ENABLING THE INTELLIGENT WATER SYSTEM



A COMPLETE GIS FOR WATER UTILITIES



Introduction

The challenges faced by utilities today may seem overwhelming at times, but there is a starting point to overcoming them that all utilities have in common: location. It's hard to think of a utility process that ignores location. Water utilities around the globe display wall maps to enhance decision-making-they work better using location intelligence.

Most utilities use geographic information system (GIS) technology as a foundation for mapping. However, limiting GIS use to a digital replacement of paper maps is a profound underutilization—a lost advantage to address new challenges.

ArcGIS is an extensive information system that empowers utilities with solutions–solutions that devour underutilized data, harness analytics, and run on any device.



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Drone technology can revolutionize operations, increasing efficiency, mitigating risk, and sharing information. go.esri.com/DroneWorkflows

Thriving in a Changing Industry

The water industry is in motion. Utilities face changes in every area of their business. They work hard to adapt and to leverage digital workflows. Yet often they meet tomorrow's challenges with yesterday's methods.

In the struggle to remain relevant and thrive, utilities look to advanced technologies-they look to ArcGIS. Organizations choose ArcGIS to make better maps because location is central to utility assets, customers, and employees. Today, it does so much more than make pretty maps. It is a complete enterprise system, providing utilities with solutions that support a system of record, a system of engagement, and a system of insight.

GIS will catalyze the improvements utilities desperately seek–today and into the future.



The Language of Location

Utilities have made substantial investments in technology to address business problems. Yet these solutions largely automated manual processes, reinforcing silos with suboptimal results. Today's problems require next-level improvements. Improvements demand a better understanding of network behavior and customer expectations.

The issues and solutions have one thing in common—location:

- Where are main breaks occurring?
- Where is the system vulnerable?
- Where are customers behaving differently?

Location yields perspective—most utility processes revolve around where they occur. Managers, employees, and customers have a common need to know what is happening, when it is happening, and where it is happening. Employees from different departments speak different lingo:

- Their data is different.
- They struggle to understand each other.
- They need a common language to work together.

That language is location. A map turns huge datasets into colorful pictures, quickly revealing the underlying business meaning. ArcGIS is a location intelligence platform. It provides an understanding of patterns and situations. ArcGIS provides the enterprise infrastructure for location-aware business solutions.

"Location provides the framework to absorb new ideas and accomplish true transformation."

> —Pat Hohl, Adjunct Professor, California Baptist University



Mature Systems **Deliver** Business Value

In the 1990s, Carnegie Mellon University looked at the maturity of digital systems. Geoffrey Moore and IBM popularized an approach based on this research. The model proposed progressive systems of record, engagement, and insight. This marked a clear path to information technology maturity and greater business value.

As water providers pivot around industry trends, they apply the best business tools to accelerate progress. Leading utilities are leveraging the power of location to accomplish this. A complete GIS supports their need to

- Migrate to a true, real-world model of their assets, building a stronger system of record.
- Liberate information for all stakeholders, internal and external, creating a dependable system of engagement.
- Capitalize on analytics, growing a system of insight.

"Digital disruption is forcing all enterprises to make big changes."

—Geoffrey Moore Crossing the Chasm

A Complete GIS



and Data Exploration

A Complete GIS—More than Making Maps

Changes in the utility environment and the explosion of data demand vastly better ways of managing, examining, and communicating utility information.

ArcGIS is a complete GIS. Complete means it contains all the elements needed to solve utility challenges-not just make conventional maps faster. The system maintains key information, analyzing and distributing it to everyone that needs business intelligence.

ArcGIS does things traditional mapping GIS can't touch. It employs an unparalleled data model and consumes most any form of external data. The rich data supports out-of-the-box analytics, the latest artificial intelligence (AI), and machine learning tools. The results are easily exploited with engaging apps personalized to each user's role. All the capabilities of ArcGIS work together and align to how people want to work today.

These capabilities create a seamless experience when using the systems needed to thrive:

• System of record—Data management and integration

- System of engagement—Sharing, collaboration, and dissemination
- System of insight—Analytics, models, and data exploration

The industry is asking for new digital tools that show the complete picture, provide powerful insights, and offer exceptional visualization on any device, anywhere, at any time. As the requirements for GIS have evolved, so has ArcGIS. It delivers the power to increase effectiveness in every corner of the utility.



Miami-Dade Water and Sewer Department uses ArcGIS to provide accurate, up-to-date information to project stakeholders go.esri.com/capitalplanning



A Stronger System of Record

How complete is your data?

In this data-driven world, advanced systems, digitally savvy customers, and the modern workforce all mandate better data inputs. Many utilities look forward to a strategic investment in new capabilities—a system of record that goes further.

In response, Esri designed a new data foundation—a utility network optimized specifically for utilities: ArcGIS Utility Network.

The new ArcGIS Utility Network fully represents today's complex water networks, sustaining powerful analytics and real-time modeling. It's fast and scalable. It goes even further by delivering its capabilities across the organization and into the field. Water utilities today face a myriad of challenges, ranging from increasing production demands, water shortages, aging infrastructure, and financing of capital projects. In addition, utilities must also keep up with fast-paced changes in technology and information security.

To help address these challenges, Esri has developed next generation data structures and tools delivered via the ArcGIS Utility Network.

Learn more by reading Understanding the Utility Network: A Guide for Water Utilities.

"The geometric network allowed us to capture institutional knowledge related to location. The utility network will allow us to also capture operational knowledge."

> -Pat Harrell, District Engineer, White House Utility District



A Dependable System of Engagement

How many are actually using your data?

To make a system of record more valuable, the information must be shared, allowing everyone to access and understand it. To be most useful, a system of record needs a system of engagement. The ArcGIS system of engagement manages and promotes user collaboration and interaction.

Engagement starts with communication connecting people in real time using locationaware devices. It's a move to empower employees, customers, and regulators with the information they need. ArcGIS gives all users access to appropriate information captured in the system of record.

• Executives use dashboards that monitor realtime events and key performance indicators (KPIs), making decisions at a glance.

- Fieldworkers easily update maps while they work, naturally reinforcing the system of record. Those updates go live without the delay of transcribing scribbled paper notes.
- Customers get maps from the web. They see the progress of projects in their neighborhood or report a leaking hydrant. When customers mention "water leak" on social media, the utility immediately gleans the information, improving safety and response time.

Using GIS this way is easy and productive, thanks to a whole suite of out-of-the-box apps that run anywhere. These apps support smart mapping, field data collection, location tracking, routing, spatial analytics, and situational awareness.



A Dependable System of Engagement (continued)

Case Study

When Northern Ireland Water selected Esri's ArcGIS mapping platform as its new corporate GIS system, it didn't just get all the functionality that the business needed. It also gained a suite of additional tools, creating a "place of opportunity" for improving its customers' experience, reducing costs, and removing inefficient processes.

Learn how Northern Ireland Water put its data into the hands of hundreds of employees, resulting in benefits beyond its expectations.



Northern Ireland Water's situational awareness web map provides managers with a clear overview of customer issues in real time.

Read the case study.

"We can rapidly deploy new web and mobile applications using standard, out-of-the-box ArcGIS tools to meet new business requirements, and moreover, we can do this all in-house."

> -Sean O'Boyle, Asset Information Development Manager, Northern Ireland Water



Growing a System of Insight

What is your data telling you?

A system of insight is about discovery—creating new understanding. Incremental improvements lead to slightly better processes. Breakthroughs require new knowledge. They require seeing things differently—discovering new insights that are not visible using conventional means. Analytics discovers secrets in data and evaluates trends.

A system of insight dramatically magnifies business value. It explores the diverse data maintained in the system of record and from the system of engagement. It adds information gained from outside sources over the web—weather, traffic, lightning, and vehicle location services. It takes in real-time data from IoT sensors collaborating with other operational systems such as SCADA and advanced metering infrastructure (AMI). Exploiting complex data requires state-of-the-art data science tools. ArcGIS delivers exciting capabilities such as spatial analysis, machine learning, big data analytics, and image processing.

Business intelligence comes from examining raw data through the lens of location. The powerful analytical features in ArcGIS release greater insights. They uncover relationships that simple reporting cannot find. They detect patterns and correlations. Data-driven predictions based on business rule logic inform decision-making:

- Where do we need to grow the system?
- Where are the greatest risks to resiliency?
- What factors are affecting asset performance and longevity?

Case Study

St. Johns County Utilities is a growing, midsize water and sewer utility serving 45,000 accounts and 110,000 customers in coastal Northeast Florida. The GIS Division has transitioned from only tracking and displaying assets with GIS to managing operations and planning through mobile GIS and live data. This has allowed St. Johns County Utilities to manage its water and sewer systems with a high level of service to the rapidly growing population.

Read the full case study.



A Complete GIS Supports Your Needs

ArcGIS is a complete GIS. Systems of record, engagement, and insight provide a mature information system that creates real business value across the utility enterprise.

Modernizing workflows with innovative technology supports your need to operate, maintain, and serve your customers. A complete GIS is able to deliver real-time information across the organization, to field crews and office staff. It provides business intelligence, improving your ability to respond to daily challenges as well as emergency situations.

Asset Management

Many forward-thinking utilities want enterprise asset management (EAM) and GIS to be fully interoperable. They want to visualize assets, access real-time data, and understand how to best allocate resources. They want to find trends to fine-tune their asset decisionmaking process.

Operations

Water operators are responsible for delivering safe drinking water on time and on budget. To do this they must know where their assets are located, be able to access information about each asset, and have an operational view of their system. ArcGIS provides an easy-to-use platform that manages data collection, editing, and sharing; providing the operational view needed to efficiently manage the system.

Customers

Utilities strive to understand customers better and engage them in more meaningful ways. Digital consumers expect current information in seconds. They want an engaging and personalized experience worthy of a valued utility customer. ArcGIS relates information to the customer's location and puts it in their hands.

Planning and Engineering

Deliver workflows, designs, and solutions that increase the bottom line. Analyze projects, deliver essential workflows, and share asset information with your stakeholders.

A Solutions Architecture for Today and Tomorrow Esri Geospatial Cloud

The combined forces of computing power and the cloud are dramatically changing how software companies are delivering functionality. The benefits of cloud computing are compelling. The fantastic capability of desktop software paired with the Geospatial Cloud is transforming how utilities work across old silos. Office staff, field staff, consultants, stakeholders, and more are transforming how they work, coordinating and collaborating to achieve common goals.

Fueled by innovation, ArcGIS is part of the Geospatial Cloud. The Geospatial Cloud describes a large set of technology offerings from Esri. It includes all software and softwareas-a-service (SaaS) offerings—they work well together as a whole. The architecture is engineered for high performance in cloud environments, in on-premises infrastructure, and in hybrid environments. This makes it easier to use, deploy, and integrate across the enterprise.

Esri Geospatial Cloud gives utilities much more than the ability to make maps—it is a basis for solutions.

ArcGIS apps are increasing how people explore and understand maps and information. They deliver an immersive experience that people find joy in using. ArcGIS apps combine a variety of analytical functions and data services to tailor specific user-centric solutions. In contrast to large, costly implementations of the past, rapidly deployed apps can be updated in a very agile cycle.

ArcGIS cloud-based offerings give utilities the advantages of scalable computing, storage of large datasets, and big data computation during critical evens such as emergency response. The Geospatial Cloud strategy allows quick integration and analysis of large datasets and imagery at scale for even the largest utilities in the world. The combination of advanced spatial analytics and new AI tools can help model and visualize complex patterns, relationships, and situations.

This approach creates a type of infrastructure to deliver utility solutions--a geospatial infrastructure. This architecture continues to evolve, providing new and flexible ways to deliver the capability utilities need--where and when it is required.





A Basis for Solutions

GIS is much more than making maps—it is a basis for solutions. Utilities around the world are making strategic investments in location-aware information capabilities as a foundation for business refinements, modernization, and customer engagement.

Truly comprehensive models of utility systems are based on Esri utility networks. These models enable smooth data compilation and compelling analytics. When solutions are visualized clearly and shared widely, they make it possible to thrive in a changing industry.

Esri's location intelligence system is a complete GIS for utilities. ArcGIS helps you work better and smarter—advancing your modernization, safety, asset management, and customer experience efforts. Empower transformation through innovation.

ArcGIS is a complete GIS—the strategic investment that every utility needs to make to move the utility forward.

To learn more visit go.esri.com/waterutilities.

About Esri

Esri, the global market leader in geographic information system (GIS) software, offers the most powerful mapping and spatial analytics technology available. Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world.

Esri supports utilities in achieving their performance and visibility with skills, knowledge, and resources in the following:

- Mapping
- Spatial analytics
- Data-driven insights
- Real-time situational awareness and alerts
- Visualization

For more information, visit *go.esri.com*/waterutilities.



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