GIS and Document Management Integration

Presented by:
Steve Sherman, GISP
City of Greensboro, NC

ESRI Conference 2007
Presentation Goals

- Definition of “Document Management”
  - What it is?
  - Why it’s important
- Role of GIS in Document Management
- Pilot project details
- Future directions
Greensboro Overview

- **Greensboro**
  - Central North Carolina
  - Population: ±230,000
  - Area: 120 sq. mi.
  - Roughly 2,800 employees
  - FY 2006-07 Budget of $386M

- **Wide range of municipal services**
  - Water & Sewer
  - Storm Water
  - Solid Waste
  - Police and Fire
  - Building Inspections
  - Parks & Recreation
  - Libraries
  - Transportation
  - General government
## Project Background: GIS

### ESRI Environment
- ArcMap 9.1 (almost 9.2)
- ArcSDE (SQL Server)
- ArcIMS
- Enterprise wide, centralized GIS management
- Using GIS technology since 1990

### System Metrics
- Roughly 150 users of ArcMap
- Numerous ArcIMS users
- ±200 SDE Layers
  - 130,000 address points
  - 18,000 street segments
  - 90,000 parcels
  - 50,000 storm water inlets
  - 45,000 street signs
Integration of GIS with Enterprise Applications

- Evolution of GIS from basic mapping to spatially enabling enterprise applications
- Importance of Enterprise GIS
- Examples
  - Work Management
  - Call Center
  - Emergency Operations Center
  - Most Recently -- Document Management
# What is Document Management?

## Problem
- Documents are everywhere and increasing in volume
- In many different types and formats, from many sources
  - Not just paper... .xls, .pdf, .tiff, etc.
- Consuming valuable time and space
- Straining manual processes

## Solution
- Store document digitally
- Indexed retrieval
- Give employees instant access to documents they need
- Provide within context of familiar business applications
Why is Document Management Important?

- Provides organization to unstructured information
- 90% of corporate memory exists on paper
- 90% of all documents handled each day are merely shuffled
- The average document gets copied 19 times
- Organizations spend $20 to file a document, $120 to find a misfiled document and $220 to reproduce a lost document
- 7.5% of all documents get lost
- 3% get misfiled
- Professionals spend 5-15% of their time reading information, but up to 50% looking for it
- There are over 4 trillion paper documents in the U.S. alone – growing at a rate of 22% per year
Why is Document Management an Enterprise Application?

- Documents have uses across departmental lines
  - Engineering documents used by street inspectors
  - Deed documents used by Legal, ROW procurement
  - Driveway permits used by Street Maintenance

- Store it once – Use multiple times

- Economies of scale
  - Document management systems are costly
  - Share resources (staff, hardware, etc.)
Why is Document Location (GIS) Important?

- **Document have locations**
  - Street segments
  - Addresses
  - Facility names
  - Rule of thumb... 80% of “information” includes a location

- **GIS provides a means for retrieving documents based on location**
  - Maps are more intuitive than “pick lists” or text queries
  - Example:
    - Select a building and retrieve the Fire permit
    - Select a document and find the corresponding GIS feature
Why is Document Location (GIS) Important?

- Retrieve documents of associated features
  - Allows selection of documents across multiple spatially related features
  - Examples:
    - Select an intersection and its associated streets, retrieving deeds, engineering drawings, accident reports, etc.
    - Retrieve all fire inspection reports within a Fire Demand Zone
- Increase inter-department sharing
  - GIS technology dissolves departmental “silos”
Project Goals

- Replace an aging in-house application
  - Only Engineering documents (200,000+)
  - VB6 & MapObjects based
  - Developed mid-1990’s
  - Required installation on client PC’s
- Intranet distribution
- Commercially available off-the-shelf solution
  - Provides “Best practices” solution
  - Eliminates need to support in-house
- Future integration path to other COTS and In-house applications
  - Call Center, Work Management, etc.
Project Goals

- Focus on Services Oriented Architecture (SOA)/WebServices
- WebServices allow programs written in different languages on different platforms to communicate in an event driven, standards-based way via XML documents
- XML documents contain:
  - “Start tag” – defines what’s coming
  - “End tag” – concludes the document
  - “Content” – the information between the two tags
    - Elements are annotated with attributes that contain metadata about the element and its contents
- Web Services allows “disconnected” participating system upgrades
- Conclusion: Create a GIS module for existing product
Partnership with Perceptive Software

- **ImageNow by Perceptive Software**
  - Document imaging, document management and workflow
  - ESRI Business Partner
  - Over 1,200 customers worldwide
  - Industry Focus: Higher Ed, Healthcare, Finance, Government

- **Existing vendor for traditional “business” documents**
  - Financial, Human Resources, etc.
  - Currently integrated with City’s ERP solution
  - Implemented in 1999

- **Current System Metrics**
  - Users: 30
  - Total Documents: 850,000 (many more pages)
Spatial Enabled Document Examples

- Fire Inspections
- Fire Investigative Reports
- Fire Permitting
- Fire Detectors
- Fire Plan Review
- Police Arrest/Accident Reports
- Driveway permits
- Engineering Drawings
- Deeds
- Project contracts
- And More…

Combined count: 200,000 documents
Application Structure Overview

- Documents stored on network drive (native format)
- ImageNow database (SQL Server) manages indexes
- Integration approach
  - Pre-populate feature class w/ unique ID number
  - Concatenation of feature ID with feature class ID number
  - Yields unique ID across all feature classes
  - Document attributes contain resulting concatenated key
- Linking of document via index value
  - Allows multiple documents per single GIS feature
Application Structure
ArcMap Client

- Extension to ArcMap
- Link document to feature
- Retrieve documents spatially
- Display in native viewer
- Display in ImageNow viewer
- Access to ImageNow tools
  - Mark-up
  - Rotate
  - Print
  - Stamp
  - Etc.
Application Structure
ArcIMS Viewer

- ArcIMS Map Service
- Retrieve documents spatially
- Display in native viewer
- Display in ImageNow viewer
- Access to ImageNow tools
  - Mark-up
  - Rotate
  - Print
  - Stamp
  - Etc.
Implementation Status

Currently
- Pilot Project
- Engineering Records
  - Link existing drawings
  - Deploy Intranet viewer
  - Replace legacy system
- Providing vendor enhancement feedback

Near-Term
- Expand to existing ImageNow users
  - Transportation
  - Fire
  - Police
- Expand to departments not now using imaging
Questions?

stephen.sherman@greensboro-nc.gov

http://www.greensboro-nc.gov/Departments/MIS/gis/