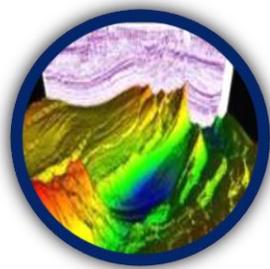




17th Petroleum Network Education Conferences

Making Data Governance Work At All Levels of the Organization



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1. Executive Summary

Data Management has quickly become a business imperative that is necessary to meet the continued demand of maintaining high quality data across the enterprise. While many organizations focus on enterprise data management capabilities they struggle with the balance of data management that is valuable and relevant to all levels of the organization. Enterprise solutions typically start as a wider data management capability while neglecting localized business data management problems. What compounds the issue is that each part of the organization has a different perspective on the value and usage of the data. This is especially true in the E&P industry regarding Well data. Even though Well Data is used by multiple departments, each one has a different perspective of the data, business rules, and processes. Providing the Field Engineer with high quality decision data is just as important as providing the back office Finance Accountant with good data. This paper will discuss the challenges of architecting a Well Data Master solution that can serve the enterprise, bring value to localize business functions while improving data quality and managing complexity.

In the book, *The Tipping Point*, Malcolm Gladwell said, "There is a simple way to package information that, under the right circumstances, can make it irresistible. All you have to do is find it". Gladwell highlighted several scenarios that gained momentum through a series of events until they reached epidemic proportion. This level of momentum means people were drawn to the cause or product and made it their own cause or rushed out to buy the product. Data Management in an organization needs to reach this same epidemic drive. Creating an organization in which everyone feels compelled to deliver high quality data across the entire value chain.

People do not think of Data Governance as something irresistible. In fact, they probably think the complete opposite. Many feel Data Governance creates roadblocks, slows down the process, adds overhead, or makes an individual's job difficult. To make Data Governance irresistible, it has to be simple to use, enhance a person's day to day job, and deliver value. The smartphone is a very complex piece of technology (hardware and software), with millions of development hours going into engineering the product. The result is a solution that is simple to use, enhances a person's day to day life, and delivers value. In the real world, data management evolves overtime as business expands and changes. Most data management projects don't have the luxury to start from a clean slate, or engineer everything from the ground up to be simple and deliver value. For example, most data management solutions have been pieced together overtime to minimize disruption to the business, while creating small victories of improvement until they reach the tipping point of desired data management.

In support of Devon Energy's quest for higher quality data, the concepts of this paper are applied as a case study making data governance work at all levels of the organization.

2. The Challenges

Most data management projects encompass several work streams at the same time to achieve the overall business objectives. These work streams typically include things like standardization, data quality processing, governance, and reference data management. For the purpose of this paper assume anyone pursuing a data management initiative is using a competent methodology as the basic framework of a data management program. When a framework is applied separately at different levels of the organization (i.e. Enterprise, Line of Business, Division, Field Office, etc.) that framework can be effective. However, when you attempt to apply the framework to multiple levels at the same time you encounter a set of challenges that have a tendency to derail large data management projects in terms of value, time & effort, and ability to quickly gain traction across the organization.

Within the E&P space Well Data is by far the most important data domains to share across the organization. In recent years there have been a growing number vendors providing technology solutions to enable better data management for Well data. However, the products alone do not solve the complexity of managing the data at all levels of the organization. It's not uncommon that for new capabilities to get introduced in an organization, business leaders must see the academic and business case in action to gain adoption. A key to the initial success is to gain traction, not try to boil the ocean and not to incorporate everyone's desires on initial deployment. Take the first generation Apple iPod® and ask why didn't Apple incorporate music art, color screen, photos, and video's, etc. when it was first released? They did not have any traction in the market on the product, they needed something that filled the basic requirements that they could build upon and to learn from the consumers. Consumers could help drive new features by what was most important. Finding where to get traction and where you can gain momentum quickly can be important to achieve quick wins, and early successes.

Starting at the enterprise level can have its share of challenges to overcome, but usually seems to be the logical starting point. In many cases the data that needs the most governance is data used across the enterprise. Taking into account company culture, ability to adopt and embrace change, and how intrusive you want to be on the organization could drive your decision to start at different levels of the organization. Typical challenges facing the Enterprise level:

- **Narrow Focus** – This could be a good thing, but depending on the consumers of the data could also be a problem. Enterprise MDM solutions typically, and rightfully so, want to master only data that is widely used and common across the landscape. If you look at the list of consumers, this probably satisfies a subset of business processes while leaving other processes with a partial set of data. Overall has an impact on the business value of the solution. Defining scope requires carefully considered tradeoffs.
- **Compromise** - Compromise is always a factor of large cross-organizational projects. Compromise in this sense is more trying to figure out what you can deliver within

the budget you have, while meeting a wide range of business needs. Reaching consensus and managing compromise in a large MDM solution that is being designed to support a global organization can be very time consuming and complex.

- **Understanding Business Needs** – IT driven projects can produce a great deal of insight into how data flows throughout the information environment, as well as data quality issues. However, many IT professionals lack understanding of how the data is being used to support day-to-day business decisions. This knowledge is essential in designing and building an effective data management solution. To address this, many project teams are comprised of IT and Business professionals.

The converse to an Enterprise (top down) approach is to start at a Division or Line of Business (LOB) level. In this case, scope can be controlled more easily, more direct business sponsorship, and more specific business objectives. For the benefit of the organization, once you establish a working data management solution is established, it is expected that the model will be applied in other areas of the company. The objective is to make data management work at all levels, not just isolated wins. Typical challenges facing projects at this level are:

- **Inability to influence others** – While success is achieved in one Division, there still might be hesitation by other Divisions to adopt the same model, especially if they were not aware or involved in its development. Hesitation might be attributed to requirements not being incorporated in the initial approach, or having a desire to build a solution specific to their needs.
- **Not seeing the big picture** – The Division solution is built so specifically to one Division's set of requirements that it may not be flexible enough to adapt to a larger set of business requirements. Another scenario is that the technology is not scalable to meet a large set of business processing and data needs, or it is not politically acceptable.
- **Maintaining Momentum** – Sponsors at a Divisional level may not have the means to fund a data management program beyond the boundaries of their own business requirements. Seeking funding or sponsorship to carry the program forward could slow momentum or even halt the progress all together.

Having a roadmap that outlines both the initial deployment and an approach to deploy across the enterprise is essential. Understanding the challenges as you begin the data management journey will help shape a capability that supports both the Division needs, as well as the Enterprise.

3. Well Data Challenges

Every part of the organization has different data needs for the same data domain (Wells, Business Associate, Equipment, Facility, etc.). While it is easy to identify the thread of common data used across the organization, the challenge is addressing the specific needs of the LOB or Division. Most Oil & Gas companies typically have challenges managing their Well data quality across all areas of the organization.

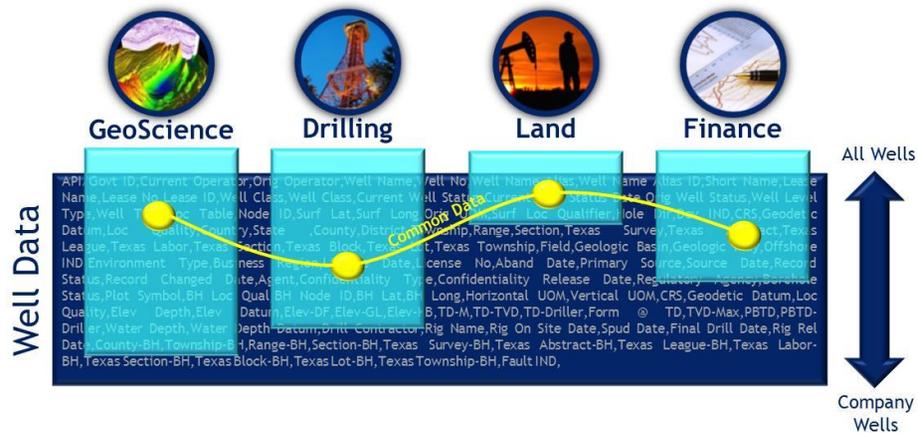


Figure 1: Well Data Coverage

Well data means something different to every part of the organization. In fact, just the term “Well” can mean something different depending on who you ask (i.e. surface location, wellbore, well completion). While parts of some organizations have adopted PPDM’s “What is a Well” definition, it often has not been embraced across the entire organization. This is compounded by different Oil & Gas applications that have their product following an even different definition of a Well. Gaining consensus on what a Well is and its components can be a daunting task. Within each Well component there are a number of data attributes that have to be defined and decided on based upon lifecycle and consumer needs.

Another factor is determining the scope of Well records that are important across the organization, as well as each business function. The scope of Well records could include just company Wells (operated wells, OBO, etc.), but also could extend out to be all wells that ever existed. The compromise is to manage the set of data that is important to a subset of high valued processes. Each option has compromises, challenges, and costs to consider.

Separating out the data management solution by Division, or Line of Business can help reduce the complexity and compromise required to derive at an enterprise solution. The solution can be architected to the specific data management needs, and data governance can be more aligned with the business objectives.

4. Enterprise and Divisional Data Management Architecture

A well designed Data Management architecture can be an enabler to support data quality and governance for sustainable results. Building on this premise, establishing an architecture that is scalable, and flexible enough to meet both the Enterprise requirements and the Division requirements is essential to bring value and results at all levels of the organization. The architecture model depicted in Figure 2 establishes a data management capability at both the Enterprise and the Divisional level. By separating the two data management functions you have the capability to manage a wider range of requirements without the compromise.

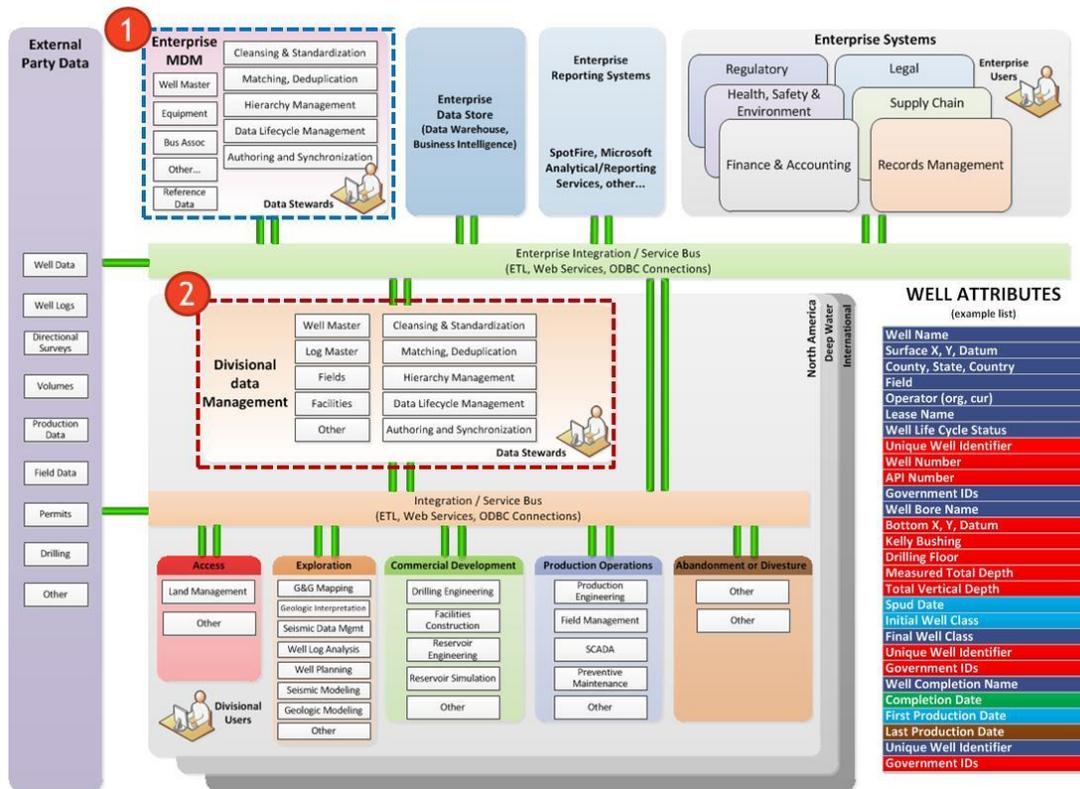


Figure 2: Conceptual Architecture

The Enterprise Master Data Management (MDM) is identified in Figure 2 with the red number one circle. The MDM provides the set of data management services and stewardship to manage the data quality across the set of Enterprise applications. For Well data the MDM stores a small set of attributes, and the subset of Well records specific to the company such as operated wells, or company interest wells. The Enterprise MDM can be architected to best meet the Enterprise set of applications without compromising the specific needs of the Division applications.

The Divisional Data Management solution is identified in Figure 2 with the red number 2 circle. The Divisional Data Management solution provides the data management services, governance and stewardship for the set of applications and business processes specific to an LOB, Department, or the Division. For Well data, the Divisional Data Management stores a larger set of attributes and Well records needed for such areas as the Geoscience or Operations Engineering.

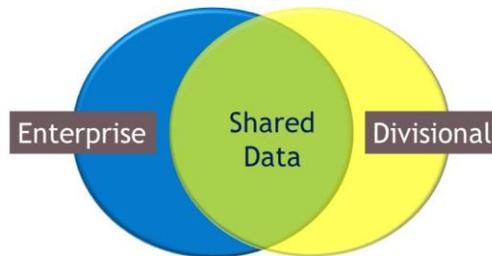


Figure 3: Data Overlap

Managing architecture with both Enterprise MDM and Divisional Data management is not without it shares of complexity. Most notably is the fact that a subset of data is stored in both solutions as illustrated in Figure 3. To manage this complexity, one system plays the trusted sources for the common data while the other is a consumer of the data. Data Governance and Stewardship is applied at the appropriate levels depending on which one is playing the trusted sources. Other less complex issues involve keeping the shared data synchronized through various integration utilities and techniques.

A data management solution architected using this approach provides greater flexibility, improved scalability, quicker deployment, and less compromise on business requirements. Governance and data stewardship can be better managed within each data management component putting data stewards closer to the business users.

5. Data Governance Framework

Establishing Data Governance can be one of the more challenging aspects of a Data Management program. The challenges can revolve around developing a governance model that is close enough to the data issues to provide good stewardship, but broad enough to service the full lifecycle of the data across the enterprise. For Well data that means having a governance model that can provide stewardship from Well planning, through drilling, completing, producing, and disposing. This ensures that the shared data and business rules are managed consistently throughout the life of the Well.

A Data Governance Framework consists of three major components; People, Processes, and Technology. Within each of these areas the Data Governances need to determine at what level of the organization policies and procedures are defined, managed, and delivered. In a decentralized approach the framework can be applied at each level of the organization (Business Function, Division, or Enterprise) as shown in Figure 4.

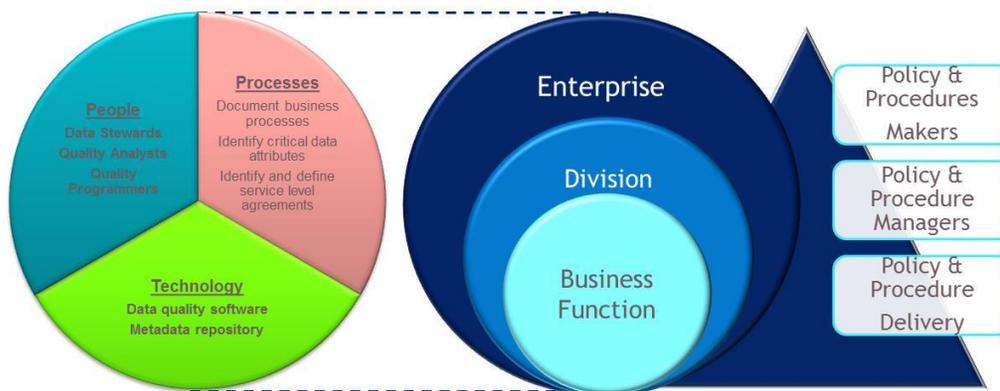


Figure 4: Governance Approach

Taking a more centralized approach puts more control of the policy and procedure makers at the Enterprise level, with management and delivery stewardship at the Division levels. To implement this strategy it is best to start at the Division level to gain traction and grow the capability to the Enterprise level as the overall data management solution grows. By approaching the data governance in this manner companies are able to get a working model in place with a much smaller scope allowing the solution to mature overtime.

6. Devon Energy Well Master

Devon Energy Corporation is a leading independent oil and natural gas exploration and production company. Devon's operations are focused onshore in the United States and Canada. Devon also owns natural gas pipelines and treatment facilities in many of their producing areas, making them one of North America's larger processors of natural gas liquids.

The company's portfolio of oil and gas properties provides stable, environmentally responsible production and a platform for future growth. The company's production mix is about two-thirds natural gas and one-third oil and natural gas liquids, such as propane, butane and ethane. Devon produces about 2.6 billion cubic feet of natural gas each day — more than 3 percent of all the gas consumed in North America.

Devon's focus on more aggressive exploration heightens the need for accurate, timely, and consistent data to meet the demands of all business processes. Consistency comes in the form of definition, access, and evaluation of key business information (i.e. Spatial, Core, Production, etc.).

Devon Geosciences and Engineering recognized the need to focus on Well Data Governance. Devon's objective was to treat data as a valuable corporate asset. While the concept was not new, Devon had not yet established a Data Governance solution that was effective at all levels of the corporation. The Mid-Continent Geosciences Division identified the gap and proceeded to formalize Data Governance across the Well lifecycle. The plan to get a working Governance model in one Division to meet the tactical needs, then use this success to build out a Governance group in other Divisions, and eventually an Exploration & Production Data Governance at the Enterprise level.

The primary objective of applying data governance practices for Well data is to create "one definition" and "one answer" (i.e. one single source of truth) for each piece of data. Expanding the Data Governance to the Enterprise level will create the business efficiencies the company is working to achieve.

6.1. Data Management Scope

Devon created a multipronged strategy to establish data management at all levels of the organization. The scope included establishing a Well MDM solution at the Division level. The primary role of the Division Well Master was to service the Geoscience related applications and provide the appropriate level of stewardship to ensure high quality data. Once successfully up and running, the solution would then be applied to other Divisions. A second major initiative was to establish an Enterprise Master Data Management (eMDM) to support Well data across Enterprise applications. The eMDM would manage the data quality of Wells across the full Well lifecycle. For each of the data management solutions there would be overall Well Data Governance organization providing data stewardship and establishing the data quality standards.

The Data Management program scope was to develop an approach that was repeatable across multiple business functions. The program established following set of deliverables to support the Data Governance objectives:

Data governance definition framework:

- Define a best practices Data Governance (DG) model and framework
- Discover what DG definitions and capabilities currently exist within Geoscience and the Enterprise
- Identify what definitions and capabilities can be used, which need enhancement, and where there are gaps
- Establish a governance communication plan

Organization and roles:

- Understand existing data management organizations and roles
- Identify data management organizational and role gaps
- Recommend data management organizations and roles
- Identify and recommend candidates for DG committee roles
- Recommend data stewardship roles
- Identify and recommend candidates for stewardship roles

Master data management:

- Identify major master data subject areas, by leveraging concurrent Geoscience project work streams to expose data models and structures through their analysis and data model designs
- Prioritize the important master data subject areas
- Perform discovery across the enterprise and understand current master data ownership, controls and actors
- Recommendations for master data controls, processes, standards and procedures
- Begin to identify systems and business functions that currently produce master data, as producer steward (system of record) candidates

Data quality management:

- Identify major data quality problem areas, by leveraging concurrent project work streams to expose data quality issues through their analysis and data profiling
- Document the impact of the data quality problems
- Perform discovery across the enterprise and understand current quality controls and actors
- Recommendations for data quality controls, processes, standards and procedures
- Begin to identify subject matter experts who currently manage data quality issues, as data steward candidate

Metadata management:

- Identify technical and business metadata that is being generated by the concurrent G&G project work-streams; ensure that consistent, transformable repositories and standards exist to capture the generated metadata
- Perform discovery across the enterprise and understand current metadata repositories, standards and processes and actors
- Recommendations for metadata tools, processes, standards and procedures

Data security management:

- Perform discovery across the enterprise and understand current data security policies, procedures and actors
- Recommendations for security processes, standards and procedures

6.2. Governance Framework

Establishing a Data Governance framework that could both service the needs of the Division business functions, and the Enterprise was essential to the overall data management success. The strategy was to get a working Data Governance organization in place for a small portion of the overall scope and use it as a model to grow the capability across the Enterprise.

The obvious choice to start a Data Governance capability was selecting a Business Function that had the ambition to be an early adopter. The Geoscience Mid-Continent organization met that criteria and was the starting point for the company. A framework was established to create a Data Governance organization for Well master that would support the full spectrum of Governance (establishing policies through execution). The Governance organization was initially a virtual organization, with minimal full-time members. The Governance was driven primarily by Business representatives, with IT sitting in an advisory role. The Governance team also took on the role of having responsibility to provide oversight of all data management related projects. The Divisional Data Governance became the standard model for other areas of the company to use as data management expanded across the corporation.

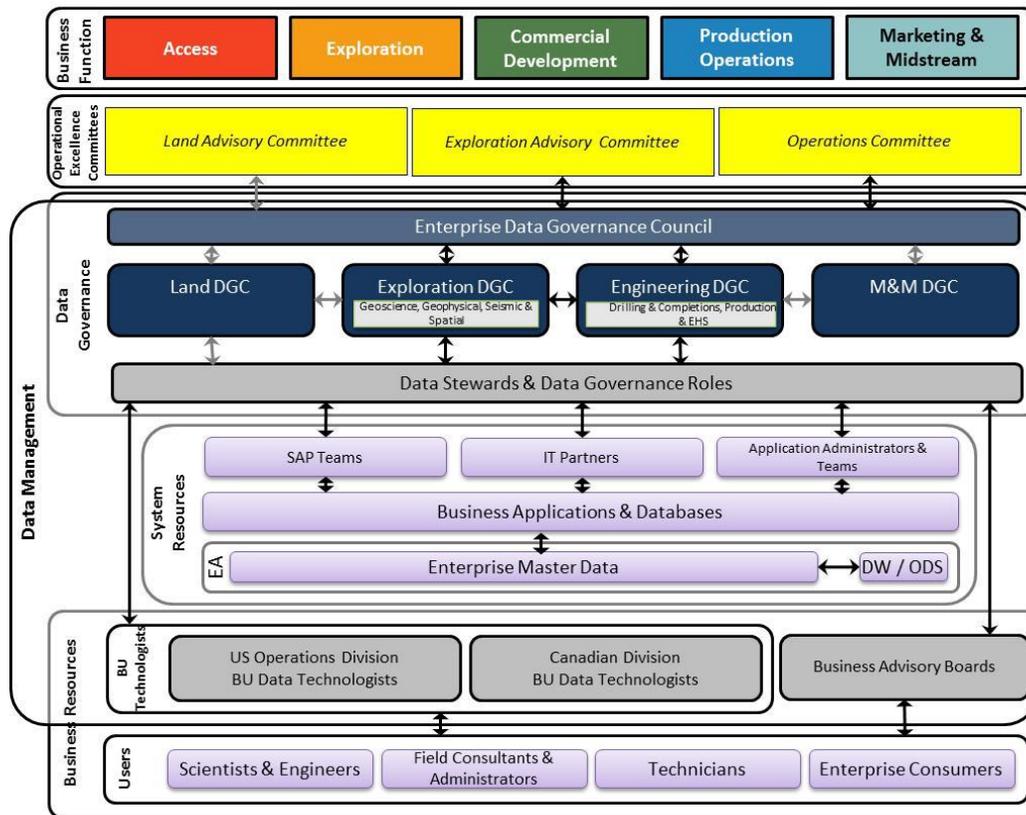


Figure 5: Governance Framework

In order for the Data Governance to be effective it needs to encompass the Well Data across the Well lifecycle. To best accomplish this requirement, the Data Governance role had to be elevated as an Enterprise Governance organization. In Figure 5, the Divisional Governance started out as a component of the Exploration Data Governance Council. As the Governance took on more of the Well Data lifecycle it was expanded to cover the entire Exploration process, and eventually became the E&P Data Governance. The E&P Data Governance charter included:

- Single point of contact
- Improve data quality
- Manage data as enterprise asset
- Improve business processes
- Framework for data management
- Strategic initiatives
- Share best practices
- Develop data standards
- Make data recommendations
- Select applications
- Responsible for data initiatives

-
- **Oversee projects**

By expanding the focus of the Governance organization, the group had more control of the overall data quality of Well Data. Because of the early success of the Divisional Governance, expanding the model had less resistance, the mechanics are understood and the value demonstrated.

6.3. Looking Ahead

The Devon Data Governance organization is still in the early stages of definition and adoption, but has already established a strong partnership with the Business necessary to be successful. Data Management has been successfully established for the early stages of the Well lifecycle. The Governance model is quickly growing as the desire to improve data quality expands across the Enterprise. The Governance continues to deliver success by developing data standards (naming standards, workflows, business rules, etc.), data stewardship processes, and a set of tools and process in which to manage data quality. The framework is in the process of being adopted by other areas of the organization to start governing the full Well lifecycle. Other data domains are on the roadmap and will be able to adopt many of the operational aspects of the Data Governance.

7. Conclusion

Many factors and challenges need to be considered when approaching a data management solution. Each organization is going to have unique business requirements that will require tailoring a solution that best meets the overall organization objectives. Implementing a solution that provides scalability, flexibility, and business value at all levels of the organization is paramount. Separating out the Enterprise and Divisional data management architecture can be an approach that can reduce the amount of compromise needed to implement the data management capability.

Building a Data Governance utilizing a bottom up approach to gain traction and momentum can help achieve early wins, and quick business value, while growing the capability across the Enterprise. Providing Well Data Governance across the Well lifecycle is going to provide the greatest level of standardization and consistency. Making Data Governance work across the organization is essential to success.

8. About the Presenters & Co-authors

Joseph Seila, Devon Energy

Mr. Joseph Seila started in Devon Energy's Central Division as a Geological Technician in 2005. Rising to the challenge to find better ways to manage well data he wrote a proposal recommending that Central implement a corporate data store and integration layer to synchronize data between multiple well project applications. Devon created two Enterprise projects based off of Joseph's proposal. In 2008 Joseph was promoted to a new data stewardship position and has been leading various data management initiatives at Devon ever since.

James Soos, Noah Consulting

Jim is a Senior Principal for Noah Consulting in the E&P Data Management industry segment, based out of Houston, Texas. He has over 25 years of consulting experience in the Energy Industry, including project experience with a broad range of Oil and Gas companies. Jim's experience spans across the upstream value chain ranging from Land administration, Geoscience, Production and Revenue Accounting, marketing, as well as pipeline transportation, and power generation. Jim's primary focus is project management for large scale data management projects, Master Data Management, Application Portfolio Strategies, and SAP ERP solutions. Jim holds a bachelor's degree in Computer Science, and is a member of PPDM.