Detection and Assessment

R&D Forum

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Jerry Rau - Panhandle Energy

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Role of Category 1 Committees

- **Corrosion and Inspection**
  - ILI for mechanical damage, cracks, & geometry, direct assessment, coatings & inspection tools, SCC, MIC
- **Design Construction and Operations**
  - Implementing new integrity standards, reliability-based design, preventing 3rd party damage, human factors, abnormal external loads, wrinkles/wripples
- **Materials**
  - New, tougher and more damage/defect-resistant steels (e.g., X100); repair & assessment tools
  - New welding & weld inspection processes to assure integrity and lower repair and new construction costs

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Strategic Objectives

1. Develop programs to maintain integrity

2. Develop programs to influence regulatory requirements associated with safety & integrity

3. Develop programs to reduce capital costs of new pipelines

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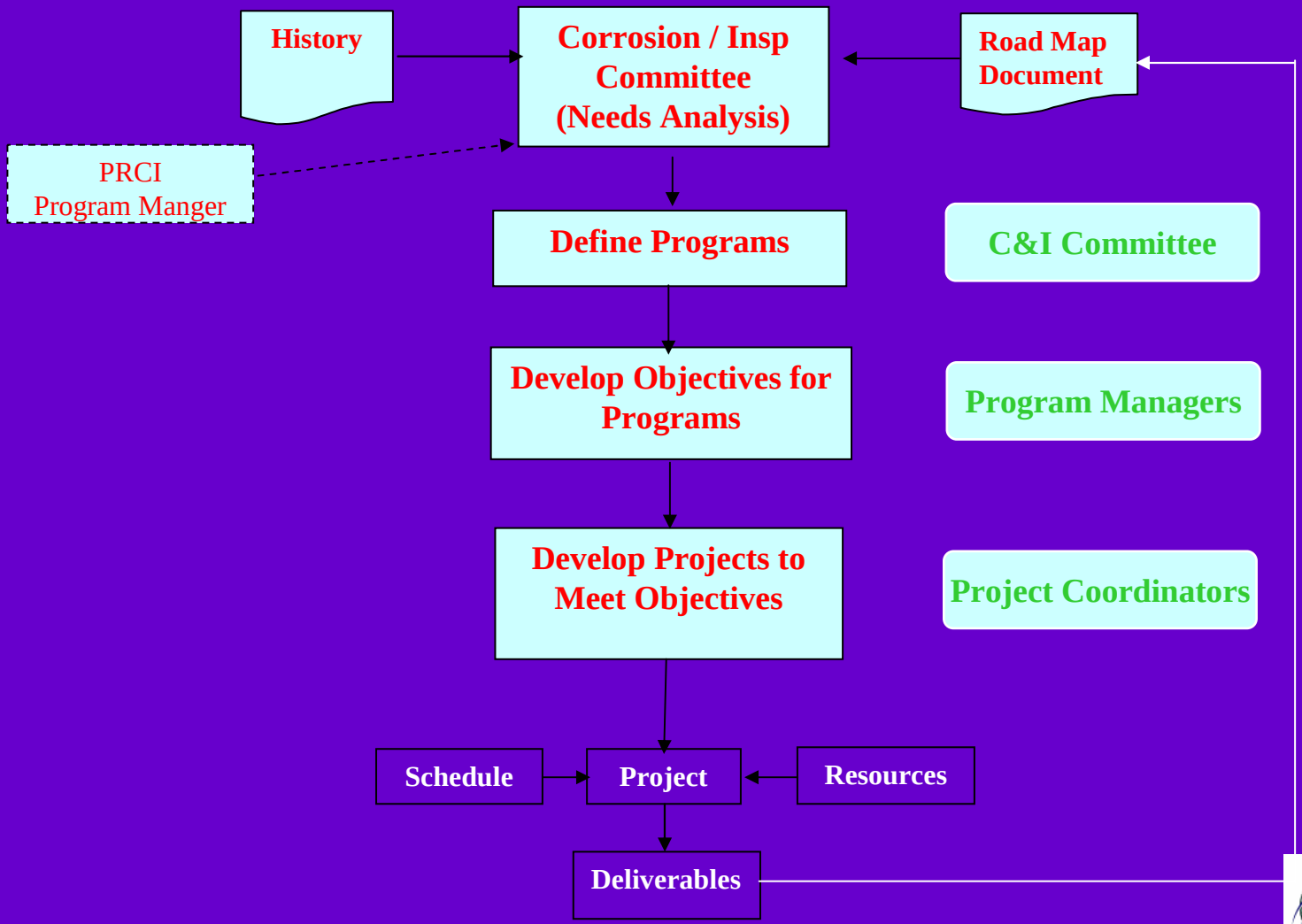
The Process



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The Road Map

- Program Name
- Program Description
- Background
  - History of previous projects

- Objectives
- Projects
- Deliverables
- Schedule / Cost

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Program Name	2004 Goal	Co Fund	Pertain to Liquids	2005 Mort.
Mechanical Damage	586	865	70%	250
Non Piggable Pipelines	1220	500	98%	355
Shielded Pipe	356	450	100%	100
Internal Corrosion	545	980	10%	200
Assessment Intervals	175	0	100%	0
SCC	415	0	100%	65
CP Effectiveness	390	265	100%	150
Total	3696	3060	91%	1120

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Integrity of Non-piggable Pipelines

- **Description:**
  - Develop inspection technologies and procedures that enable the use of alternative methods of integrity assessment for non-piggable pipelines.

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Integrity of Non-piggable Pipelines

- **Completed non-piggable pipelines member questionnaire**
  - No clear direction for ILI tool development to meet PRCI member needs
  - Priority for PRCI members is clearly weighted towards direct assessment
- **DOT cofunded projects**
  - Remote field eddy currents
  - Baseline study of options for new types of vehicle
  - “No Pig” development

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Integrity of Non-piggable Pipelines

- **Schedule / Cost:**
  - 4 Year – $3,000K
  - 2004 PRCI Funding – $1,220K
  - 2004 Co-Funding – $500K

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Identify and Prioritize Locations for Internal Corrosion Inspection, Monitoring and Mitigation

- **Description:**

  Reduce the internal corrosion management costs of essentially dry gas (< 7 #/ MMSCFD) systems subjected to occasional upsets in gas quality by targeting the locations most susceptible to corrosion for inspection and monitoring, improving the effectiveness of mitigation methods, and prioritizing lines for maintenance activities.

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Identify and Prioritize Locations for Internal Corrosion Inspection, Monitoring and Mitigation

2003 Highlights:

- **Corrosive/inhibitive properties of condensates**
- **Internal Corrosion Direct Assessment – DOT/RSPA**
- **Guidelines/ quality standards for transportation of gas**

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Identify and Prioritize Locations for Internal Corrosion Inspection, Monitoring and Mitigation

2004 Projects:

- **Pipeline Drip Corrosion Mitigation**
- **MIC Test Method**
- **Fluidized Sensors (RFID)**
- **Effect of Solids & Bio-film on Dew Point**
- **Microbial Ecology Survey (DNA)**

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Identify and Prioritize Locations for Internal Corrosion Inspection, Monitoring and Mitigation

- **Schedule / Cost:**
  - 5 Year – $890K
  - 2004 PRCI Funding – $545K
  - 2004 Co-Funding – $705K

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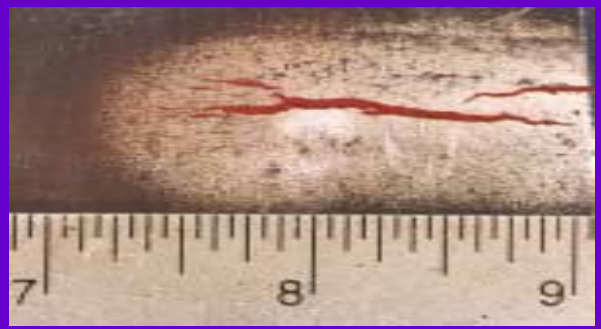
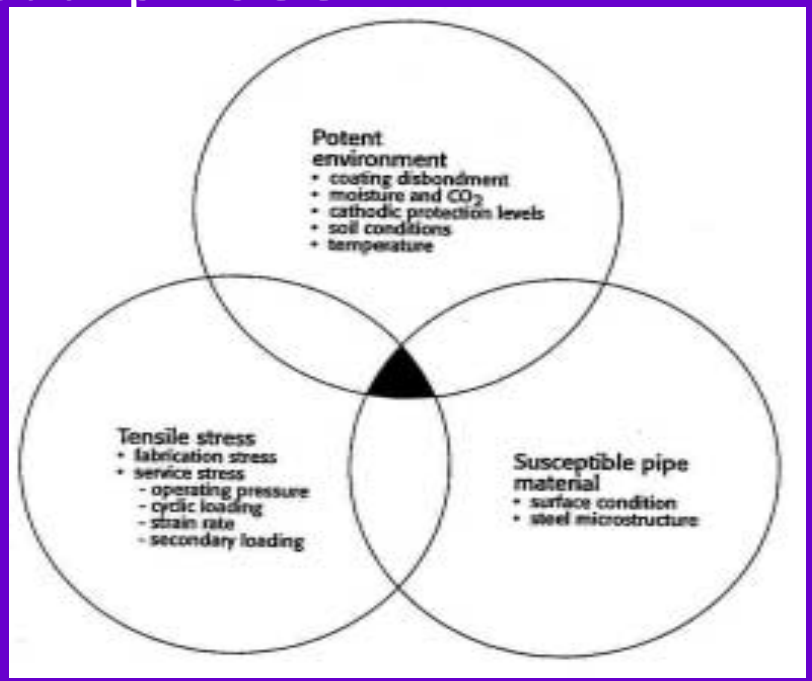
Managing SCC

- **Description:**

  Reduce the cost and increase the effectiveness of in-line inspection (ILI) and hydrostatic retesting for managing high-pH and near-neutral-pH SCC





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Managing SCC

2003 Projects:

- **Mechanism of Organic Soil Inhibition of SCC**
- **SCC sample management**
- **Increase Number of Wheel Sensors, different coupling methods, PII CDUT Density**
- **Non-Traditional Methods for Detecting Cracks**
- **Gas Coupled UT (SwRI)**
- **Circumferential MFL Capability of Detecting SCC**

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Managing SCC

- **Schedule / Cost:**
  - 6 Year – $3,250K
  - 2004 Funding – $415K
  - 2004 Co-Funding – $0

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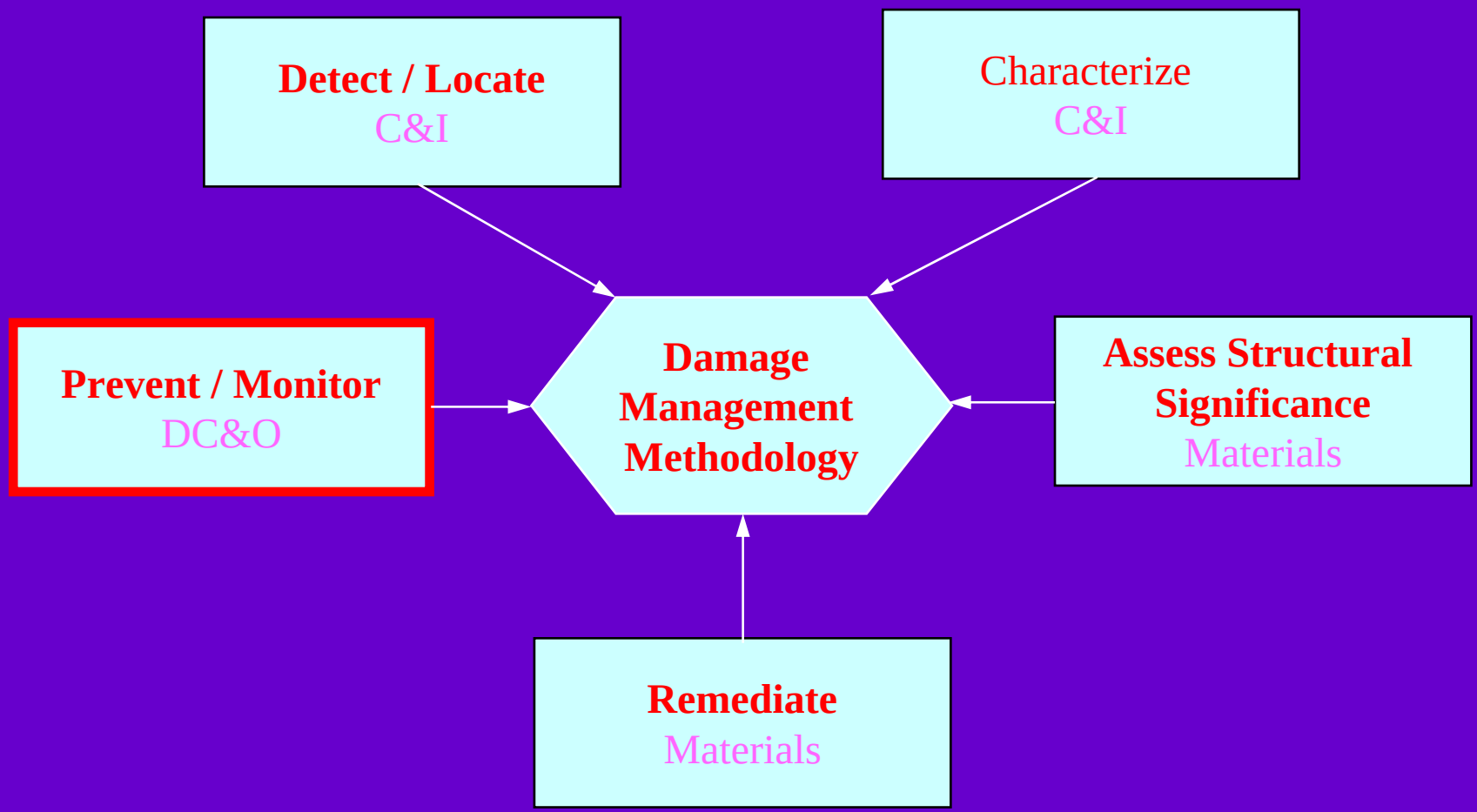
Locate Mechanical Damage



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Locate Mechanical Damage

Description:

Improve methods to locate pipeline prior damage. Improve corrosion detection and characterization. Ensure reliability of detection and determine the threshold for biggest missed imperfection not detected. Prevent pipeline delayed failures due to 3rd party damage on pipelines that have been inspected using in-line tools.

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Locate Mechanical Damage

2003 Projects:

- ✓ **Enhanced Assessment for Mechanical Damage**
- ✓ **Gas Coupled UT**
- ✓ **Mechanical Damage Inspection Using MFL Tech**
- ✓ **Continuous Barkhausen Technique**

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Locate Mechanical Damage

Schedule / Cost:

- 5 Year – $4,000K
- 2004 Funding – $586K
- 2004 Co-Funding – $865K

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Gaps / Additional Research Needs

- **SCC Sizing and Characterization**
- **Above Ground Detection Methods for Defects**
- **Inline Tools to Traverse Reduction in Pipeline Bore**
- **Mechanical Damage Characterization from MFL Signals**
- **Wet Gas ICDA**

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Summary

- **Consensus Process**
- **Road Map to Ensure Focus**
- **Various Programs Which Address Operators and Regulators Concerns**
- **Broad Spectrum of Input by Researchers, Gas Pipelines, Liquids Pipelines and Regulators**

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