Integrating GIS and Asset Management at GCWW

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Abstract:
Managing the maintenance activities of a large municipal water system with over 235,000 accounts is a monumental challenge. The water infrastructure assets number more than 500,000 and span a service area of over 400 square miles. The legacy software of the 90's was inadequate at tracking work on our distributed assets. In early 1999, the Greater Cincinnati Water Works (GCWW) began looking for a comprehensive Enterprise Asset Management (EAM) system. Through an exhaustive process, the GCWW selected a leading EAM solution. While the selected software was the best overall fit for our various requirements, it lacked baseline support for GIS and addresses. This represented a significant functionality gap for the GCWW.

The GCWW designed and built an application to fill the gap between our existing GIS system and the new EAM software. The integrated solution satisfies the GCWW's GIS needs without compromising a baseline implementation of the EAM system.
Greater Cincinnati Water Works (GCWW)

GCWW provides high quality drinking water to most of the greater Cincinnati region
- Most of Hamilton County (Ohio)
- Parts of Butler and Warren Counties (Ohio)
- Boone County (Kentucky)

Vision
Greater Cincinnati Water Works will be the standard for excellence in the water industry

Mission
To provide our customers with a plentiful supply of the highest quality water and outstanding services in a financially responsible manner
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GCWW Statistics

- **589,000 assets (in GIS)**
  - 226,000 Branches
  - 185,000 Water Mains (> 3,000 miles)
  - 68,000 Valves
  - 30,000 Fire Hydrants
  - 80,000 Fittings

- **235,000 customers**
- **150,000 work orders per year**
- **50 billion gallons of water distributed annually**
- **5,000 supply division facility assets**
- **9,500 preventative maintenance work orders**
- **335 EMPAC (EAM) users**
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EAM Background

- Oct 1994 implemented RJ N Cassworks “pilot”
- 1999 / 2000 – performed RFI, RFP in search of replacement
- Best overall fit: Indus EMPAC
- Major gap – GIS
- Constraints – no customization of baseline product
- Solution: in-house development of bridging application that effectively integrates GIS with EMPAC
- Distribution Work Creation (DWC)
- Went live with EMPAC / DWC in late 2001
- Currently on DWC v5
Alternatives Considered

GEN7 (extensive ArcView 3 project)

Pros:
- Some existing code to leverage
- Some familiarity with development environment (Avenue)

Cons:
- Complex UI
- Limited integration with external systems
- Expensive to license
- Aging technology
- Limited control of development
- Client server difficult to support, deploy
Alternatives Considered

ArcIMS

Pros:
• Web deployment

Cons:
• Learning curve
• Lack of confidence in maturity of product
• Performance concerns
• Very few web development resources
Alternatives Considered

Visual Basic / MapObjects

Pros:
- Ease of Use
- Full control of development
- Mainstream technology - not legacy, not bleeding edge
- Lots of developer support (everyone knows VB)
- Strong systems integration possible
- "Just enough" GIS functionality

Cons:
- Client server difficult to support, deploy
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Technical Architecture

EMPAC

EMPAC Oracle 8.x DB Server

EMPAC WO/WR data, map metadata

EMPAC WO/WR data (DDE integration)

DWC

ArcView 3.x (GEN7)

ESRI Map Objects

Initial version supported DDE integration

GIS data

GIS File Server

GIS File Server

GIS File Server

GIS data
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Major Functionality

• Standardized address validation
• Easy selection of GIS assets (water main, valve, hydrant, branch line)
• Ability to alert user of open, nearby work during work creation
• Simplified work creation
• Table-driven map configuration (layers, labels, identify, symbology…)
• Quick identify
• Display work (work orders and work requests) on the map
• Valve card (what valves and customers are affected by shutdown)
• Event Board (high visibility work)
• MOAQ (Mother of All Queries) – searches across several data sources
• Simplified scheduling
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Sample Screenshots – WO (Default View)
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Sample Screenshots – WO (Map View)

What features are under my cursor?

Where is this WO?
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Future

- Indus has converged product lines – EMPAC will go off support Dec 2006
- New Indus product – Indus Asset Suite (IAS)
- Will consider IAS as well as other EAM solutions
- Likely re-development of DWC as new solutions are web-based
Lessons Learned

• Sometimes your best solution is the one that is “least bad”
• There is a cost to custom development
• Flexibility matters
• End User involvement critical at all stages: concept, design, development, testing, training, deployment, support
• No news is NOT good news
• Executive management support critical
• Mainstream technology beats bleeding edge
• Scope control critical
• Plan for a longer, more expensive project than you expect - and then increase it
• Focus on business process and not technology