Introduction

The mission of the PODS Association is to develop and advance global pipeline data standards to support efficient data management and reporting for the oil and gas pipeline industry. In December 2015 PODS published its 2016 – 2019 PODS Association Strategic Plan. The Strategic Plan identified six goals to ensure the Association realizes its mission and strategic vision of being the global leader in pipeline data standards and best practices.

Establishing an industry-recognized core data model and stewarding open interchange specifications for data sharing and interoperability are two of the six key goals established by the PODS Association in its Strategic Plan. The Association has been stewarding the PODS Pipeline Data Model in an incremental fashion for many years with the latest release, Version 6.0, released in May 2013.

In recent years, including most recently at the September 2015 PODS Conference and Pipeline Week, PODS Association members have identified issues and opportunities for improvement to the PODS Pipeline Data Model. Through consideration of member-identified issues and opportunities, lessons learned from PODS Association member implementations of the Standard, expanded regulatory reporting requirements (PHSMA, FERC) and changes in relevant technologies, the PODS Board of Directors has chosen to transform the PODS Pipeline Data Standard, going forward.

This document summarizes the scope and intended outcomes for transformation of the PODS Pipeline Data Model and development of open interchange specifications to better enable data sharing and interoperability.

Next Generation Defined

The PODS Next Generation will re-engineer the existing PODS data model. Next Gen PODS will define a set of core tables primarily designed as the system of record for location of pipeline assets. The standard will be re-defined as:

- the schema for these tables,
- the definition of how data are stored in these tables,
- the definition of how data in these tables are represented as spatial features;
- and the specification for how the model can be expanded with operator and/or third party vendor defined modules.

Next Gen PODS will be clearly documented to support the deployment of the model as a defined standard. Further, the PODS Next Generation initiative will include development of new services to enable interoperability and data sharing, as well as enhancements to organization and standards governance and communication in providing guidance and training.

PODS Association leadership recognizes that the next version of the Pipeline Data Model will not be another incremental release. The next version of the Data Model will likely be entirely restructured with major improvements and new approaches.

Benefits of Next Generation Data Standards Transformation

PODS association members and other stakeholders will realize the following benefits using transformed PODS standards:

- Achieve greater agility to respond to new requirements.
- Interoperate through consistent application of a common data model. Provide an easy to understand framework to allow applications to connect to PODS data model
- Share data within and between organizations using well defined data exchange specifications.
- Rapidly build and extend the data model to meet business needs through clear and concise guidance and specifications.
- Prescribe well-defined data maintenance processes to manage pipeline data that include definition of the rules for the content, structure, and editing for data contained within the model.
- Optimize performance for the management of bulk loading, reroute, inspection data, and history.

**Process and Governance**

The PODS Board of Directors has formed a Next Generation Working Group to establish the scope and to guide implementation of the standards transformation effort. The Working Group is comprised of individuals from select operator and service provider organizations.

The Next Generation Working Group has established a charter and an initial scope – summarized herein. The Next Generation Working Group may also establish sub-groups to focus on specific implementation focus areas and topics. The Next Generation Working Group charter and actions will be approved by the PODS Technical Committee for Governance (TCG).

The schedule for Next Generation implementation is being established. The next major milestone for the Next Generation initiative will be to present the scope and gain Association Member feedback at the Operators and Service Providers Forum, held in conjunction with the Esri Petroleum User’s Group Conference, on April 26-28 2016.

**Implementation Timeline**

The timeline for development and release of a transformed PODS Pipeline Data Model is still being determined. Design of a transformed standard will begin in 2016. Standards transformation will be performed in an iterative and incremental fashion.

The PODS Association recognizes that its members have made significant investments around the current Pipeline Data Model and that migration to a new, transformed standard may take time. The PODS Association will provide validation tools and best practices to assist its member organizations in migrating to and using the transformed Pipeline Data Model.

**Next Generation Pipeline Data Standards – Scope**

Key elements of a transformed PODS standard will include the following:
Pipeline Data Model – Core Tables — tables required for managing core assets in a pipeline system. The tables will support management of hierarchy (lines, sites, etc.) and will provide a core set of attributes and code lists and lookup values for describing the characteristics, condition and operational status of the core assets.

- The Next Generation Working Group is evaluating the number of tables to be contained in the core – the transformed core will likely have a smaller number of tables and attributes as compared to the current standard (version 6.0).
- The core tables can either stand-alone without a spatial component or can be coupled with a spatial representation of pipeline assets.
- Simple and complex spatial representation approaches are being considered, including alignment with key industry innovations such as Esri.

Pipeline Data Model – Modules — Modules are extensions to the core data model to represent and manage data related to specific business requirements and work streams including in-line inspections (ILI), regulatory reporting, new construction, etc. and representing specialized assets unique to key upstream, midstream and downstream operations such as offshore operations.

- Modules defined as a set of tables with definitions for every element of the schema and example spec apps connect to specific fields.
- Modules can be deployed and extended in an open approach. PODS organizations/members can utilize, vote for and extend modules based on their effectiveness.
- The PODS Data Model Team would be responsible for the initial evaluation of the proposed module structure, content and accuracy before it is deployed.
- Migration strategies for existing Pipeline Data Model modules are also being evaluated.

Data Exchange Specification — PODS will implement a standard data exchange mechanism using readily available and industry-accepted technologies including extensible markup language (XML) and/or JavaScript Object Notation (JSON). The PODS interoperability specification will enable data exchange between organizations, systems and databases via an open, vendor-neutral exchange format.

- The Next Generation Working Group will guide definition of interoperability and data exchange requirements, as well as providing a definition of “interoperability”, both within and between organizations and systems. Interoperability is defined as the ability to “hook” applications to data as defined by the exchange format.
- One alternative being considered include adoption and adaptation of the Open Geospatial Consortium’s PipelineML data exchange specification (see http://www.pipelineml.org).
Linear Referencing Approaches – The transformed PODS Pipeline Data Model will support several different linear referencing systems including measure, station and milepost approaches.

  - Esri’s APR (ArcGIS for Pipeline Referencing) linear referencing model will be supported in the transformed core data model.
  - Reference modes including continuous measurements (using 2D/3D determined measure distances), interrupted stationing (using 2D/3D station distance), reference point and offset, inspection KP (2D distance), odometer values and X,Y,Z coordinate systems will all be supported.

Location and Spatial Data Management – The transformed PODS Pipeline Data Model will be vendor- and platform-agnostic, though will support specific vendor platforms including those listed below, and organizations will be able to implement the Model both with and without spatial (geographic) components.

  - **Relational Data Model** – PODS Association members will be able to implement the transformed PODS Pipeline Data Model in standard relational database management systems (RDBMS) including Oracle, SQL Server, PostreSQL and others. Basic location information including XYZ coordinates can be managed in the Model’s data tables.
  - **Spatial Data Model** – When electing to include spatial representations, the model will support spatial platforms including Esri’s ArcGIS Platform, PostGIS, and RDBMS spatial formats including SQL Server spatial data types and Oracle Spatial.
  - Spatial tables/attributes/structures would “bolt in” to the PODS Pipeline Data Model Core tables, allowing organizations to easily include or exclude spatial representations at any time.

Implementation Resources – The PODS Association intends to provide a broad range of comprehensive tools and services to enable Association member organizations to understand, implement, extend, use and sustain the transformed PODS Pipeline Data Model and standards. Key implementation resources will include:

  - **Data Dictionaries and Models** – Describing the conceptual, logical and physical structure of the transformed Pipeline Data Standard. Descriptions of tables, attributes/columns, domain values and relationships between tables will all be described in sufficient detail to ensure Association members have a common and adequate interpretation of data modeling business rules with no room for misinterpretation.
  - **Data Maintenance Best Practices** – Describing how data would be managed in the transformed Pipeline Data Model to support common operations including centerline modifications, asset modifications, pipe change-outs, re-routes, etc. Guidance will be provided on how the transformed Pipeline Data Model can be used to support history tracking, time-based events including inspections, repairs and other activities.
  - **Model Deployment and Data Validation Guidance** – Including best practices to create PODS Pipeline Data Model schema templates in RDBMS and spatial systems – for both the core and modules, migrate data from prior PODS versions and to perform quality assurance/quality control (QA/QC) and compliance checks.
  - **Business Intelligence Layer/Service** – The transformed PODS Pipeline Data Model will include pre-defined database views and queries to enable easy access to information stored in the Model. The current model is highly normalized and as a result is structured in a very complex fashion and extracting meaningful business intelligence from the current data model is difficult. The transformed Model will be less normalized and include readily-available views and queries enabling discovery of meaningful information in a highly performant fashion.
PODS Next Generation – Scope and Summary

- **Data Import/Export and Exchange Tools** – Allowing organizations to import, export and publish data using the PODS open interchange specification.

- **Module Management Tools (TBD)** – Depending on which approach is taken for module management and governance, the PODS Association may provide tools allowing Association members to upload modules for posting, sharing and collaboration. The PODS web site may include module sharing and collaboration capability. Tools will be provided to ensure that submitted modules comply with core specifications and requirements and to generate schemas and documentation from submitted modules.

- **Training and Implementation Support** – The PODS Association is considering training approaches including both direct training for Association members and “train the trainer” approaches to enable service provider organizations to assist operators and other organizations in implementation of the transformed PODS Pipeline Data Model.

**Standards Governance**

The PODS Association has established a new governance organization and processes in late 2015. PODS governance bodies will provide policy and requirements guiding Association member organizations in adoption and adaptation of the transformed standards. Guidelines for minimal and preferred compliance will be provided, along with instructions on how to provide feedback and enhancement recommendations.

Management of model content – for both the Core and Modules – will be defined and managed in a sustainable fashion to ensure that the transformed standards remain aligned with key design patterns and organizational strategic goals and objectives.