



GIS/IS Integration

Arkansas Users Group Conference

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Spatial Focus, Inc.

Agenda

- Introduction and Discussion

- ◆ Who's here?
- ◆ What are your concerns?
- ◆ Goals for the day?

- Topic Review

- ◆ What is GIS
- ◆ Spatial data in the enterprise
- ◆ Integration Concerns
- ◆ Bridging technologies
- ◆ Opportunities and pitfalls
- ◆ Who does what?

Agenda

- The Nitty-Gritty

- ◆ Data storage
- ◆ Data contents
- ◆ Decimals, desires and dollars
- ◆ Data standards

- Case Study

- ◆ Field trip
- ◆ Elementary data set
- ◆ System design and discussion

- Wrap Up

- ◆ Conclusions
- ◆ Resources



What is GIS?

"Isn't everything mapped already?"

-Annie DiCicco



What is GIS?

GIS is a database in which location is the common column.

What is GIS?

- The contents of the common column depends on your business:
 - ◆ Addresses
 - ◆ Parcels
 - ◆ Manholes
 - ◆ Utility poles

What is GIS?

- What does that mean for the enterprise?
 - ◆ Quality control
 - ➔ Existing data has to be rectified and completed
 - ◆ New data relationships
 - ◆ New people relationships

Spatial Data in the Enterprise

Q: What is spatial data in the enterprise

A: Anything that has (or should have) a location

- Anything with an address
 - ◆ Property records
 - ◆ Billing records
 - ◆ Sign inventories
 - ◆ Utility meters
 - ◆ Voting Records
 - ◆ Etc.

Spatial Data in the Enterprise

More things that have (or should have) a location

- Anything with a parcel number
 - ◆ Property records
 - ◆ Tax assessment and billing
 - ◆ Zoning records
 - ◆ Etc.

Spatial Data in the Enterprise

Yet more things that have (or should have) a location:

- Anything requiring maintenance
 - ◆ Utility poles
 - ◆ Fire hydrants, etc.
- Administrative and/or legal boundaries
 - ◆ Zip codes
 - ◆ Census geography (tracts, blocks, etc.)
 - ◆ Voting precincts

Spatial Data in the Enterprise

Geographic relationships are the key to operating efficiencies

- Routing and scheduling
- Districting
- Emergency response
- Maintenance management
- Resource location/allocation
- Targeting communications

GIS is a Tool to Manage Spatial Data in the Enterprise

- Link previously disparate data
 - ◆ Assemble data to shut down crack houses
 - 911 calls to location
 - Building code violations
 - Complaints from citizens
- Reveal patterns
 - Schedule preventive maintenance
 - Realign districts
 - Etc.

Integration Concerns

- Data integration
 - ◆ Enterprise-wide database design, replication & synchronization
 - ◆ Quality control
 - ◆ User interface
- Procedural Integration
 - ◆ Management support
 - ◆ User support
 - ◆ Staff consensus
 - ◆ Quality control
 - ◆ Work flow
 - ◆ Interface

Bridging Technologies: Client/Server Architectures

- Support applications with common data
 - ◆ GIS
 - ◆ Accounting
 - ◆ Building Permits
 - ◆ Etc.
- Promote database design standards
- Allow disparate clients
- Separates support for basic services from application support

Bridging Technologies: Enterprise-Wide DBMS

- Provides enterprise-wide access to:
 - ◆ Legacy data
 - ◆ Operating information
 - ◆ Work flows
 - ◆ LOCATIONS

Bridging Technologies: the Internet

- Unifies data access with geography & overcomes media incompatibilities
 - ◆ Web access
 - ◆ FTP
 - ◆ Virtual Private Networks (VPN)
- Promotes simple, economical communications
 - ◆ Instant messaging
 - ◆ Email
 - ◆ Newsgroups
 - ◆ Video conferencing

Bridging Technologies: Electronic Data Management Systems

- Use GIS to make paper systems into electronically available, georeferenced data
 - ◆ Provide data for work flows, selected by location
 - ◆ Integrate data from different sources, selected by location

Bridging Technologies: Global Positioning Systems (GPS)

- Collect data that:
 - ◆ Lack systematic inventories
 - Drainage facilities
 - Curb ramps
 - ◆ Lack important location information and/or cannot be efficiently captured photogrammetrically
 - Manholes
 - Utility poles

Opportunities and Pitfalls

Opportunity:

Generate return on information investment

- Efficient Service Delivery
- Centralized Complaint Response
- Reduction in Cost of Services

Pitfall Potential:

Create a money pit

- Ignore standards
- Allow unconnected systems to proliferate
- Do not seek organizational support
- Do not integrate data
- Disregard quality control



Q: What makes the difference?

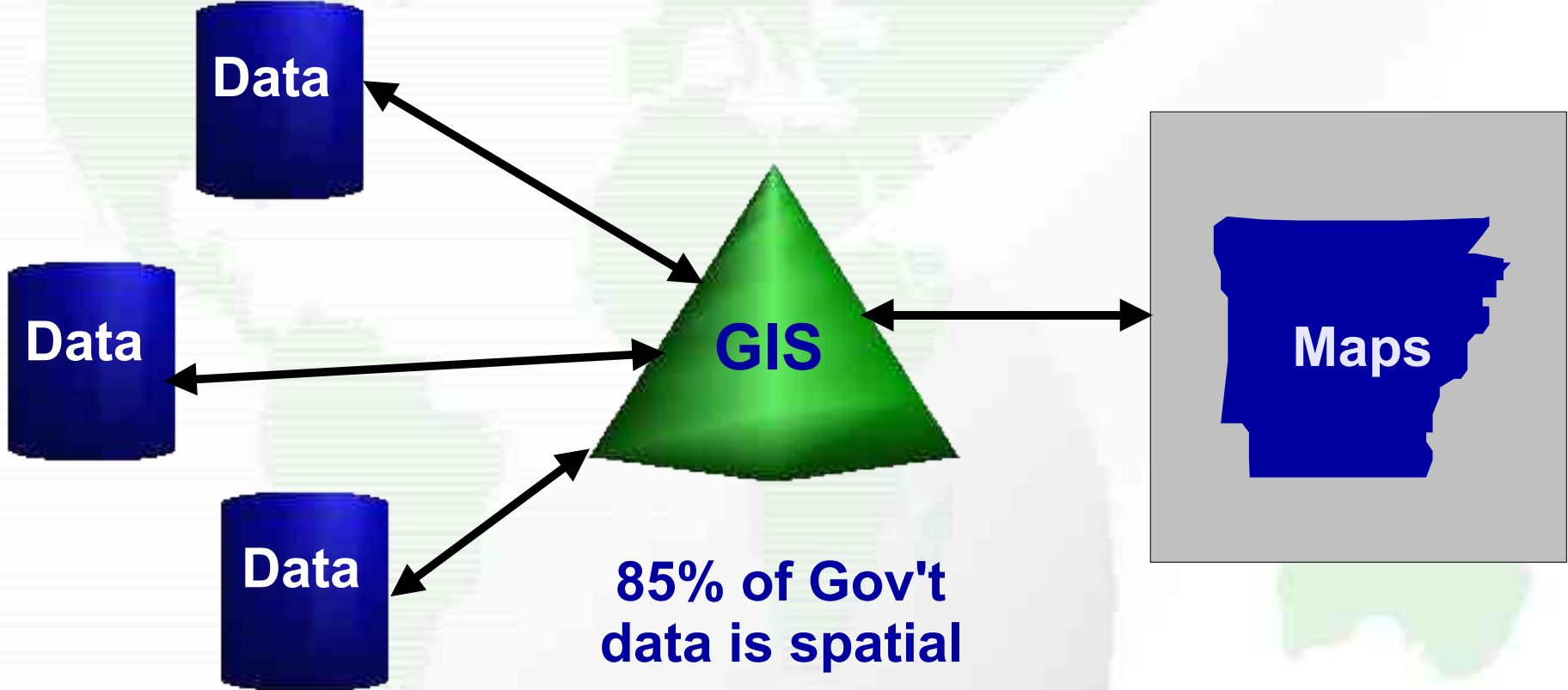
A: Preparing for success.

- Top Level Organizational Support
- Vision, Mission and Goals
- Integration of Spatial Data
- Design
- Implementation
- Maintenance

Opportunities and Pitfalls: Organizational Issues

- Get top level support
- Conduct a Needs Analysis
- Get an organizational commitments
- Written agreements
- Funding

Integration



Opportunities and Pitfalls: Business Processes

- Review workflows
 - ◆ Pay attention to how location is attached to the record:
 - Where
 - When
 - How
 - By whom
- Integrate GIS into business processes

Opportunities and Pitfalls: Design and Implementation

- Based on needs of users
- Based on standards
- Database structure is critical
- Metadata provides the information about the information (who, what, where, when, how accurate)
- Supports vision

Opportunities and Pitfalls: Implementation

- Phased approach
- Concurrent activities
- Related to budget cycles
- "Small win" strategy - show results fast.

Opportunities and Pitfalls: Understanding Maintenance

- Maintenance is on-going
- Data only valuable if current
- Budget for annual updates
- Institutionalize data maintenance

Opportunities and Pitfalls: Making Your Data Deliver

- Mission of Government is to enhance the delivery of services
- Government's business is service delivery
- First, you have to find the customer

LOCATION is the KEY

Opportunities and Pitfalls: Key Fields

- Location = Address and Parcel Number
 - ◆ Must be cross-referenced
 - ◆ Must be standard in all data
 - ◆ Must be linked to map

Opportunities and Pitfalls: Key Fields

Address storage before
standardization and
quality control

original_string
 MARY TAYLOR RD 3601
 AV F 638
 COTTON AVE SW 912 (VOID)
 17TH AV N 3420
 GRASSELLI AV SW 4441
 ALBANY ST 328 WYLAM
 EAST PARK CIR 129
 MASON AV SW 906
 3RD AV N 1701
 3RD FLR 9TH CT S 2701 MAIN HOSP
 1ST FLR POBII MAM 10TH AV S 2700

Address storage
after
standardization
and quality
control

void	prefix_dir	street_name	street_tpy	suffix_dir	street_num1	unit_type	unit_descr
N		MARY TAYLOR	ROAD		3601		
N		AVENUE F			638		
Y		COTTON	AVENUE	SOUTHWEST	912		
N		17TH	AVENUE	NORTH	3420		
N		GRASSELLI	AVENUE	SOUTHWEST	4441		
N		ALBANY	STREET		328		
N	EAST	PARK	CIRCLE		129		
N		MASON	AVENUE	SOUTHWEST	906		
N		3RD	AVENUE	NORTH	1701		
N		9TH	COURT	SOUTH	2701	FLOOR	3RD
N		10TH	AVENUE	SOUTH	2700	FLOOR	1ST

Opportunities and Pitfalls: Addresses

If everything is addressed, in standard form,
then all data are geographic.

Work processes can be rationalized

And simplified

What does that mean?

The Opportunity: Return on Investment

- Efficient Service Delivery
- Centralized Complaint Response
- Reduction in Cost of Services
- Ability to Improve Services to Citizen

The Nitty-Gritty: Traditional GIS Data Storage

**Enterprise
Applications**

**Tabular
Data**

GIS

**Spatial
Data**

The Nitty-Gritty: Unified Data Storage

Enterprise
Applications



The Nitty-Gritty: Data Storage

- Size: Vector data are large, imagery even larger
- Consider network demands carefully
- Design concerns mount with the degree of integration
- Disparate and/or low quality spatial data will
 - ◆ Crowd drive space
 - ◆ Provide conflicting or unreliable linkages to spatial data

Quality control is crucial to IS integration

The Nitty-Gritty:

Base maps are constructed from aerial observation.

- Physics are involved
 - ◆ Planes fly lower and slower to see more detail
 - ◆ You can't map what you can't see.
- Error is involved
 - ◆ Measurement depends on conditions of capture and processing
- People are involved
 - ◆ Metadata gives you a record of both the process and the "people trail"

The Nitty-Gritty: Decimals, Desires and Dollars

- Base map data that reflect needs (not wants) produce a return on investment for the enterprise.
 - ◆ A want:

"I want edge of pavement collected so my maps will look right."
 - ◆ A need:

"I need edge of pavement for NPDES calculations."

The Nitty-Gritty: Decimals, Desires and Dollars

- Accuracy has to be kept in perspective.
 - ◆ Support needs, not wants
 - ◆ Mapping accuracy vs. survey accuracy
- The acid test:

**Would this level of accuracy mean that
you won't send a truck out?**

The Nitty-Gritty: Decimals, Desires and Dollars

- Accuracy at capture is no substitute for maintenance.

Remember:

**You can stop maintaining your data
when the world stops changing.**

The Nitty-Gritty: Data Standards

- Spatial data are especially complex. Standards are essential for:
 - ◆ Interoperability
 - ◆ Longevity
 - ◆ Portability

The Nitty-Gritty: Data Standards

- Standards for capture and use
 - ◆ National Standard for Spatial Data Accuracy
 - ◆ National Map Accuracy Standard
- Format Standards
 - ◆ Digital Line Graph, Level 3 (DLG-3)
 - ◆ Digital Line Graph, F (DLG-F)
 - ◆ Spatial Data Transfer Standard (SDTS)

The Nitty-Gritty: Data Standards

- Content Standards
 - ◆ Content Standard for Digital Geospatial Metadata (CSDGM)
 - ◆ Geographic Names information System (GNIS)
 - ◆ Content standards to support users:
 - ➔ National Fire Incident Reporting System (NFIRS)
 - ➔ North American Emergency Response Guide (NAERG96)

The Nitty-Gritty: Data Standards

- Federal Geographic Data Committee (FGDC) Framework concept
 - ◆ Orthoimagery
 - ◆ Elevation
 - ◆ Transportation
 - ◆ Hydrography
 - ◆ Governmental units
 - ◆ Cadastral information

The Nitty-Gritty: Data Standards

- Open GIS Consortium
 - ◆ Decoupling data and functions from monolithic software
 - ◆ Client/Server and web technology

Case Study

- Choose a topic
- Field Trip
- Elementary Data Set
- GIS/IS System Integration Design
- Discussion

Conclusions

- GIS/IS Integration is happening now
- Frameworks and standards have been built to support it
- Software tends to lag
- Data are the heart of the matter

Resources

- United States Geological Survey (USGS)
<http://www.usgs.gov/>
- Federal Geographic Data Committee (FGDC)
<http://www.fgdc.gov/>
- National Institute of Standards and Technology (NIST)
<http://www.nist.gov/>
- Open GIS Consortium (OGC)
<http://www.opengis.org/>

For Further Information

Martha Lombard

Director of Consulting
Services

5364 Pineywood Rd.
Birmingham, AL 35242

205-980-4843

mlombard@spatialfocus.com

Sara Yurman

Director of Information
Services

436 Avery Street
Decatur, GA 30030

404-378-0989

syurman@spatialfocus.com

Visit our website at www.spatialfocus.com

Spatial Focus, Inc.