Abstract:

The City of Saskatoon has separate data models for Parcel, Transportation, Water, Sanitary, and Storm in 1 ArcSDE. Transportation data is edited using NovaLIS Editor except for Asset Lines & Points. Asset Lines (for example, curbs, sidewalks, painted lines) are edited in AutoCAD and transferred to ArcSDE using SAFE FME batch program. Asset Points (stop, yield, overhead signs and traffic lights) are edited in MapGuide by field staff and transferred to ArcSDE. Water, Sanitary, and Storm are edited using AutoCAD with an editor extension soon to change to AutoCAD Oracle Locator. The data is then transferred to ArcSDE. The inventory data is completely replaced every four months while operation data (ie., hydrant pressure) persists. Operational data is supported by ArcPad from ten different field groups. Spatial inventory data is not changed by field staff but sent as event tables to data editors. MapGuide uses SAFE SDP to view ArcSDE data.
City of Saskatoon

Saskatoon:
- largest city in Saskatchewan.
- population of 206,000
- 60,000 privately owned parcels of land.
- adjacent to the South Saskatchewan River
The presentation:

- Engineering GIS Objectives
  - Strategies
  - Tactics
  - Status today
- GIS access
- Data Models
- Editing & data transfer
- How is data integrated
- How is data analyzed
- Is the Enterprise integrated & Seamless?

Engineering GIS Objectives

- Everything we do today, we do well, let's do it better
- Concentrate on people and their jobs
How we do our job today:

- MapGuide to every employee
- AutoCAD feeds MapGuide
- ArcSDE feeds MapGuide
- Moving from:
  - paper forms & pin maps to digital forms and analysis maps
  - Excel, Paradox, and MS Access db to MS SQL server & Oracle Locator tables

Stated GIS Enterprise Benefits

- Removing:
  - In-accuracies
  - Duplicate copies
  - Concurrency
- In reality:
  - Justification for cleaning data both spatial & attribute
  - Moving from central control to field control
  - Building in benchmark reports (read “manager” reports)
  - IT department’s desire to control by consolidation to single vendor
**Tactics**

- Spatial data accuracy is 99% - standard attained in 2000
- Defining a Maintenance cycle - standard attained in 2004
- Attribute data is 99% accurate by Dec. 2005
- Automatic synchronization of data by Dec. 2005
- Supplying Annualized Reports
- Making more data more readily available to more staff
  - Attribute data is 99% accurate by Dec. 2005
  - Maintained by field staff
  - Changing to PDA or tablet digital forms
  - Reducing bottle necks
  - Automatic synchronization of data
    - Increase concurrency
    - Increase acceptance & buy-in

**Background**

GIS use since early 80’s
- highly decentralized with each Business Area maintaining their own (potentially duplicate) data sets

1996, move towards a Corporate or Enterprise Model
Background (con’t)

- 1997, Mapguide Enterprise / Intranet applications
- 2000, choose ESRI’s SDE data engine and ArcGIS 8 as Enterprise host.

Integration of Data Stores

♦ Where we are now

[Diagram: Enterprise Architecture with Enterprise GIS Warehouse]
The target  
– Totally integrated & seamless?

Source: ESRI Redland 2004
It was ESRI’s Strategy that sold us

**1st Year**

- Linear referencing
- Single editing tool
- Same data store
- Cool maps
- Dynamic Segmentation
- Network analysis
- GeoCoding or Geolocating
- Fabric Concept

**ESRI Use Cases**

- Parcel
- Event Tables
- Cool maps
- Network analysis

**ESRI User Cases**

**CIS Architecture**

ArcInfo  ArcView  MapObjects  ArcExplorer  ArcIMS

Scalable Solution for Comprehensive Geographic Analysis

Source: ESRI Redland 2003
The GIS Enterprise

Network

GIS Database Server

Metadata Server

RDBMS Server

GIS Professional

Desktop GIS

Browser GIS

Component GIS

Other Applications

The GIS Enterprise

Successes:

1st Year ESRI Use Case

Linear referencing

Dynamic Segmentation

Network analysis

GeoCoding or Geolocating

Fabric Concept

SDE

Personal GeoDB

Shape files

ArcPad (12 app & 30 licences)

Success came about because of people!

- stubborn, determined people

Source: ESRI Redland 2004
Failures:

Every failure is because nobody took ownership &/or the technology was too difficult to implement.

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- **How is data integrated**
- **How is data analyzed**
- **Is the Enterprise integrated & Seamless?**
Transportation Use Cases

- Create New Road
- Flip Road Links
- Update Road Status by Graphic Selection
- Create Pavement Link Feature Class
- Populate Turn Table
- Export to TMODEL
- Create / Update Traffic Analysis Zones
Implement Enterprise GIS  
(Water, Sanitary and Storm Sewer)

♦ Water Distribution System  
  • Primary (Trunk) - operational  
  • Secondary – operational  
  • Every customer’s demand is represented

♦ Sanitary Sewer Collection System  
  • 1 city wide model - end of 2005

♦ Storm Water Management System  
  • 45 catchment-scale models – operational

Water Distribution Modeling

Parcels  
SITEID, area, water meter ID, average consumption

Service Connections  
Size, material

Junctions  
WMNODENO, function

Pipes  
WMLINENO, diameter, material

Demand Zones  
Area, property use, land use, postal code, population
Storm Sewer Data Model
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Parcel Editor (NovaLIS)
SAFE FME Workbench
AutoCAD map to Personal GeoDB to SDE and back

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Field Collection applications

- **ArcPad**
  - Public Works operations
    - Excavation Works
    - Flushing & Brushing
    - Hydrant inspection
    - Valve inspection
    - Video Inspection
    - Manhole Inspection
    - Catch Basin Inspection
    - Road Rating
    - Sidewalk inspection
    - Trouble crews
- **Other systems:**
  - Municipal Engineering
    - Signs
    - Water levels
    - Rain gauges
    - Traffic Volumes
    - Traffic Signal (StreetWise)
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**HOLE**

**OPEN**

**MAINTENANCE**

**EXPEDITED**

**REPAIR**

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**Impervious Area**

- 2 parcels

- Impervious
  - By block
  - By roofline
Water Distribution

- Hydrant
- Pressure zone for fire fighting

Water Consumption

- Individual house
- Block
- Iron pipe connection
Traffic system

- Stop/Yield/Traffic Lights

- Pavement Markings

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While the target was seamless, it was not achieved

- Just want to hide the seams
- The user doesn’t need to know the seams exist
- Not just 1 solution to all our problems (”opportunities”), just a common data store accessed differently!

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Acknowledgements

The authors are indebted to the following city employees for their dedication and enthusiasm:
Dr. David Laboullier P.Eng for his ideas and help in editing the paper
Dr. Ian-Mark Guenther P.Eng  GIS Champion
Ray Fidacy & Ryan Osmundson: MapGuide Authors
Kevin Shershenik: City GIS Coordinator
Peter Forsyth: Manager, Technology Integration
Lisa Rogers: Database Administrator
The other 25 members of IS GIS Group.
ERSI Canada Enterprise Group, Toronto