GAS DISTRIBUTION & Pipeline Infrastructure Management
Asset-intensive pipeline and local distribution companies (LDCs) have large capital investments in their extensive and complex transmission and distribution systems. Having found manual and partially automated systems to be obsolete – laborious, error-prone, and prohibitively slow – pipeline operators and LDCs have begun to geospatially enable their information systems for enhanced infrastructure management to protect this investment. This requires a geospatial asset database that eliminates redundant or duplicate processes – one that refines workflows spanning the entire infrastructure. This new paradigm for dealing with expansive infrastructures also includes the need for addressing workforce management, as the majority of the natural gas workforce either plans, designs, constructs, maintains, or operates these geographically dispersed transmission or distribution assets.

Challenges to the Industry
The gas industry has many unique challenges: pipeline operators face the legal and environmental challenges of putting new infrastructure in place to meet rising demand for product while being good stewards of the environment and meeting shareholder demands; local distribution companies face the economic realities of doing more with less.
while meeting customer service expectations. All face the need to maintain safe operations and actively manage the integrity of their systems to comply with regulations. All face the challenge of operating and protecting critical national infrastructure while being prepared to respond to emergencies. The gas industry is looking to capitalize on more automated technologies to help them increase service reliability, safety, and cost savings.

To ensure a return on investment for these technologies, pipeline operators and LDCs alike need sophisticated software solutions and partners who are up to the challenge – partners who provide cost-effective, enterprise-scalable solutions proven over time.

**MANAGING THE LOCAL INFRASTRUCTURE**

Enterprise integration requires that a superior infrastructure management solution integrate with other systems within the corporation that require asset information, including the following:

- Customer information systems
- Outage management systems
- Integrity management systems
- Work management systems
- Enterprise resource management systems
- Financial systems

Intergraph®’s system interfaces provide tight integration with these systems and others and ensure you can meet demands in a dynamic situation, reducing labor and operating costs, responding better to customers, and following the industry’s best practices.

An asset-sensitive, geospatial infrastructure management system can easily result in significant record management labor savings of up to 50 percent. By circumventing obsolete processes and improving internal communication and asset management, such systems greatly improve your operating efficiency and enhance customer service capabilities.

**Geospatial Versus GIS**

The common denominator for Intergraph solutions is geospatial technology, which is based on interoperability, scalability, and flexibility. This technology enables you to perform the complicated tasks of developing and maintaining your network infrastructure. Unlike other systems, all data is stored in a standard Oracle database and is accessible directly, as with any other Oracle database. There is no need to access data through any other slower, proprietary software application. Simple geographic information systems (GIS) – supplying thematic mapping, spatial analysis, parcel management, and the like – lack the critical functionality and enterprise integration required for most large-scale gas and pipeline companies. The acute need for data integrity and interactive performance in infrastructure management exceeds what traditional GIS can deliver.

**Asset Management**

Gas and pipeline asset management requires large linear networks consisting of sometimes hundreds of thousands of explicitly connected pieces of equipment that are geographically dispersed, managed, and located using various geospatial views into the system. Data integrity is crucial, and downstream or across-stream
MidAmerican Energy company serves more than 660,000 natural gas and 680,000 electric customers in a 10,600 square-mile area – from Sioux Falls, South Dakota, to the Quad Cities of Iowa and Illinois. MEC uses Intergraph’s gas and electric infrastructure management solutions integrated with a third-party work management system to perform network analysis. In addition, MEC has deployed Intergraph’s field automation solution to more than 450 field users.
integration is vital to your company’s bottom line. A viable and flexible infrastructure management solution must interact seamlessly with both peer and corporate systems, especially those for operations and financial reporting. The fundamental feature of Intergraph’s solution is a single, traceable, geospatial network asset database for all natural gas transmission and distribution assets (e.g., pipelines, compressor stations, valves, right-of-ways, and easements) in one continuous model. This unique solution delivers a connected network model of the entire natural gas transmission and distribution infrastructure, permitting integration with other corporate systems for true enterprise data sharing.

Adherence to Standards
Intergraph Gas and Pipeline Infrastructure Management solutions support industry and technical standards, such as Pipeline Open Data Standard (PODS) and German Technical and Scientific Association for Gas and Water (DGVW). Intergraph is an active member of many standards organizations, working to promote best practices and protect your technology investment.

KEY APPLICATIONS
Our Gas and Pipeline Infrastructure Management solutions flawlessly manage the long-term transactions typical of the planning, analysis, design, and mapping of both transmission and distribution processes, while preserving data integrity and overall system performance among hundreds of thousands of simultaneous users. System applications support the workflows of the entire infrastructure, including design management, field automation, and enterprise imaging distribution and management. In addition, these applications coexist seamlessly with Intergraph’s superior outage and mobile workforce management solutions, along with many other extensible solutions, giving you an enterprisewide, flexible, and reliable set of integrated tools to meet your increasing challenges.

Design Management
Design Management enables the design of new facilities and the extension or replacement of existing facilities. Our application provides the long-term transaction processing necessary to design a work order and manage the status of projects through partial and final posting of all facility changes. These design projects encompass all types of work, from simple repairs and extensions to large, geographically dispersed installations with construction interdependencies.

Alignment Sheet Generation
With this application, you can generate a pipe profile engineering drawing in elevation format, known in the pipeline industry as an alignment sheet drawing. It includes graphic delimiters and tabular data describing the pipeline and indicating changes in material or coatings, or other attributes along the pipeline.

Leak/Survey Management
Intergraph’s Leak/Survey Management application provides you with a data store for leak survey data collected for piping sections. Using the leak history, together with material types and age of pipe, you can prioritize the replacement of pipe sections.
**Cathodic Protection/Corrosion Management**

This application allows you to trace sections of the metal piping network to design electrical insulation points for sections of the metallic network (protection zones), create electrically isolated zones, and locate and manage sacrificial anodes placed to electrically protect each network zone from corrosion.

**Landbase Management**

Intergraph’s Landbase Management application supports the background landbase used for various utility infrastructure mapping and design tasks. It typically includes geospatial data, such as edge of roadways, street centerlines, and street names. It may also include company easements and right-of-ways as maintained by the utility’s real estate department. When aerial photography or commercially available landbases are used for background land information, this application manages that information for you as well.

**Regulatory Compliance Analysis**

Intergraph provides calculators for high consequence areas (HCA) to assist in compliance with Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) regulations. Our class location application helps you maintain compliant and safe gas pressure levels according to population density factors. These applications can adjust to changing or non-U.S. regulations to meet distribution integrity guidelines.
Emergency Area Isolation
Intergraph’s Emergency Area Isolation application allows you to quickly identify the infrastructure asset in the event of a network break and helps determine appropriate repairs. Tracing the network upstream, downstream, or in both directions, you can determine and display the nearest flow-control devices. If these assets are not accessible or have become inoperable, you can extend the trace to locate the next set of flow control devices.

Engineering Network Analysis
This application exports the network information you need to industry-standard, third-party applications for advanced network modeling and analysis of a gas transmission or distribution network. Advanced network modeling and analysis is useful when you design or modify a portion of the network, and it also provides an understanding of the characteristics of the existing network. You can conduct simulations and parameter/equation driven analysis that helps determine the adequacy of the system to support new or existing customers.

Field Automation
With advances in communications and more compact and rugged hardware, there is a growing trend by organizations to mobilize access to critical business applications. Natural gas companies are increasingly moving to deliver business-critical applications and real-time data to workers in the field.

Intergraph’s Field Automation application uniquely integrates mobile mapping and IT systems on one platform. It includes an optional Mobile Workforce Management (MWFM) application for short-cycle work scheduling and management to improve productivity of field personnel. Intergraph’s rich functionality includes navigation, analysis, vehicle tracking and routing, job creation and management, and access to real-time status of crews and jobs. The application can work in a connected or disconnected mode – with the ability to store and forward information – allowing crews the flexibility to work inside and outside of wireless coverage. Field service personnel can accept multiple types of work orders, view up-to-date facility maps, turn redlines into almost immediate database updates, and communicate instantly with the back office. Field personnel can accomplish more work through immediate and efficient communication, data update, and use of the most current enterprise data. Our Field Automation application supports additional activities, such as field design, field inspection, vegetation management, and damage assessment.

Enterprise Image Management and Distribution
Gas pipeline and local distribution personnel use imagery to help them understand the location and characteristics of the physical network and facilitate a variety of activities. Using Intergraph technology, you can have direct access to all imagery available throughout the enterprise through a modular client-server system that enables users to store, manage, and access multiple types of imagery and terrain data – no matter where they are in the workflow. Imagery needed for planning, design, construction, and maintenance is available in seconds, not hours or days.
EXTENDED APPLICATIONS

Outage Management for Gas Distribution Companies

Intergraph’s Outage Management System (OMS) can help gas distribution companies reduce restoration time, improve operational efficiency, and enhance safety. The system uses the geofacilities model with links to customer information systems, automated voice response units, SCADA systems, and automated meter reading systems to help you monitor the state of the network. Using the fully connected model of the gas network, you can quickly assess the optimum way to isolate a problem area and can efficiently dispatch crews for repair and service restoration. OMS also provides you with tools for preparing valve operation and area isolation plans. These tools, tightly integrated with geographic and schematic views of the operational network, handle emergency and planned area isolations for maintenance or construction. In addition, OMS offers you a full suite of tools for managing trouble crews. Crew management functions include street-level routing, geographic crew tracking, and automatic crew recommendations.

Mobile Workforce Management

MWFM supports dispatch, scheduling, and mobile computing solutions for all types of field work – planned and unplanned, short-term and long-term. Productized interfaces, intranet access, and decision-support tools for reporting are integral components. This map-driven, mobile workforce application provides you with full dispatching and crew management capabilities, including appointment and workload scheduling, assignment optimization, and CIS integration. MWFM supports mobile devices for field personnel and in vehicles. Technicians receive work automatically and update the status of work on mobile data terminals. Full-blown mapping and configuration functions provide you with such capabilities as street-level routing, street and facility queries, and even in-vehicle navigation. The system is highly configurable, eliminating the need for custom programming.

Critical Infrastructure Protection for Pipeline Operators

World events have focused our attention and concern on security. Governments, public safety agencies, energy suppliers, and others work tirelessly to assess the vulnerabilities of our national critical infrastructure, evaluate these vulnerabilities, and coordinate with other government and private entities to ensure the most effective response. Successfully managing and securing critical infrastructure and responding to large-scale natural or man-made incidents presents enormous challenges. Each demands similar results: efficient operations, good business practices, and improved visibility and management of all resources. Our geospatially powered incident management solutions improve your responsiveness and resiliency in the face of such threats by integrating information from a variety of sources in real time. This improves situational awareness within the command-and-control environment of Intergraph’s security framework.

Business Intelligence and Intergraph’s Enterprise Web Portal

Gas and pipeline companies need access to not only the infrastructure information, but also the ability to integrate the geospatial information with a variety of other data types to support decision-
Ruhrgas, Germany’s leading gas transmission company, chose an Intergraph geospatial solution to manage the technical administration of its system. Integrated with other enterprise systems and configured to company requirements, the system enables 200 field staff to access the latest data and send redline information back to the office.
making and reporting requirements, both internally and externally. Today, this is defined as business intelligence. Intergraph’s Business Intelligence solutions provide your employees, customers, and the public with fast and easy access to the integrated data within a geospatial context. Because Web technology has evolved from a means of posting static company information to a powerful business platform, Intergraph’s Enterprise Web Portal has emerged as the principal interface for delivering business intelligence and other customized content to executives, employees and customers through a user-friendly format. It provides real-time access to multiple data stores both on the Internet and on internal servers, direct access to the communications infrastructure data, land base information and can include current information on inspections, service interruptions, and any number of reports needed by employees or customers. Intergraph’s Enterprise Web Portal is also an executive dashboard used for reporting, spatial analysis, and decision-support functions, and you can control access according to your intended audience.

The solution is a truly vendor-independent analysis tool, as it works with data from a variety of sources, including:

- Intergraph’s infrastructure management systems
- Data formats from traditional GIS Vendors
- Commercial database formats from Oracle, Microsoft®, and others
- Design files from computer-aided design packages
- Data in OpenGIS® (OGIS) format, Web services, and more

The idea behind Intergraph’s Business Intelligence solution is straightforward – provide real-time access to disparate data sources online and equip you with geospatial query, analysis, and visualization tools. With these tools, you can interrogate, analyze, assess, and formulate decisions in support of core business objectives, such as emergency management, critical infrastructure protection, economic development, and more. Any user equipped with a standard Web browser can accomplish these tasks and more with no GIS training.

**WHY NATURAL GAS LEADERS CHOOSE INTERGRAPH**

Intergraph is a recognized leader specializing in infrastructure management solutions for utilities and integration of engineering and operations with asset management. Intergraph infrastructure solutions can deliver productivity savings of up to 50 percent. Intergraph solutions are scalable to any enterprise, allowing integration of asset data with other corporate systems to further improve productivity and streamline workflows. Our solutions are open on Oracle, providing a lower total cost of ownership. With more than 400 utility and pipeline customers worldwide and more than 40 years of experience in GIS for the natural gas industry, Intergraph is your single source for infrastructure management solutions, including products, services, and support.
ABOUT INTERGRAPH

Intergraph is the leading global provider of engineering and geospatial software that enables customers to visualize complex data. Businesses and governments in more than 60 countries rely on Intergraph's industry-specific software to organize vast amounts of data into understandable visual representations and actionable intelligence. Intergraph’s software and services empower customers to build and operate more efficient plants and ships, create intelligent maps, and protect critical infrastructure and millions of people around the world.

Intergraph operates through two divisions: Process, Power & Marine (PP&M) and Security, Government & Infrastructure (SG&I). Intergraph PP&M provides enterprise engineering software for the design, construction, and operation of plants, ships, and offshore facilities. Intergraph SG&I provides geospatially powered solutions to the defense and intelligence, public safety and security, government, transportation, photogrammetry, utilities, and communications industries.

For more information, visit www.intergraph.com.