

Separating Pipeline Integrity Management's Wheat from Its Chaff

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Natural gas and hazardous liquids pipeline operators have been accumulating mass volumes of data for several years. But what to do with all this data? This is a question many natural gas pipeline operators are asking in advance of the highly anticipated Pipeline and Hazardous Materials Safety Administration's (PHMSA) proposed gas and gathering pipeline mega-rule. For hazardous liquids pipeline operator pending rules are also driving the need for more robust data. Placing a greater emphasis on data and risk is where our industry is moving, so an effective process to manage this data is becoming an industry necessity.

BACKGROUND

Expected in phases—beginning later this year—the “Safety of Gas Transmission and Gathering Pipelines” PHMSA-1011-0023 ruling has been an 8-year odyssey, with an anticipated end result of sweeping revisions to the existing 49 CFR Part 192 regulations nearly twice the length of the original regulations. Within these regulations will be items relating to natural gas pipeline integrity management, pipeline assessments, and more. A less robust, but also pending rule, is expected for hazardous liquids pipeline operators. A common denominator in much of these regulations will be the application of actual data for a myriad of purposes including more effective risk modeling. As operators incorporate the newly required data into their systems they can benefit from better decision making across the board. Data integration will drive more informed risk analysis, which can ultimately lead to safer and more efficient systems.

For decades, industries have been using data to drive business decisions. Oil companies rely on data to determine exploration efficiencies and calculate how effectively they can produce a barrel of oil. The Centers for Disease Control look at spikes in on-line searches to predict regional outbreaks for things like the flu. Retailers analyze zip codes to determine future brick-and-mortar locations. Leveraging data can be just as effective for pipeline operators—once the data has been 1) identified, 2) prioritized, and 3) analyzed.

MILES AND MILES OF DATA

We work in an industry that measures assets in miles. For operators who have grown through mergers and acquisitions it can seem as though they have miles and miles of data as well. Many operators find themselves the beneficiaries of inherited data, created in varying degrees of complexity, and cobbled together in multiple data management systems. Most of the data lacks cohesiveness, which can hinder

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an operator from leveraging the data. Lack of a strategic plan to prioritize and apply the relevant data can be more of a hindrance. While we await pending rules, there are things operators can do now to shore up their data. Operators must start with an overarching data system and a data management plan.

CREATING A STRATEGIC DATA MANAGEMENT PLAN

This is an ideal time to take a strategic approach to managing your data. While risk assessment is one important application for data management, it's not the only one. There are a multitude of ways data can be leveraged strategically to drive several aspects of an operator's business. A data management plan becomes more relevant and powerful when all voices (senior leadership, operations, finance, integrity management, IT, etc.) give input with regard to the process of capturing and integrating the data. When all key business functions participate in the planning process, the more likely it is that these functions will assume ownership of the results. Bringing many voices to the planning process also assures that the data is aligned with the operator's strategic goals, thus becoming a value-add for the entire organization. Participants in the data management planning process should be made aware of the goals and strategy of the plan and be given responsibility for their relevant portion of the data. Once the data has been collected and shared, these stakeholders can be helpful in evaluating the data as it relates to their function and how it can drive their long-term goals.

To further enhance the strategic value of the data management plan, consideration should also be given to the overriding business drivers. One operator may identify security as their key driver, while another may be more interested in improving operational efficiencies. Most all operators place safety as a primary driver. Establishing key drivers and alignment with business strategies is the proverbial data management stake in the ground, it is the fulcrum around which all data management decisions are based.

THIRD-PARTY PERSPECTIVE

With the pressures to maintain a safe and profitable pipeline system, today's operators may be short of internal resources to develop the strategic data management plan and perform the data sourcing and identification tasks described in Table 1. Consulting firms, like EN Engineering, can provide a third-party perspective in bringing stakeholders together, identifying the gaps in data, evaluating data, and prioritizing needs.

A key aspect of our data management service is helping the operator prioritize all their data. There is a cost associated with acquisition, integration, storage, and maintenance of data. The sheer amount of data possessed by an operator can be overwhelming, even paralyzing. But pending regulations are forcing operators to more closely examine their data. An outside firm can reconcile the operator's business drivers with available data to prioritize what is worth converting, acquiring, and keeping. At EN Engineering, we use a ranking system to derive our data priorities. With an outside perspective, many operator's can take leave of their less-important data and focus on the data that most supports their strategic vision.

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DATA SOURCING AND IDENTIFICATION

Integral to the data management plan is a robust review of the operator's existing data as well as identification of correct and missing data. During the process of identifying and collecting necessary data, there should also be consideration given with regard to pending rules and any data that may be needed to support activities associated with any new requirements. Table 1 illustrates a process we use in sourcing and identifying an operator's data.

- 1. Determine what data you need, include format.** This should include setting a standard protocol for formatting and frequency. Spreadsheets, so common in the 1990s, are no longer an efficient way to manage data. There are more advanced data management systems available that can interface with an operator's enterprise-wide asset management system. Consider any externally curated data with national and localized datasets.
- 2. Determine what data you have.** This may require converting or digitizing the existing, legacy data into a common format. Create an expiration date for data to help streamline information and ensure its relevancy. Consider the reliability and accuracy of the existing data.
- 3. Bridge the gap between internal and external data** and assess where data is incomplete. Also analyze the gaps between your current processes and procedures.
- 4. Make the business case for data.** Evaluate the cost to acquire, integrate, and maintain current and acquired data.

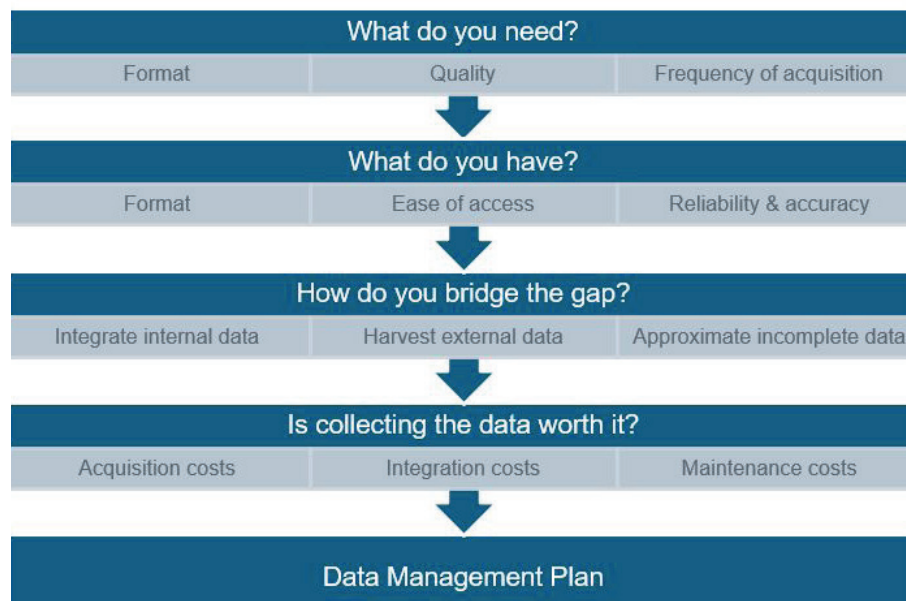


Table 1: Data Source Identification & Evaluation Process

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INTEGRITY MANAGEMENT AND RISK ANALYSIS

Once the data has been collected, it can be applied in a number of ways including support of the overall integrity management program and performing risk analysis—all using actual data. Historically, companies relied upon subject matter expert knowledge, which was opinion-based—albeit an informed opinion. With regard to risk models, in the past these were relative to each other, instead of relying on the actual data. An effective data management program gives operators actual data to apply in various applications. Now, the analysis is a trigger point for business decisions. Using actual data provides a more objective understanding of what's going on within an operator's organization. This objectivity can be helpful in identifying future actions. The resulting analysis becomes more powerful because it no longer relies on models to predict future behavior.

Operators are advised to consider data management (DM) firms with an integrity management (IM) expertise in the natural gas and hazardous liquids pipeline segment. A combination of both backgrounds (DM and IM) can assure a keen understanding of the various opportunities as well as safety concerns inherent in our industry.

Ideally, the data collected gives a window into all the details that support the pipeline and a history of each asset. This is critical, as our industry migrates toward risk-based program development. Using data, the consultant and the operator can consider a number of factors with regard to integrity management and risk analysis. For example, now the operator can view all assets—across the board—or track third-party interfaces. The analysis can draw upon in-line inspection (ILI) data, corrosion data, and contractor history, for example. Once all of this is in place then it relates to each other. Operators can identify the location of high-risk welds or fittings in need of replacement. The likelihood of an asset impacted by an external force, like landslides, can be determined. Data can also identify areas requiring encroachment programs, for example, where contractor excavations have occurred or where structures have been placed or built above the pipeline. And construction data can be called upon to identify precisely where a welding company—or even individual welder—serviced a section of pipe.

We work with operators to design dashboards to assess factor impacts and drill down to those factors with the greatest impact.

Reports can easily be run to determine federal, local, and internal compliance. Trends can be spotted to alert the operator of changes in the system and the rate of change. Cost optimization is another key

RISK ANALYSIS APPLICATIONS

-Dashboard

- Factor impact assessment
- Drill down to factor of greatest impact

-Compliance Reporting

- Federal
- Local
- Internal

-Trend Identification

- Rate of change

-Cost Optimization

- Risk-driven activity prioritization
- Optimize life-cycle cost analysis
- Balancing risk vs. cost

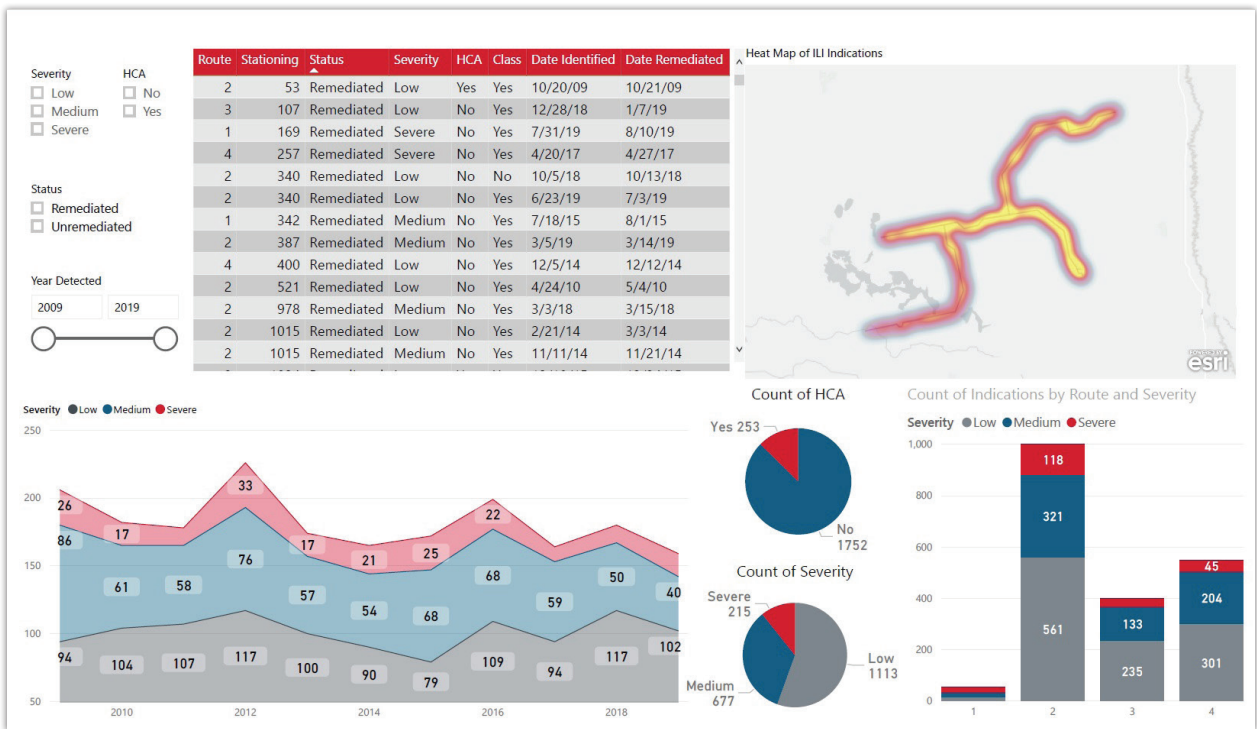
-Probabilistic Transition

- Data collecting
- Archiving
- Measurable data

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benefit of a robust data management system. Operators can prioritize risk-driven activity, optimize life-cycle cost analysis, and balance risk versus cost.

With an experienced third-party consultant on board, today's savvy natural gas and hazardous liquids pipeline operators can develop a powerful strategic data management plan. This outside expertise can streamline miles and miles of data into miles and miles of opportunities to inform your business, your operations, risk management, and ultimately the safety and efficiency of your pipeline.



Example of a dashboard. Graphic courtesy of EN Engineering.

ABOUT THE AUTHOR:

Ellie Souder Lynch is Manager-GIS & Data Analytics at EN Engineering. She has a Master's of Data Science degree with a specialization in Artificial Intelligence and considerable experience in the Oil & Gas and Utility industry. She studied Civil Engineering at Illinois Institute of Technology and has led projects relating to retrofitting existing infrastructure to use energy more efficiently; mapping and analyzing existing utility networks for smart grid design; and large main replacement projects. Ms. Lynch established the GIS & Data Analytics team at EN Engineering where she helps organizations develop sustainable data system strategies to extract long-term value from their data systems.