Executive Summary

WERF

A user's guide to WERF's practical and reliable asset management decision support tools

Decision Analysis/Implementation Guidance – Asset Management Tools Development: Research Digest (SAM1R06i)

Pipes under Fulton Street in New York City.

The Central Issue

Providing wastewater service involves managing assets to meet increasing customer service levels demands. Assets have design or service lives that vary from years to decades. Therefore, utilities strive to gain a better understanding of the tactics and strategies for economic and risk factors, operations and maintenance, or other improved management practices to prolong asset life. Considering limited resources, extending asset life by even a small amount may result in substantial savings, while still providing the service customers require.

Context and Background

WERF's asset management decision support tools help practitioners organize and manage their information so that they have confidence in their decisions. Six tools were developed and field tested under this phase of research. The Five Core Questions/Ten Steps of Asset Management have a tool associated with each step.

Findings and Conclusions

This digest presents an overview of the concept, description, purpose, and benefits of each tool. Additionally, worked examples are given with each task. An appendix excerpted from the SIMPLE knowledge base, titled *What is Asset Management?* presents several views of asset management. Tools included are:

Asset Hierarchy/Registry Tool – Where assets are organized and data is stored and extracted for analysis. A registry is built around two main concepts: The asset hierarchy and the data standard. Having a well-designed and constructed asset hierarchy is one of the most important steps in building an effective asset management program. It provides both context and organization to the asset registry.

Remaining Effective Life Tool – Provides for the systematic estimation of residual physical life using age and design life of the asset, as modified by local factors, as the drivers. The condition of an asset provides valuable insight into its remaining useful physical life. It is an essential piece of information that ultimately assists in identifying which management strategies to deploy and when to transition from one strategy to another.

Life Cycle Cost Projection Tool – A step-by-step guide for assistance in developing a life cycle cost projection and subsequent analysis. A life cycle cost analysis examines the costs of a system or a component over a defined period or over its entire life span. The analysis allows the utility to examine projected life cycle costs for comparing competing capital projects and associated O&M strategies and enables appropriate comparison of alternatives of different investment values and lengths of time.

End of Asset Life Reinvestment Decision Support Tool – Assists in determining which renewal strategy (maintenance/repair, refurbishment, or replacement) is most cost effective, as well as the point in the life cycle of a given asset transitioning from an operations and maintenance strategy to a capital reinvestment (renewal) strategy is appropriate given a set of user-established baseline conditions and assumptions.

Business Case Analysis Tool – Assists in evaluating the relative investment merits of a range of alternative management solutions, whether operations, maintenance, or capital. To add further insight, the tool incorporates an optional "Triple Bottom Line" basis (facilitates analysis from a financial, environmental, and community perspective). The business case rationalizes why, given limited resources and competing investment opportunities, additional investment or the modification of existing investment for a specific purpose is in the best interest of the organization.

Asset Management Plan Template Tool – A step-by-step guide developing an Asset Management Plan (AMP). The tool outlines several routes to generating an AMP including a staged process that starts with a State of the Assets Report. It then adds a subsequent Management Strategy Report to achieve the equivalent of a

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complete plan in two stages, or the undertaking of a full, single-staged AMP. It also guides practitioners through development of either a concise (short) version AMP or through an extensive AMP. The tool not only provides step-by-step guidance, it also provides template-type outlines as examples of plans from different types and sizes of water utilities.

Management and Policy Implications

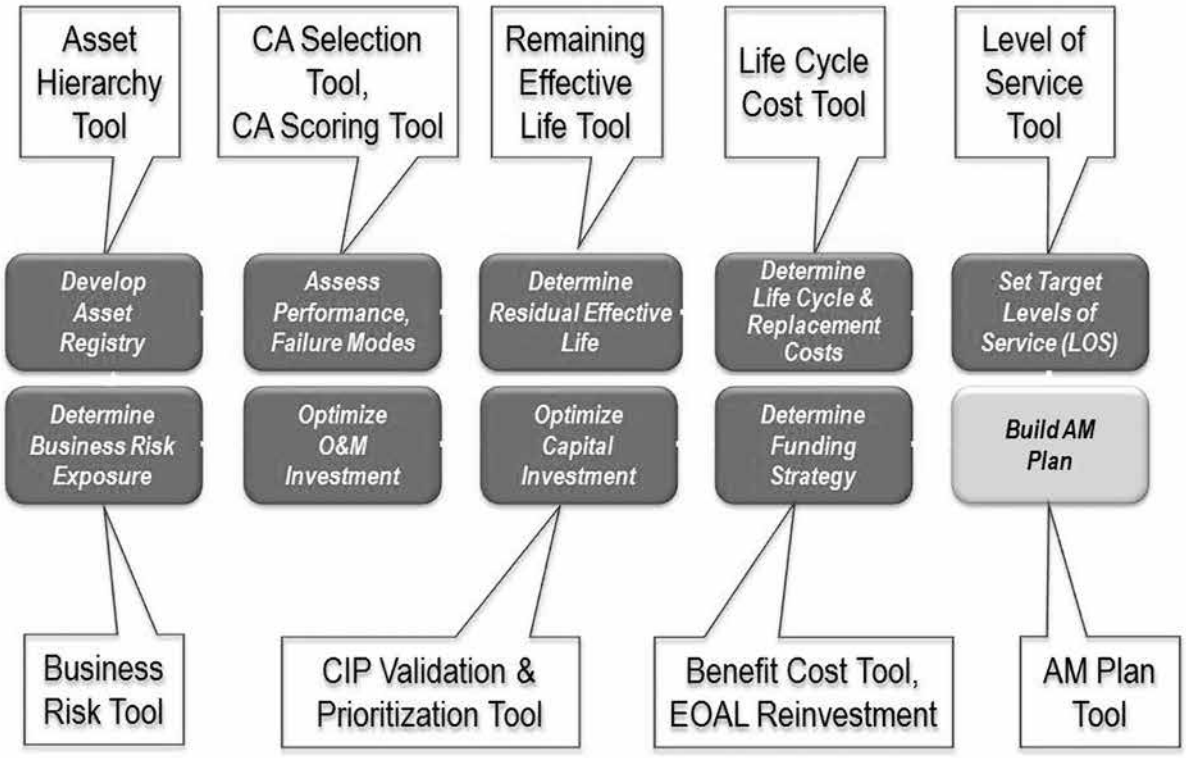
Given the fact that every decision is one of investment, utilities cannot afford to make unwise selections. All of the tools in this digest will help asset managers make asset intervention and, ultimately, investment decisions.

WERF Strategic Asset Management Tools
All tools are included in SIMPLE (03CTS14) unless otherwise indicated.

Tool	Related Asset Management Step	Description
Asset Hierarchy/ Registry	Develop Asset Registry	Provides two working examples of a hierarchical asset register structure reaching down to a maximum of seven levels. Each includes above- and below-ground assets.
Condition Assessment Scoring	Assess Performance Failure Modes	This multi-attribute, condition-rating tool incorporates metrics of other performance-based attributes such as current operating performance and reliability across several major asset classes.
Condition Assessment Selection	Assess Performance Failure Modes	Web-based tool assists asset management and maintenance practitioners select appropriate condition assessment tools and techniques.
Remaining Effective Life	Determine Residual Effective Life	Helps determine remaining useful physical life based on age/design life modified by local factors. Incorporates a table of "default" useful lives for a wide range of assets.
Life Cycle Cost Projection	Determine Life Cycle and Replacement Costs	Facilitates systematic organization and projection of life cycle costs by major cost category for an asset or class of similar assets, based on identified cost trends.
Level of Service	Set Target Levels of Service (LOS)	Assists a utility to establish (and periodically measure) targeted and actual levels of service, both at the enterprise (strategic) and asset (operations) levels. Tool was developed using a "triple bottom line" approach (financial, environmental, and social/community/organizational perspectives).
Risk Management (SAM4C07)	Determine Business Risk Exposure	Guides management of risk of assets, covering cost, decision models, strategic security, the role of expert judgment, and the impact of asset standards on performance, risk, customer service, and investment requirements.
Business Risk Exposure	Determine Business Risk Exposure	Aids in characterizing the business risk exposure (BRE) of the utility associated with assets through assigning risk scores to assets or groups of assets. Raw "risk" (business risk exposure) is a score representing the probability of failure multiplied by the consequence of failure. Raw risk is then adjusted for mitigation actions.
Maintenance and KPI Survey Tool with Case Studies	Optimize O&M Investment	Survey instrument on maintenance leading practices and key performance indicators focuses on qualitative information on three areas of competency for best management practices related to maintenance combined with metrics. Covers three broad areas of competency both for the practice statements and the key performance indicators (KPIs) – Strategy and Tactics, Work Flow Management, and Managing and Monitoring. Case studies based on leading practice utilities are presented in the accompanying report.
SCRAPS: Sewer Cataloging, Retrieval, and Prioritization System (97CTS7)	Assess Performance Failure Modes	Expert system helps users identify pipelines at risk for structural and operational failure of pipes. Not in SIMPLE. Not compatible with Windows Vista or Windows 7.

End of Asset Life Reinvestment	Optimize Capital Investment	Assists asset managers determine which renewal strategy (maintenance/repair, refurbishment, and replacement) is most cost effective and when in an asset's life cycle to transition from an operations and maintenance strategy to a capital investment (renewal) strategy. Integrates many of the tools incorporated in SIMPLE and adds an economic life component.
Benefit Cost Analysis (SAM7C07)	Determine Funding Strategy	Provides a step-by-step guide for developing a benefit-cost analysis. Both benefits and costs are monetized to determine the economic justification for a project, or the prioritization of a group of competing projects on a full Triple Bottom Line basis.
Business Case Analysis	Determine Funding Strategy	Assists practitioners evaluate, from a business metric perspective, the relative investment merits of a range of alternative management solutions, whether operations, maintenance, or capital. For further insight, the tool incorporates an optional Triple Bottom Line.
Capital Improvement Project Validation/ Prioritization	Optimize Capital Investment	Helps asset managers determine when a proposed list of capital investments is ready to move to a budget funding stage by assigning a "confidence level rating" for validation. Once validated, the tool assists in the prioritization of each project so that a specific CIP list can be adopted.
Asset Management Plan Template	Build Asset Management Plan	Provides a set of investment strategies (integrating operations, maintenance, and capital investment) that constitutes, through step-by-step analysis, what is determined to be the best investment plan given a defined level of performance and service and a defined level of risk. Includes a set of basic templates to assist in constructing an Asset Management Plan.
Strategic Asset Management Gap Analysis Tool (SAM GAP)	All 10 Steps	Provides an electronic self-assessment of asset management practices to create a profile to measure performance against over 170 of the best asset management practitioners of similar size and practice level (benchmarking). Generates a customized report with a prioritized task list for implementation of an improvement program.

How the SAM Tools Relate to the 10 Steps of Asset Management



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