ASSET MANAGEMENT 101

CT GIS Group

6/26/2020
Boulder Mountain Creative

- Woman-Owned Small Business
- Offices in Storrs, CT and Hillsboro, Oregon.
- BMC was inspired by TEDx and specializes at the intersection of Design and Technology.
- Boulder Mountain Creative specializes in the following services:
  - Asset Management
  - CMMS Implementation Support
  - GIS
  - Database Data Model Design
  - Technology Planning
  - Project Management
Juston Manville, MIAM

27 Years in Engineering Specific
• Asset Management
• Systems Integration
• Compliance Reporting
• Pavement Management
• CIP Prioritization
• GIS
What is Asset Management?

“What coordinated activity of an organization to realize value from assets.”
(International Organization for Standardization (ISO) 55000:2014)
# 39 Areas of Asset Management

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<th>Strategy &amp; Planning</th>
<th>Asset Information</th>
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<td>Asset Management Strategy &amp; Objectives</td>
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<td>Shutdowns &amp; Outage Strategy</td>
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<td>Fault &amp; Incident Response</td>
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<td>Asset Decommissioning &amp; Disposal</td>
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Asset Management Drivers

- Portfolio of aging and expensive assets
- Understanding future renewal expenditures
- Trade-off decisions between O&M (OpEX) and Capital (CapEX) ➔ Total Expense (TOTEX)
- Need for optimal investment strategies – new and old
- Loss of institutional knowledge from retiring workforce aka “Knowledge Management”
- Need for efficient maintenance practices
- Lack of cross-department integration
- Technology inputs not informing outputs
Goals of a Robust AM Program

• **Improved financial performance:**
  • Return on investments and reducing costs
  • Preserve asset value without sacrificing the short or long-term objectives

• **Informed asset decisions:**
  • Data driven decision making to balance costs, risks, opportunities and performance

• **Demonstrated compliance:**
  • Transparently conform with legal, statutory and regulatory requirements

• **Improved efficiency and effectiveness:**
  • Review and improving processes, procedures and asset performance to improve efficiencies and effectiveness
An Asset Management approach balances effort with value!

- Most effective use of money available
- Problem-solving approach
- Knowledge transfer for long-term sustainability
Improved Financial Performance

“Give me six hours to chop down a tree and I will spend the first four hours sharpening the axe” – Abraham Lincoln
Forecasting Replacement Cost is a Key Part of Asset Planning

- Asset Installation
- Asset Replacement

Year Installed

Miles of Pipe

- 1950
- 2000
- 2050
- 2100
Replacement Year Depends on Remaining Useful Life

Year Installed

- Asset Installation
- Asset Replacement

Miles of Pipe

1950 2000 2050 2100
## Philosophies That Guide Capital Funding

<table>
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<th>Pros</th>
<th>Cons</th>
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</table>
| **Cash Reserves** | ▪ Lower overall cost  
                      ▪ Financial flexibility  
                      ▪ Eases financial projections | ▪ Higher near-term rates  
                      ▪ Disproportionate burden on existing customers  
                      ▪ Need higher cash balances  
                      ▪ Puts a premium on advance planning |
| **Debt**       | ▪ Mitigates immediate rate impacts of capital investment  
                      ▪ “Generational equity”  
                      ▪ You get the money when you need it | ▪ Higher overall cost (interest)  
                      ▪ Reduces financial flexibility  
                      ▪ Debt is a useful tool in the toolbox, but amount of debt must be limited  
                      ▪ Last resort |
How Do You Want to Play Ball?
Options for Funding Capital Through Rates

• Do nothing
• Original-cost depreciation
• Replacement-cost depreciation
• Sinking fund (based on projected needs)
Asset Replacement Example

• Assumptions:
  • $1 million asset
  • 40-year useful life
  • 3% annual cost inflation
  • 1% investment earnings rate

  – Debt funding for costs that exceed resources:
    • 4.5% interest rate
    • 20-year repayment period

• We can choose to fund this replacement through rates based on:

  • **Original-cost depreciation**: $1,000,000 / 40 years = $25,000 per year
  • **Replacement-cost depreciation**: $25,000 x (1.03)^\text{Asset Age} per year
  • **Sinking fund**: $64,783 per year

Annual transfers escalate with inflation, ranging from $25,000 - $79,176 per year

Annual transfer needed to fully cover projected replacement cost in projected year of replacement
Funding for Asset Replacement

Replacement-cost basis funds
70% of replacement liability

Original-cost basis funds ≈ 39% of replacement liability

Replacement Cost in Year 40: $3.2 Million
Annual Rate Funding for Replacement

System Reinvestment Policy | Total Funded From Rates
---|---
None | $4,869,376
Original-Cost Depreciation | $3,990,279
Replacement-Cost Depreciation | $3,346,538
Sinking Fund | $2,591,337

Amount needed to fund a $3.2-million asset replacement in Year 40
Minimize Expenses Using Asset Management
Informed Asset Decisions

“Most of the world will make decisions by either guessing or using their gut. They will be either lucky or wrong.” – Suhail Doshi
Data Fundamentals

• **Strategy**
  - Clear statement of objectives
  - Data managed through asset lifecycle
  - Decision making process outlined

• **Align goals:**
  - Finance, information systems, engineering and operations

• **Leadership**
  - Clearly defined roles and responsibilities
  - Empower employees

• **Assurance**
  - A process for monitoring and improvement
A systematic and comprehensive listing of all assets in a logical, nested order that facilitates quick location of asset records and the rolling up of data from lower levels to higher or the drilling down from higher levels to lower. The hierarchy, when combined with unique identification numbers and relevant attribute data for each asset comprises an asset registry, is one of the most fundamental building blocks of an asset management program and system.  

WERF: http://simple.werf.org/simple/media/AHT/howTo.html
Asset Hierarchy

- Cost rolls up from part(s) to site(s)
- Condition rolls up from part(s) to site(s)
- Depth of the hierarchy needs to consider:
  - Level of asset for maintenance: maintenance managed item(s)
  - Information system(s) used:
    - GIS is shallow
    - Maximo can go 9 levels
    - PeopleSoft, Tyler Technologies (Finance Systems)
    - CAD / BISDM / ArcFM
Step 1: Organize the Layout

- Identify components and logic groupings
- Determine roll-up requirements
- Define the levels required for operations and maintenance (maintenance managed items)
Maintenance Managed Item (MMI)

- A maintainable unit is repaired by replacing a component or part
- A component is replaced upon failure, not repaired
- Low cost items could be tracked based on criticality:
  - Due to *indirect cost consequences*
  - Due to *safety*
  - Due to *theft*
  - Due to *Environmental Impact*
Step 2: Develop Asset Registry

• Asset Tags & Naming Conventions
  • *Unintelligent* (random, often sequential numbers)
  • *Semi-intelligent* (numbers that may indicate the type of asset, department, or responsible Business Unit and may identify its approximate location but then use an unintelligent sequential number for the balance of the number)
  • *Fully intelligent* (numbers that will have a detailed structure so that the number can indicate the general type of asset, the location, and whatever other attributes are deemed important)

• Document Data
  • Develop attributes of asset classes
  • Inventory and record tag IDs
Step 3: Load Data & Beyond

• Develop a strategy for testing and loading data
• Develop relationships with data collectors, end users and data stewards
  • Include all levels of the organization
  • Train data collectors, end users and data stewards on the goals of systems
  • Train end users in the use of systems
• Implement a change control process
  • Consider dependent systems:
    • Finance System
    • GIS
    • RCM Tools
    • Etc...
Data you can trust...
The Truth about Field Truth

- As-Built drawings are always correct?
- Biggest gain in efficiencies
- Better data = better reporting
- High ROI
- Common Operating Picture
Good Data ➔ Planned Actions ➔ Lowest Cost

- Total cost
- Unplanned Actions
- Planned Actions

Community Cost

Low ↔ Level of Service ↔ High
Demonstrated compliance

“All I want is compliance with my wishes, after reasonable discussion.”
— Winston Churchill
Good Data Keeps the Auditors Away

- GASB
- MS4
- NPDES
- TAMP
Improved Efficiency

“Modern technology has become a total phenomenon for civilization, the defining force of a new social order in which efficiency is no longer an option but a necessity imposed on all human activity.”
— Jacques Ellul
Levels of Service Drive Risk
Levels of Service Drive Priorities

- Services Provided
- The Customers Who Use the Services
- Customer Needs and Expectations
- Alignment of Customer and Supplier
- Actions to Meet Service Expectation
- Information Needed to Run the Business
- Metrics for Good Performance

Key Performance Indicators

Level of Service
“A good place to be a pipe” - PWB

Graph showing the relationship between detectable deterioration, potential failure, functional failure, and total failure over time, with the PF-Curve as a critical point.
What risk are you willing to take....

Define the Acceptable Levels of Risk
**Operational Efficiencies**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Condition</th>
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<tbody>
<tr>
<td>A – No Future Issues</td>
<td>1 – New</td>
</tr>
<tr>
<td>B - Little Future Issues</td>
<td>2 - Good</td>
</tr>
<tr>
<td>C – At Capacity</td>
<td>3 - Fair</td>
</tr>
<tr>
<td>D - High Capacity Issue</td>
<td>4 - Poor</td>
</tr>
<tr>
<td>E – Major Capacity Issues</td>
<td>5 - Failed</td>
</tr>
</tbody>
</table>
## Priority Rank with a Risk Map

<table>
<thead>
<tr>
<th>Condition Index</th>
<th>Condition Beta</th>
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<tbody>
<tr>
<td>0 to 0.9</td>
<td>10 11 12 13 14 15 16 17 18 19 20</td>
</tr>
<tr>
<td>1 to 1.9</td>
<td>9 10 11 12 13 14 15 16 17 18 19</td>
</tr>
<tr>
<td>2 to 2.9</td>
<td>8 9 10 11 12 13 14 15 16 17 18</td>
</tr>
<tr>
<td>3 to 3.9</td>
<td>6 7 8 9 10 11 12 13 14 15 16</td>
</tr>
<tr>
<td>4 to 4.9</td>
<td>5 6 7 8 9 10 11 12 13 14 15</td>
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<td>4 5 6 7 8 9 10 11 12 13 14</td>
</tr>
<tr>
<td>6 to 6.9</td>
<td>3 4 5 6 7 8 9 10 11 12 13</td>
</tr>
<tr>
<td>7 to 7.9</td>
<td>2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td>8 to 8.9</td>
<td>1 2 3 4 5 6 7 8 9 10 11</td>
</tr>
<tr>
<td>9 to 10</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
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</table>

### Consequence Beta

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Level</td>
<td>Low</td>
<td>Medium-Low</td>
<td>Medium</td>
<td>Medium-High</td>
<td>High</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Risk Level Results (Map #)

- High 17 - 20
- Medium-High 13 - 16
- Medium 9 - 12
- Medium-Low 5 - 8
- Low 1 - 4
Key Asset Management Concepts Summary

1. Policy
2. Levels of Service
3. Failure Modes, Effects, and Criticality Analysis (FMECA) / Fault Tree
4. Lifecycle Costing
5. Risk Management
6. Condition Assessments
7. Business Case Evaluations
8. Optimized Renewals Decision Making (Asset Analytics)
9. Project Prioritization
10. Lifecycle Management Plans (Asset Management Plans)
11. Information Systems
Question or Comments?

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