Pipeline Data Models
Advances in the Industry

Jeff Allen
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Why are we still talking about pipeline data models…
Industry Segments

Gathering

Midstream

Transmission

Distribution
Approaches

- Linear Referencing System
- Geometric Networks
- Simple Features

Model Types vs. Increasing Complexity of Data
Industry Segments

Gathering
Midstream
Transmission
Distribution
What's Available Today…

- APDM
- PODS Relational
- PODS ESRI Spatial
- ISAT
- Vendor Specific
- PODS Oracle Spatial
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What are Operators Looking for…

• Starting or Departure Point
• Industry Best Practice
• Meets Specific Business Needs and Objectives
• Guidance / Documentation
• Interoperability
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Application Level Logic

Custom Core Development

Pipeline Focus

Core Functionality

esri
New Technology

- ALRP
  ArcGIS Location Referencing for Pipeline

- UPDM
  Utility and Pipeline Data Model
What is ALRP

• Adds Linear Referencing Capabilities to the Geodatabase

• Is a mixture of linear referencing enabled features combined with Esri software (extensions and GP tools)

• Software is being developed for the ArcGIS Pro platform
What is UPDM

- Template Data Model for Pipelines
- Capable of supporting both stationed and non-stationed pipelines
- Utilized a Geometric Network and ALRP together
- Targeted at vertically integrated utilities
  - (Distribution and Transmission)
Location Model

**Centerline sequence**
Key table for M-N relationship between Centerline and Route.

**Routes**
Route definitions.

**Calibration points**
Point feature class that stores route measures.

**Centerline**
Line feature class that stores route geometry.

- **Centerline sequence**
- **Routes**
  - **Calibration points**
- **Centerline**
Multi Linear Referencing Systems Support

Route features are generated from centerline geometry and calibration point measures

- Two routes
- 4 Calibration points
- 3 centerlines

The two routes above are derived from three centerline lines
Multiple Location Referencing Modes can be utilized simultaneously

- **Route and measure**
- **Stationing**
- **Referent and offset**
  - Intersections
  - Events
  - Features
- **Coordinates and offset**
  
  - Calibration Point: 1 mile
  - Event: 1.27 miles
  - Station Event: 100+00.00
  - Event: 456+25.00
  - Intersection Features
    - US Highway 10 crossing
  - Event: 300 feet from US Highway 10
  - Event: 45 feet from cell tower
  - Cell tower location: 34.0547, 117.1825
Incorporate ALRP objects into the core of PODS and align Relational Model attributes with new model
All Require Application Specific Functions to Support Linear Relationships

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ALRP

ALRP
All Require Application Specific Functions to Support Linear Relationships
Industry Segments

- Gathering
- Midstream
- Transmission
- Distribution

UPDM

Gas Distribution
Geometric Network

ALRP
Utility & Pipeline Data Model
For the natural gas and hazardous liquids industries

**Features**

- Pipeline-centric; Geodatabase-based
- Wellhead to customer meter or delivery point
- Moderately normalized
- Each component explicitly represented in a single database table object
Thank You

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