The one thing that confuses me is the terms – PODS Next Generation, PODS Lite, PODS 7.0 Model – Help!

<table>
<thead>
<tr>
<th>Next Generation (effort/project)</th>
<th>= the initiative to transform the data model</th>
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</thead>
<tbody>
<tr>
<td>PODS Lite</td>
<td>= a POC and free reference model containing a subset of the PODS 7.0 Model</td>
</tr>
<tr>
<td>PODS 7.0</td>
<td>= the next major release of the PODS data model resulting from the Next Gen efforts</td>
</tr>
</tbody>
</table>

The reason for these different terms is because data models and supporting documentation aren’t created instantly – we needed to move forward and show progress, while the concepts evolved.
Board of Directors

Established the Strategic Direction

TCG

Provides:
- Technical Guidance and Planning
- Coordination across teams
- Recommended Practices

Next Gen Workgroup

Created PODS Lite
Created PODS 7.0

- Documentation
- Business Rules
- DES
- User Guides

Sub-Workgroups

ILI

History

Others

- Provenance
- Regulatory
- Physical Inspection
## PODS 7.0 Team

<table>
<thead>
<tr>
<th>Role</th>
<th>Member Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-Chair</td>
<td>Buddy Nagel</td>
<td>Kinder Morgan</td>
</tr>
<tr>
<td>Co-Chair</td>
<td>Chad Corcoran</td>
<td>Andeavor</td>
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<tr>
<td></td>
<td>Craig Hawkins</td>
<td>Crestwood</td>
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<td></td>
<td>Dan Palazzolo</td>
<td>Williams</td>
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<td></td>
<td>Kirk Cameron</td>
<td>New Century Software</td>
</tr>
<tr>
<td>External Advisor</td>
<td>Kurt Buehler</td>
<td>Image Matters</td>
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<td></td>
<td>Michael Ray</td>
<td>Geofields</td>
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<tr>
<td>Co-Chair</td>
<td>Pete Veenstra</td>
<td>Pivvot</td>
</tr>
<tr>
<td></td>
<td>Steve Greenwalt</td>
<td>TRC Solutions</td>
</tr>
<tr>
<td></td>
<td>Todd Patterson</td>
<td>Buckeye Partners</td>
</tr>
</tbody>
</table>
• PODS is *the* standard in modeling pipeline data
  • The PODS Organization is working with operators, vendors, regulatory bodies, and other industry associations (API, IPLOCA, INGAA, OGC, etc.)

• Enabling a lot for your organization ...
  • Data storage definitions defined by operators like yourself
  • Access to a wide range of vendors to you solve complex problems
  • Providing a wide range of software solutions leveraging the standard
  • Organization of data in a standardized manner (reproducible, accessible, non-redundant, secure, standardized)
Design Principles

• Simplification of the data model
• Remove the need for linear referencing as the sole method for locating features
• Provide a formal data exchange specification for transfer of schema and data
• Framework for documentation including edit workflows and design decisions
• Adherence to accepted standard for data model design and management of geo-data
• One conceptual and one logical data model \(\rightarrow\) MANY physical database implementations
• Extendible through modules
• Documentation, documentation, documentation
What’s included in release

• Documentation
  • Executive Summary
  • Technical Overview
  • Conceptual Model
  • Design Standards *
  • Guidance Documents
    • Geodatabase Configuration
    • RDBMS Configuration
    • Modeling and Physical Implementation Generation *

• Logical Model Files *
  • ShapeChange *
  • Logical Model.eap *
  • Logical Model Data Dictionary *

• Geodatabase Files
  • Configuration toolbox
  • XML Workspaces
    • With and without APR
  • Insert Metadata.xls
  • Data Dictionaries

• Scripts and data dictionary files
  • Insert Metadata.sql
  • Scripts and Data Dictionaries:
    • Oracle SDO
    • Oracle ST
    • PostgreSQL
    • SQL Server

* Only available in PODS 7.0 Release
Full Release Schedule

- Member Comments – Now through 06/21/2019
- Final Release – by 8/9/2019 (dependent on comments)
- Business Rules Documentation – Q3 2019
- DES Documentation – Q3 2019
Getting from Conceptual and Logical to Physical Models

One PODS 7.0 Conceptual Model
Microsoft Visio

One PODS 7.0 Logical Model
Sparx Enterprise Architect, Shapechange

Managed by the PODS Association
Managed by Users of the PODS Model

Multiple Implementation Patterns (templates for different platforms)

Download templates and instructions from PODS website

RDBMS
Geodatabase
Open Source
Relational

RDBMS Spatial Data Types: Oracle Spatial, SQL Server Spatial
Esri Geodatabase native data format
PostGIS native data format
Coordinates managed in database tables

e.g., geodatabase for use with Esri APR
• I don’t get it, why have all these models ?!?

Conceptual Model
Concepts, entities and relationships between them
Helps in understanding and teaching the problem domain
(concepts, things)

Logical Model
Geographic Mark-up Language (GML) Standard
Provides a framework or foundation that can be used for documentation and extending the model
(standard, agnostic)

Physical Model
A physical schema in a physical database
Allows users to implement the schema in a database platform of their choice
(specific RDBMS/GIS)
Choosing the Right Implementation Pattern

- Implement using the database framework of your choosing

<table>
<thead>
<tr>
<th></th>
<th>Geodatabase</th>
<th>Relational</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQL Server</td>
<td></td>
<td></td>
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<tr>
<td>Oracle</td>
<td></td>
<td></td>
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<tr>
<td>PostgreSQL</td>
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</tr>
<tr>
<td>Any Open Source RDBMS</td>
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<td></td>
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<tr>
<td>SDE Binary</td>
<td></td>
<td></td>
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<tr>
<td>ST_Geometry</td>
<td></td>
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<tr>
<td>SDO_Geometry</td>
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<tr>
<td>PostGIS Geometry</td>
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<tr>
<td>OCG WKT</td>
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</tr>
<tr>
<td>Any RDBMS Supported Spatial Type</td>
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</tbody>
</table>
Using PODS 7.0 and PODS Lite with Esri Solutions

PODS 7.0 and PODS Lite work seamlessly with Esri Pipeline Referencing for ArcGIS Pro

This is enabled by adopting Esri LRS approaches in the transformed PODS Data Model

Geodatabase for use with Esri Solutions
• Great starting place to learn what is in the PODS 7.0 Model
• Broken down into sections listed below and described in subsequent slides
• Describes the conceptual model poster including:
  • How to understand the diagram
  • How to read the diagram

• Abstract Classes
• Location Model (Linear Referencing System – LRS)
• Metadata
• Assets, Conditions, Operations, Locations
• Domains and Look-ups
• EditResponseCL
- Includes all elements in the model
- Includes a legend to help understand what the symbols, colors and text mean
- \[\text{L} = \text{PODS Lite tables}\]
• Explain higher level attributes and geometry types
• Avoid repetition
• Show building blocks that are extended to form tables (and tables in new modules)
• Assign editing behavior
• Included if locations are determined by linear referencing (distance from start)
• Included if implementing ESRI ArcGIS for Pipeline Referencing (APR)
• Not required for geometry-only (XY) implementations
Organizes pipeline system into logical groupings (pipelines)
Organizes begin, pass-through and ending points of pipeline (sites)
Product transported, Ownership and Operator (Gas, HVL)
Table Metadata

- Metadata about tables, modules, attributes, domains
Table Metadata – LayerMetadata Explanation

- Each table must be listed in TableMetaData
- Layers as subsets of records in tables (merging schema, allows differentiation)
- Also allows for more finite interaction rules - allow gap, allow overlap, topology
Table Metadata – TableRuleCrossRef Explanation

• TableCrossRef allows Units of Measure and Business Rules (Validation) to be applied to Attributes in Layers (or Tables) and for a given route.

• This allows for description of units without dependent fields (coatingThickness, coatingThicknessUOM)

• This allows for UOM to be applied to specific routes (re: USA/Canada cross border shopping problem)
  • Features belonging to this route have these UOMs (Metric)
  • These features on this route have these other UOMs (US)

• This allows for validation rules to be stored in the database and applied to particular attributes, layers and/or tables

| BusinessRule |
| StateCountry Lookup XML |
| Conditional Domains XML |
| Pipe Spec Sheet XML |
| US Rules |

| UnitOfMeasure |
| Meter |
| Foot |
| PSI |
| bar |

Only one or the other per TableRuleCrossRef record
• Same concept for activities

Each feature (1 valve, 1 well, 2 Taps, and a PipeSegment) were inspected and require a link to the document.

Comment
Can be used to describe any record in any table.

Valve
Well
Tap (2)
PipeSegment

DocumentCrossRef

Inspection Report, Valve
Inspection Report, Well
Inspection Report, Tap 1
Inspection Report, Tap 2
Inspection Report, PipeSegment
Inspection Report, Note
Equivalent Pipe Assets

- Some asset point tables are represented as points where the actual feature has a length
  - Valves, PipeBend, BranchConnect, Elbow, Reducer, Tee, Flange, MiscFitting, or Meter
- These tables inherit from the EquivalentPipeAsset table
- Have relationship from point table to PipeSegment via pipeSegmentID
Domains and Code Lookups

• Apply valid value lists to fields
• In RDBMS – Use code look up tables with additional meta-attributes
  • CurrentLF, SupercedeLF, AltDescription etc.
• In Geodatabase – use domains
  • Code Value = Code Description
• Different Types of Code Lookups/Domains
  • Type 1 – Immutable/PODS Model Standard (Enumeration/Check Constraint)
  • Type 2 – Additive Only (Regional) (PODS Managed)
  • Type 3 – Anything goes (Unmanaged)
EditResponseCL Domain

• Contains critical information for determining how a record, in a table inheriting from PipelineFeature, reacts when the feature location is altered, or the underlying network feature, that the feature is associated with, is moved or altered:
  • Null geometry = no location, no response to CL move
  • Relative, Online, Fixed LRS = move event on the line, do not update measure
  • Absolute, Online, Update LRS = do not move the even on the line, do not update the measure
  • Absolute, Offline, Update LRS for Point = do not move the even, update the measure if the point is within the ValidityTolerance of the NetworkRoute
  • Absolute, Offline, No LRS = Do not move the event, there is no measure to update
• PODS 7.0 and PODS Lite are out for comments
• Full Release by August 8th
• Review the Conceptual Model poster
• Modules, DES and Business Rules in-development
Thank you
Any questions?