Spatial Accounting™
Using GIS to Power Decision Support Systems in Asset Management, Facility Maintenance and Real Estate Operations

Daniel Elroi
President & CEO, NSGIS
delroi@nsgis.com

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About the Speaker

- Daniel Elroi, President & CEO of NSGIS
- 33+ years’ experience in geospatial and related technologies
- Entrepreneur helped start 4 GIS companies in 3 countries
- “Adopted” Californian (UCLA grad, 16+ years here)
- Coined the term Spatial Accounting™
- Frequent speaker and writer on GIS, asset management, property management, security management
Purpose of Presentation

• Touch on SAM (Strategic Asset Management) principles
• How they apply to asset, facility and property management
• How SAM principles can be used in practical decision support terms
• The concept of Spatial Accounting™
• Outlining the steps to get there
• Assessing your organization’s readiness
• Recommending next steps
Strategic Asset Management (SAM/SAMP)

• Purpose of Strategic Asset Management:
  • “Optimize the use and value of assets, assessing risk and cost, all driven by data”

• Asset:
  • “An item, thing or entity that has potential or actual value”

• Examples:
  • A pump
  • The water treatment plant that the pump is located in
  • The land that the water treatment plant is built on

• Everyone makes SAM decisions:
  • Private entities
  • Institutions
  • Government
SAM Principles

• Increase predictability of asset performance

• Balance:
  • Level of Service from an asset
  • Likelihood of the failure of an asset
  • Consequence of the failure of an asset

• Reduce the variability in repairs and replacements

• Furthermore, look at the bigger context of the asset
Asset Maintenance vs. Asset Management

- Asset Maintenance = Facilities Management
- CMMS = Computerized Maintenance Management System
- This is not synonymous with Asset Management
- EAM = Enterprise Asset Management software
- Strategic Asset Management (SAM) starts at the top, permeates the entire enterprise
SAM Standards

Standards

- **Are**: Specifications
- **Are not**: Prescriptions
- **Do**: Provide guidelines
- **Do not**: Provide implementation
- **Can**: Help design a SAM program
- **Can not**: Get a program off the ground
Key Info Management Components of SAM

• SAM developed in Australia, New Zealand and Europe – we learn from them
• Foundation Systems
  • ERP – Enterprise Resource Planning, or
  • EAM – Enterprise Asset Management
  • GIS – Geographic Information System
  • EDMS – Electronic Document Management System
• Expert Systems
  • Engineering
    • Condition Assessment
    • Materials Testing and Lifecycle Modeling
  • Real Estate
    • Mass Assessment
    • Comparables Analysis
  • Fleet
    • Automotive diagnostics
Decision Support System

• What is your organization’s current “decision support system”?
  • Your staff’s brain, memory, knowing where to find information
  • Your institutional knowledge, your “old timers”
  • Your staff and management’s gut feel, intuition

• What does it lack?
  • Accountability
  • Transparency
  • Repeatability
  • Scalability
  • Resiliency

• What is the new Decision Support System?
  • Let’s take a look
Decision Support System
Decision Support System
Decision Support System

• “It’s broken, it needs to be fixed, now!”
• “We’ll have to stop operations if we don’t fix”
• “We’ll have to stop operations in order to fix”
• “Somebody is going to get hurt”
• “We’re not meeting the lease terms”
• “It’s not in the budget”
• “We should have inspected sooner”

But…
• “It’s broken, it needs to be fixed, now!”
Decision Support System
Let’s Start with Condition Assessments
Put All Assessments in a Database
Look at the Overall Rating to Identify Trouble
Access Current and Past Assessments
Model Deterioration and Life Cycle

Zone 1 - Significant risk zone: Significant CoF environmental and operational impacts. Address in short term (0-5 years).

Zone 2 - Assets with high CoF but failure not imminent - Real time / more aggressive condition monitoring (as applicable).

Zone 3 - Assets with moderate CoF but failure not imminent - Real time / more aggressive condition monitoring (as applicable).
Let’s Not Stop There!

Zone 1 - Significant risk zone: Significant CoF environmental and operational impacts. Address in short term (0-5 years).

Zone 2 - Assets with high CoF but failure not imminent - Real time / more aggressive condition monitoring (as applicable).

Zone 3 - Assets with moderate CoF but failure not imminent - Real time / more aggressive condition monitoring (as applicable).

Zone 4 - Standard maintenance and replacement strategies.

Zone 5 - Low CoF assets. Run to repair: • Not critical • Redundancy • Spares • Maintenance optimization.
Use Spatial Accounting™!

- A visual dashboard into your data, maps and documents
- Manage both physical and financial assets together
- Including real estate
Map Your Billing System

Top earner
Connect To Your Work Order System

Expensive

Expensive

Source: NSGIS
Visual Balance Sheet: Net Asset Values

Most neglected earner: Reinvest

Good asset, focus on cash flow

Get rid of this
Visualize Your Utilities, Infrastructure, Leases
Use a Map-Based Dashboard

- Repair Second
- Repair First
- Move Tenant

Source: NSGIS
Let’s Recap

• Spatial Accounting™ is the concept of:
  • Connecting different Systems of Record using GIS
  • Implementing the principles of Strategic Asset Management as a Decision Support System
  • Delivering it as a map-enabled System of Engagement

• This requires:
  • Existing systems to be connected
  • New systems to be added
  • Collaboration across the enterprise
How Does One Get There, Incrementally?

• “We have nothing” or “We have pieces”
• “We don’t have the experts to do this”
• “I’ve heard this is very expensive”
• “We’ve tried this before, it failed”
• “I already have a day job!”
• “We’re just a small organization”
• “Cyber-security”
• “Something urgent came up”
• “My management doesn’t get it”
GIS Strategic Plans

• **What:** Interviews across organization, providing budget, staffing, action plans

• **ROI:**
  - Coordinated vision & a road map
  - Sync with organization’s master plan & strategic asset management plans
  - Basis for budget requests
  - Bridge gap with IT
  - Better communication with leadership
Assessment of Paper Records

• **What:** Catalog paper, scanned and digital documents

• **ROI:**
  - Catalog of available data
  - Prioritization for conversion to GIS so only most reliable data is used
  - Gain value from GIS even before starting on data conversion and even from documents that are never converted
  - Map- and metadata-based search and retrieval of documents
Spatial Index of Digital Documents

• **What:** Spatially search and retrieve record drawings

• **ROI:**
  - Reduced risk of using wrong or incomplete document sets
  - Easier for new staff to find documents
  - Some organizations have reported 90%+ reduction in search for as-buils
Rectification of Scanned CAD Drawings

• **What:** Overlay images spatially without conversion to GIS
• **ROI:**
  • Much easier to use than disjointed standalone scanned drawings
  • Can stitch drawing sets together
  • Retain details that will never be converted to GIS
  • Save one-of-a-kind drawings before they are destroyed
  • Tangible value from document scanning
Data Conversion and Publication

**What:** Conversion of 100s map layers from paper, CAD, GIS

**ROI:**
- Vetted, authoritative data sources
- Available any time and on any device
- Stored on-premise or in the cloud
- Tools for sketches, measurements
- Integrates external data sources from city, county, state, federal agencies, etc.
- Integrates dynamic data with static data sources
Data Storage and Management

• **What:** On-premise or cloud storage and management

• **ROI:**
  • Complete systems of record and engagement
  • Options for economical cloud data streams, storage, analysis
  • Web GIS available on any device, anytime and anywhere (including offline)
  • Supports third-party software
Field Data Capture and Verification

• **What:** Verification and documentation of assets in the field

• **ROI:**
  • Increase confidence in data
  • Field apps eliminate paper
  • Can inspect conditions while verifying locations
  • Capture photos
  • Instant feedback to office
Condition Assessment Management

• **What:** Combine data, reports, maps, photos in one system

• **ROI:**
  • Faster, more precise access to condition data, not just recommendations
  • Comparison of conditions across space and time
  • Integration with engineering data to plan for project design and operations
  • Integration of data from different consultants and from internal assessments
  • Overlay with other map layers
Facilities and Work Order System

- **What:** GIS-based work order system, linked to finance & docs
- **ROI:**
  - Electronic work orders based on mapped assets
  - Work, labor and cost history retained in a database
  - Correlated to other systems through location information
  - Built-in scheduling and load balancing
  - Inventory control
  - Preventive maintenance planning
  - No paper records
  - Risk-based prioritization
Long-Term Lease Management

• **What:** Management of commercial property portfolio

• **ROI:**
  - Single map-based view of all properties
  - Differentiate between leased, available, expiring leases
  - Searchable, integrated data, maps and documents
  - Lease abstract and other reports
  - Query and analysis capabilities
  - Alerts and email notifications
  - Linkable to document management system
  - Executive dashboard
Capital Projects Management

• **What:** Tracking capital projects, exposing through dashboard

• **ROI:**
  - Internal tracking, public sharing
  - Can be used from beginning to drive the process
  - Linkable to document management system
Where is Your Organization on This Path?

- Do you lack systems or connectivity?
Where is Your Organization on This Path?

• Or only have enterprise systems for finance?
Where is Your Organization on This Path?

- Or have some GIS but it stands on its own?
Where is Your Organization on This Path?

- Or your GIS is connected to some enterprise systems but is not itself an enterprise system?
Where is Your Organization on This Path?

• Perhaps you are still managing everything with Word and Excel?
Where is Your Organization on This Path?

• You can start with specific systems, perhaps to just manage your record drawings
• Or just your critical map layers in GIS
Where is Your Organization on This Path?

• Or have a couple of systems, one for engineering and one for real estate
Where is Your Organization on This Path?

• As long as you have a plan for how you will eventually bring these systems together using the principles of Spatial Accounting™

• Your organization too can build a Decision Support System that will reflect your Strategic Asset Management Plan

• Not surprisingly, best outcomes if you
  • Have a plan
  • Get buy-in and budget
  • Standardize on a common platform
  • Learn from your peers, contract with experts, grow and hire people to sustain and grow

Spatial Accounting™

turns

Strategic Asset Management Plan

into

Decision Support System
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