Integrating Supply Management With Finance and Asset Management

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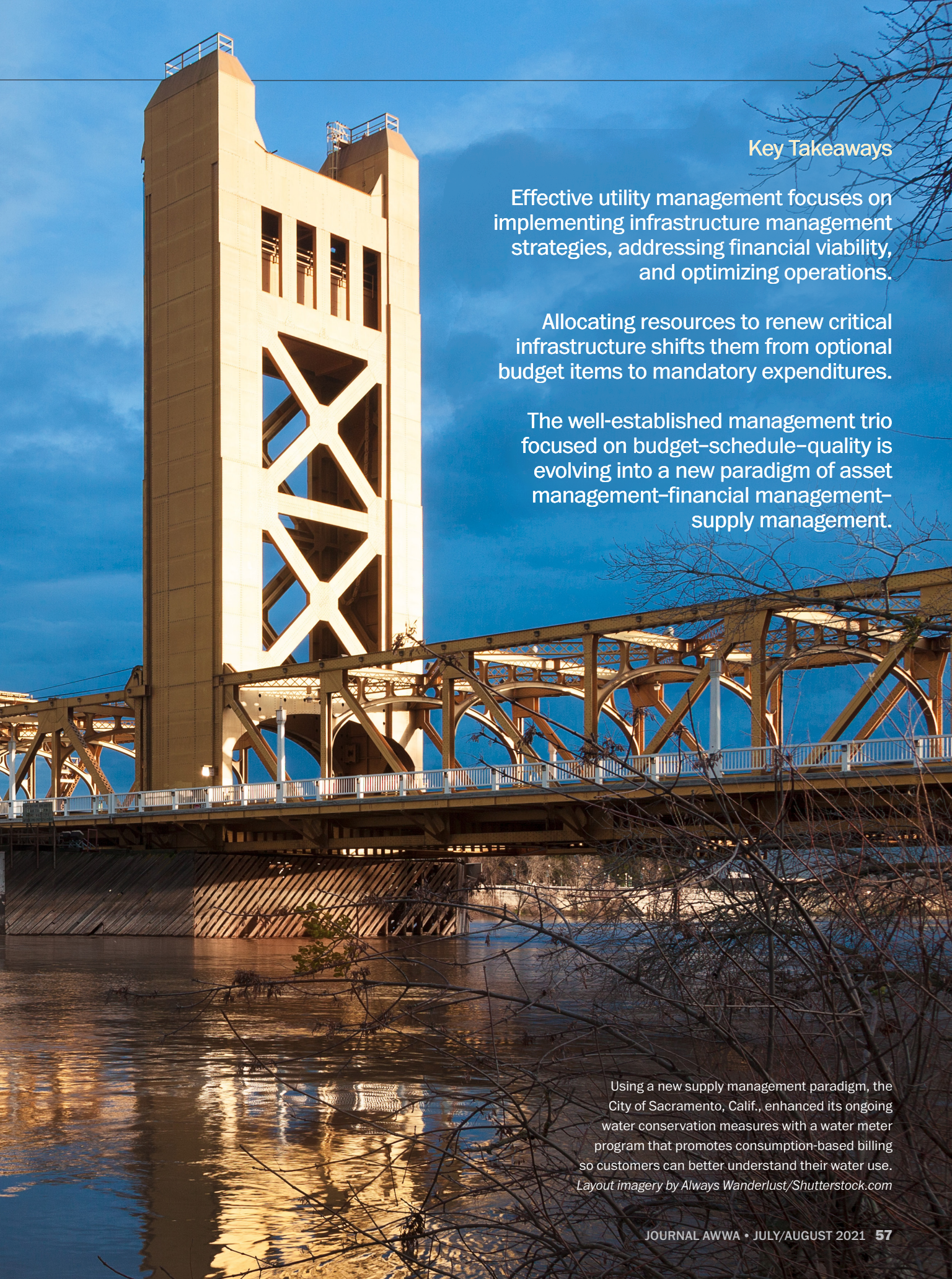


Key Takeaways

Effective utility management focuses on implementing infrastructure management strategies, addressing financial viability, and optimizing operations.

Allocating resources to renew critical infrastructure shifts them from optional budget items to mandatory expenditures.

The well-established management trio focused on budget–schedule–quality is evolving into a new paradigm of asset management–financial management–supply management.

Using a new supply management paradigm, the City of Sacramento, Calif., enhanced its ongoing water conservation measures with a water meter program that promotes consumption-based billing so customers can better understand their water use. *Layout imagery by Always Wanderlust/Shutterstock.com*

Aging infrastructure becomes more vulnerable over time, and if resources are not allocated well in advance or if such funds are not readily available, renewal and replacement (R&R) efforts can shift from optional budget line items under consideration to mandatory emergency expenditures that usurp resources from other priorities. With large-scale investment needs continuously looming on the horizon, utilities must proactively explore creative strategies to procure needed services and supplies that optimize limited funds without hindering the on-time completion of essential projects.

Supply management is an emerging best practice in many industries—one that strategically allocates resources and optimizes procurement of goods and services, not by using the lowest-bid approach of the past, but through cross-functional teams and strategic actions that holistically reflect a utility's specific needs and objectives. Thus, the standard project management trio of budget–schedule–quality is replaced by a transformative new paradigm integrating asset management, financial management, and supply management.

Supply Management

In September 1983, Peter Kraljic, the originator of the Kraljic matrix, published his seminal article "Purchasing Must Become Supply Management" in the *Harvard Business Review* (Kraljic 1983). Under Kraljic's model, acquisition of services and supplies is driven by a process rather than a function, and its goal is to pursue overall value by researching facts and collecting information to support proactive decision-making rather than simply reacting to problems after they've occurred.

Today, the Institute for Supply Management, a worldwide nonprofit professional supply-management organization, defines supply management as "the identification, acquisition, access, positioning, and management of resources and related capabilities the organization needs or potentially needs in the attainment of its strategic objectives." Its major tasks break down into the following stages:

- **Purchasing** (operational): The act of buying something in return for payment, following a structured process
- **Procurement** (tactical): The acquisition of goods and services through special means or effort
- **Sourcing** (strategic): The proactive search for goods and services and the application of buying strategies intended to meet business needs over a period of time

While efficiency is required, it is effectiveness that matters most to be among the best-performing supply management groups. An effective supply management team embraces the following strategies:

- **Engage early.** Identifying and engaging with relevant stakeholders enables a better understanding of the goals and complexities associated with delivering on critical projects as well as the demands of daily operations; connecting early and communicating often with internal and external stakeholders builds trust and support for procurement's role.
- **Use facts to drive decisions.** Supply management organizations must develop a fact-based culture, which means that rather than accepting assumptions at face value, they want to know more and are willing to dig for factual evidence to know what's happening as well as why it's happening—because knowing why provides the context needed for effective decision-making.
- **Be outcome-oriented.** Supply management organizations can conduct their business in two ways: focus on the process it takes to get to the outcome or focus on the outcome itself; being focused on outcomes drives organizations to apply their time to areas that leverage the greatest benefit.
- **Control trade-offs between price and cost.** Smart trade-offs between price and cost are critical to effective supply management and to satisfying business requirements; decisions are based on the total cost of operations versus lowest price.
- **Build relationships.** Developing a business relationship with key suppliers is fundamental to leveraging suppliers' capabilities, delivering cost savings, reducing risk exposure, and delivering improvements.
- **Seek continuous improvement.** Instilling a mindset for continuous improvement means paying attention to how well things are going—always looking for opportunities to improve and then acting on those opportunities by pursuing incremental initiatives and innovations.
- **Balance "will and skill."** Organizational abilities and expertise ("skills") are developed to competently drive execution—balancing short-term tactical goals (the "will") with long-term strategic objectives to align with business drivers that enable success.

Over the past four decades, the private sector has incrementally pursued Kraljic's concepts; however, the public sector has been slow to incorporate supply management into capital planning efforts, holding it at arm's length or through one-off efforts rather than full commitment. Still, at a time when operations and maintenance personnel and the capital budget account for an estimated 85% of a typical water system's expenses, utility managers have begun to recognize the need for models that move beyond traditional buying methods (USEPA 2012).

Siloed Versus Cross-Functional

Silos prevent interdepartmental sharing of knowledge and information, resulting in departmental isolation and suboptimized processes.

In 2008, AWWA, the US Environmental Protection Agency, and nine other association partners came together as collaborating organizations to publish *Effective Utility Management: A Primer for Water and Wastewater Utilities* (*EUM Primer*; updated in 2017), which outlines the Ten Attributes of effectively managed water and wastewater utilities. The "Infrastructure Strategy and Performance" attribute addresses the condition and costs associated with critical infrastructure assets.

Consistent with this attribute, utilities are increasingly pressured to balance infrastructure R&R with customer affordability. These challenges have been exacerbated when dealing with the socioeconomic effects of the COVID-19 pandemic.

For water utilities, the decision elements of a capital project generally are represented by a series of hand-offs between business functions:

- Asset management assesses needs and opportunities
- Finance decides if and how the project can be funded
- Procurement assembles a solicitation that takes the project to market
- If financially feasible, the project is awarded to the selected contractor

However, existing acquisition compliance requirements tend to box in utilities by focusing only on obtaining three viable bids and awarding to the lowest price. This linear process may work when handling basic purchases with simple specifications, but it restricts the innovation needed to improve proficiency when sourcing complex capital projects. More importantly, existing processes lack cross-functionality and consider each functional management area as separate and distinct—i.e., *siloed*. As a result, discrepancies in priorities, needs, and best practices arise between the three areas, generating solutions that marginalize making purchases as just a means to an end.

The aforementioned low-bid procurement strategy exemplifies this perfectly: does the lowest-bid proposal consider risks identified by asset management or innovations in new R&R methods? Does it address all project needs and challenges with consideration of the utility's culture, customers, and community? Is there any consideration for the total life-cycle costs? Most importantly, does the decision fit the utility's commitment to be a good steward of its financial resources? If any of these questions are answered with a no, the lowest bid may not offer the best quality or ultimate value.

Strategic asset management goes hand-in-hand with *strategic* financial management: the former aligns a utility's strategic goals and expected levels of service with available resources to maximize the value of their assets, while the latter evaluates the risks and value of required projects to then raise and use funds. *Strategic procurement*, then, must be an entity-wide process that engages all departments and functions to comprehensively set the direction for optimizing available resources, and this is where supply management comes in.

As shown in Figure 1, asset management, finance, and supply management still have distinct responsibilities; however, they overlap in determining risk and assigning costs. Each of these areas evaluates risk in the second stage and manages a utility's cost responsibility and financials at the third stage. This means that all three management processes must clarify a capital project's cost, risk, and ultimately its value through the same lens, discovering and testing new ideas and best practices collaboratively. While this can be accomplished independently through siloed functions, a cross-functional endeavor can better manage costs, mitigate risk, and create sustainable value for the utility and its customers.

The benefits of cooperation between organizational functions have long been touted by academic and practical evidence. In 1967, Paul R. Lawrence and Jay W. Lorsch wrote an article advancing a now commonly accepted theory of integration and differentiation. The theory states that, when specialized functional units are integrated, organizations function more effectively.

Lawrence and Lorsch (1967) defined integration as "the process of achieving unity of effort among the various subsystems in the accomplishment of the organization's task." In modern procurement, this definition is the essence of cross-functionality.

A Supply Management Case Study

The City of Sacramento, Calif., recently incorporated supply management to help navigate the intersections between budget, schedule, and quality in its Department of Utilities (DOU). In 2004, the state of California enacted Assembly Bill 2572 requiring urban water suppliers to install meters on unmetered municipal water service connections on or before Jan. 1, 2025. To comply, the city initiated a water meter installation program in 2005; however, by 2015, ongoing extreme drought conditions prompted the city council to pass Resolution 2015-0056, which accelerated the program with an authorized budget of US$244.9 million for implementation.

The new Accelerated Water Meter Program (AWMP) enhanced Sacramento's ongoing water conservation measures to promote consumption-based billing so customers could better understand their water use. To this

The Parallel Roles and Responsibilities of Asset Management, Finance, and Supply Management

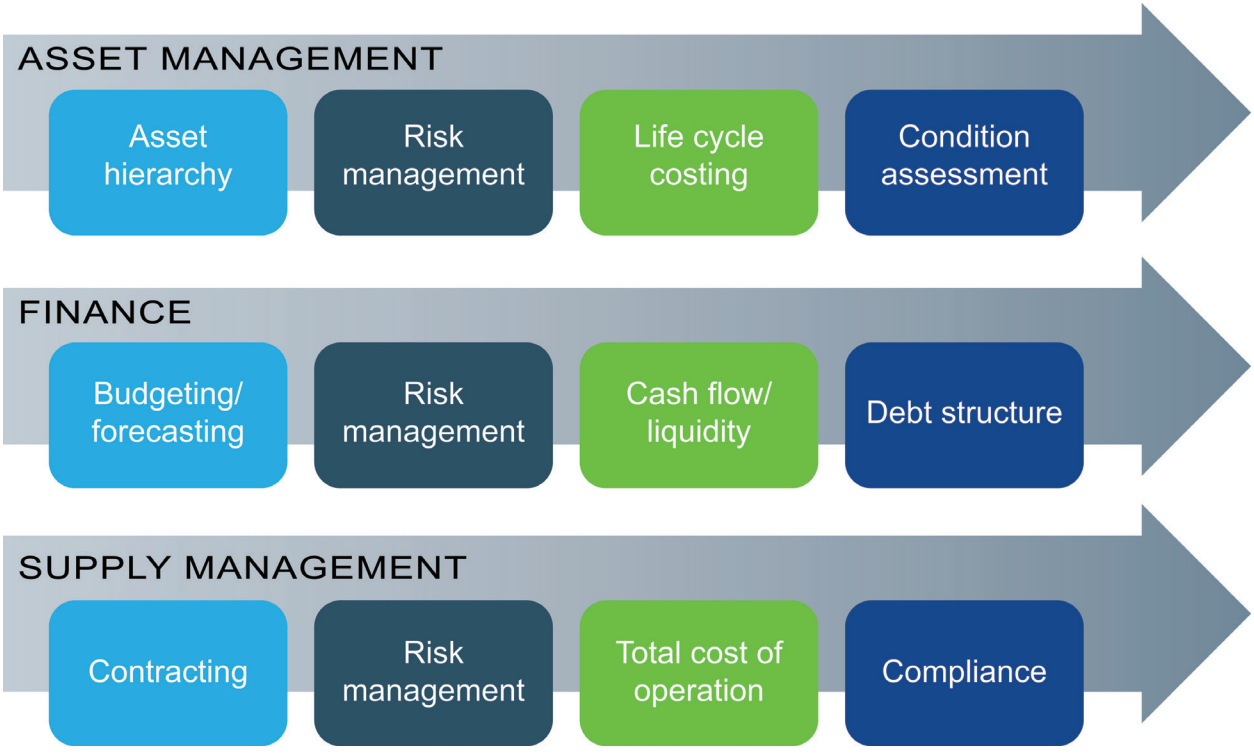


Figure 1

end, the city planned to install 40,000 water meters, in addition to those already installed, by June 2021—three and a half years ahead of the state's deadline.

One of the first steps in developing the AWMP was to identify the city's priorities for success. The meter-installation effort touched many city departments and the public; as such, stakeholders agreed that key measures of success for the AWMP came down to quality, collaboration, and public support. The following sections describe each of these priorities and how they were incorporated into supply management.

Quality: From Low-Bid to Qualifications-Based Procurement

At the start of this project, Sacramento decided that quality construction would be defined by safety, timeliness, and positive public interactions; however, the circumstances at hand did not always make things easy. One of the primary challenges was to minimize disruption to the public during construction, but many of the remaining meter installations were connected to services on backyard water mains or mains that also needed to be replaced. This meant that construction activities often extended beyond the public right-of-way onto residential properties.

Given the delicacy of these demands on the public, the city decided to move away from low-bid procurement, instead using a nontraditional method that emphasizes public relationships, minimizes disturbances, and encourages local employment. More specifically, the selected qualifications-based procurement approach prequalified contractors on the basis of their management and outreach techniques, past performance, certification in the Gold Shovel Standard safety program (a nonprofit organization for reducing damage to buried infrastructure), and commitment to hiring from local priority zip codes, all in addition to price.

Next, to meter approximately 40,000 residential, commercial, and irrigation water services as well as replace

about 60 miles of associated water main, the AWMP was subdivided into approximately 30 project areas within the city. As designs were completed for these project areas, prequalified contractors were invited to submit competitive proposals to the city.

For the first phase of projects to be awarded, contractors were narrowed down only on the basis of their proposed project approach and pricing. For subsequent phases, contractors were evaluated for selection according to their performance on previous utility projects, percentage of labor hours attributed to local employees, and construction-related complaints received from customers.

In accordance with this qualifications-based procurement strategy, contracts were completed at or under budget, and utility setbacks that had been disruptions to existing underground utilities were minimized during construction. Moreover, there was a dramatic reduction in construction-related complaints from the community—and many compliments.

Collaboration: An Integrated Team

The AWMP's success relied on close coordination among city departments, contractors, consultants, and other stakeholders such as city council members. To facilitate communication and collaboration, a dedicated program management team (PMT) and construction management team (CMT) were assembled to carry out the AWMP's objectives. The city selected Carollo Engineers Inc. to develop the programmatic framework and provide program management and engineering services, and Psomas was selected to provide construction management services.

The PMT was made up of the following five operational teams:

- **Program controls**—provided the analytical and reporting tools to track the AWMP's budget, scope, and schedule; monthly reports kept stakeholders informed of the status of key measures and opportunities to implement corrective measures if warranted.
- **Business systems integration**—supported the critical function of data and document management; meter installations were tracked from design through construction and incorporated into the city's billing system by the CMT and DOU staff.
- **Public outreach**—kept customers informed and involved with the AWMP through social media, mailed notifications, neighborhood meetings, a dedicated website, a mobile phone app, and an information phone line and email address; timely and informative communication was instrumental in garnering public trust and engagement.
- **Engineering support services**—managed design, planning, and engineering and offered other ancillary support services such as coordination with the CMT during construction.
- **Procurement and contracting**—organized activities to procure construction services for the meter installation and pipeline replacement projects; for instance, this team developed the request for proposal (RFP) documents for each construction project.

Meanwhile, the CMT focused on construction management, including inspecting activities in the field, monitoring the construction schedule, capturing global positioning system (GPS) coordinates of installed meters, and ensuring that the contractors' contractual obligations were met.

The AWMP's progress and key performance indicators, including the number of meters installed to date and project costs, were regularly discussed among the six teams and delivered to stakeholders on a monthly basis. Additionally, information on the timing of meter installations and construction status were made available to the public on Sacramento's website and via door hangers distributed by contractors. Figure 2 shows examples of the AWMP's reporting dashboard.

Public Support: Winning Over the City

Buy-in and support were critical to AWMP's success, because for customers, the meter installations shifted fees from a flat rate to consumption-based billing. Additionally, the city council chose to increase water rates by 10% annually over the course of four years to fund the AWMP.

To help customers recognize the importance of their contribution to water conservation in a drought-affected state, the public outreach team developed a comprehensive communication plan using the following tools:

- Project-specific printed materials such as door hangers, postcards, and project signage
- A downloadable app for mobile phones
- The interactive website (see the screenshot in Figure 3)

The team also conducted English- and Spanish-language focus groups with a cross section of the public to test preferred means of communication and overall program messaging.

Also emphasizing the importance of public support to involved parties, every project-related RFP required contractors to submit detailed outreach plans. Their proposals were evaluated regarding the number of complaints and compliments associated with their performance on previously awarded projects.

Finally, the public outreach team managed a dedicated AWMP phone line and email account to address customer inquiries, resolve complaints, and receive feedback.

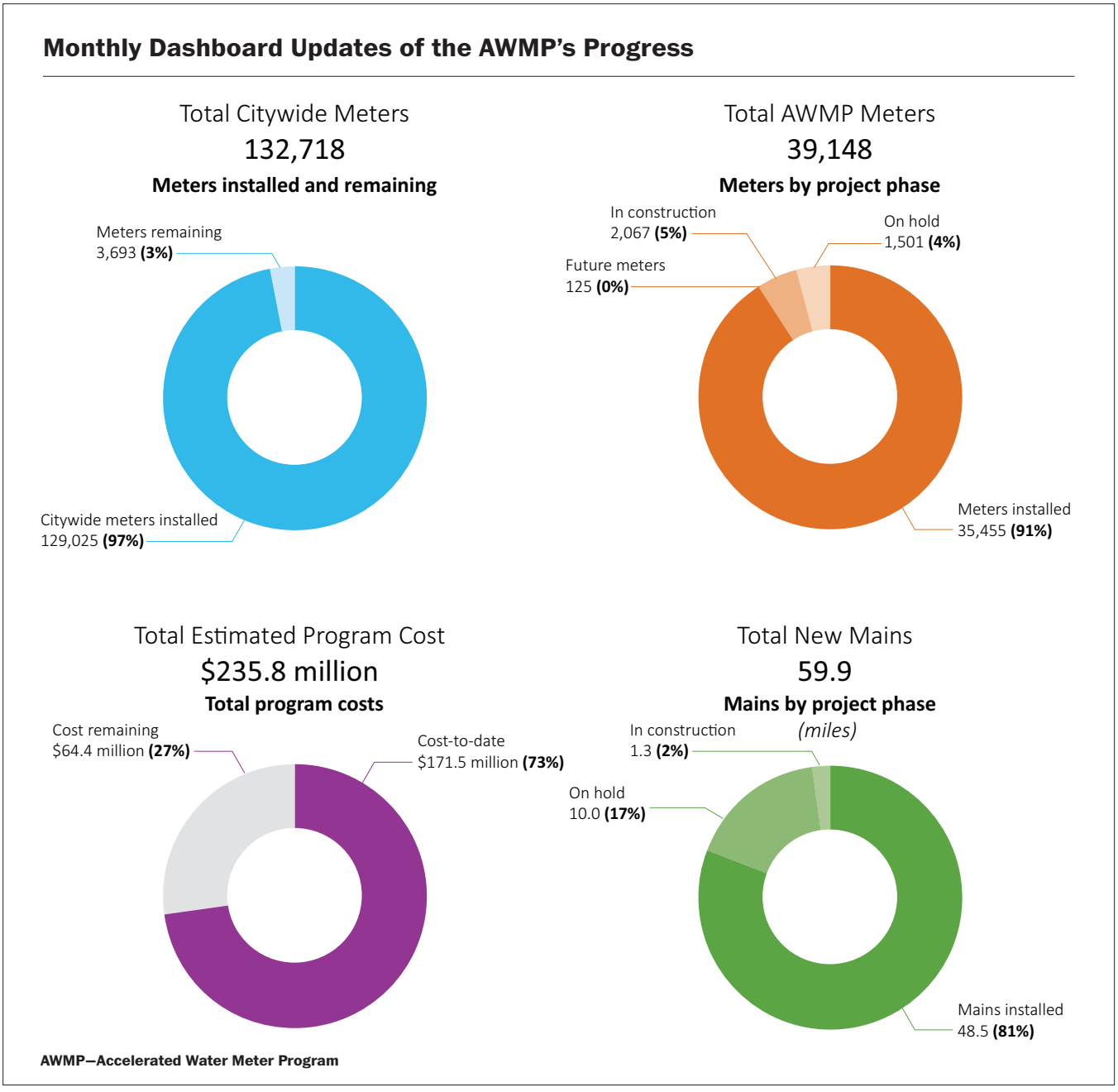


Figure 2

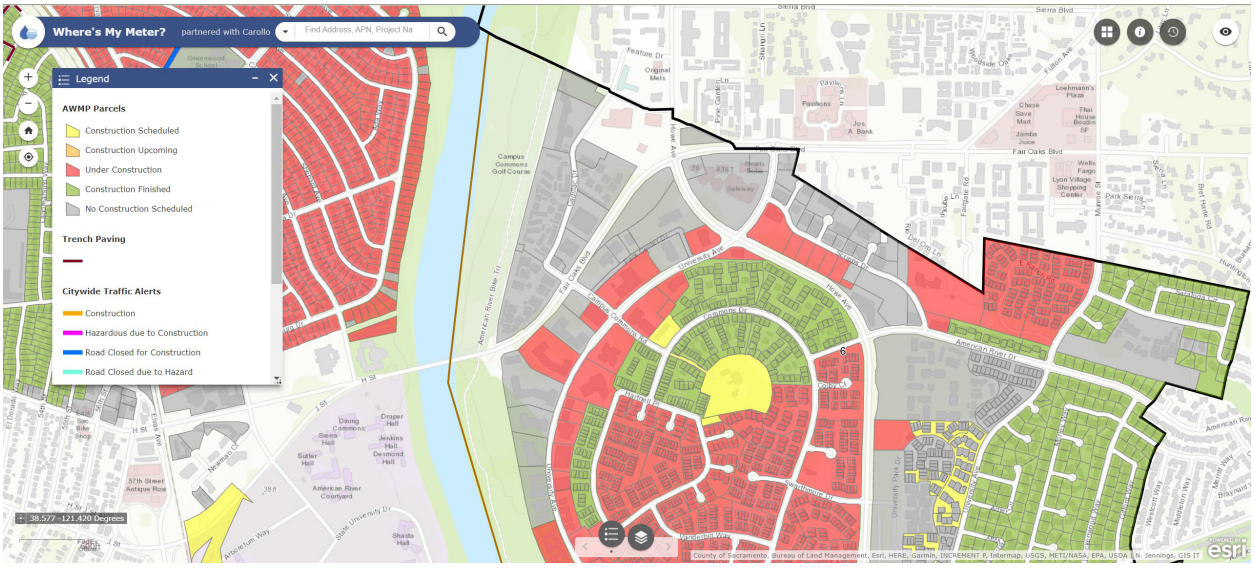
The results of these efforts were reported on a monthly basis using the scales shown in Figure 4.

Solidifying Financial and Asset Management

While the City of Sacramento and its partners focused on the three priorities for success, the AWMP—which was covered in the budget by a combination of pay–go funds, bonds, grants, and the state's revolving fund loan program—was supported by qualifications-based procurement. This enabled the PMT to adjust future spending projections while tracking program spending to date.

When contractors submitted proposals, they used a consistent set of pay items similar to bid items for low-bid projects. The pay items allowed the PMT to

Interactive Online Map Showing the Status and Timing of the AWMP Meter Installations



AWMP—Accelerated Water Meter Program

Figure 3

Monthly Updates of Time Taken to Respond to Customer Inquiries and Resolve Construction-Related Complaints

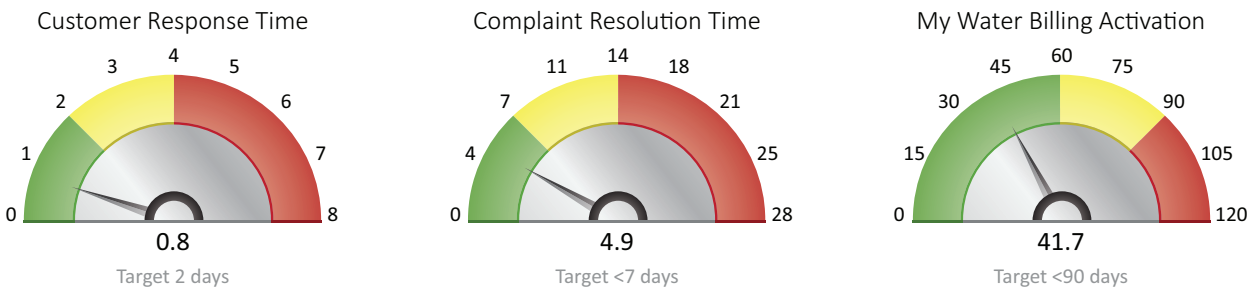


Figure 4

compare pricing transparently across projects, identify trends in unit prices, and adjust estimates for future projects. This process also allowed the city to gather feedback from contractors on the description of the pay items—for example, clarifying restoration requirements for landscape, asphaltic concrete, and other nonhardscape surfaces, which reduced uncertainty and helped the contractor estimate prices more accurately.

The AWMP's preliminary budget estimates indicated that Sacramento did not have enough funds to replace

Example of GIS Map Used to Track Meter-Installation Data

GIS—geographic information system

Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, and the GIS User Community

Figure 5

all identified water mains, thus restricting individual project scopes to only the highest-priority replacements. However, as projected costs were reduced, there was greater flexibility to address more, and as budget projections were updated, the city was able to re-incorporate many water mains into the AWMP that met replacement criteria. This would help on several fronts as it would reduce the costs, planning, and inconvenience of returning to and disturbing neighborhoods that received meter installations with subsequent water main replacements.

Alongside tracking the budget and project spending, the CMT, PMT, and contractors worked together to implement a rigorous quality-control process for tracking meter installations. This effort streamlined updates to the city's asset inventory and helped customers monitor their water use as they transitioned to consumption-based, metered-rate billing.

Over the course of the program, contractors submitted monthly spreadsheets that included information on each meter installed within a billing period. The CMT captured the new meters' GPS coordinates and scanned their serial number as they were installed; all information was then tracked per project area by the PMT in the geographic information system (GIS) geodatabase shown in Figure 5.

GIS also was used to compare information collected by the contractor and by the CMT. Any discrepancies were identified for correction before submitting the information to the city's billing department, which then ran additional data quality reviews and conducted field spot-checks of the meter installations to match meter serial numbers with customer account records. As a result of this multilayered quality control process, the average activation time to update customer accounts with the installed meter was well under the target of 90 days, instead averaging around 42 days.

The City of Sacramento successfully integrated supply management into its construction contracting process through qualifications-based procurement and cross-functional teams. It was able to efficiently

and cost-effectively implement the AWMP with public support because the team was able to triangulate asset management, finance, and supply management.

Additional Case Studies

The following three case studies provide examples of other organizations similarly committed to this triangulation but that are taking different approaches.

The United Kingdom: Routemap

In 2010, the United Kingdom's Infrastructure and Projects Authority (IPA) investigated how to reduce costs for delivering major infrastructure projects, resulting in the creation of an Infrastructure Cost Review program. The three-year implementation plan included developing a "routemap" to "enable public and private clients to select the most appropriate procurement strategy" and new approaches to manage risk and contingency for public sector infrastructure projects. In 2014, the IPA and Her Majesty's Treasury co-published the report, *Infrastructure Cost Review: Measuring and Improving Delivery*, which attributed more than £3.4 billion in annual cost savings to improvements in collaborative behaviors that supported better delivery outcomes. The report also reviewed new procurement models that were proposed and described as follows:

> **2.35** The new procurement models are based around delivery by integrated project teams working collaboratively. Along with reducing costs, the models are expected to: contribute to improved programme certainty, reduce risk, encourage greater innovation, and improve relationships across clients and the supply chain. The models may not always deliver the cheapest construction project, but aim to deliver the most cost effective and value for money outcome.

The procurement strategy and models evolved to become the Project Initiation Routemap—an aid to strategic decision-making for infrastructure projects. The Routemap is an assemblage of concepts presented in modules and designed to identify common causes of project failure during the crucial early stages of a project's development.

An asset management module within the Routemap helps with the selection and delivery of assets into operation and the management of risks throughout the asset life cycle. The procurement module guides engagement with the market, supports discovery of the most appropriate procurement strategy, and identifies risks to be shared across the project owner and the supply chain. The Routemap provides the analytical and collaborative tools to support strategic decision-making, enabling sponsors, investors, and those responsible for executing the project to proceed with the confidence that they have selected the most appropriate delivery model.

WSSC Water

Based in Laurel, Md., the Washington Suburban Sanitary Commission (WSSC Water) is one of the largest US water and wastewater utilities, serving Montgomery and Prince George's Counties (Md.), adjacent to the District of Columbia. It operates approximately 145 miles of prestressed concrete cylinder pipes (PCCPs) 36 inches or more in diameter.

In 2007, WSSC Water began developing its asset management strategy for this critical pipe inventory. Historically, WSSC Water's finance policy considered the R&R of less than 100 feet of water main a maintenance activity to be supported by operating funds. However, because operating funds have greater influences on water rates, obtaining the necessary funding for PCCP repairs became a challenge.

In 2016, WSSC Water's finance policy was revised to capitalize PCCP R&Rs. To justify and optimize this process, WSSC Water simultaneously launched a cross-functional team with three objectives:

- Convert multiple independent contracts that supported the PCCP program into a holistic sourcing strategy
- Leverage WSSC Water's leadership position in PCCP management to engage world-class suppliers and contractors
- Evolve PCCP program technology to control costs

The financial benefit of triangulating the sourcing strategy with the asset management and financial strategies reduced projected program costs by $7.5 million over three years.

DC Water

The District of Columbia Water and Sewer Authority (DC Water) delivers drinking water and collects and treats wastewater for Washington, D.C. From the "Procurement" page on its website (DC Water n.d.):

> DC Water has hundreds of contracts in place for construction, engineering, and goods and services. Our Capital Improvement Program addresses infrastructure repairs, modernization of facilities and processes for treating and transporting biosolids and limiting sewer overflows. Construction, architecture, and

> engineering contracts range from several thousand to several hundred million dollars for projects related to maintenance, repair, and upgrades to the plant as well as for projects involving sewage, stormwater, water storage, and water distribution systems.

In August 2019, DC Water announced the launch of its capital programs procurement (CPP) group. This group is responsible for enhancing DC Water's procurement capabilities, working in collaboration with DC Water's engineering and construction groups and its Capital Improvement Program Infrastructure Management group to introduce best practices for managing capital-intensive investments.

While the CPP group is in its early stages, it has already introduced sourcing elements to the solicitation and award process, such as gathering market intelligence, structured negotiations, and contract execution to ensure that project awards are based on best value for the monies spent.

The New Trio for Success

Integrating the trio of asset management, finance, and supply management starts by acknowledging that performing them as independent functions strains efforts and undercuts results. Implementing cross-functional processes, which has been compelling in the private sector, demonstrates clear value for the public sector. The following guidance will help others considering this approach:

- Continue to develop the role of assessment management. Invest in talent and tools.
- Initiate the transition from purchasing to supply management for capital-intensive investments. Assess the current state of assets, finances, and the supply market to map out a sourcing strategy based on needs, funding, and supply market conditions.
- Use cross-functional teams to collaborate. Sponsor, champion, coach, train, and develop these teams.

This approach can work for all sizes of water and wastewater utilities, and keep in mind that cross-functionality is primarily about people and processes. Monies coming from ratepayers must be spent wisely, but while saving money is important, real value is derived from doing more and better with the funds at hand.

Improvement and innovation come from collaborating across functions and eliminating siloes. As for creativity, Sawyer and colleagues (2003) put it best:

> Creativity requires a confluence of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. Although levels of these resources are sources of individual differences, often the decision to use a resource is a more important source of individual differences.

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AWWA Resources

- **Planning for Resilient Drinking Water Systems: Case Studies From Pennsylvania. Liu R, Graf CA. 2021. *Journal AWWA.* 113:2:22. https://doi.org/10.1002/awwa.1668**
- **Take A Systems Approach to Energy Management. Dufresne L. 2016. *Opflow.* 42:12:10. https://doi.org/10.5991/OPF.2016.42.0070**
- **Implementing Asset Management to Influence and Manage Organizational Change. Dimperio A, Ramamurthy A. 2019. *Journal AWWA.* https://doi.org/10.1002/awwa.1324**

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