Protecting Our Future by Making Advanced Asset Management Decisions

< All stories in this section

Gregory M. Baird — Dec 23, 2011

America's economic dominance as a world power over the past several decades has been based on the strength and investment in its critical infrastructure. Without the infrastructure networks of drinking water systems, wastewater, ground transportation, waterways, oil, gas, electric, airports and seaports, our superpower engine of manufacturing both goods and services could never have been achieved. These early investments have built the foundation of our current expectations of a modern standard of living and have played a substantial role in the sustained prosperity and quality of life of our country.

These complicated infrastructure networks are now more interdependent than ever before. Urbanization has layered these separate systems in an intensive public works infrastructure web. Each valued network (water, sewer, electric, etc.), each with its own unique purpose and critical functions, has different repair and renewal costs and timing requirements. Manual processes and individual human mental storage of these challenging relationships of risk and cost tradeoffs no longer meets the needs of public work and utility departments for municipal or private utility management companies. We are currently in a dynamic period of shifting "data rich and information poor" decision making to a more knowledgeable and discernible era of effective cost management for all assets.

Our Challenging Future

In order to make an organized transition from post-World War II practices to the emerging 21st century of infrastructure technology and best practices, an approach to managing all of our capital assets is needed. At some point, an Excel spreadsheet just does not cut it for hundreds of thousands of assets worth billions of dollars. In the United States, the East Coast is lighting up with pipe failures due to both age and corrosion.
Infrastructure intensive operations like water, wastewater and drainage with long-term assets coming to the end of their useful lives are presenting an overwhelming flood of funding and affordability issues. Likewise, the energy sector of oil, gas, electric and hydroelectric faces renewal issues. Unmanaged and un-forecasted, these basic systems will fail and utilities will be forced to restore service through unplanned emergency repairs requiring higher rates for customers. Public officials should protect the future affordability of these basic services by requiring infrastructure management best practices. Advanced asset management (AM) concepts, software tools and techniques that focus on managing cost-effective sustained performance to the customer at the lowest life-cycle cost and at an acceptable level of risk to the organization is the ultimate answer.

Asset Management is the Answer

In 2010, the New Jersey Clean Water Council, which has the statutory function of advising the Commissioner of the Department of Environmental Protection regarding issues related to clean water, explained that the New Jersey Section of the American Society of Civil Engineers (ASCE) in 2007 gave grades of D to wastewater utilities and C to drinking water utilities in New Jersey. The Council understood that for New Jersey to maintain a viable economy with a sound environment it must begin managing its infrastructure in a manner that produces the lowest life-cycle cost. The Council further believed that deferred maintenance ("run to failure") might hold rates down in the short term but inevitably increases long-term costs and causes service disruptions that harm the customers and the environment, and is therefore self-defeating. The Council proposed that asset management, utility rates and utility accounting should be used to achieve sustainable utility functions and finances that minimize long-term costs.

Managing Long-term Costs

Communities put their economy and environment at risk when they ignore infrastructure asset management. The basic component of an asset management program includes the computerized maintenance management system (CMMS), but a work order system alone needs additional asset management software to take it to the next level. There are many choices of various types of asset management planning software, but finding one that is truly advanced and embeds the financial analysis and reporting component for all assets, across all asset types and all utilities, can be more difficult.

The basic steps and components of asset management software include:

- Collecting and organizing tangible asset data from a broad range of paper and electronic sources to create the asset registry (AR).
- Integrating disparate database systems including GIS and financial packages for centralized tangible capital asset data manipulation that develops an enterprise inventory (EI).
- Performing integrated strategic short-term capital asset planning and maintenance management scheduling as part of the decision support (DS) process.
- Performing integrated long range, 10- to 100-year, capital asset planning and maintenance management forecasting as part of the decision support (DS) process.
- Tracking capital projects from inception through design and approvals all the way to construction as part of a capital projects (CP) procedure.

Decision Support Asset Management Software

A best-in-class of advanced asset management decision support software for all assets comes from the Canadian infrastructure marketplace, which as a whole seems to be recognizing the

neglect of its long-term infrastructure funding and embracing the application of best practice investment solutions. RIVA Modeling, a Toronto-based company, offers real-time asset valuation analysis decision support software that is extremely scalable to support an all assets management program roll out while embedding baseline financial performance monitoring. With successful integrations with SAP, CityWorks Computerized Maintenance Management, financial systems and other vendors combined with ESRI or Intergraph GIS, RIVA offers solutions to the most complicated layers of repair, replacement and renewal decision-making over a 10- to 100-year planning horizon.

RIVA is a web-based client-server application that can interface with most common applications. The data can come from any ODBC-compliant source, so the user can leverage existing data and pull data from other databases to create a central asset registry or inventory of all assets and their attributes, eliminating the extra costs of separately maintained and isolated asset databases. The advanced modeling capabilities are used for asset valuation, estimation of deferred maintenance, condition assessment, estimating remaining service life and for the prioritization of maintenance and renewal programs. These capabilities have offered Canadian utilities the ability to handle PSAB 3150 infrastructure reporting requirements, which are stricter than GASB34and fit nicely with new international PAS 55 and ISO infrastructure policy developments.
There are common issues across utilities including electrical generation, transmission and distribution, water, wastewater and sanitary. Utilities must maintain service levels regardless of credit and economic crisis, manage regulatory risks and respond to political objectives. Ultimately, the ability to continue meeting increasing demands will depend on good stewardship of the infrastructure portfolio. Utilities need the ability through advanced decision support software to understand costs, risk and renewal prioritization in the context of their budget and service level requirements.

The Corporate Approach

The management of physical assets and infrastructure is continuing to emerge as a key corporate objective. Top level executive support is critical because it offers integration with tactical and strategic planning throughout the entire organization to meet service levels and increasing demand from consumers.

Asset management needs to be supported from a corporate level to leverage the cost savings of the layered urbanized systems and not just be a best practice. Toronto, Ottawa, Burlington, Prince George and other municipalities in Canada understand the concept. In this context, utilities that mitigate risks to their operations are proving to be more efficient in managing capital and operational expenditures. The City of Calgary is implementing this concept as it plans to fully integrate RIVA across the entire organization, first, in the utilities then expanding to roads, transit, parks, rec, corporate properties, information technology, etc.

Empowering Infrastructure Asset Managers

Asset managers require the functionality of integrating across different asset types at the street view, to make important decisions at a user defined level (block by block) with a rules-based approach. This effort offers the ability of prioritizing assets like water mains and allowing the timing of the investment to advance or defer or align water, sewer, storm, electric, road repair and replacement programs. An upgraded Formula Builder tool leverages the probabilistic modeling capability of the software to create, change and test trial models and calculations. It is this type of flexibility that allows asset managers to compare various asset management scenarios with different priorities or even asset deterioration curves. As new technologies develop to improve asset maintenance and repair and replacement activities it is imperative to have decision support software in place to accurately evaluate the different options available cast against a wide range of interdependent assets.

Benefiting Financial Asset Managers

As more capital is required to fund future repair and replacement programs and as the credit monitoring services and the financial markets continue to demonstrate signs of uncertainty, investors in both public (through traditional tax exempt bonds) and private utilities will demand a higher level of operational cost-effectiveness and asset management planning. Decision support asset management software will be required to demonstrate and report the financial analysis of the asset intensive activities. The results will also become the basis for tax or rate increase justifications. The power of these tools will also enable utility infrastructure fund managers the ability to better forecast earning yields and rate of returns.

Asset Register Development

The RIVA modules offer quick asset inventory and valuation at the user defined hierarchal structure and level of detail requested. The user friendly views can drill down from a city to a street level and the inventory of assets can be viewed both geographically and by asset category at every level. The valuation process applies economic factors to calculate the asset values. This data is critical in rolling up costs to demonstrate long-term infrastructure funding requirements against any projected budget shortfalls.

Effectively Managing Deferred Maintenance

The quintessential nature of infrastructure needs and constrained budgets makes deferred maintenance a reality. RIVA has a deferred maintenance user defined function to calculate the level of deference based on a set of events triggered by the user defined best practice. Modeling these scenarios creates the visible impact of the maintenance backlog against various user defined financial and economic factors and assumptions. The financial results develop a snapshot of long-term funding issues.

Condition Assessment Flexibility

RIVA has the ability to import condition assessment data from other sources and connect these data attributes to an asset at any level of detail. RIVA allows for almost any condition assessment tool or scoring metric to be used in RIVA for advanced analysis and scenario testing. Prioritizing takes effect as remaining service life and condition assessment data are used with maintenance and repair strategies while monitoring the bottom dollar impact of different scenario outcomes. The result of an advanced asset management program should be to build a prioritized, full life-cycle plan for maintaining and replacing any type of asset while offering the capability of including the organization's best practices of sustaining those assets for the next 30 to 100 years. This process should include the forecasts of the costs, condition, service level and risk of the assets.

Implementation Options

As a best-in-class, RIVA offers tools to fit the organization's recommended work plans into the actual budget and demonstrate the effect on condition, service level and risk with state-of-the-art graphing and map views. This functionality is offered for large agencies with in-house asset databases, GIS and extensive financial packages with an enterprise version or even hosted by RIVA "on demand" for municipalities with populations under 50,000 and corporations with fewer than 25,000 assets. The user configures RIVA to suit his or her requirements, thus enhancing and complementing the capabilities of existing asset management tools already used by the organization. A useful feature of RIVA is that it implements default models and processes that would allow users to begin implementing all features of the application with minimal starting data.

Looking to the Future

As with most software acquisition processes, understanding the various features and your own asset management best practices, business processes, financial reporting needs and requirements are a first step in developing the functional requirements. It is advisable to always schedule a demonstration well in advance of a formal procurement process in order to see what the future may hold.

As utilities move forward with asset management programs, best practices will be standardized and more accurate benchmarking will become commonplace. All organizations with physical assets have an obligation to track and maintain those public assets. All municipalities and utilities are currently on a timeline of how sophisticated their asset management practices are. The approaching motivation to implement formal corporate asset management programs will occur as time progresses and the lack of asset planning catches up to the community public view.

Gregory M. Baird *is Managing Director and Chief Financial Officer of AWI "Aging Water Infrastructure" Consulting and can be reached at Greg.M.Baird@AgingWaterInfrastructure.org.*