



Let's build a smarter planet



## DC Water creates a smarter utility service with IBM

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### Overview

#### The need

Facing an aging infrastructure and numerous customer complaints, the District of Columbia Water and Sewer Authority (DC Water) needed to improve asset reliability and lifespan, and streamline its business processes.

#### The solution

DC Water worked with IBM, IBM Premier Business Partner ESRI, joint IBM and DC Water Business Partner tieBridge, and others to modernize infrastructure management and gain greater visibility into critical operations.

#### What makes it smarter

Advanced spatial analytics will deliver near real-time information to assist DC Water in predicting potential problems and occurrences based on location, time, weather and historical events.

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According to George S. Hawkins, General Manager of the District of Columbia Water and Sewer Authority (DC Water), aging water and sewer infrastructure is a problem that plagues many of the older cities across the country and, the District of Columbia is no exception. The median age of the 1,300 miles of pipe in the DC Water distribution system is 76 years old and much of the 1,800 miles that make up the sewer collection system was installed in the mid-1800s and early 1900s.

“I find it truly amazing that we still have infrastructure providing service to our customers that predates the Civil War,” says Hawkins. “My preference is to modernize the system and provide a higher level of service to the customers we serve.”

DC Water provides clean drinking water services and wastewater collection and treatment to 600,000 customers in the District and wastewater services to 1.6 million customers in nearby Fairfax and Loudon counties in Virginia and Prince George's and Montgomery counties in Maryland. The organization estimated that it would take billions of dollars and well over a century to replace its aging infrastructure. “What's more, manual, disconnected business processes made strategic decisions on where to invest our limited capital dollars more difficult,” says Hawkins.





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## Business benefits

- 36 percent reduction in customer calls through increased preventive maintenance and implementation of automated meter readings
  - Increased percentage of emergency investigations dispatched within 10 minutes from 49 percent to 93 percent
  - Ability to generate reports for regulatory compliance and management review in seconds versus days
  - Significant reduction in asset downtime
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*“Our work with IBM has allowed our assets to communicate with us—and we’re doing more than just listening, we’re taking action.”*

—Mujib U. Lodhi, Chief Information Officer, DC Water

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According to Mujib U. Lodhi, Chief Information Officer of DC Water, the organization bridged the gap between technical and operational resources using information technology (IT) as the change agent. “The partnership developed between IT, operations and our business partners became the principal driver in advancing many smart initiatives that helped advance DC Water as a premier service provider and as a SMART utility in the nation’s capital,” says Lodhi. “At DC Water, we use an end-to-end process in technology solutions where IT and operations work hand-in-hand to understand and develop the business requirements before an IT solution is proposed. In my experience, the business process owners typically have a conceptual idea of what is needed when it comes to IT solutions. At DC Water, scarce funds are not committed to conceptual ideas without first developing clearly defined business requirements. Once the requirements are defined, DC Water reaches out to the executive team to serve as the steering committee for the entire project life cycle with clearly defined tasks and project milestones, including process owners composed of both IT and operations personnel. As a change agent, IT introduced the project life cycle discipline at DC Water and nurtured the partnership concept needed to transform a conceptual idea into a business process solution.”

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## Smarter Water:

## Improving water quality and service

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### Instrumented

Asset and maintenance data, including fire hydrant status captured from handheld devices, is collected and analyzed via a single platform and mapped with ESRI’s GIS software.



### Interconnected

Status of the city’s hydrants can be viewed by firefighters via Google Earth as they are rushing to the scene and spatial data is shared transparently.



### Intelligent

Real-time, map-based information and geo-analytics will help DC Water predict infrastructure problems based on location, time, weather and historical maintenance data.



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## Solution components:

### Software

- IBM® Cognos® 8 Business Intelligence
- IBM Maximo® Asset Management
- IBM Maximo Spatial Asset Management
- IBM SPSS
- IBM WebSphere® ILOG® business rule management system
- ESRI ArcGIS

### Services

- IBM Global Business Services—Supply Chain Management: Enterprise Asset Management, Spatial Services
- IBM T.J. Watson Research Lab

### IBM Business Partners

- ESRI
  - tieBridge
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*“Having a world-class asset management system integrated with a world-class GIS allows our personnel to maximize their potential and helps us realize the vision of higher efficiency and better customer service.”*

—Charles W. Kiely, Assistant General Manager, Consumer Services, DC Water

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## Modernizing an aging infrastructure

Through a strategic maintenance and asset management program and transition to automated meter readings, DC Water is modernizing management of its massive water and sewer infrastructure—which includes hundreds of thousands of assets such as water distribution pipes, valves, public fire hydrants, collection pipes, manholes and water meters.

IBM, IBM Premier Business Partner ESRI, and joint IBM and DC Water Business Partner tieBridge worked with DC Water to help staff gain greater visibility into its assets and streamline business processes across the organization. Using IBM® Maximo® Asset Management in combination with ESRI GIS software, DC Water staff can view the location and condition of each asset on a detailed map and can quickly access asset history, total asset cost, number of problems in specific areas, and even water quality issues by type and area. This is vital in enabling staff to identify patterns and make informed decisions regarding which infrastructure assets to repair, which to replace and when. With the implementation of IBM Maximo Spatial Asset Management, the integration between Maximo and ESRI software—using ESRI’s REST (Representational State Transfer) application programming interface—will provide an increasingly seamless integration of spatial and asset management data.

“IBM Maximo Asset Management helps us to make intelligent decisions so we can extend the useful life of critical infrastructure components while planning the capital improvements necessary for reliable infrastructure,” says Charles W. Kiely, Assistant General Manager, Consumer Services, DC Water.



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*“Predictive analytics will bring our operating costs down even further, reducing the cost per work order of service.”*

—Mujib U. Lodhi

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When water and sewer customers call the agency regarding service issues—a water main break, a leak, a billing question or a water quality complaint—customer service staff in the agency’s new consolidated Command Center captures the information in IBM Maximo Asset Management software and automatically initiates a work order. Work orders that once took days to process can now be approved and crews dispatched in minutes. The system captures useful data such as the time to complete repairs compared with the expected problem resolution time. DC Water supervisors can then identify jobs in which durations exceed acceptable parameters and research what caused the anomaly. Process improvements are then implemented to alleviate reoccurrences. Planning preventive job plans help agency staff extend the lifespan of critical assets and manage compliance requirements, such as confirming that water samples and equipment tests are conducted at the appropriate intervals as required by the U.S. Environmental Protection Agency.

“Using IBM Software, we’re able to deploy our crews faster, which is a key driver of customer satisfaction,” says Kiely. “For day-to-day maintenance, IBM Software helps us to coordinate and plan our crew assignments weeks in advance so we can work much more efficiently.”

### **Advanced water management**

When DC Water implemented its asset and maintenance management program, the goal wasn’t to simply automate existing processes. It was to better serve the community through improved business processes. Take, for example, the agency’s new hydrant inspection program. Previously firefighters had to fill out paper forms when inspecting the district’s 9,000 fire hydrants and then mail the information to DC Water headquarters, which would assign work orders as needed. The process was time consuming and error prone. Information was often



incomplete, making it difficult to reliably provide hydrant status information to the Fire Department, the public and DC Water field crews. Now with IBM Maximo Asset Management, ESRI ArcGIS and a third-party mobile application, inspections are performed using a smart handheld device. When an individual holding this device is within 10 feet of a hydrant, the application automatically identifies the hydrant and its location and the system prompts the inspector for the required information. Photos of the hydrant can be captured for inclusion in the inspection report using the handheld. If a problem is noted, the system automatically generates a work order. In addition, the status and water flow capacity of each hydrant is mapped and can be viewed by the Fire Department via Google Earth so when firefighters are rushing to the scene, in most cases they know in advance the level of water flow to expect out of the hydrants in the vicinity.

“Our work with IBM has allowed our assets to communicate with us—and we’re doing more than just listening, we’re taking action,” says Lodhi.

### **Realizing a significant return on its investment**

How much impact has this new approach had on operational efficiency? A great deal, according to Kiely. Among the many statistics compiled: Customer call volume has decreased by 36 percent through increased preventive maintenance, improved scheduling and the agency’s new automated meter reading (AMI) infrastructure. Meter reading costs that averaged US\$3 per reading in 2000 are now measured in cents. “It is incredible when we step back and realize that DC Water has collected almost 400 million meter readings since implementing AMI,” adds Kiely.



DC Water's credit and collection performance improved dramatically as 90-day receivables declined from \$26 million in 2003 to \$5 million in 2009. Emergency investigations dispatched in under 10 minutes increased from 49 percent in 2006 to 93 percent in 2009. "Our first responders are at the site of any emergency within 45 minutes, although frequently our response is much faster," says Kiely.

"As part of DC Water construction permitting process automation with new business processes, the percentage of application reviews completed within goal has increased from 63 percent to 90 percent," adds Lodhi.

Kiely continues, "Our customer service goal is in keeping with the 'one and done' concept, meaning that we try to do everything needed the first time, every time and IBM Maximo helps us manage this process. This results in very few return visits."

The recent integration of ESRI ArcGIS with IBM Maximo allows DC Water to deploy its crews more effectively, which translated into hard operational savings. Using ESRI ArcGIS and IBM Maximo software, DC Water can strategically assign its crews to a small geographical area to perform both corrective and preventive maintenance work, with the goal being to capture every asset touch in IBM Maximo. By capturing data and information on every asset, DC Water can reduce the costs of its preventative maintenance programs while extending the useful life of this critical infrastructure.



According to Lodhi, while the organization has realized tremendous results so far, what comes next will be even more impressive.

DC Water is working with IBM Global Business Services and the IBM T.J. Watson Research Lab to integrate advanced analytics with IBM Maximo Asset Management software and ESRI ArcGIS. The availability of real-time, map-based information and geo-analytics—developed based on hundreds of algorithms and delivered using IBM Cognos® 8 Business Intelligence, IBM WebSphere® ILOG® and IBM SPSS software—will help DC Water engineers predict potential problems and occurrences based on location, time, weather and historical maintenance-related events. What's more, the agency will be able to more intelligently dispatch crews so that as maintenance personnel are sent to a site they can address all work requirements in the vicinity—both corrective and preventive. This is expected to further reduce the time to correct problems while decreasing mileage on its trucks by at least 20 percent. The agency also plans to use analytics to understand service demand—such as which areas of the city use water the most and how usage changes each season—and potentially create a new rate model.

“Predictive analytics will bring our operating costs down even further, reducing the cost per work order of service,” says Lodhi. “DC Water is well beyond the phase of automation and now very much focused on predictive analytics and ‘making our assets intelligent’. It is all about data insights as part of the ‘out data management strategy’, which sits on three pillars, I call the three A’s—Acquire, Analyze and Act. This will help us gain not only operational efficiencies but also investment efficiencies, which in the long term offer a much bigger payoff.”

## For more information

To learn more about how IBM can help you transform your business, please contact your IBM sales representative or IBM Business Partner.

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