Eating the Elephant 1 Bite at a Time...

Asset Management Programs at Small & Mid-Size Utilities

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Safety Moment – Parking Safety

- Stay alert and scan the area. Use your mirrors or rear-view cameras.
- Look for pedestrians.
- Drive slow. Obey posted speed limits and signs.
- Wear your seat belt.
- When parking, keep distance between your vehicle and others.
- Reverse park into the parking space.

Annually 267 people are killed and 15,000 injured (primarily children and elderly) by drivers who back into them; usually in driveways and parking lots.

- National Highway and Traffic Safety Administration
Current State of Utility Infrastructure

- Overall Poor to Mediocre (D+)
- Improving or holding steady for water, wastewater and stormwater utilities
2017 Strategic Directions – Water Industry

- 397 qualified utility, municipal, and commercial stakeholders surveyed
- Exactly how was aging infrastructure affecting operations?

**Predictable Trends**
- Capital costs, unbudgeted emergency work, operational costs

**Surprising Trends**
- Integrated planning, better data management, sustainability/resiliency
Ohio Revised Code 6109.24(B) / Senate Bill No. 2

• “A public water system shall demonstrate the technical, managerial, and financial capability of the system to comply with this chapter and rules adopted under it by implementing an asset management program”

• Applies to all public water systems w/ implementation by **October 1, 2018**
Asset Management

- Asset Management is not a CMMS/work order system, federally mandated requirement, financial accounting method...but all are key components
- Asset Management is not a project – it’s a long-term philosophy for managing infrastructure
- Simply a more structured, objective, and repeatable process for targeting resources (human, financial and technical) for greatest impact

Getting the most out of your water infrastructure while delivering the service you promised at the lowest cost
Section 6109.24 (B)(3) Asset Management Program Components

- Inventory and evaluation of all (physical) assets
- Approved capacity projections
- Emergency preparedness and contingency planning programs
- A capital improvements plan (CIP)
- Asset rehabilitation and replacement ("R&R") program - criteria and timeline
- Operations and maintenance programs
- Long-term funding strategy
Infrastructure Assets Have Always Been Managed...But Today Represents New Challenges

- Past – organizational knowledge (history and experience), gut feel, reliance on longevity and stability of workforce

- Today – faster rate of technological change, more transient and aging workforce, more and more software tools which means increasing amounts of data
Ok Great...Where Do I Start?

- 6109.24(B)(3) provides guidance
- But start by defining program framework...and then follow through

Framework sets the foundation for what you plan to build...and remember constraints can be liberating!
Asset Management Program Framework

- Nothing more than plan of attack
- Aligns goals/objectives of AM Program w/ Strategic Plan
- Existing guidance on structuring program

Organizational Strategic Plan

Strategic Asset Management Plan
Framework – Policy, Strategy & Objectives

Tactical Asset Management Plans
Distribution System, Water Treatment Plant(s), Collection System, Wastewater Treatment Plant(s), Stormwater

Asset Management Decision Making
- Asset Risk & Review
- Maintenance Strategies
- Renewal Strategies
- Project Identification
- CIP Prioritization

Performance Monitoring

Acquire
 Dispose
 Lifecycle
 Maintenance
 Delivery
 Operate

Asset Information

Organizations & People
Simple, Fundamental Questions

What don't I know?
- Riskiest infrastructure
- Filling the gaps in information

What ways can I attack the problem(s)?
- Mitigation actions
- Project identification
- Rehab vs Replace
- Capital vs. O&M

Is this the best way/ways to address?
- Sustainable program development
- Service, rate and resiliency impacts
Fundamental Questions to the Big Picture

- What don't I know?
- What ways can I attack the problem(s)?
- Is this the best way/ways to address?

Assets

Projects

Programs
## Fundamental Questions to the Big Picture

### Assets
- **Registry of Infrastructure Assets**
- **Analysis of Asset Data**

**Which assets are my biggest risk or do I need more information on to make more informed decisions?**

### Projects

**How do I best mitigate those risks (rehab/replace/inspect)? Costs? Where can I target and apply resources for greatest impact?**

### Programs

**How do those strategies and actions impact our rates, resiliency, and operating costs? Will the funds required even be available?**
Asset Inventory

- Reality is you probably already have a good start – even if it can be improved
- State what you know, state what you don’t
- Steps to build on what you have
- Start with improving the physically descriptive information on infrastructure
  - Age, material, diameter, accurate locations
- Age – estimate is sometimes best that can be done (subdivision plats, institutional knowledge e.g. ”sometime in this decade”)

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Fundamental Questions to the Big Picture

Assets

- Develop Criticality Criteria
- Assess Failure Likelihood
- Score Risk for All Assets
- Develop Rehab/Replace Costs

Registry of Infrastructure Assets

Analysis of Asset Data

Which assets are my biggest risk or do I need more information on to make more informed decisions?

Projects

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Asset Risk/Criticality – Business Risk Exposure (BRE)

Risk (Criticality) calculated as:
\[ \text{CoF} \times \text{LoF} = \text{BRE} \]

Impacts to:
- Regulatory Compliance
- Environment
- Health & Human Safety
- Cost/Difficulty of Repair
- Redundancy

Assessment of:
- Remaining Useful Life
- Asset Condition
- Current Asset Performance
Criticality – Consequence of Failure (CoF)

- Horizontal Assets – GIS is excellent tool for using asset descriptive and spatial relationship information to determine CoF
  - Water Main: serves hospital or dialysis center, # of customers impacted, diameter & depth (difficulty of repair)
  - Sewer Main: under major road or highway (difficulty of repair), diameter (size of potential spill), proximity to water body (environmental impact)
- Vertical Assets – Spreadsheet or similar good for weighting assessing CoF
  - Pump: importance to process train (potential for permit violation), redundancy at capacity (duty vs. standby), difficulty of repair (parts availability)
Probability (PoF) or Likelihood (LoF) of Failure

- Maintenance History and Frequency from CMMS
  - Assets that fail often/require high frequency of maintenance will likely fail again
  - Example – water main break rate (breaks per linear unit or per time period)

- Condition Assessments/Inspections
  - Sewer – PACP/MACP/LACP
  - Pavement – Pavement Condition Index (PCI)
  - Visual Assessments Using Asset-Specific Criteria

- Non-Destructive Testing/Predictive Maintenance (PdM)
  - Tribology, Vibration Monitoring, Thermography, etc.
  - Test results/trends available in CMMS
Incorporating Condition Assessments

- Condition assessments drive likelihood of failure for assets
- Condition assessments affect the point on the curve and the likelihood of failure for the assets
Speaking of Condition Assessment...

- Horizontal asset (e.g. hydrants, valves, mains) fairly well established
- Vertical assets – changing focus
  - Less about next plant expansion and design-build project
  - Instead - optimizing O&M practices and R&R projects to maximize asset useful life
Speaking of Condition Assessment…

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Asset Risk Not Just Theoretical Planning & Budgeting Information

Understanding asset risk is a tool that can help you better target your limited maintenance resources for greater impact.
**Fundamental Questions to the Big Picture**

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**Projects**
- Identify Projects from Other Drivers (Growth, Reg, Safety, etc.)
- System Resiliency Analysis
- Business Case Development (Risk and NPV)
- Condition Based Project/R&R/Maint. Development

**Programs**
- Optimized Capital Improvement Program

**Which assets are my biggest risk or do I need more information on to make more informed decisions?**

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Quantify Risk Mitigated by Projects

- Combine high risk assets into actionable projects
- Evaluate pre and post project risk
- Constraints
  - Pre-requisites
  - Coordination w/ other projects
  - Budget limits
Examine Scenarios – Find Tolerance for Risk

- Look at different options
- Optimize based on desired budget compared to risk level organization feels comfortable accepting
- Spending more is not always the answer...but spending smarter is
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**Programs**
- Optimize Capital Improvement Program
- Constraints (Budget, Labor, Risk Appetite, Levels of Service)
- Rate Payer Impacts
- Sustainability Impacts
- Operating Costs Impacts
- System Resiliency Impacts

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