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The Intelligent Pipeline: Achieving high performance by accelerating the path from data to decision making

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Trends in the gas and pipeline industries

Natural gas is experiencing resurgent growth in North America and around the world—driving increases in supply and demand. New technologies have contributed to the diversity of gas supply. New supplies require new infrastructure or the upgrading of existing assets for the processing, transportation and distribution of gas.

Natural gas is being positioned as a “bridge” to a low-carbon future. While the current “gas glut” is expected to continue until at least 2013, supermajors and national oil companies (NOCs) alike are demonstrating through exploration and acquisition activity that gas is clearly part of their long-term future. Policymakers continue to be focused on making the shift to a low-carbon economy and, among the fossil fuels, natural gas has the lowest carbon intensity. Gas will likely be the “fuel of choice” in the future, with consensus estimates indicating that gas demand will grow anywhere from 4 to 28 percent in the next 10 years, with gas supplies representing between 20 and 26 percent of the global energy mix.

Thus, gas is becoming more important—to the industry, our economy and our environment. As the energy industry becomes more focused on the production of natural gas, the continued safe and reliable operation of transportation and processing infrastructure is a constant

concern for gas companies. These companies are under greater scrutiny to manage the risk of failure from aging assets, as well as maintain compliance with increasing regulatory requirements wherever they operate. Additionally, public concern around environment, health and safety (EH&S) issues has heightened. The aging workforce is departing with undocumented legacy knowledge. In summary, the industry is challenged—as it builds new infrastructure yet continues to maintain aging infrastructure.

Industry drivers

The ability to operate gas infrastructure and pipelines safely and efficiently will become an important differentiator in the future, as the industry and the economy rely more heavily on natural gas supplies. This competitive advantage relies, to a great extent, on the ability of the pipeline operator to see and understand what is happening in real time with regard to the asset. For example, in the important areas of operations, safety and maintenance,

having up-to-date knowledge of pipeline condition is crucial. Having a real-time and holistic view of pipeline operations can help the operator in the event of an emergency, enabling them to prepare for, and react to, incidents more quickly.

Additionally, pipeline maintenance is a high-cost area, often plagued by data and information challenges. In the United States alone, some gas pipelines have been in service for more than 40 years and require substantial levels of maintenance to keep them safely operational. Poor data management means that companies are unable to effectively interpret the information on the pipeline and often need to reproduce data by reinspecting the pipeline, thereby incurring additional costs.

Accenture has identified a number of factors driving the need for operational improvement at pipeline operations. Gas pipeline companies need to look closely at:

Asset integrity—Maintaining a safe, reliable and dependable asset.

Asset security—Protecting staff, assets and intelligence from threats.

Cost management—Minimizing cost escalation of operations and administration to protect shareholder value.

Customer satisfaction—Providing highest-value services to customers in an efficient manner.

Data—Improving decision making, which suffers from a lack of data integration.

Environmental stewardship—Managing, tracking and reporting carbon, waste and volatile organic compounds to minimize financial exposure and maximize good corporate citizenship.

Knowledge transfer—Capturing and using knowledge from the workforce.

Operational excellence—Optimizing leadership, teamwork and problem solving—resulting in continuous improvement.

Safety—Managing risk to assets, resources and the public across a widely distributed geographic footprint.

Intelligent infrastructure trends

In other industries, the emergence of “smart” infrastructure concepts enables operators to extract the best value from existing systems (often through better integration of information and the ability to look at information in real time). Barriers to operational improvement in most industries often result from a lack of integration among systems and business processes across departments. For example, operating and commercial data can remain “siloesd” and often exists in manually produced spreadsheets on individual hard drives. This lack of integration leads to delayed or incomplete data, limiting access to real-time data and ultimately compromising decision making.

Accenture believes that the development of such intelligent pipelines enables companies to better control and extract value from their pipeline networks, primarily by using an integrated approach to data and information management to measure, control and optimize the business. We are already seeing gas pipeline operating companies investing in new technologies, such as satellite monitoring, for better inspection and maintenance of assets.

An intelligent pipeline works on two levels. On the functional level, an intelligent pipeline provides the opportunity to rethink utilization of workforce and processes, remove information barriers and move toward more empirical decision making. On the technical level, an intelligent pipeline is enabled through the application of innovative technologies such as:

- Visualization and collaboration.
- Data management and analytics.
- Security and integration.
- Automation and instrumentation.

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Accenture's intelligent pipeline solution

Accenture's intelligent pipeline solution helps gas companies achieve high performance by providing them with a game-changing new ability to fast-track intelligent pipeline projects and accelerate business benefits. The reference architecture in the solution is based on other successful implementations (e.g., utilities' smart grids) and embodies lessons learned from many years of accumulated experience along with a consistent set of leading practices. Leveraging reusable code and integration adapters, the standards-based reference architecture includes:

Geospatial visualization

Accenture's intelligent pipeline solution leverages visually effective technologies and makes best use of existing technology investments. Our solution produces a more intuitive way of viewing data and capturing it for end-to-end analysis. Our solution also supports ad-hoc exploration

of information. From high-level overviews to very low-level analysis, our solution provides playback of historical operations and events, alerts and remediation. Whether information is displayed on desktops, large interactive screens or mobile devices, our use of modern Web 2.0 frameworks enables flexibility of application design and delivery mechanisms.

Strong data management and analytics core

Leading-edge technologies, such as service-oriented architecture (SOA), form the backbone of the solution. SOA efficiently supports integration with existing systems or enterprise integration architectures. For example, SOA takes advantage of information within a pipeline's existing IT infrastructure (such as issues and anomalies throughout the system) and helps put the "puzzle" of

complex event processing together—enabling improved integration between operations.

Business processes for the gas and pipeline industries

Accenture has codified our knowledge of industry-leading practices into a library of high-performance business processes. In addition to technological components, Accenture's intelligent pipeline solution includes well-formulated business processes that assist the integrated approach to data management for business optimization.

Enterprise framework and delivery methods

Our solution draws on Accenture's well-honed delivery methods and security frameworks, based on the latest industry standards and rapid development tools.

Intelligent pipeline scenarios

Drawing on advanced technological features such as rich geospatial visualization and event-driven architecture, an intelligent pipeline integrates strategic and operational data to raise the level of situational awareness in a variety of scenarios:

Having a continuous read of data

Since sensors read massive amounts of data, a single, individual reading of data may not indicate a problem. But having a continuously running predictive analytics system enables identification of anomalies or trends in sensor-reading data. Consulting the predictive analytics system helps identify actions to be taken and enables faster resolution of potential failures leaks or encroachment scenarios.

Getting the right work done

Getting the right work done consists of making more-intuitive correlations in data (which the geospatial visualization

tools enable) and secondly, having the ability to take actions with the toolset (e.g., work order). Temporal and geospatial visualization applications enable users to create and submit work orders directly within the visualization application, so operations managers can ensure the right work is under order. This approach also contributes to the predictive monitoring of asset health and personnel safety.

Monitoring personnel safety and pipeline events

Using aerial reconnaissance video footage, operation managers have real-time monitoring of pipelines and associated control stations. They can view pipeline flyovers and determine possible encroachment to the right of way. Pop-up alerts identify areas of concern where sensor readings have exceeded a specified threshold, drawing the operational manager's attention to begin a corrective course of action. Multiple levels of detail

allow the manager to obtain drill-down information of individual alerts, specifically current readings, historical data and thresholds.

An intelligent pipeline helps accelerate the path from data to decision making:

- Collects and integrates data.
- Analyzes and anticipates.
- Decides and optimizes.
- Acts and continually adapts.



Transition to an intelligent pipeline

For many gas companies, the "as-is" operating environment typically has data in silos throughout the organization. For example, commercial (customer) data is not integrated with operational data, such as schedule management. Instead, disparate sets of data exist; there is no "single screen view" of data. Additionally, the general management of data is dominated by niche applications with point-to-point connections—resulting in restricted opportunities for data insight.

For high-performance businesses in the gas industry, the transition to an intelligent pipeline means achieving a "to-be" environment that:

- Includes a single visualization layer.
- Is accessible across the enterprise.
- Provides direct insight into value levers.

Did you know?

Accenture Technology Labs, the dedicated technology research and development (R&D) organization within Accenture, has been turning technology innovation into business results for more than 20 years. The Labs, located in Chicago, Illinois; San Jose, California; Sophia Antipolis, France; and Bangalore, India, create the Accenture Technology Vision, a view of how technology will shape the future, and invent the next wave of



Potential benefits of an intelligent pipeline

An intelligent pipeline can provide many benefits:

Improve asset reliability

Across the energy industry, we are seeing the advancement of “smart” infrastructure concepts. But simply having the ability to collect raw data is not the end goal. Accenture’s intelligent pipeline solution helps integrate operational data, resulting in decreased unplanned asset maintenance and improved system planning and predictive monitoring.

Decrease costs

Improved data management can reduce the costs associated with equipment maintenance, field labor and “lost and unaccounted for” (LUAF) volumes. Accenture’s intelligent pipeline solution and its integrated resource management tools enable the optimization of resource allocation in the field including people, materials and equipment.

Increase customer satisfaction and revenue

On the commercial side of a gas business, our intelligent pipeline solution provides better visibility into real-time performance and problem resolution. For example, integrated customer data enhances the ability to offer no-notice services through better line pack visibility and management. Near-real-time information enables operators to respond faster to outages and break-ins.

Support regulatory and EH&S mandates

By developing enhanced situational awareness using an intelligent pipeline, gas companies can facilitate faster decision making and improved executive oversight. Safety and operations managers will have end-to-end visibility of the location of people, asset conditions and risk predictions. Having the ability for near-real-time monitoring of assets is a key component of a carbon reduction agenda.

Support workforce transition

Talent is the most critical part of any operation, particularly field operations. But when workers depart (taking critical knowledge with them) or it is difficult to find the right people with the right amount of knowledge, our intelligent pipeline solution can help cover those gaps. Tacit knowledge is already embedded in systems; our solution helps simplify the data for more empirical decision making. Expert systems capture institutional rules and practices, and enable a consistent view of all specifications and original equipment manufacturer (OEM) specifications.

An intelligent pipeline solution can help your company make an impact on critical industry issues:

Current state: typical gas pipeline company

Benefits of an intelligent pipeline

Need for improved personnel safety and asset integrity/security

Enhanced visibility into resources and asset safety through real-time monitoring

Changing parameters of environmental stewardship

Faster response and more-accurate analysis of environmental data

Ongoing cost containment

Optimization of maintenance and resource management capability

Customer satisfaction uneven across markets

Faster response to changing demand conditions and enhanced load forecasting

Minimizing cost escalation of operations and administration to protect shareholder value

Full visibility into integrated operations to enable a culture of continuous improvement

Data quality suffers from lack of integration

High degree of data integration with full view via visualization layer

Uneven knowledge transfer from experienced workers to newer recruits

Capture and deployment of legacy knowledge into a centralized, usable format

Why Accenture

Accenture offers a combination of experienced people, proven assets and well-designed processes to support our pipeline clients.

Our global gas practice delivers projects that span from business strategy (merger integration and growth strategy) and business process reengineering to system design and implementation. Accenture has maintained a global gas and liquids pipeline and liquefied natural gas (LNG) group for more than 10 years. We also provide our clients with gas/midstream assets that include a comprehensive industry operating model that helps speed the delivery of projects. The model includes domestic gas (midstream and pipeline) and LNG (liquefaction to regasification).

Through an online repository, our client project teams have access to our Accenture Business Process Management models. We also use the Accenture Delivery Model, which includes tools and methodologies to efficiently manage and deliver projects of various scales and types.

Did you know?

Accenture delivers its services and solutions through 19 focused industry groups in five operating groups. This industry focus provides Accenture's professionals with a thorough understanding of industry evolution, business issues and applicable technologies, enabling Accenture to deliver solutions tailored to each client's industry.

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Contact us

We help companies become high-performance businesses by drawing on our deep industry experience and the findings from our High Performance Business research. To learn more about how Accenture can help your company on its journey to high performance, visit us at www.accenture.com or call us at +1 312 737 7909 or toll-free in the United States and Canada at +1 888 688 7909.

About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with approximately 211,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US\$21.6 billion for the fiscal year ended Aug. 31, 2010. Its home page is www.accenture.com.