Client

FGDC etc.

Database

Database

Database
NSDI Components

Clearinghouse (catalog)

Metadata

Clearinghouse Method

Metadata preparation → Metadata validation/staging → Metadata publication and Data Linkage → User access
NSDI Components

Framework

Provides consistent base for spatial location

Framework Data Themes

- Imagery
- Elevation
- Cadastral
- Transportation
- Governmental Units
- Geodetic
- Hydrography

Concentration of chemical X...
NSDI Components

GEOdata

Geographic data needed for community decision-making
NSDI Components

Standards

Standards for data and technology interoperability

Open GIS Specifications

- Bring geoprocessing technology providers and technology users together
- Develop multi-use interoperable technology
- “Standards-based commercial off-the-shelf” (SCOTS) technology
NSDI Components

**Partnerships**

Relationships for collaboration, sharing and policy deliberations

NSDI Partnerships

National League of Cities  
Intertribal GIS Council  
Open GIS Consortium  
National States Geographic Information Council  
International City / County Managers Association

National Association of Counties  
University Consortium on GIS Sciences  
FGDC  
GeoData Alliance
NSDI Components

Clearinghouse (catalog)

Metadata

Framework

GEOdata

Standards

Partnerships
NSDI - What Is It?

- **Public Policies** - Public Access for Federal Data, Data Sharing, Privacy Protection, Reduce Duplication, Use Effective Business Practices (Unify and Simplify)

- **Technology** - NSDI Clearinghouse, Interoperable Geoprocessing

- **Standards** - Metadata, Data Standards, Framework Data

- **Resources** - Partnerships, Collaboration, Leverage Investments, Grant Program
NSDI - How Is It Built?

• By Implementing NSDI Policies, Practices and Standards in Agency Programs and Geospatial Activities as part of Agency Responsibilities
Access, Sharing, Interoperability and Relationships to Build Once, Use Many Times

Framework/Core Data

Cadastral
Transportation
Hydrography
Government Units
Geodetic Control
Elevation
Imagery

Other Thematic Data

Crime data
Demographic
Landcover
Biological
Economic
Social

Source KY Office of Geographic Information
Some FGDC Activities

• Electronic Government - Geospatial Information One Stop
  – Framework Data Standards Development and Implementation
• Homeland Security Working Group
• Global Spatial Data Infrastructure
• Common Procurement Language
  – Interoperable Geospatial Portal Components
• Future Directions
• CAP Funding Opportunity
Geospatial One Stop

- E-Government (E-gov) Initiative
  - Component of President Bush’s Management Agenda
  - One of 24 E-Government initiatives
  - Part of the Government to Government Portfolio

- Vision: *the geographic component for e-gov*

- Accelerate implementation of the National Spatial Data Infrastructure (NSDI)
Geospatial One-Stop

• Making it
  – Easier
  – Faster
  – Less expensive

For all levels of government and the public to access geospatial data.
Geospatial One-Stop

Project Modules

- Framework data standards
- Existing data inventory
- Data acquisition marketplace
- Web services and portal design
- Portal Implementation

Implemented through cross agency and intergovernmental partnerships
Make a Map
Launch The National Map

Data Categories

→ Administrative and political boundaries
→ Agriculture and farming
→ Atmosphere and climatic
→ Biology and ecology
→ Business and economic
→ Cadastral
→ Cultural, society, and demographic
→ Elevation and derived products
→ Environment and conservation
→ Facilities and structures
→ Geological and geophysical
→ Human health and disease
→ Imagery and base maps
→ Inland water resources
→ Locations and geodetic networks
→ Military
→ Oceans and estuaries
→ Transportation networks
→ Utilities and communication

Search for Data
→ Search all the data in this site
→ geodata Marketplace

Search for Data
Find out about the latest geographic data sharing and acquisition initiatives.

→ Information Center
Standards, tools, and resources.

→ About This Site
How to find the maps & data you need and how to publish your data here.

→ My geodata.gov
Login Publish

→ What’s New

→ Site Help
**Congressman Putnam’s Goals**

- Use of Geospatial One-Stop to Improve Decision Making At All Government Levels
- Better Interrelationship Decisions Between Locations and Issues
  - Disaster Management
  - First Responders
  - Land Management / Environmental
  - Demography Issues
- Incorporating Private Sector Geospatial Databases Where Governmental Access & Role End
- Cost Savings to Taxpayers

Congressman Adam H. Putnam
Chairman, Subcommittee on Technology, Information Policy, Intergovernmental Relations and the Census
2004 CAP – Opening Soon!
Funding Categories

- **Category 1**: Metadata Creation and Implementation
- **Category 2**: Metadata Training Assistance
- **Category 3**: NSDI Institution Building
- **Category 4**: Clearinghouse Integration with OpenGIS Web Mapping Service
- **Category 5**: Establishing Framework Data Services using OpenGIS Web Feature Service Specification
- **Category 6**: The National Map
1. Metadata Creation and Implementation

- Seed funds to new organizations
- Implement the basic NSDI technical building block
- Funds cover:
  - Training, travel, labor
  - $9,000 (50% in-kind match) (~10 awards)
- Project objectives:
  - Metadata created
  - Served through NSDI clearinghouse
  - Metadata integrated into standard practices
- FGDC training coordination available
2. Metadata Training Assistance

- Provides assistance to metadata trainers

- Funds cover:
  - training, travel, facilities, training materials
  - $30,000 (~13 awards)

- Eligibility:
  - ability to travel regionally & nationally
  - metadata expertise

- Project objectives:
  - Organizations trained, metadata created and served
3. NSDI Institution Building

- Support to consorcia to develop or strengthen existing multi-organizational strategic plans for development and maintenance of a shared digital geographic resource.

- Foster the establishment of cross-organizational coordinating councils that develop and advance the NSDI within a specific geographic area.

- Funding: $15,000 (~12 awards)

- Organizational eligibility:
  - Consortia of public and non-profit organizations
4. Clearinghouse integration with OpenGIS Web Mapping Services

- **Objective:** Deploy web map (and feature) client and server software for linking to and viewing geospatial data from metadata in the NSDI Clearinghouse utilizing embedded URL map requests.
- **Operational and registered clearinghouse node**
- **Operating web map server software extendable to support OpenGIS Web Mapping (or feature) Standard 1.0**
- **FGDC assists in providing training and technical referrals**
- **Funding:** $10,000 (~7 awards)**
5. Establishing Framework Data Services using OpenGIS Web Mapping Services

- The goal for projects in this category is to deploy OGC Web Feature Service (and optionally, client) interfaces to respond to Web “POST” requests for Framework data, and to return the data that conforms to the draft ANSI/INCITS L1 Standard for each identified theme in the format given by OGC Geography Markup Language (GML) Version 3.0.

- Operational and registered clearinghouse node

- FGDC assists in providing training and technical referrals

- **Funding:** $75,000 (~4 awards)
6. The National Map

- Projects shall have an outcome of providing sustained operational capabilities to maintain and update data over an organization’s or consortium’s geographic area of interest and to provide access to them through The National Map.

- Of special interest are organizations or consortia whose geographic area of interest covers a “large area” (for example, a state or group of states), and/or one or more “urban areas.”

- Funding: $75,000 (~7 awards)
FGDC Community Demonstration Project
Baltimore Police Department

June 27, 2000

Regional Crime Analysis GIS
(RCAGIS)

Developed by the
United States Department of Justice
Criminal Division
Geographic Information Systems Staff
Why Baltimore City?

Population: 736,014 (1990 Census)

1998 Second Most Violent Big City in America
Among the 30 largest cities
- Ranked 2nd in violent crime
- Ranked 2nd in total felony crime
- Ranked 2nd in murder rate

1999
311 homicides in Baltimore City
Seven times the national average
RCAGIS Members

RCAS MEMBERS
- Alexandria City
- Annapolis City
- Anne Arundel County
- Baltimore City
- Baltimore County
- Charles County
- Harford County
- Howard County
- Maryland State Police
- Montgomery County
- Prince Georges' County
- Washington, DC
- Wicomico County

Legend:
- Green: RCAS Member - Contributing Data
- Yellow: RCAS Member - Contributing Partial/Sporadic Data
- Blue: New RCAS Member - Not Contributing Data
The Greater Baltimore Area
The Greater Baltimore Area
Two Primary Purposes of GIS to Law Enforcement

1. Tactical and strategic responses to crime
   - Prevent crime, reduce crime, clear cases
   - Identify target areas, trends, potential suspects
   - Proactive measures
   - Assist commanders to deploy officers more effectively
   - Use a variety of data sources

2. Officer and commander accountability
   - Take action against crime and measure the effectiveness of the anti-crime initiative
Auto Theft and Recovery Locations and Auto Theft Hot Spots

This map shows the need for a regional focus and the similarity of auto theft hot spots using two different methods.
RCAGIS Uses

- Compare concentrations of open and cleared cases, identify incident similarities, and identify potential suspects
- Show Changes in Crime and Crime Displacement Effects
- Early Warning System - calculates a threshold of crime for a given region and then uses statistics to warn the user of increases in crime
RCAGIS SAMPLE
Crime Alert Notice
CRIME BULLETIN

*** PLEASE POST AND READ AT ROLL CALL ***

DATE: June 15, 1999

SUBJECT: Commercial Robberies in Precincts 6, 9, 12

SUMMARY: A white male suspect displaying a dark semiautomatic handgun robbed three gas stations and attempted to rob one gas station during the late evening and early morning hours in Precincts 6, 9, 12.

DAYS & TIMES:

<table>
<thead>
<tr>
<th>DATE</th>
<th>CC NUMBER</th>
<th>ADDRESS</th>
<th>TIME</th>
<th>DOW</th>
</tr>
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<tbody>
<tr>
<td>5/23/98</td>
<td>981430373-33</td>
<td>BELAIR RD</td>
<td>0740</td>
<td>SAT</td>
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<tr>
<td>6/9/98</td>
<td>981541696-33</td>
<td>N CHARLES ST</td>
<td>0730</td>
<td>WED</td>
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<tr>
<td>7/9/98</td>
<td>981580391-33</td>
<td>KENWOOD AV</td>
<td>0715</td>
<td>SUN</td>
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<tr>
<td>5/9/98</td>
<td>981580250-33</td>
<td>MERIOTT BLVD</td>
<td>0310</td>
<td></td>
</tr>
</tbody>
</table>

MO: The suspect enters the location, displays a dark semiautomatic handgun, forces the victim to lie on the floor, demands and removes money from the register. In the second case, the suspect forced the victim to walk to the back of the business. The suspect has also demanded cartons of Newport and Marlboro cigarettes.

SUSPECT: White male, 25 to 35 years, 5-09 to 6-00, medium build, light complexion, wearing a hooded sweatshirt. He may be wearing a baseball cap and have a goatee.
Community Demonstration Project Issues for BPD

• Thankful to be a CDP site

• Metadata is “twice removed” from local law enforcement agencies (LEAs)
  – Good reason to include an LEA as a site
  – Poses new communication challenges

• Resources
  – Crime Analysis Unit is at half-staff
  – Lack of funds, other resources
  – Lack of previous knowledge about metadata
NSDI

Data Sharing and Metadata

• received metadata training
• Identified geographic data to share via clearinghouse nodes
• Identified a potential clearinghouse node
  – (University of Maryland, Baltimore County)
• Improved relationship with Baltimore City GIS Staff
Partners

- Baltimore City Police Department
  - Sgt. Paul Herman
- Baltimore County Police Department
  - Phil Canter
- Dr. Ned Levine (developer of CrimeStat)
- Our Staff
  - USDOJ/Criminal Division
    - John E. De Voe
    - Alex Mudd
  - INDUS Corporation
    - David Nulph
    - Jeff Burka
    - Robert Crump
    - Ron Wilson
For additional information please contact:

Alex Mudd
U.S. Department of Justice, Criminal Division
GIS Staff

1400 New York Ave., Rm. 7120
Washington, DC  20530

Phone: (202) 307-3865
E-mail: alexander.mudd@usdoj.gov

USDOJ Criminal Division Web Site
www.usdoj.gov/criminal/gis
Summary

• Long History of Coordination
• OMB A-16 provides Federal Policy
• NSDI
• FGDC
• Geospatial One-Stop
• Crime mapping Example
Questions?

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