Regional integration of a PODS database

*Aberdeen Exhibition & Conference Centre*
“The focus of this presentation is to highlight the processes, resource, knowledge base, architecture and infrastructure required for a successful PODS implementation.”
Seriously – Are you just digging a hole for yourself?

“It will cost a Fortune…”

“Take ages to deliver…”

“Just sit on the shelf!”
Why Change?

- Simplification & Efficiency?
- Modernising & Transforming?
- Cost Reduction?
- Regaining ownership of data?
- Regaining control over data?
- Improving access to (your own) data?
Why Change?

- Original design purpose
- Original design life
- Collaboration (OGA)
- Decommissioned Pipelines
- Change of ownership
- ‘MOT’ for your pipeline
- Vendor neutral (PODS)

There must be a reason to change an established process
If your company migrates to PODS, it is a long term decision and will *completely* change the way both you and your company manage pipeline spatial & integrity data.

Existing corporate structure is liable to re-align, necessitating the development or hire of new skill sets and establishment of new reporting lines (for example, essential knowledge of RDBMS/S - SQL / Oracle).

Significant IT co-operation will be required.
Hows’, Whys’ and Wherefores?

- Engineering properties
  - Physical properties of the pipeline

- Year on year inspection data
  - ILI, GVI, GI

- DVD / Video / stills footage
  - Space Hog!
  - Do not underestimate the space requirement / cost of video storage.

Where is all this data?

**Rationalise and migrate**
Challenge

- Sourcing and accessing data
- Preparing for migration

HOW to migrate?

- Invest in infrastructure and personnel
- Get someone else to do it!? 
- Magic Button? (NOT)
Options

Do it In-house:

- Strategy
- Management buy in
- Access to data
- Finance
- Organisation
- Resource
- Architecture

Outsource:

- Contractor
- Strategy
- Management buy in
- Access to data
- Finance
- Organisation
- Resource
- Architecture
First – Find one!

BP have utilised two companies to assist with PODS deployments globally to date:
  One based in Vancouver
  One based in Kansas City

Obvious conflict of interest with existing integrity management houses – one of the underlying ideologies of PODS is to retain data and IM process internally.
Level of engagement:

- Consultancy
- Guidance & Training
- ‘Simple’ data mining, rationalisation & migration
- Ongoing ‘Year on Year’ migration
- Hosting GIS
- Hosting analysis tools
- Managing corporate integrity program…
- Long term relationships
MEETINGS…..!

- Planning
- Start-up
- Kick-off
- Rollout
- Update
- Weekly
- Monthly
- Cake

These will take up a LOT of time, but if anyone in the loop feels they are not informed…. 😞
Define Strategy

A detailed development strategy outlining:

- COST estimates
- Delivery timeline
- Stakeholder engagement
- Access to source data
  - Archived engineering & Inspection data
  - As Built data
- Hardware
  - Servers
    - ArcSDE (ArcServer) is essential for the multi-user deployment of a PODS model and delivery of web-based mapping.
- Software
  - ArcGIS / Pipeline Office Studio (PLOS) / ESRI Portal / Geocortex
- People
  - Operations & Integrity Engineers
  - GIS Specialists / Database Specialist / Administrator
  - Data Entry personnel
Beginning....

More MEETINGS.....!
take a deep breath.
The PODS Association is a not-for-profit, vendor-neutral, pipeline data standards association. The association was created to develop and maintain open data storage and interchange standards to support the needs of the pipeline industry.

PODS (Pipeline Open Data Standard) is a database schema.

Schema - the structured organization of data to create a blueprint of how a database will be constructed - divided into database tables.

Each table within the database is in a specific format that is universally recognized.

http://www.pods.org/
Example data set: Abbreviated “Anode” table under Cathodic Protection category.
Data Dictionary specifies exact format of data field (Alpha Numeric Space Character) as well as description of field.
PODS Positives

- Global data standard governed by association
- Standard means same format and structure of data is used worldwide
- Scalable and adaptable
- Highly detailed
- Base PODS Model and schema easy to implement
- Copes with land-based pipelines, offshore pipelines and a mix in one database
PODS Negatives

- Overly complex in current “standard” format
- Steep learning curve for non-engineers and non-GIS professionals alike
- Poor interface with ArcGIS Portal to publish online maps due to number of relations extant
- Third party data loaders can be inconsistent and bug-prone
- Relationships between tables not always obvious
- Relationships not always handled well by ArcGIS
- No global symbology style in place
- Only one PODS instance per Server install (more than one causes issues due to relations clashing)
A Relational Database links tables using Globally Unique Identifier (GUID) whereas a Spatial database contains all the data required for (an event) in a single table (eg co-ordinates).

Software used to maintain relational databases are known as Relational Database Management Systems (RDBMS).

Virtually all RDBMS use SQL (Structured Query Language) for querying and maintaining the database.

The route centreline is created once. Many pipeline segments may be compiled in a single Station Series table with each segment assigned a GUID.

Each event (anode etc) will be associated with the Segment GUID, and will have a unique Event ID.

The position of an event will be defined by either or both of a ‘Station’ or ‘Measure’ value.

A pipeline segment may be simply 2D KP developed, or 3D based on engineering and installation records.

The ‘station’ may be used to define the KP of the event.

The ‘measure’ value may be true physical distance of the event.
“Creating a PODS dB is largely a data mining and syntax exercise!”
Playbook Process

- Identify pipeline segments requiring migration
- Develop segment centrelines in 3D (Measure Values)
- Develop segment centrelines in 2D (Station Series)
- Identify which PODS tables required
- Identify required fields in the tables
- Populate Excel spreadsheets
- QC – Check table content and syntax – Align with Data Dictionary
- Collaboration on structure of GIS and implementation support
- Collaboration during migration from spreadsheet to database via PLOS
- Construct a ‘Baseline’ database (Centerline & As-Built Features)
- Inclusion of additional GVI and ILI data (Year on Year inspection data)
- Work with sub-contractors to determine future PODS requirements for data delivery (GVI / ILI / Acoustic results) in data delivery process

- Big projects = Big data
- Long pipelines, many years inspection data = Big Data
- Video Data = Big Data
Example Workflow:

Data file (PRISM) → EXCEL → PLOS data loader → Access mdb in PLOS → PLOS Output to ArcGIS

**Process and challenges:**

- Measure value vs Station value
- PLOS does not accept –ve values for measure
- Frequently station series based on 2D KP value
- KP0 frequently at SSIV
- -ve KP along spool – riser – topside pipework.
Pipeline Office Studio

www.geonamic.com

- Designed as an analytical browsing and reporting tool for PODS data
- Creating EXCEL templates, populating and uploading to schema
- Creates and manages GUIs through process
- New Co. low resources. Beta testing product. Slow turnaround on recognising & resolving problems.
- Improving steadily.
Turboroute

www.eaglemap.com

➢ Turboroute Alignment sheet generator

➢ Eagle Information mapping Inc. product
Server Specifications (BP specification)

Staging and Production servers:

- Located in NSHQ Computer Room, data backed up in EMDC
- Server Specification: Dell R720, 2*4 Cores (8 total), 512 GB RAM, Intel Xeon E5-2643 3.30GHz, 10M Cache, 8.0GT/s QPI, Turbo, 4C, 130W, DDR3-1600MHz, on RHEV – SPECint2006 617 (per core = 51.4)
- Supports around 536 concurrent users at 80% server utilization
- Oracle 11g base
- 1.5TB storage, expandable
- Upscaled from base recommendation for PODS usage - upscale includes Pipeline Office Studio, and Turboroute
- ArcGIS Server 10.4 utilised on this server - on desktops it is ArcGIS Desktop 10.3.1 until Q2 2017, when it will be upgraded to ArcGIS Pro.
- Cost approximately £40K purchase & installation (not including software)
- Software suites operated under enterprise licenses.
Strategy, Implementation & Instructions
Viewing PODS data GIS
Accessing a feature
Review Anode Information
Review Anode Information
BP Instances

- Azerbaijan, Georgia, Turkey (AGT)
- Trinidad
- Angola
- North Sea
- Gulf of Mexico

No region is fully mature and all are still under various levels of development. Current climate has restricted development due to funding & resourcing challenges.
The PODS data model is implemented on a relational database management system (RDBMS) such as Oracle or SQL Server. Queries and interactions with the PODS database are written in structured query language (SQL), the most common database programming language.

The PODS relational model does not depend on GIS, but a GIS is the most common method for displaying PODS data.

PODS is ‘GIS-platform independent’, meaning it can work with ESRI, Intergraph, or any other GIS software.

Building and maintaining a PODS compliant pipeline GIS is an investment in gathering and maintaining quality data, creating manageable workflows, building and supporting software.

Since the data records are linked to the pipe segment, re-route, change of service, asset transfer or sale, abandonment, removal, repair, and replacement are all managed within the PODS database.

A PODS compliant database WILL increase the value of your asset

A PODS database WILL reduce risk through increased Pipeline Integrity Management features
Conclusion

- Developing and managing a PODS Database is expensive, time and resource consuming.

- Development & management is a long term proposal requiring collaboration between Geomatics, Operations and Integrity Management.

- Managing data and integrity of pipelines internally will eventually save costs, so long as your company commits, is aware of timelines / requirements and maintains this approach throughout the development and delivery process.

- There is very little external PODS consultancy support in UK.

- OPPORTUNITY!
Questions?