Challenges Managing ILI Data in an Enterprise Environment using PODS 6.0 Relational

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Triggers

• Partnership between TransCanada and ROSEN to implement a PIMS

• ILI is one of TransCanada's core integrity management drivers

• PODS 6.0 relational supports Pipe Integrity's business processes
Challenges

• Business requirements
• Performance and model scalability
• Enterprise integration
• Centerline Maintenance

STANDARD PODS ILI MODULE DID NOT MEET THE REQUIREMENTS
Business Requirements

• Unified enterprise ILI view
• Low quality ILI sections and report revisions
• Multiple ILI technologies
• Risk and feature assessment support
• Data integration
Performance & Scalability

Massive amounts of data

- Estimated +1 billion records in 10 years
  - TCPL’s network 65,000 km of pipe
  - >100 ILI runs per year
- Overpopulation of the event tables

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Enterprise Integration

- Data volume effects inside the organization
- Integration of various systems
- Workflow coordination
Centerline Maintenance

- Geometry changes
  - Re-routings, in-line replacements, repairs
  - GIS centerline maintenance

- Data alignment and correlation
  - Historical ILI
  - Centerline components
Conquering the Challenges

Started from standard PODS model

• Several refinement iterations

Contributions:

• Business requirements (operator)
• Product vision (vendor)
• Technical constraints (both)
Architecture

Possible architectures

- Keep as single PODS database
- Split PODS DB horizontally (by events)
- Split PODS DB vertically (by lines)
- External ILI DB

Decision to externalize the ILI module
ILI Module (current)

- Follows PODS conventions
  - Could be re-inserted into PODS database if need arises
- 13 “primary” tables with 300+ attributes
- 13 Code List tables
ILI Module (current)
ILI Module - Inspection

Before:
- 24 Attributes
- Basic run & tool information

After:
- 50 attributes
- Pipetally revisions
- Comprehensive tool/run statistics
- Data quality information
- Special tool/run configurations
- General tool information moved to tool specific tables
ILI Module – Tool (cont’d)

Before:
- No support for combo tools
- Core tool information

After:
- Support for combo tools
- Support more tool technologies
- Store detailed tool information, statistics, and capabilities
ILI Module – ILI_Data

Before:
- 56 attributes
- Basic support for MFL and GEO features
- ~10 attributes dedicated to positioning
- All data stored in single table

After:
- 2 core tables (Anomaly + Reference)
- ~110 attributes (Anomaly + Reference)
- ILI_Cluster table removed
- Support MFL, GEO, EMAT, UT, UTCD, IMU, etc.
- Remove link to Coordinate and Event_Range
ILI Module - Calculations

Before:
- Subset of ILI_DATA table
- Standard assessment results
- New assessments require extension of table

After:
- Assessment specific tables
- Extensible model: can add operator specific assessments, new industry methods
- Can store multiple results per feature
- Corrosion growth + re-clustering
Advantages

• Supports required data volumes
• Follows PODS conventions
• Supports wide variety of ILI tools
• Supports business processes
  • Advanced data mining
  • Extended
• Extensible
• Normalized
Disadvantages

- **Increased software complexity**
  - Additional development effort
  - Loading and querying data
  - ILI Alignment to Centerline
  - Centerline and geometry changes
  - History management

- **Point vs. linear event representation**
  - No mechanism to describe it
What’s Next?

• Continue module development
  • New requirements, clarifications, improvements, addressing disadvantages
• Dig Programs & Feature Verification
• More robust tool tolerances model
• PODS Spatial integration (?)
• Open discussions with PODS committees
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