



GEOSPATIAL INFORMATION &
TECHNOLOGY ASSOCIATION®

Data Management within the Pipeline Industry

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Introductions

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Overview

- Data Standard, Template, Model
- Decision Drivers
- What are the options?
- PODS Data Model
- APDM Data Model
- Similarities and Differences

What is a Data Standard?

- It defines what is recorded
- It establishes how it is recorded
- Defines how it is supported by a system in order to retain its full meaning.
- A standard enables consistency and predictability in an organization's or an industry's information.
- A standard is an established format.

What is a Data Template?

- A data template establishes a framework that is used to collect and store information.
- It is usually created for a specific purpose but can be used as a best practice to collect information beyond its original scope.
- Beyond a central core; it is extendable and focuses on patterns.
- One goal of a template is to establish similarities between like datasets.
- While a template can be used rigidly to provide consistency, it is meant to provide flexibility.

What is a Data Model?

- It is a model of reality – it abstracts complex occurrences and interactions into entities and the relationships between them ...
- A data model is the logical data structure that comes as a result of a database design process.
- It is the implementation of a data standard or a data template, or even a combination of the standard and a template.

Data Model Decision Drivers

- Understanding the direction of the business
 - This is an excellent opportunity to look beyond current uses to make an educated guess about the long term direction the business will take.
 - One important step is to identify all the types of pipeline that may eventually reside in the model and into what other systems the model may be integrated.

Does the business drive the data model or does the data model drive the business (or do both drive you crazy?)

Decision Drivers

- Identify the corporate perspective regarding industry standards, particularly with respect to developing a solution designed to meet the organization's specific needs.

Decision Drivers

- What is the overall strategy for information management?
 - Does the business tend to manage information using relational technologies?
 - Do individual groups exist with little or no communication between them?
 - Does anyone currently employ the geodatabase or other specific spatial management techniques?

Decision Drivers

- How is the organization planning to perform enterprise wide integrations?
 - Tight integration involves the use of foreign keys or related records to form linkages between otherwise independent data stores.
 - Loose integration involves the use of reusable web services to provide access to the desired data.
- Are there integration solutions/vendors already in place?

Decision Drivers

- What data already exists in your organization?
 - Your organization may have gone through other similar selection processes, e.g. PPDM (Public Petroleum Data Model), from which you can learn.

Decision Drivers

- Have the work flows and business processes (particularly with respect to the management of pipeline, E&P data) been identified and validated.

What are the Options?

- Pipeline Open Data Standard (PODS)
- ArcGIS Pipeline Data Model (APDM)
- Industry Standard Pipeline Data Management (ISPDM)
 - Originally developed by the Gas Research Institute and funded by the European Commission
- Integrated Spatial Analysis Techniques (ISAT) Model

Pipeline Open Data Standard (PODS)

PODS

Pipeline Open Data Standard

The PODS Data Model

- A comprehensive pipeline data model
- Primarily used for operations and integrity management but includes all areas of information related to a pipeline
- Designed for gas and liquids
- Designed for gathering, distribution, and transmission lines
- An open standard
- The intellectual property of the PODS Association
- Designed by PODS members – industry leaders who volunteer their time in the Technical Committee and on working groups

The PODS Data Model (History)

- Initiated by GRI in 1998
- Driven by the PODS Association
- ISAT v.2 = PODS Release 2
- ISAT I.P. assigned to PODS Association
- Incorporated work from ISAT many different contributors

The PODS Data Model (Current)

- PODS 4.0.2 was released September 2007
- Data model contains almost 1,000 tables and continues to develop
- Industry leaders form working groups to create necessary tables

Mandates

- That the technologies used for model development strive to be open and independent of platform or vendor;
- That membership be open to any company, association, agency or individual;
- That membership directs the activities and priorities of the Association and the model;
- That data model standards developed are non-proprietary;
- That members vote to approve all proposed data standards;
- That funding is raised through membership fees and sponsorship by members.

Objectives

- Improve data integration
- Reduce implementation risk
- Improve user capabilities
- Set industry data standards
- Allow interoperability between vendors
- Improve data management

Initiatives

- PODS Spatial Committee
 - ◆ ESRI Geodatabase Working Group
 - ◆ Oracle Spatial Data Model Working Group
- ILI Data Interchange Working Group
- ECDA Data Interchange Working Group, in association with NACE
- One Call Damage Prevention Working Group
- New Construction and Survey Data Exchange Standards Working Group (in development)

ArcGIS Pipeline Data Model (APDM)



The APDM Data Model

- A comprehensive pipeline data template managed by APDM/PIG
- Designed for management of a pipeline centerline to support facility, integrity and operational management
- Designed for gas or liquid systems
- Designed for gathering, distribution, and transmission lines
- An open template
- The intellectual property of ESRI
- Designed by APDM Technical Committee

The APDM (History)

- March 2002 – M.J. Harden starts the initial work on the model.
- October 2002 – The steering and technical committees are officially formed at the ESRI Electric/Gas Utility User Group Conference (EGUG), Coeur d'Alene, Idaho.
- July 2003 – Version 1 of the APDM is officially released at the ESRI International User Conference in San Diego, California.
- October 2003 – The model is reviewed and Version 2 is released.
- August 2004 – The model is reviewed and Version 3 is released by the APDM technical committee.
- May 2007 – The final draft of APDM v4.0 is released.

The APDM (Current)

- APDM 4.0 Released in May 2007
- 21 core classes, 2 metadata tables, 23 abstract or template classes, 102 example classes
- Steering Committee focused on education, ROI, Enterprise
- Technical Committee working on APDM 5.0
- 2 User Group Meetings per year, GITA O&G, PUG, ESRI UC Conference Meetings

Mandates

- An ESRI Geodatabase for use with ESRI's ArcGIS products OOTB
- Designed as a starting point, not an ending point
- Core objects and attributes that describe and effectively handle stationing, plus a core set of conceptual objects by which most, if not all, pipeline features could be categorized.
- By this approach, any pipeline company can add features to the model, modify existing features in the model, or subtract features from the model as required by business needs.
- Develop a model that end users could implement, and add data to without the need for custom code or development efforts

Abstract, Core, Metadata classes focus on behavior – response to centerline editing ...

Objectives

- Reduce the entry cost - build a model that can be extended as needed
- Decrease need for software development
- Focused on pipelines that use stationed position AND XY coordinates to locate positions of features on or along the pipeline
- ESRI Object Model so:
 - ◆ multiple forms of linear referencing
 - ◆ ESRI route and measure technology
 - ◆ hierarchical/geographical organization of pipeline features
 - ◆ Feature behavior during centerline editing operations
 - ◆ Links to external systems - ERP, Document Management, Work Order MS

Initiatives

- Development of APDM 5.0
 - ◆ Revised Example Classes
 - ◆ Best Practices (ROI Working Group, Enterprise GIS Integration Working Group)
- Focus on education, operator implementation stories, best practices via user group meetings
- Creation of a sample database with simple scripts for data loading

Similarities between PODS and APDM (The Models)

- Support similar types of pipelines - transmission and gathering, liquids or gas
- Support use of linear referencing and absolute coordinates to locate features
- Run by technical and administrative groups comprised of operators, consultants, and vendors
- GIS capable
- Select solutions from a group of vendors
- Blend solutions for multiple vendors
- Offer support via training, seminars, user group meetings

Similarities between PODS and APDM (Organizations)

- Organizations are members, not people
 - ◆ One representative per company
 - ◆ Each company has 1 vote (multinationals - special case)
 - ◆ Organization must be involved in the pipeline industry
 - ◆ Must be incorporated
- Responsibilities
 - ◆ Vote during elections
 - ◆ Keep representative information current

Organizational Differences

- PODS Annual Membership Fees (IP owned by PODS Association)
- APDM – ESRI Owned IP (Model developed in trust by APDM SC/TC)
- Voting rights per company – slight variance – intent is the same
- Incorporation requirements for membership – intent is the same

Differences between PODS and APDM

- APDM is a template with a standard core.
- The standard core is not approved by any industry body but it must be implemented as described in order to promote maximum interoperability between database implementations and business partner software.
- The remainder of the APDM model is a series of best practices which are optional but if selected must be implemented according to a set of rules, formally described as the APDM Abstract Classes.
- APDM provides an operator with flexibility but it is open-ended; it can be difficult for operators to clearly understand the requirements, define their specific needs, and implement the model.

Differences between PODS and APDM

- PODS is a certified standard that seeks to define in rich detail the features that describe a pipeline.
- The entire PODS tables structure is meant to be implemented 'as is' – this is what comprises the standard.
- The operator must have a good understanding of their business needs and the model or, as a standard, the model could dictate how the business operates rather than allowing the business to dictate the model.

Differences between PODS and APDM

- PODS describes in extensive detail the content and structure of a pipeline database.
- APDM describes in extensive detail the behavior of pipeline data elements when they are edited.

Differences between PODS and APDM (GIS Enabled)

- APDM is an ESRI Geodatabase, and therefore has GIS “built into” the model. Its implementations are standard and generally involve the same types of technology (linear referencing/topology).
- The PODS model is a Relational Database Management System with no inherent GIS functionality. It stores linear referencing and coordinate information in tables.
- The PODS model is vendor neutral and it gives pipeline operators the ability to choose the most appropriate GIS application for their organization.

PODS Spatial

- Two Initiatives – PODS ESRI Geodatabase and Oracle Spatial
- The PODS Association, ESRI, and APDM are working together to develop an ESRI dependent spatial implementation of the PODS model.

The PODS Association desires to collaborate with the APDM committees to form a common set of core classes for both the APDM and the PODS ESRI Geodatabase. The resulting PODS ESRI Geodatabase model will support the requirements of the PODS Association and maintain compatibility with existing APDM implementations to the greatest extent possible for both. The PODS ESRI Geodatabase model will also include representations of all PODS event and domain tables currently in the PODS relational database model. This will promote flexibility across the industry for users desiring to enhance their respective systems by providing more implementation and system development options in data models, applications, and service providers.

Summary

- Operators and service providers must have an understanding of their needs when choosing the most appropriate solution.
- Both PODS and APDM offer similar solutions with slightly different approaches
- Both models are established and have growing user communities
- The PODS model and APDM are not in competition but are working together to develop the best implementation for all operators and service providers.

Conclusions

- For the record - PODS and APDM are not in competition
- We have entered a formal agreement, driven by the pipeline operator community, in which we are developing a mutual solution