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REGULATORY DATA STANDARDS STAKEHOLDER INTERVIEW REPORT

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1 ABSTRACT

The swift pace of technological advance in drilling, completion and production techniques often strains the capacity of regulators to develop, deploy and maintain necessary legislative, regulatory and technical systems in a timely and efficient manner. Disconnects between regulators and operators are sometimes the consequence when operator and regulators have mismatched expectations and capabilities.

In an environment where most regulators develop or customize internal technical systems to support their legal framework, the cost and risk to all stakeholders has reached unsustainable levels, particularly as systems developed decades ago are deteriorating, and the staff who support them retire or move to other positions (or companies). Typically, when regulators need to make change, they reach out to industry to support and fund the work that needs to be done. Today, industry can't afford to sponsor the independent development of new regulatory infrastructures at each agency they work with. Regulatory agencies find the cost and risk of developing and maintaining a customized environment may pose a threat to their operations.

In mid-2015, The Alberta Energy Regulator (AER) approached the Professional Petroleum Data Management Association with a request to interview key operator and regulator stakeholders to identify opportunities for industry standards to reinforce and support interactions between regulators and operators. This report summarizes the outcome of that study. Copies will be made available to all interviewees and key stakeholders. Several opportunities for industry standards to effect improvements were identified, including:

- Semantics: Variable vocabularies and dialects are used by all stakeholders, resulting in unclear communication, misinterpretation and errors. The impact to process efficiency and reliability can be high. "Rosetta Stone" vocabularies such as the PPDM "What is a Well" can help disambiguate these dialects.
- Quality and Completeness: Expectations about what "good" or "complete" data are extremely variable, so data submitted to regulators is often not fit for purpose by regulatory agencies or industry users. Industry agreed data quality and completeness expectations, such as the PPDM "Data Rules" initiative can be readily expanded to develop a collective industry consensus about appropriate data creation and submission.
- Proprietary systems overhead: Custom built data and software systems are difficult, time consuming and expensive to develop and maintain. Neutral industry standards such as the PPDM Data Model are widely supported and provide all stakeholders with opportunities to leverage standards based software, consulting services and expertise. These systems, after implementation, are more robust and extensible than proprietary systems.

The PPDM Association already has considerable expertise in these areas, and is highly regarded by industry for its reputation of standards excellence. Existing PPDM standards such as the PPDM Data Model, "What is a Well" and the Data Rules Library are widely adopted and endorsed, and can be leveraged throughout industry. In 2016, the PPDM Association will launch a broad based Regulatory Data Standards Workgroup, which will be phased into short, achievable and specific phases or projects. This work will be supported, sponsored and developed using the PPDM Association's methodology ([The PPDM Way](#)).

2 INTRODUCTION

In an information centric economy, good analytics depend on data sources that are integrated, accessible, trusted and unambiguous. Analysts cannot be hampered or misled by regional data constraints or local dialects. Industry standards are a solid foundation upon which regulators, operators, and other key stakeholders can establish technology solutions that are fit for purpose and robust.

Typically, a governmental authority distributes the necessary functions of approving and overseeing the complex E&P life cycle processes amongst one or more units or agencies; in many cases, rules of primacy may determine where this authority resides. For simplicity, we use “regulator” or “government” to mean all of these government components unless otherwise explicitly stated. Regulatory or administrative agencies develop a series of processes and technical systems for receiving, reviewing and managing the information that moves between themselves and industry.

The legislative and technical architecture in regulatory agencies is developed expressly to fit the social, economic and environmental needs of each constituency. Over time, the cost and effort required for each agency to develop the necessary regulations, guides, forms, procedures and administrative infrastructure can become difficult and expensive. Operational risk may be introduced when proprietary systems age, particularly if the effort, complexity and cost of upgrading these systems is high.

Oil and gas industry operators develop many different families of processes, applications and data systems that are able to address the often unique and complex application and compliance processes for every regulatory agency under whose authority they do business. Creating policies and procedures to conduct operations in each region, training staff and developing the data systems to respond appropriately to each regulator can be costly and time consuming for operators.

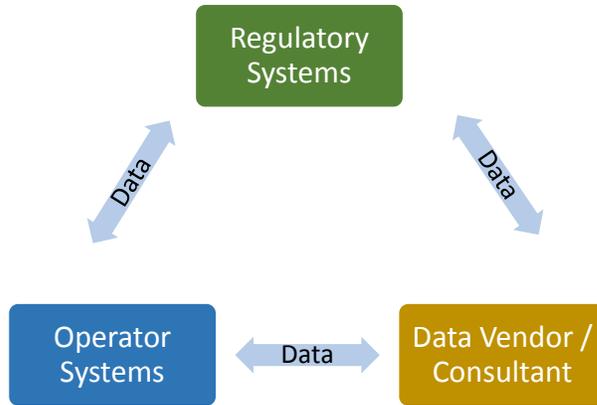
The diagrams below illustrates some of the key operational milestones for regulators and operators. Each of these stakeholder groups will use many of the same data types, although the purposes for which they are using the data are often different in intention. This is one of the factors that can lead to process or workflow barriers at all stakeholder levels.

Operator life cycles are typically focused on key operational or financial activities.



Regulatory life cycles are typically focused on conformance to regulations, environmental protection, royalties and resource management.





Information architectures are developed by all stakeholders to support procedural requirements. In some regions, data vendors collect and aggregate data for use by consumers. Consultants may be retained to act on behalf of the operator or regulator. The result is a complex and diverse environment that can be difficult to adapt to new situations or technology.

Information architectures based on industry standards support the development of processes and systems that could be shared by regulators. These would allow industry to plan and permit operations more efficiently and with greater certainty of the outcome.

While not on the direct path of either the procedural or data flow, the public and academia are key considerations in all steps along the way.

2.1 PURPOSE OF THE INTERVIEWS

Interviews were conducted in mid-2015 to identify potential opportunities for data standards to improve and harmonize the creation and management of data through the life cycle in ways that will benefit both regulator and industry stakeholders. In particular, we focused on areas where data is shared between regulators and industry stakeholders, or where data is part of business processes and interactions between regulators and industry stakeholders. This was also an opportunity for stakeholders to have open dialogue about their common challenges.

Stakeholders that participate in the interview process receive a copy of this report. Stakeholders who join the Regulatory Data Standards Work Group will have an active voice in the development of future Regulatory data standards.

The diagram below illustrates, at a high level, the process used to design and execute any resulting regulatory data standards project.



2.2 PARTICIPANT SELECTION

Five stakeholder groups were identified based on their unique perspectives. This helped identify candidate participants who could represent a spectrum of issues that may be present. Each stakeholder group plays a valuable role in the creation, dissemination and use of data over the life of a well, facility, land right, seismic set or other industry object.

The various functions carried out at each stakeholder group, and the relationships that the groups have with each other may be very complex. Data is moved between processes within each stakeholder's organization, and also between different stakeholders, each of whom have their own processes and workflows that use data. One of our objectives is to identify and resolve challenges that result in disruption of these workflows.

Global participation was sought as PPDM identified and contacted candidate organizations in North America, South America, Australia and Europe. Our preference was to conduct the interviews face to face, but accommodations were made to conduct over the phone.

- ✓ Large operators
- ✓ Mid-sized or small operators
- ✓ Regulatory agencies
- ✓ Government users of regulatory or industry submitted data
- ✓ Data vendors

2.3 INTERVIEWS

Interviews were scheduled from May through October 2015. Summer vacations, staff re-organizations, economic stresses and scheduling conflicts resulted in some reductions in the final number of candidate organizations interviewed in each category. A total of twenty-three (23) stakeholder organization interviews were conducted internationally. Where relevant, the interview results were correlated to PPDM findings from other workgroups that involved regulator interaction, such as the Well Identification, Well Status and "What is a Well" workgroups.

Interviews Conducted	Stakeholder Group
2	Mid-Sized Operators
8	Large Operators
2	Data Vendors (review followed other interviews)
8	Regulatory Agencies
3	Government Users of Regulatory Data

Each company being interviewed had discretion to invite any relevant staff based on their specific organizational structure; participation ranged from one to fifteen or more people from different departments. Where possible, two members of the interviewing team attended each interview, with one conducting the actual interview and the other documenting key issues. Stakeholder interview participants were introduced to the proposed scope of work, goals, and objectives of the study.

Interviewees were informed that specific questions would be posed to engage and encourage feedback. Participants were generally posed the same questions but the dialogue was allowed to flow based on the knowledge, interest and concerns of each stakeholder. Questions were focused on the following topics:

- ✓ Data related processes challenges and opportunities
- ✓ Relationships between data, technology, processes and legislation/regulations
- ✓ Real or potential risks such as financial, HSE (Health, Safety and Environment)
- ✓ Impact of processes that move data between stakeholders
- ✓ Industry standards

The interview script and questions are included in Appendix A.

3 DISCLAIMERS

Before continuing, we ask the reader to keep in mind that this report captures many of the comments made by operators and regulators, whether or not addressing or resolving these issues is considered to be directly in scope for the proposed workgroup. These are included for completeness and to assist in identifying potential value propositions for the proposed workgroup. The survey was intended to identify areas in which data or data management strategies might have a positive impact on the challenges identified by stakeholders.

The proposed workgroup does not intend to interpret regulations, take on any regulatory function, create any regulatory processes, or administer any functions or tasks that are in the purview of the regulator, operator, or any other stakeholder.

4 INTERVIEW RESULTS

4.1 OPERATORS

4.1.1 What Operators Like

- Several operators noted that individual relationships with regulatory staff can be very helpful, and that trusted relationships between parties can make approvals, communication and ongoing compliance more transparent and mutually effective. Operators value these relationships.
- Processes and other interactions between regulators and operators that are related to conventional (or typical) operations are typically straightforward, timely and efficient. Where difficulties or challenges exist, they often relate to unconventional operations.
- Regulatory expectations that are fully and completely established, and well defined terminology help operators understand and conform to regulatory expectations.

4.1.2 Semantics

The language used by all stakeholders is critical to clear communication. However, many stakeholders note that different stakeholders may use the same term but with different meanings, or different terms with the same meaning. Additional challenges arise when different stakeholders require information at different levels of granularity (or precision).

- Local dialects: Participants who work with more than one regulator said that differences in terminology or language can create internal complexity or time delays. These differences appear on agency forms, on lists of values that are used for submissions, or in the support documentation and legislation/regulations.

- Small Operators who deal with a single regulator often depend on a small number of experts to interpret regulatory intentions; the necessary skills are not easily portable to other staff (little or no backup).
- Large Operators often have more than one dialect or vocabulary in use internally, and must also adapt to regulatory dialects. Considerable effort must be expended to handle each agency appropriately, and a lot of data translation or conversion may be needed.
- Definitions: Some regulators are seen as somewhat dictatorial in their use of terms and definitions, even when out of date or ambiguous in the real world. Other regulators do not provide any definitions of the terms they use, sometimes because the terms are considered “self-defining”.

4.1.3 Identifiers

Regulators and companies assign identifiers to objects (such as wells, facilities, or documents). Inter-agency communications depend heavily on these identifiers through the life cycle. Problems can result in misleading communications, association of data or records with incorrect objects, or process inefficiencies.

- Multiple identifiers: Within a jurisdictional area, an operator may need to work with more than one agency. In some cases, different agencies will assign a different identifier to the same object (such as a well). Keeping track of every identifier and the agencies that use each can be difficult.
- Changing identifiers: In some regions, regulators may change the identifier for an object (such as a well) one or more times over the life of the object. Keeping track of these changes and ensuring that all documentation has the correct (rather than an old) identifier adds time and complexity to work flows.
- Reassigning identifiers: In some regions, identifiers assigned to an object (such as a well) that is not constructed may be reassigned to a new object. This creates confusion and ambiguity about what an identifier is identifying.
- Tracking progress: As an application passes through many groups, it can be difficult to track its progress. Clearer and more holistic identification of an application or object would be helpful according to some operators.

4.1.4 Data Quality

All the operators we interviewed noted one or more challenges associated with the format, quality, consistency or completeness of data that may be retrieved by the operator. This is particularly true in regions where operators retrieve data directly from the regulator’s web site (as opposed to obtaining data through a data vendor). Data quality problems lead to distrust among stakeholders, errors in interpretation or application of data to processes, and potential financial or other risk.

- Incomplete data submissions create challenges for operators using regulatory data in order to conduct preliminary or regional analysis, or when doing competitor analysis. Several interviewees noted that it would be nice if agencies had clear and consistently enforced expectations for data submissions.
- Incorrect data may originate through faulty operator submissions, or through ambiguity about submission requirements. In some cases, data that is incorrect or not fit for purpose, may exist as a result of limitations in the regulatory data systems (such as insufficient precision of bottom hole coordinates).

- Inconsistent data may originate when each operator reports in the vocabulary that they have adopted internally (but which is different from the vocabulary of other operators). It can also result from differences in reporting expectations between regulators, or even in differences in specific reporting requirements between individual regulations in a single agency. When data is seen to be inconsistent between internal and regulatory systems, users may become mistrustful of the underlying systems.
- Out of date information may exist in regulator systems, even if more current information has been provided by the operator (such as planned vs. “as built” facility or well configurations).
- Data updates provided to a regulator may take a long time (often many months) to be reflected in regulator systems.

4.1.5 Data reporting, dissemination and use

Operators must exchange data with many stakeholders; regulatory agencies, partners, public disclosure and interdepartmental data exchanged add complexity to operational procedures. Stakeholders expressed a desire for data requirements to be clearly laid out and consistently applied, and for these expectations be as aligned with other business needs as possible.

- Difficulties in submitting correct or complete data may be experienced because of ambiguous rules or differences between regulators in the same of different jurisdictions.
- Data updates may be rejected by the regulator’s online reporting system, adding time and complexity to the process.
- Frustration is experienced when operators are required to submit data that is not (as far as they can tell) ever used or reviewed.
- Spatial compliance: Operators must ensure that they are in compliance with spatial conditions (such as required offsets). Systems that are equipped to automate analysis of data to ensure compliance are helpful.
- Spatial changes: Between planning and construction or execution of a program, decisions to change the location of an object (well, seismic point, facility, pipeline object) may be made. Some regulators only require “as planned” location information, but operators would prefer that “as built” locations (and other details) be at the regulator. This is seen as a risk reducer.

4.1.6 Operational Risks

Companies of all sizes need the capacity to recognize and respond to risks of various kinds. Factors that result in operational risk may discourage an operator from doing business in a region, or may affect corporate efficiency, reputation or even financial solvency.

- Business risk
 - Operators entering a new region may have difficulty determining which agencies they must work with, and what the role of each agency is. This can result in delays or errors.
 - Understaffed agencies may take a long time to respond to information provided by the operator, or to acknowledge that required work has been completed. This results in process delays for the operator, and some uncertainty about whether an operation has ‘passed’ in a time frame when the operator can efficiently respond to problems.
- Non routine applications or processes risk
 - Many regulators are seen as slow to adapt their regulations and procedures to accommodate technology innovations such as large drilling pads or complex multi-lateral drilling. This may result in applications processes that are not appropriate for the technology, or risk during field construction and operations.

- Regulatory systems that are not able to accommodate new technology may result in slower applications approval processes. Regulatory staff may not have sufficient expertise to understand the implications of technology change, and underlying systems may not be able to handle the information that is desirable.
- Financial or reputation risk
 - Small operators note that complex procedures, particularly those related to community negotiations, can require an extended period of time. In some cases, it was noted that this poses a significant financial risk to the operator.
 - Large operators note regulators may have processes that do not meet the more rigorous internal requirements of the company (most particularly in the HSE domain). In this case, the operator may choose to operate elsewhere.
- Change management risk
 - Small operators may find it difficult to adapt to changes in the expectations of regulators.
 - Large operators note that it can be complicated to develop internal systems that accommodate the total of all requirements of all the agencies they work with. Often, this function is divided into one or more business units within a company adding complexity to keeping processes aligned with policy. Changes to the regulatory environment can be difficult to accommodate.
- Staff knowledge or capacity risk (Internal expertise)
 - Small operators often have a single individual who is responsible for all regulatory relations with respect to applications, approval, and compliance and reporting. These people develop extensive expertise; the training time is high and risk is associated when a skilled staff member is lost.
 - Large operators have a regulatory filing group with several individuals responsible for applications, approval, and compliance and reporting. The training time for each individual is long and specialized; training for new staff is generally not available. Staff are less interoperable than is ideal.

4.1.7 Communication

Communication is fundamental to operational excellence and efficiency. Numerous challenges were noted, with a few key examples included for reference. Since the scope of this work related to data and data standards, our focus has been primarily on communication challenges that affect data.

- Relationships: nearly every stakeholder interviewed described the importance of developing and building on relationships with other stakeholders. These build trust, confidence and understanding that improve operational effectiveness and reduce the risk of misunderstandings.
- Consistency: stakeholders describe challenges when agreements or decisions are not communicated with (or upheld by) other agencies, or when the outcomes of processes are not communicated (such as the results of a field inspection).

4.2 REGULATORS AND ASSOCIATED AGENCIES

Most regulators are planning or making changes that will increase the level of public interaction and communication, that increase the amount and kind of information disclosed to industry and the public, and that result in a higher degree of social and environmental responsibility. Some are in the process of adding or altering legislation, regulations, procedures or underlying technical and data systems.

Most regulators feel that they are not empowered to “force” certain types of behavior on industry; instead, they work collaboratively with their constituency to set expectations that are mutually acceptable. When questioned, all regulators indicated that they would be very interested in participating in the development of, and encouraging adherence to, industry data standards. All felt that industry developed standards would benefit all stakeholders in the long term, even though their adoption would require the outlay of time and resources.

4.2.1 What Regulators like

- Regulators value relationships with operators, because they facilitate and improve communications, the quality of information received, and the timeliness in which processes can be completed.
- Regulators appreciate the time and effort taken by highly compliant operators to work with them, and ensure that the information they receive is fit for purpose.

4.2.2 Semantics

The language used by all stakeholders is critical to clear communication. However, many stakeholders note that different stakeholders may use the same term but with different meanings, or different terms with the same meaning. Additional challenges arise when different stakeholders require information at different levels of granularity (or precision).

- Compliance: Regulators struggle when operators use different terminology to describe their operations. It may be difficult to determine whether an application or process is in compliance.
- Variable vocabularies (dialects): agencies have often developed their own internal vocabulary, sometimes in isolation from other agencies or operators. Information received from another agency or an operator may contain that organization’s local dialect, making it difficult to use appropriately. Agencies within the same government may have difficulty communicating with each other.

4.2.3 Compliance

Virtually every regulator said that the nature, completeness and quality of operator data submissions are variable. Some operators are seen as highly conformant with expectations, while other operators tend to be less diligent. Small operators are widely understood to have the most difficulty in adapting to regulatory change, particularly if they result in higher regulatory expectations.

- Variability in submissions: Not all operators prepare and submit regulatory compliance data directly; in some cases, this work is subcontracted. In these cases, it may be difficult for the regulator to obtain complete data, or to fill “gaps” in data submission. For example, the content of submissions for a ‘well completion report’ can be quite variable.
- Subcontracted submissions: Different contractors may use different processes and information for submission, so the regulator receives different data results from various sources. This adds time and complexity to regulatory processes and to operator relations. Industry set expectations that can be followed by all would benefit all stakeholders.
- Variability in formats: Regulatory filings may come in many different formats, from paper to PDF documents, or electronic online filings. These formats makes regulatory processes more difficult and time consuming. As one interviewee said, “PDF documents are not digital data”. Consistent format expectations would help relieve this problem.
- Quality and completeness: Regulators (and agencies that use regulatory data) report that inconsistent, incomplete or incorrect data submissions are a common problem. However, they

recognize that as regulators it is not feasible for them to set more rigorous expectations; these organizations feel that an industry led initiative would be appropriate.

- Operator capability: Regulators recognize that smaller operators don't have the same capacity to handle changes or higher expectations, and endeavor to accommodate limitations. However, the result is often data that is less complete or accurate than is needed. Additional support to help all operators get to the same level of capability (at the upper end) is desirable.
- Spatial processing: Many regulators have processes in place that are based on spatial conditions (such as required offsets). Systems that are equipped to automate analysis of applications or submissions that contain spatial information are helpful.
- Spatial changes: Some regulators only require "as planned" location information, but operators would prefer that "as built" locations (and other details) be at the regulator. This is seen as a risk reducer.

4.2.4 Inter-agency data sharing

Data that is collected by one regulatory agency may be used by other agencies in the same jurisdiction. In these cases, the using agency (in some cases, these are quasi agencies that don't carry regulatory authority) may not have direct control over the content or quality of the data that is received. Government or quasi-government users often view themselves as end users of data, with very little influence over the quality of completeness of the data they work with. Cooperative relationships between agencies can help alleviate problems, but in some cases it is difficult for the receiving agency to get data that is truly "fit for purpose".

- Indirect access: Agencies that work with data collected by another agency feel somewhat "removed" from the process, and face challenges when data is incorrect, incomplete or not fit for the purpose it is needed for. These agencies would value industry standard expectations that could be addressed early in the life cycle in order to resolve these issues.

4.2.5 Regulatory stack

Agencies that enforce legislation must develop a supporting 'stack' of regulations, procedures, software and data stores. Some or all of this stack may need to be altered over time to accommodate changes to legislation or government policy, advances in industry technology, or to replace aging technical systems (software, forms and data stores). The necessary changes can be expensive and time consuming, and may not be prioritized during the budget setting process. Regulators recognize that an environment that allows them to respond to change faster and more cheaply would be valuable.

- Semantics: Nearly all regulators are aware that variations in vocabularies leads to misunderstanding, confusion, error and potential risks. In many cases, these semantic issues have arisen as a result of isolated evolution and development. As operations become more international, and open data initiatives seek to merge data from many regulators into a single portal, regulators recognize that standard industry vocabularies are important.
- Data stores: Legacy data stores have often been based on specific, custom developed software systems. Changes in regulation or advances in technology result in new kinds of data that must be managed, but which legacy systems cannot handle. Also, changes to data stores and to software systems must often be made in tandem; this further slows change and adds expense and complexity to updates.
- Software: most regulatory software is custom built to the needs of the regulator. An exception is the Risk Based Data Management system (RBDMS) developed and managed by the Ground

Water Protection Council in the USA. Produced as a set of configurable modules, this system can provide a starting point for regulators as appropriate.

- Change management: As legislation, regulations and technology advance, regulatory staff must update their processes and procedures to accommodate. Where the technology stack is not yet current with the expectations of the government or industry, temporary processes or systems may be developed. These can slow down processes for all stakeholders and are difficult to manage consistently (particularly where there are many staff). Regulatory capability may be affected by the experience and knowledge of regulatory staff.

4.3 DATA VENDORS

Input from data vendors was obtained after the operator and regulator interviews were complete. In many parts of the world, data vendors are the lynch pin between regulatory data stores and industry consumption of that data. Data vendors play many crucial roles in the data ecosystem, and are understood by all stakeholders to be essential to any successful industry workgroup.

Data vendors develop their processes and systems internally or in consultation with their clients. The result is sometimes data that is structured or reported differently than data delivered by another data vendor. These apparent discrepancies cause confusion for operators who subscribe to multiple data vendors.

4.3.1 What Data Vendors like

- Because data vendors interact with many regulatory agencies and many operating companies, greater consistency and clarity helps them meet industry needs.
- Relationships with all stakeholders help data vendors facilitate the movement of data from regulators to industry stakeholders.

4.3.2 Semantics

- Regulatory relations: Data vendors spend a lot of time working with legislation, regulation, and technical systems to understand how they impact the data in each data store. This involves research in order to understand the specific semantics being used.
- Dialects: Regulators often provide data in their own dialect (vocabulary). Cross referencing and correlating these is a necessary, but often difficult, step in preparing data for industry consumption. Clear and consistent vocabularies, or at least complete definitions, would be helpful.
- Harmonization vocabularies: Data vendors may have their own harmonization vocabulary in order to integrate multiple regulatory data sources and prepare data for industry consumption. This may create new, distinct vocabularies for some clients.

4.3.3 Data quality and completeness

- Data quality: Data vendors work with both regulators and operators to identify and resolve issues in regulatory data stores. Challenges may arise from data submitted by the operator (or delegate), limitations in the regulatory data store, or differences in regulatory requirements and expectations.
- Data completeness: Gaps in data may make the data less “fit for purpose” for clients, so data vendors exert considerable effort to find data where possible.
- Data submission: The content required for a regulatory data submission is variable between regulators. The result is that data available from one agency may not be provided by another. This may result from legal or procedural differences between regulators.

4.3.4 Data conversion, calculation and harmonization

- Data harmonization: Data vendors obtain data from many regulatory sources and apply complex processes that prepare the data to be consumed by clients so that as much of the regulatory “variability” as possible has been harmonized. Data vendors work to reconcile differences in vocabulary, format, content and completeness.
- Added value data: Most data vendors work with the available regulatory data to create computed or integrated data that is more useful than the raw data in regulatory stores.
- Customized delivery: Different clients may require the data in different formats; adding time and cost inefficiencies.

4.3.5 Regulatory change

- Changes to the data structure are made from time to time. These often result in changes in the way data is received, the format in which it is provided, or the content of the data itself. Data vendors feel that good communication and early notification would help them prepare for these changes. Clear and complete documentation about the changes and complete sample data are also very helpful.
- Changes to the legal structure are made from time to time. Data vendors want good communication and early notification to give them time to prepare for these changes, but data vendors may not be included in key communications made to operators.

5 CHALLENGES AND OPPORTUNITIES

Following the interviews, the interview team, PPDM resources and key stakeholders worked to correlate the challenges found between stakeholders. This provided the team with information about areas where data related standards might be able to effect positive change for stakeholder groups. The team discovered that some of the problems related to communication, workflows or interactions between specific groups or agencies. These are considered out of scope and are not addressed further in this document, unless they point to an opportunity for data standards to effect a positive change.

	Challenge	Opportunity
Collaboration	Each stakeholder group uses different mechanisms to communicate. Accommodating this variability adds complexity, cost and time to workflows. Sometimes the nature of the communication is not clear, misinterpreted by recipients and unable to transcend regional boundaries.	Communication systems that use consistent, industry defined vocabularies are easier to understand. All stakeholders should participate in industry communication events, such as the <u>PPDM family of community events</u> (luncheons, workshops symposiums and data focused journals such as Foundations) to communicate changes in data systems, data rules, data expectations and requirements to industry.
Semantics, vocabularies and dialects	Local dialects and internal (possibly undefined) vocabularies make communication between stakeholders (both internal and external) difficult. Variability results in time and cost inefficiencies. Potential misinterpretation or errors can result in problems for future stakeholders.	Identify key terms and phrases that introduce the highest risk. Develop disambiguation standards similar to PPDM’s “ <u>What is a Well</u> ” that will provide a Rosetta Stone for users, and a possible path to convergence in key terminology.

Identifiers	<p>Identifiers that change or are re-used pose challenges to data stores and users as data flows through processes.</p> <p>Objects that have multiple identifiers (one or more per stakeholder group) make data systems difficult and cumbersome to use, and processes difficult to track.</p> <p>Identifiers may not be “fit for purpose” for all stakeholders, so an identifier that works well for one stakeholder may pose problems at another.</p>	<p>It is not realistic to expect all stakeholders to adopt a single method for identifying objects. However, improvements in industry’s capability to find and correlate identifiers are feasible.</p> <p>Develop a family of best practices for object identification, similar in concept to PPDM’s Global Well Identification best practices. Also develop a method for tracking and correlating identifiers through the life cycle of an object.</p>
Data quality content and completeness	<p>Data quality and timeliness challenges result in confusion and difficult workflows for affected stakeholders. Data that is fit for purpose for one stakeholder may not be for another.</p> <p>Variability in the format, content and definition of completeness are inefficient for all stakeholders.</p> <p>Differences in expectations between regulators, and different agencies within the same regulator, and variability in what operators are capable of providing, result in agency data stores that are not internally consistent, and that are not compatible with systems from other agencies.</p>	<p>Data quality needs for all stakeholders through the life cycle should be considered when systems are designed. Standards would provide guidance.</p> <p>Regulatory stakeholders do not feel it is appropriate for them to develop standards, but they would be interested in following standards developed in an appropriate, industry neutral framework.</p> <p>The PPDM Rules are atomic, specific and testable expectations about data can be recorded. This repository can be expanded to further support complete rule sets for data and data types, and also for specific agency expectations.</p> <p>Develop a core framework recommendation for industry reporting and submissions that makes use of data rules, semantics, and identification best practices.</p>
Regulatory Systems Standardization	<p>Changes to the regulatory or legislative framework, and technical changes to the data systems that underpin the framework are difficult, expensive and time consuming for all stakeholders.</p> <p>Most regulatory systems are custom built (data systems, vocabularies, rules and more), and require considerable internal effort by all stakeholders to accommodate change.</p>	<p>Systems that are based on industry standards can take advantage of economy of scale, shared application development effort and cost, and access to industry resources.</p> <p>They can also provide clear and consistent channels of communications with operator systems that are based on the same industry standards. This results in better communication at all levels, and facilitates efficiencies for all stakeholders.</p> <p>Systems based on industry standards are more robust, and can be adopted or adapted more readily than custom built systems.</p>

6 CONCLUSIONS

Through the interview and analysis process, opportunities for process efficiencies and improved communications emerged. At the same time, it is clear that both regulators and operators struggle with the impact and cost of change. The PPDM Association recommends a balanced approach that will provide stakeholders with a standards based environment that can be taken up as appropriate to the needs and capabilities of each regional stakeholder community. This approach is consistent with the PPDM Association's philosophy of endorsing and supporting convergence in data management practices around the globe at a useful but sustainable pace.

The PPDM Association recommends the formation of a long term Special Interest Group that will focus on the opportunities identified in this document, and will continue to evaluate and set priorities for standards development that allow the challenges to be addressed in a cohesive manner.

1. PPDM proposes a multi-party work group comprised of representatives from international Regulators, Operators, vendors and service suppliers.
2. We'll provide a standards based foundation upon which flexible and robust solutions can be built by industry.
3. This project will focus on how PPDM data standards can be deployed and expanded to support the needs of regulators to create a standards based information foundation.
4. It will support, but not take on any of the regulatory or administrative functions of any agency.
5. We'll come to consensus on what it means for data to be measurably complete, consistent and cohesive.
6. We'll develop the glossary (vocabulary) to serve as a Rosetta Stone that will disambiguate key terms and phrases such as: Well, Log, and Completion.
7. We'll develop a model for storing or mapping existing information stores for the purpose of sharing information.

If you are interested in participating in this workgroup, or have comments about any of the materials presented in this report, please contact us (projects@ppdm.org).

7 NEXT STEPS

7.1 DISCLAIMER

The proposed workgroup does not intend to interpret regulations, take on any regulatory function, create any regulatory processes, or administer any functions or tasks that are in the purview of the regulator, operator, or any other stakeholder. While it is expected that software products based on the resulting standards will be developed, this is not within the purview of the PPDM Association.

7.2 CHARTERING AND PRIORITIZING

The high level results of the stakeholder interviews, with additional feedback from stakeholders and sponsors, will be used to derive the initial scope of the work group. Documents chartering the workgroup will be created and distributed among stakeholders.

The potential scope for the Regulatory Data Standards Workgroup is quite large, so a leadership team consisting of key stakeholders and sponsors will be created to prioritize work to be done. Each prioritized deliverable will be developed in independent phases that are specific, well defined and have an expected time frame for completion. These priorities will be laid out in the charter and associated documents.

7.3 PARTICIPATION

Participation in this work group will be open to any member of the PPDM Association. Certain key stakeholders (such as Regulators or other Societies and Associations) may be invited to participate, provided they are willing to sign documents such as anti-trust and IP policies (these provide the PPDM Association with the necessary approval to use or embed IP that may be contributed by a participant). Note that members of the PPDM Association have provided this to PPDM through their acceptance of a membership agreement.

7.4 FUNDING AND INDUSTRY SUPPORT

The PPDM Association is a Not for Profit Society that works with industry in a vendor neutral, open process to develop standards and best practices.

- Work groups are conducted in accordance with the PPDM Association methodology, called [the PPDM Way](#).
- Work groups are managed by a professional project manager and additional supporting resources who are employed by the PPDM Association.
- Work groups are sponsored and funded by interested industry stakeholders. Funding pays for the resources necessary to complete the work outlined and develop the deliverables as prioritized by the sponsor group.
- Work groups are conducted by individuals who have the necessary skills and knowledge to assist with the creation of the deliverables. Participation provides these individuals with opportunities for professional development and networking.
- Participants join the work group with the support of their employers, who understand that participation gives their company an opportunity to participate in and influence the development of industry standards.

7.5 PUBLICATION

The products of PPDM workgroups are made available to industry as they are developed. Many products are available free of charge from the PPDM Association Website. Some products are reserved for the use of PPDM members only, particularly in cases where the development and maintenance of the product is funded by membership dues.

8 APPENDIX A - INTERVIEW OUTLINE AND QUESTIONS

Participants were generally posed the same questions with some flexibility based on interest and concerns of each stakeholder group. Not all questions were asked of every participant, depending on the constituency of the interviewee group and their interests.

Thank you for taking time to meet with us today. Please be sure that your responses are being treated confidentially, and that any and all names will be obfuscated for the final report. As a result of your participation in this process, you will receive a copy of our summary findings.

1. Is your company operating in multiple jurisdictions?
 - a. If yes, how many regulatory agencies does your company deal with?
 - b. Can you list them?
2. Please explain how your company is organized to manage regulatory data submission and compliance?
3. What are your current challenges with the application process?
 - a. What is working well?
4. Is the current application-to-approval turn-around time satisfactory?
5. What are your current pain-points associated with dealing with the Regulators in your areas of interest?
6. Are there inconsistencies in the regulatory requirements in the jurisdictions in which you operate?
 - a. Can you list them and describe the associated risk this introduces?
7. Are you satisfied that the data you have submitted is being properly cared for, secured and managed?
8. Do you believe there may be value in regulators moving towards industry standards?
9. Is there interest in your company to participate in the Regulatory Standards Work Group?
10. Is there capacity within your company to hold a co-chair position for the Regulatory Standards Work Group?
11. Who in your organization should participate, someone that balances both interest and authority, in a Regulatory Standards Work Group?
12. To what extent are your internal systems standards based (e.g. PODS, PPDM, WITSML, etc.)?
 - a. If not, are you interested in moving towards standards based systems?
 - b. If so, have you allocated budget?
13. To what extent are your internal systems spatially enabled?
 - a. If not, are you interested in moving towards spatially enabled systems?
 - b. If so, have you allocated budget?
14. Are you satisfied with the quality of the data available from the data vendors?
15. What kind of issues have you seen in the data you have submitted when reviewed via a public data vendor?
16. Policies between government organizations drive work practices, and those practices drive touch-points between your organizations, can you describe some of those touch-points?
 - a. Is there an opportunity to improve those touch points?
17. How are new regulations communicated?
What does change management look like?
Areas of improvement in this area?
18. Is the process flow from the AER to your departmental systems distributed or centralized?
19. Can you describe a typical process flow, say from the DDS system?
(people & data)

20. Are existing interfaces between the AER and your department sufficiently automated?
21. Is the data collected on behalf of your department of sufficient quality?
 - a. Fit for purpose?
 - b. Ready to use?
 - c. Timely?
22. Are you getting *all* of the data required?
 - a. If not, how are exceptions treated? (SIR to Operator)?
23. Does the data received require significant reforming (ETL) prior to use or ingestion?
24. Are the existing data and work-flows well understood?
 - a. Straight forward or convoluted?
 - b. Impact on "on boarding" new staff?
25. What risks does this "current state" represent?
26. How do you perceive current "Open Data" initiatives?
27. How would you rate your government "Open Data" progress?