5 Essentials to Effective Integrity Management

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WHAT IS INTEGRITY MANAGEMENT?

Integrity management is a process for assessing and mitigating risk to pipelines and to the areas surrounding a pipeline in the event of an incident or accident. Integrity Management is the ultimate goal for pipeline companies in terms of both safety and responsibility. Pipeline companies are also driven by compliance with the US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), which helps ensure that companies keep data organized and accessible, protect and safely operate pipelines, and ultimately reduce risk.

Industry Challenges

The oil & gas industry faces the challenge of both confronting aging infrastructure and managing new infrastructure. The average lifespan of a pre 1970s pipeline is only 50 years. However, the majority of the US Transmission Pipelines were built prior to 1970 (a.k.a. "grandfathered" pipe) and according to US Department of Transportation data, approximately 3% of our gas distribution mains are made of cast or wrought iron and were built in the first half of the 20th century. Over 12% of the nation's cross-country gas transmission and hazardous liquid pipelines were built prior to the 1950s. Each of these pipelines has its own unique age characteristics, and material/composition. The challenge facing the oil & gas industry to repair and replace this aging infrastructure seems overwhelming. In addition, the ever-changing environment above ground (and often right above pipelines) makes the challenge of prioritizing work even more difficult. In an effort to address these challenges, PHMSA provides regulatory guidelines to the pipeline operators, by specifying how they must identify, prioritize, assess, evaluate, repair and validate the integrity of hazardous pipelines. Information about the pipeline infrastructure becomes critical in prioritizing and taking the required preventative and mitigative actions as required by PHMSA.

Ill-managed pipeline integrity can be the result of improper information management, which often leads to siloed data. A lot of necessary information exists somewhere in the company—it is just disorganized, scattered throughout the organization or inaccessible. It is often very difficult to share the most accurate and up-to-date information across relevant departments. For example, Engineering, Construction, Integrity Management, and Field Operations may require a specific characteristics of a pipeline and may not have access to the information immediately for maintaining the integrity of the pipeline. This fact is compounded by the dynamic nature of the changing pipeline information such as pipeline relocation, abandonment and new pipeline installations. As such, accessibility and availability of the accurate and up-to-date information about pipeline infrastructure becomes key for meeting the PHMSA regulations.

5 Essential Steps to Address these Challenges

This document outlines five essential steps to take in order to effectively begin (and optimize!) an integrity management program with your organization:

1. Assess your current situation.
2. Create and implement standards that work.
3. Harness the power of the data you already have.
4. Make your data and analytics easy to access and measure.
5. Don't tackle today's challenges with yesterday's technology.

1. ASSESS YOUR CURRENT SITUATION.

Integrity Management begins with taking a look at the current state of your pipeline infrastructure and its related geographic environment. That means assessing your current situation with the same type of scrutiny that may come with an audit. First, look at your current data and figure out where you are most and least prepared to effectively meet PHMSA and other regulatory expectations. Is that data is available, accurate and complete? Consider your current GIS, which plays a critical role in many areas of your company—whether it is engineering, operations, construction and design. Is Integrity Management, in fact, considered in your current GIS system? This is a key question to ask yourself in a self assessment. This step, "Assess your Current Situation" is an honest look at how things work now in your organization.

There are three parts to this step:

1.Needs Analysis

What data do you have and where are you lacking data?

2.System Design Check

What systems are in place now? There will already be sys tems in GIS, construction and design. You will most likely find very good, highly applicable data in several areas of the company.

3.Systems Integration Check

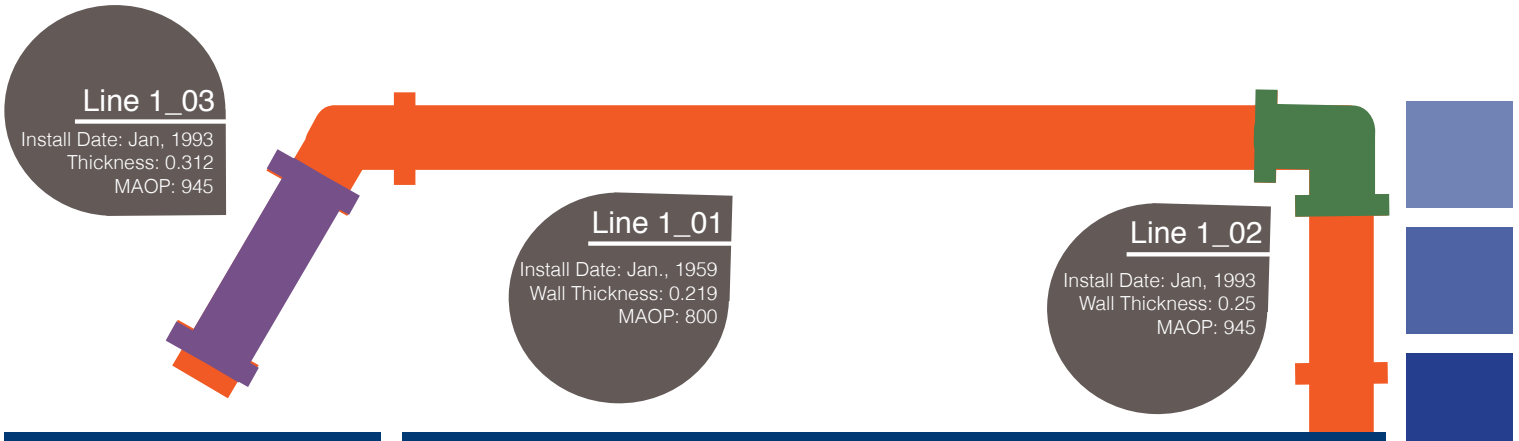
How well do the current systems work together? By taking a deeper look at the current situation you will be able to evaluate the wealth of available data across departments and how well (or poorly) it is integrated. His will provide a clear picture of data discrepancies and data duplication.

2. CREATE AND IMPLEMENT STANDARDS THAT WORK.

At some point, you will be audited by PHMSA. Pipeline operators must embrace this fact. When that happens, a key interest of the audit will be to see how/if the organization is showing continuous improvement in the processes and technology that are being put into place related to integrity management. GIS is designed to present all types of geographical data, but the standards that exist in many GIS may not be enough to fully serve Integrity Management needs and satisfy PHMSA requirements. Some of the best practices and standards that will help the organization to fulfill the regulatory needs include:

- Leverage a collaborative data environment
- Implement a standard way to continually harness that data for integrity management
- Adopt/define standards and processes to be efficient and effective ongoing (i.e. PODS, PPDM, GDM, etc.)
- Promote effective business processes through clarification of data ownership

You want to be able to leverage as much existing data and as many existing processes as you can. There's no need to reinvent the wheel, but moving forward it's important to establish standards in order to create sustainability in the long term. This doesn't just mean the data fields but the process and definitions an organization adopts. For example, consider what processes must be adopted to ensure that a GIS shows the latest changes to a pipeline, such as in the example below.



real world CASE STUDY

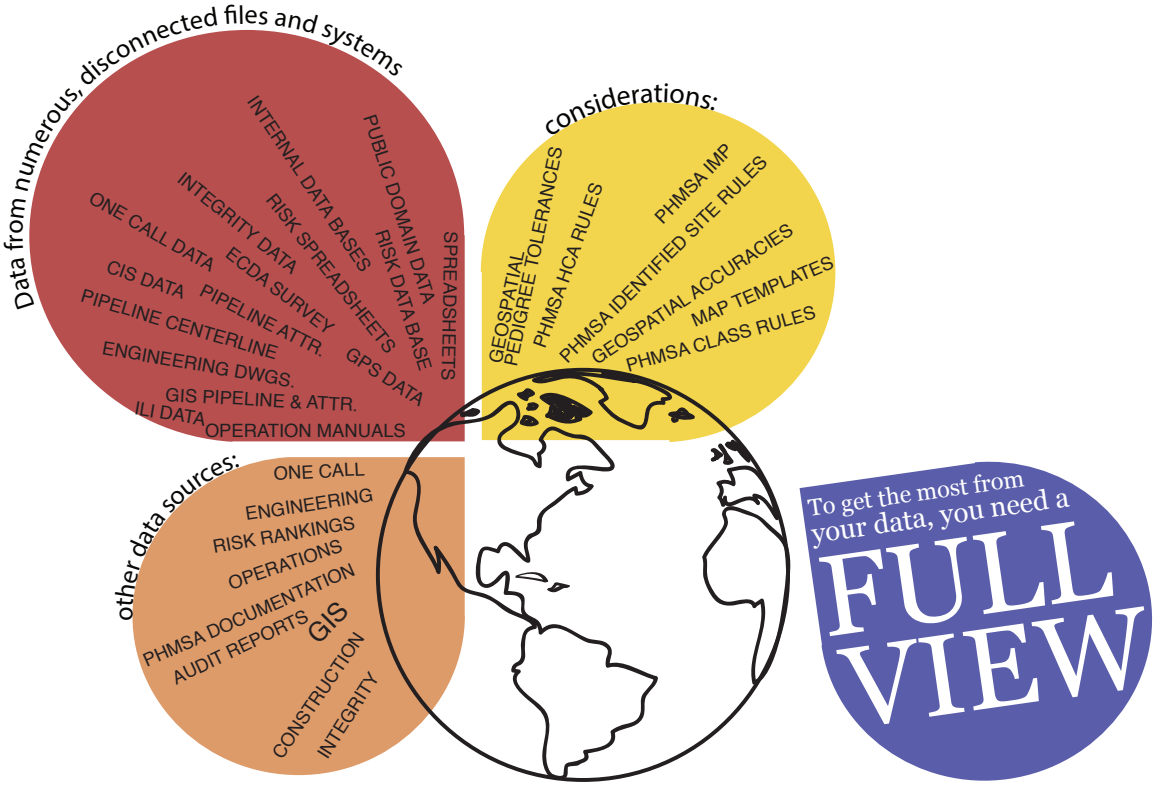
Pipelines get relocated, replaced and re-routed for various safety and operational reasons. As such, the physical characteristics and geographical location of pipelines are subjected to change and do not exist in a static environment. What was considered one pipeline in the past may have been spilt into multiple lines because of series of replacements done on the pipe to ensure its safe operation and to address anomalies, such as leaks, cracks or corrosion.

The figure above illustrates this fact. It shows three sub-sections of a continuous pipeline with different operating pressures and wall thicknesses. It is critical that an operator captures, documents, stores and retrieves these historic pipe characteristic changes in order to implement an effective integrity management program.

3. HARNESS THE POWER OF THE DATA YOU ALREADY HAVE.

Operators must consider all data and associated documentation that can be leveraged from both internal and external sources for effective Integrity Management. These data sets shall include (but are not limited to): As-built engineering drawings, ILI run results, leak reports, bell hole reports, GPS Surveys, ECDA/ICDA Survey, Field excavation documents, land parcel information, right-of way information, soil property information, etc. Most often the data gets siloed within its respective department and becomes invisible and inaccessible across departments in a timely manner. Data inaccessibility combined with lack of visibility leads to duplication of efforts in recreation of data.

Pipeline companies include many groups collecting data every day, from internal staff members to external contractual vendors in engineering, surveying, maintenance, repair crews, GIS, etc. Assembling all this information into one centralized location that the entire organization can access will result in a collaborative environment with data that can be accessed in a timely manner. This will allow the operator to further evaluate and address any questions related to missing gaps in the data; What is missing? Why it is missing? Can this be supplemented with an additional data sources or processes? Leveraging internal and external data sets is the first step towards fully understanding the organization's data needs and communicating it across multiple departments.

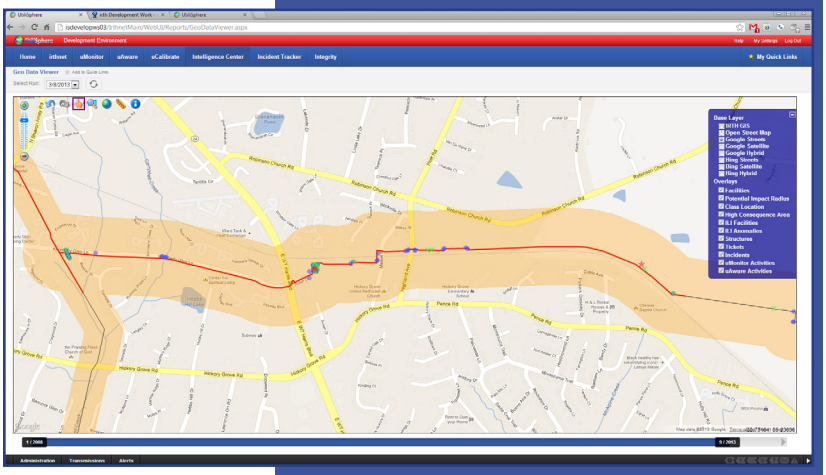


4. MAKE YOUR DATA & ANALYTICS EASY TO ACCESS & MEASURE

As mentioned, data silos are a key problem in the industry. Critical data exists, but it is scattered throughout the organization and is not integrated in one central repository. These documents and data exist in various data formats and cover varying time periods. Storing all of this information in its native format consumes extensive storage and becomes time consuming to access. A collaborative environment with a central data repository will help to dissolve departmental silos of information by integrating and storing all the information digitally in a system where it is easy to access. This will provide an organized way to store and retrieve information including, but not limited to, engineering drawings, CAD/GIS data, permit documents, ILI run data, procurement documents, paper scans, pdfs, raster images (.tiffs, .jpegs, etc.) and other integrity-related documents. This could be viewed as a content management system (CMS) integrated with geospatial information. Creating such a collaborative environment to harness all pipe-relevant internal and external data can be time consuming and laborious task, but it is an important investment to achieve a well-organized and complete integrity management program.

> "The most common cause of pipeline failure is third-party excavations on transmission pipelines."

In step three, you gathered all important data and found what gaps were present in your knowledge of pipeline systems. Number four is about organizing it. Regardless of what data standard you adopt, data must be easily accessible. Preparing for audits will keep you one step ahead, not only to be constantly and consistently aware of expectations, not only to meet them, but to exceed them. One way to easily recognize areas in need of improvement is to simply perform mock audits—use the same scrutiny you would expect if you were the subject of a real audit! The most common cause of pipeline failure is third-party excavations on transmission pipelines. Having easily accessible and easy-to-analyze information for third-party excavators can lower risk of damaging the pipeline. This means centralizing and correlating all pipeline risk variables. In doing this, you are able to: visualize a complete picture of both internal and external risks to the pipeline for better resource and budget allocation decisions; measure the integrity management process and iterate on improvements for efficiency gains; empower the field workforce through increased communication; and find answers quickly and accurately for audit compliance.



EXAMPLE: Pipeline operators very often receive questions about dig tickets, incidents or accidents and several other outlier cases within the pipeline. They are simultaneously challenged with standardizing, centralizing and correlating data. Figure 4-1 is a map that features both Damage Prevention data overlayed with Integrity Management data. The picture provides a more detailed image—standardized, repeatable, verifiable—that many people in the organization can utilize. For example, while the public awareness person will know where to focus programs, the VP of Operations will be able to clearly see where resources need to be allocated for pipe segments. And they will be working off of the same data, creating consistency.

5. DON'T TACKLE TODAY'S CHALLENGES WITH YESTERDAY'S TECHNOLOGY.

It's important to understand and embrace the fact that technology is always advancing. There are multiple ways to leverage technological advancements for integrity management. For example, new capabilities with GIS and analytics provide greater technologies than previous systems.

There are three technology areas that are making significant impact on the energy and utility industries: Business intelligence & analytics, GIS and mobile. Adopting these technologies (and others like them) can lead not only to cost reduction with gained efficiencies, but also to centralized electronic data that empowers both management and the field, ultimately helping to improve safety and protection of pipelines.

Discover how other industries are using new technologies. What changes can be made to current integrity management work procedures that take advantage of new technology?

Many pipeline companies have approached the adoption of new technologies. Here are a few tips based on their experiences:

1. **Look at other industries.** How are they leveraging new technologies? Consider how that might be applied to your organization.

2. **Be open to adjusting integrity management work processes and procedures to fit the new technology.** An up-front cost that initially seems high may yield both hard and soft return-on-investment because it streamlines processes and helps further protection and safety of pipelines.

3. **Gain experience so you can take advantage.** The industry is going through a reconciliation of what and how to leverage new technologies. Take the time to understand them as they emerge and to identify where that may be able to provide value to your organization.

OVERVIEW

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About UtiliSphere

UtiliSphere™ is an asset management solution for the energy and utility industries that helps ensure delivery system protection, safety, and compliance. As an integrated cloud-based solution, UtiliSphere automates operational processes and manages data associated with delivery system protection to improve efficiencies and provide deeper insight into activity related to product delivery systems (pipelines, grids and cables).

About irth Solutions

irth Solutions®, Technologies For Earth™ , provides leading cloud-based asset management solutions to gas, oil, electric, telecommunications and other utility companies, and to One Call Centers across the country to increase operational efficiency, improve workforce productivity, comply with regulatory requirements, and ensure safety. For nearly two decades, irth Solutions has been meeting the unique needs of the energy & utility industries with unmatched service and groundbreaking solutions for delivery system protection, safety and compliance. Investors include Columbus-based Crane Group and Main Street Capital, located in Houston.