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## Session 4

## Defect Detection and Characterization

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# Obligatory System Map


**Panhandle Energy –**

- Approx . 19,000 Miles of Large and Small Diameter Transmission Pipeline
- Transmission, Storage, Onshore, Offshore, LNG Facilities
- 79 Compressor Stations – Over 2,000 Employees

# Overview

- What ILI can and can't see,
- or how interacting defects (dent w/ metal loss) are critical in response timing,
- or what is an appropriate sample size to verify conformance to ILI performance specifications
- or improvements in industry guidance and regulations???

# Uncertainties

- The accuracy and reliability of ILI measurements
- The accuracy of severity assessment calculations
- The reliability/accuracy of growth rate data for time-dependent defects
- Defining the urgency of response
- The safety of field crews during excavation and repair activities

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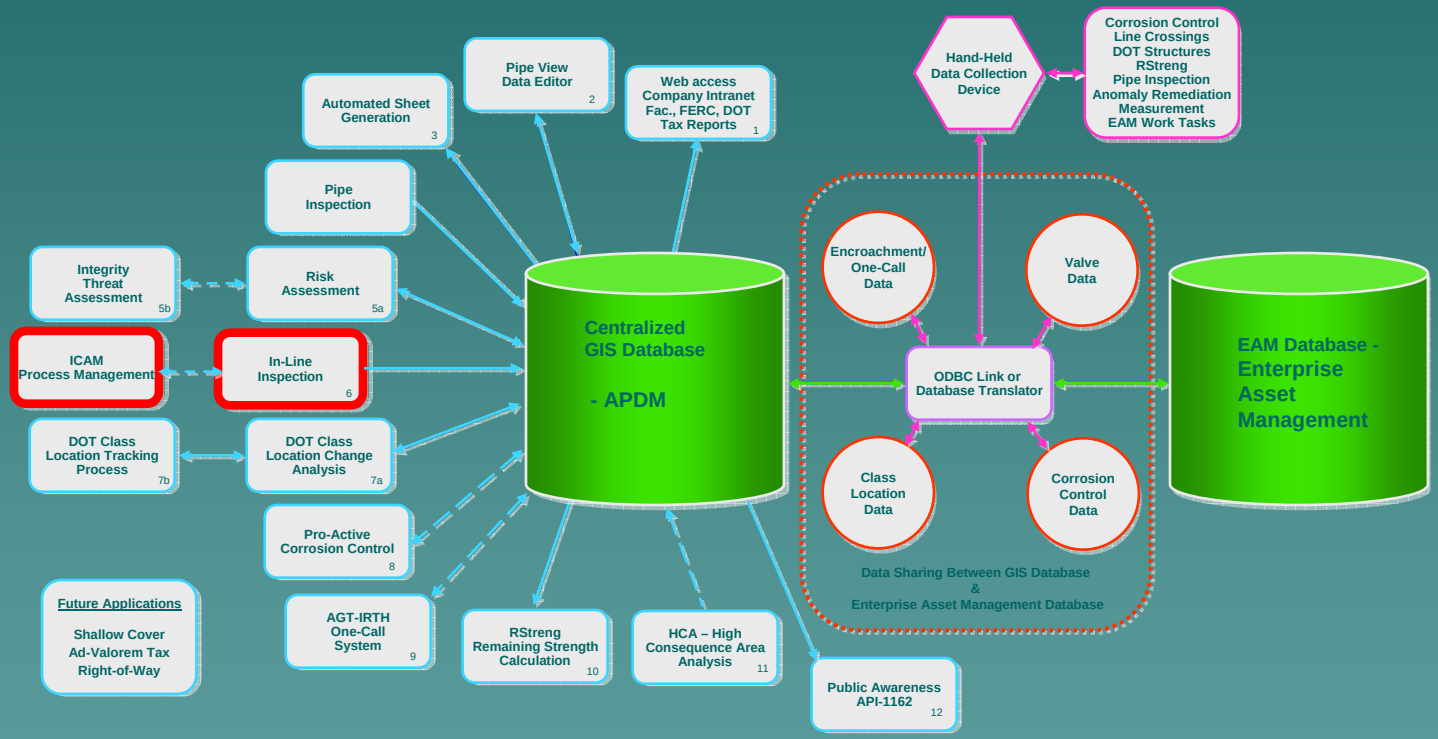
GIS – EAM Configuration

# Obligatory Data Map



# Process Management


- **ILI Discovery**
  - Log receipt of final report from assessment vendor
  - Integrate data with pipe properties
  - Analyze data prior to classification of anomalous conditions
  - Were all monitored conditions from previous assessments included in the discovery?
  - Were any anomalies discovered that fell outside the definition of Immediate, Scheduled or Monitored?
  - Detail how these "Other" anomalies will be addressed and add to the excavation plan as required
  - Confirm Discovery was competed within 180 days of assessment
- **Immediate Condition Response**
  - Is this area one that we will be able to excavate within 5 days?
  - Aggregate and review data associated with the potential immediate condition
  - Notify management & gas control that immediate condition may exist
  - Meeting / conference to determine implications of pressure reduction and personnel required to implement
  - Make formal recommendations to management for reduced pressure
  - Confirm Gas Control notified and pressure reduced

# ILI Sensor Technology

- Understanding Performance Characteristics and Limitations
  - Need to develop clear understanding of sensor capabilities with respect to different materials, sensor package, pipe geometry/cleanliness
  - What are nominal expectations for each of the technologies, and across all vendors
  - How can more precise measurements from subsequent inspections and in-ditch verifications be used to “close the loop” on performance of tools?

# Sensor Technology

- Detection of Cracks/SCC
  - In-ditch methods for finding and sizing SCC
- Cased Pipes
- Small Diameter Lines
  - Are inspection pigs needed?
  - What minimum size should be investigated?
- New Technologies are Needed
  - For unpiggable lines; e.g., pig on a stick
  - For patched pipe
  - For non-metallic materials
- Apply existing technologies from exploration and production sector
- Maximize data acquisition

# Mechanical Damage

- What are immediate needs?
  - Screening and ranking tools for decision-making
  - Guidance to make life predictions and prioritize maintenance operations
  - Tools to locate and quantify all parameters needed for assessment models
    - Severity assessment
    - Guidance on acceptable levels of damage
  - Methods to locate and repair damage in difficult to inspect areas

# Mechanical Damage

- Need to develop acceptable definitions for
  - Cracks
    - No guidance exists for definition of cracks – significant vs. microcracks
    - Can quantitative models of damage assist development of definitions?
  - Ripples/wrinkles
- Inspection tools need to consider variations in steel grade and non-metallic materials

# When to Repair

- Primary need is to transfer technologies to practices and implement in standards to influence regulatory activities as quickly as possible
  - Technologies to address accurate corrosion rate determination to quickly address intervals
  - Post ILI calibration technologies to address intervals
- What is the technology needed to support repair decisions?
- How do you mine existing datasets to learn from and provide practical guidance?