

An aerial photograph of a suburban area, showing a grid of streets, houses, and a river on the left side. The image is used as a background for the title slide.

# OPTIMIZING MOBILE WORKFORCES



## A COMPREHENSIVE GIS

## Electric and Gas Utilities



**THE  
SCIENCE  
OF  
WHERE®**

# Introduction

Utilities balance four goals: profitability, safety, reliable customer service, and compliance. The large mobile workforce is on the front line, impacting all four. The crews' diligence impacts costs, reliability, and compliance. Their work is dangerous, so they must take precautions to do their jobs safely.

Workers also have to deal with miserable weather, wretched traffic, and annoyed customers. Their success depends on real-time awareness. Because situations can change quickly and depend on location, a geographic information system (GIS) is vital. Clumsy paper maps and poor data inhibit awareness, interfering with collaboration between workers and the rest of the corporation. GIS provides immediate access to asset condition and location information. It eliminates jobsite surprises and allows simple, accurate, and timely reporting of network status and surrounding situations.

Incomplete and out-of-date information causes job delays, putting utilities at greater risk for accidents and mistakes. This increases costs, lowers output, and wastes time. The results are longer outage times, customer frustration, and fines from regulatory agencies. Using GIS as a source of high-quality location data boosts productivity, lowers costs, and preserves customer satisfaction.

GIS simply removes obstacles so workers can do their best. There is a lot at stake, because utilities are judged on how well this large workforce performs.





## Contents

**02** Introduction

**04** Mobile Work—The Pulse of  
Utility Operations

**05** Why Location Matters

**06** Location Technology  
Helps Workers Do  
Their Job

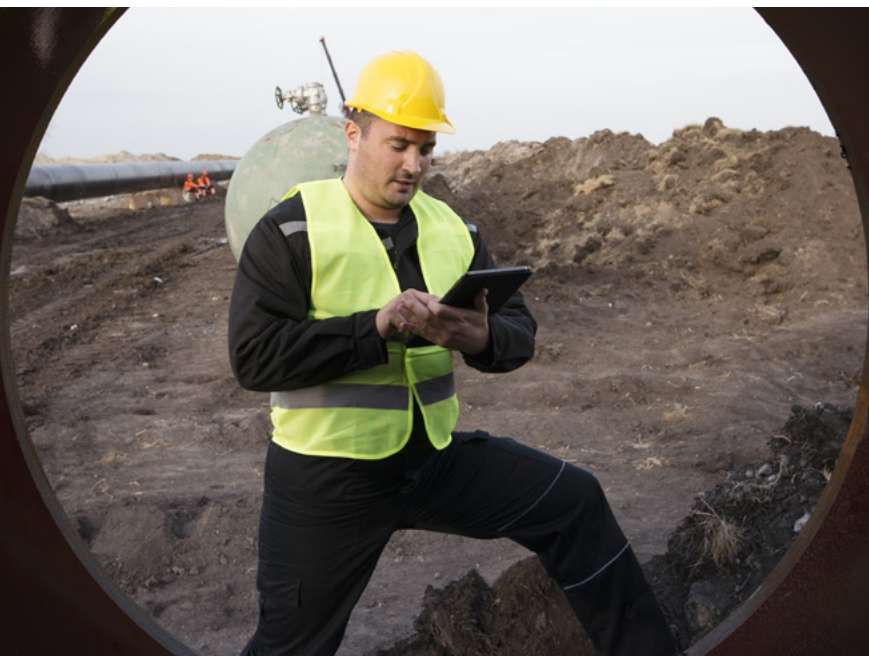
**07** Create Awareness

**08** Collect and Capture

**09** Communicate,  
Coordinate, Collaborate

**10** The Comprehensive GIS  
Arms Workers with the  
Information They Need

**11** About Esri



## Mobile Work— The Pulse of Utility Operations

The action at a utility happens outside the safe confines of headquarters. The pulse of field operations beats under and above the city streets. It occurs in backyards, remote expanses, and barbed wire enclosures. The work can be deadly, so working safely is job one, not only for the employees but also for the community where the work is performed. The more workers know, the safer they can be while working. Making sure they fully understand their surroundings is the key to their safety. That means knowing not only about the network

assets but also what factors impact both utilities and employees. Utilities should consider questions such as, What are the conditions in the field? Are there sensitive areas to avoid? Are there hazards lurking around the corner? Are there upset customers?

What field operations needs most are real-time answers.

Utilities rely solely on mobile workers to make sure that the data in the field is accurate. Their diligence in verifying such information preserves data quality for the workers who follow them.

Mobile work involves a variety of tasks, including inspection, maintenance, repair, and construction. Workers perform cleanup, restoration, vegetation management, troubleshooting, oversight of equipment settings, and valve exercising. This work directly impacts reliability, customer service, company reputation, and costs. And it all happens somewhere.

“We wanted to make sure that this technology was easy for our crews to use—and it is, which has allowed them to work remotely and independently.”

—Dan Siewert, Regional Forester, Wisconsin Public Service





## Why Location Matters

Location is at the heart of field activities, and this work is distributed widely. Utilities must always know where crews, assets, and customers are located, and workers need to be informed of real-time traffic and weather conditions and possible threats. Workers are more likely to make decisions faster and deliver better customer service if they can access location intelligence in the field.

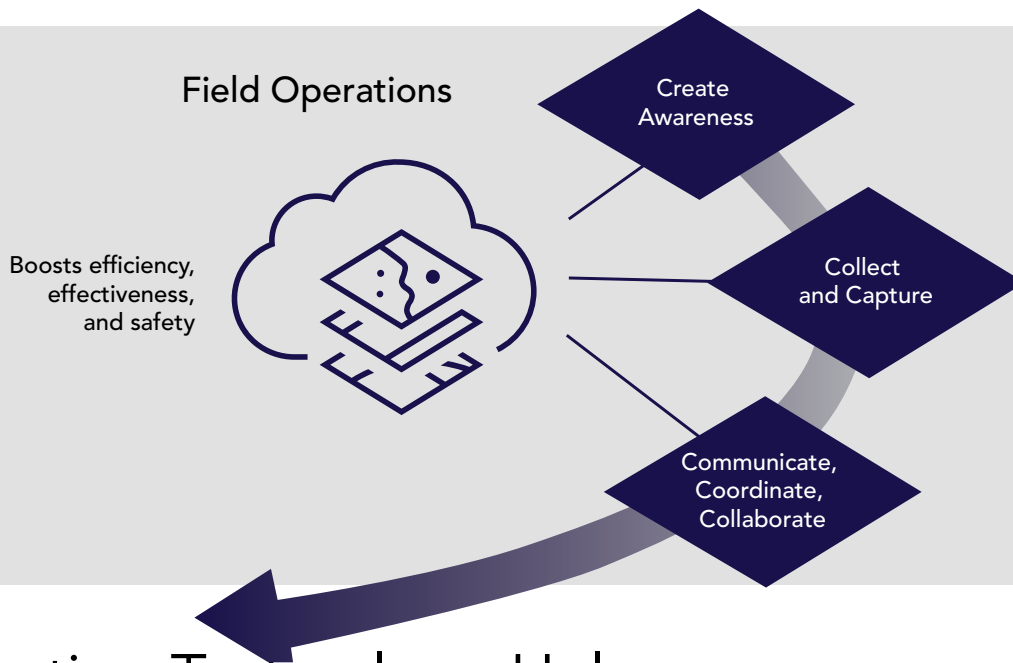
GIS provides that location intelligence.

Most utility processes revolve around where operations occur. This requires a full appreciation of where and when work is being performed to provide workers with insight into potential problems. Things happen, and situations can change quickly. GIS spatial analysis can lead on-site workers to adjust their attitude about and execution of their work.

Organizations use GIS to manage all forms of location information; for example, they rely on focused field apps to improve field operations. The ability to transform data into useful information is essential for coordination, navigation, data collection, and asset monitoring.

"The crew [members] found that ArcGIS apps were easy to use and made work more efficient. Now, they rely on their iPads as a single source of truth for an accurate picture of the electric system while they're in the field."

—Andy Adrien, Right-of-Way Coordinator, CEPC



## Location Technology Helps Workers Do Their Job

Utility workers want to do a good job. They are skilled at hanging transformers, setting poles, and replacing gas valves. The more time they spend doing this work, the better. They view spending time deciphering cluttered maps as a distraction from doing their job. They need easy-to-understand information on field and asset conditions, and a simple and fast way to communicate data back to the corporation. Esri® mobility solutions help workers focus on their jobs and connect them to the big picture, removing barriers so they can get to work. These solutions strengthen field operations through the following capabilities:

- **Create Awareness**

Mobile workers face numerous challenges and obstacles. ArcGIS® software provides ready access to all kinds of data about workers' surroundings, helping them understand the conditions they will face as they approach their work.

- **Collect and Capture**

Much of the mobile work consists of collecting vital information about utility assets. ArcGIS eases the ability to understand the work and provide feedback on as-built conditions.

- **Communicate, Coordinate, Collaborate**

With ArcGIS, mobile workers see the network and their surroundings as they really are, but communicating those conditions can often be tough. ArcGIS field and mobile solutions simplify getting information to and from corporate systems.

"ArcGIS enabled us to do, in weeks, a project that might otherwise have taken years."

– Paul Hart, Information Management Specialist, Black & Veatch



## Create Awareness

The moment workers leave their homes, service centers, or office buildings for the jobsite, they face uncertainty. ArcGIS provides awareness based on predictive information, real-time conditions, and historical events. Demographics, crime statistics, outage history, and historical weather patterns can inform predictions. Real-time information, such as current weather, traffic conditions, and voltage or pressure measures of the network, alerts workers to potential hazards. Customer complaints signal the workers to be especially sensitive. Armed with this data, workers are better prepared.

ArcGIS provides the following capabilities:

- **Reveals Hazards and Sensitive Areas**  
These include environmentally sensitive areas, such as vegetated wetlands, historic sites, ancient burial grounds, and endangered species habitat. ArcGIS can consume data from governments, public safety records, and other utility sources.
- **Visualizes Real-Time Conditions**  
ArcGIS provides streaming data from virtually any real-time data source. This gives workers a view that was previously only available to office or dispatch staff. Data from weather services, satellites, SCADA, AMI, and ADMS can be provided to workers via their mobile devices.

- **Uncovers Insights into Customer Demographics**

Esri [Tapestry™ Segmentation](#) organizes US neighborhoods into 67 segments, based on demographics and socioeconomic characteristics. Segments have unique names, like Uptown Individuals, Bright Young Professionals, and Retirement Communities.

- **Exposes Construction Activities and Network Condition**

Workers can obtain details of activities in the area that might impede their work. Examples include other utilities digging in the street, street and bridge closures, or network conditions.

### Awareness Case Study— El Paso Electric

El Paso Electric (EPE) was challenged due to the 1,800 miles of power lines that traverse many sensitive-environment resources. These concerns frequently delayed routine maintenance. The utility needed a better way to ensure that crews maintained compliance while performing their work. EPE worked with Westland Resources Inc. to create a custom form in the [ArcGIS Collector](#) app to help identify environmentally sensitive zones. EPE uses the app to improve regulatory compliance and increase productivity of the utility's workforce.

[Read the complete case study.](#)





## Collect and Capture

Inspection of assets is one of the most critical tasks for field operations and intimately dependent on location. The more utilities understand about their assets, the better they can proactively improve operations. Utilities have a huge number of distributed assets. Collecting data about those assets can be tedious, time-consuming, and error prone. ArcGIS streamlines this process with purpose-built mobility apps such as [ArcGIS Field Maps](#).

These apps allow utilities to achieve the following:

- **Streamline Workflows and Eliminate Paper**

Paper processes grow backlogs of data that must be handled. This leads to out-of-date data, compromising decision-making.

- **Automate Navigation, Data Capture, and Validation**

While most workers are familiar with commercial navigation, ArcGIS Field Maps provides navigation from locations only the utilities understand, from asset to asset or over rights-of-way. [ArcGIS Drone2Map](#)® transforms data capture for many tasks. ArcGIS manages high-resolution imagery from drones to capture data well in advance of the worker's arrival at the jobsite. Errors are dramatically reduced through smart validation provided by ArcGIS.

- **Modernize Asset Condition Assessments**

On-site workers can readily assess conditions and report immediately to the enterprise. This eliminates the long process of information gathering from the field to the office.

- **Update Source Systems Automatically**

Esri's suite of field apps eliminates having to recode data to incorporate it into enterprise systems. Automating data capture from the field saves time, provides validation, and eliminates redundancy.

### **Collect and Capture Case Study— Apex Utilities, Inc.**

Apex Utilities (formerly AltaGas Utilities) needed to prepare for a potential forthcoming industry standard that specifies how pipeline attributes should be identified via a standard, 16-digit bar code. Apex partnered with Eos Positioning Systems to utilize the company's location technology. Apex's solution involved the integration of the Eos technology with Esri ArcGIS for a complete data location system. This enabled compliance with the standard and transformed the data collection-and-capture process. Apex was able to reduce its as-built processing time by 50 percent and proactively achieve regulatory compliance.

[Read the complete case study.](#)





# Communicate, Coordinate, Collaborate

Radio transmissions, text messages, and phone calls do not provide an adequate level of detail for the reporting of asset condition or location. Paper maps cannot communicate to anyone who is not within close contact. To effectively collaborate, workers in the field and in the office must be provided the same information at the same time. ArcGIS and its mobility solutions do just that. They put information quickly into the hands of workers, giving them the tools to share their knowledge with the enterprise and their coworkers.

ArcGIS mobility solutions allow utilities to achieve the following:

- **Coordinate Site and Safety Information**  
Paper processes grow backlogs of data that must be handled. This leads to out-of-date data, compromising decision-making.
- **Track Crew Status in Real Time**  
Tracking provides oversight of workers, which is particularly important for those who are working alone. Knowing where the crew is and noting when there is no movement within a certain time period—especially when a worker is near a potential hazard—can alert the company to a potential safety issue.
- **Provide Immediate Feedback to the Organization**  
Workers on-site have the eyes and ears that give the utility essential situational

awareness and identify potential customer issues. Workers can provide that essential information for faster action and response. GIS maps provide greater context than emails, text messages, or phone calls. GIS answers the question, where is the issue?

- **Foster Internal and External Cooperation**

Esri's suite of mobility and desktop solutions provides a repeatable process of constant communication and cooperation among internal crews, other utilities, and public safety personnel.

## **Communication, Coordination, and Collaboration Case Study: Central Electric Power Cooperative**

Central Electric Power Cooperative (CEPC) needed to improve field efficiencies for servicing, inspecting, and maintaining its 1,555-mile-long network across 22,000 square miles. Office staff and mobile line workers were often struggling with inaccurate system maps and disparate information. As a result, CEPC experienced significant inefficiencies. Its solution was to automate both the data collection process and the navigation of its crews. To improve communication, collaboration, and coordination of its mobile workforce, the utility turned to Esri's suite of products. Having access to authoritative data and maps of the entire network enabled both mobile and office staff to use the same information from their respective locations, resulting in a dramatic improvement in efficiency. [Read the complete case study.](#)

# The Comprehensive GIS Arms Workers with the Information They Need

Location technology is essential to improving productivity, safety, and data quality. ArcGIS is a comprehensive GIS, incorporating the capabilities of the following:

- **System of Record**

ArcGIS provides utilities with a complete digital twin of their network. ArcGIS Utility Network captures utility assets and their relationship to one other, for example, the relationship between overhead and underground support structures. State-of-the-art validation tools give on-site workers full visibility through both 2D and 3D representations, freeing them to do their work without having to interpret hard-to-read paper maps and notes. Field Maps improves the accuracy and timeliness of the system of record for use by other employees and contractors. Designers, digging crews, call-before-you-dig contractors, dispatchers, engineers, asset managers, and workers all benefit from ready access to complete and accurate data that the GIS delivers.

- **System of Insight**

ArcGIS tools give workers needed insight into their surroundings by allowing them to perform instant analysis of network conditions. Predictive analysis alerts them to hazards and potential customer issues. ArcGIS arms workers with analytics about customer satisfaction, behaviors, and history.

- **System of Engagement**

Two keys to effective communication are clarity and timeliness. In a recent study of GIS users, Energy Acuity noted that 25 percent of utility respondents utilize update processes that exceed 30 days.

With ArcGIS Utility Network and ArcGIS Field Maps, that time can be reduced to seconds. ArcGIS provides immediate two-way communication from the field to the office, to other workers, and to the enterprise. This gives workers confidence that the decisions they make are based on the most up-to-date information possible.

ArcGIS strengthens field operations by giving workers as much information as possible as they head to the jobsite. It creates awareness of hazards, customer issues, and environmentally sensitive areas and provides real-time weather, traffic, and network conditions. ArcGIS tools allow utilities to unify their workforce, making it easier to combine tasks and allocate resources effectively.

ArcGIS automates many of the tasks that take workers away from their primary mission, making it easier for them to do their job.



# About Esri

Esri, the global market leader in 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 goals 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 [esri.com/electric](https://esri.com/electric).



# Contact Esri

380 New York Street  
Redlands, California  
92373-8100 USA

1 800 447 9778  
T 909 793 2853  
F 909 793 5953

[info@esri.com](mailto:info@esri.com)  
[esri.com](https://esri.com)

Offices worldwide  
[esri.com/locations](https://esri.com/locations)