Pipeline Research Council International

Inspection & Integrity Research Roadmap



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PRCI™

LEADING PIPELINE RESEARCH

What Is I&I Trying to Accomplish?

The I&I Technical Committee is working to help the pipeline industry:

- Detect and characterize integrity threats more reliably
- Convert inspection data into defensible engineering decisions
- Manage uncertainty and prioritize action based on risk
- Translate research into practical tools, guidance, training, and standards

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How the Roadmap Has Evolved

From:

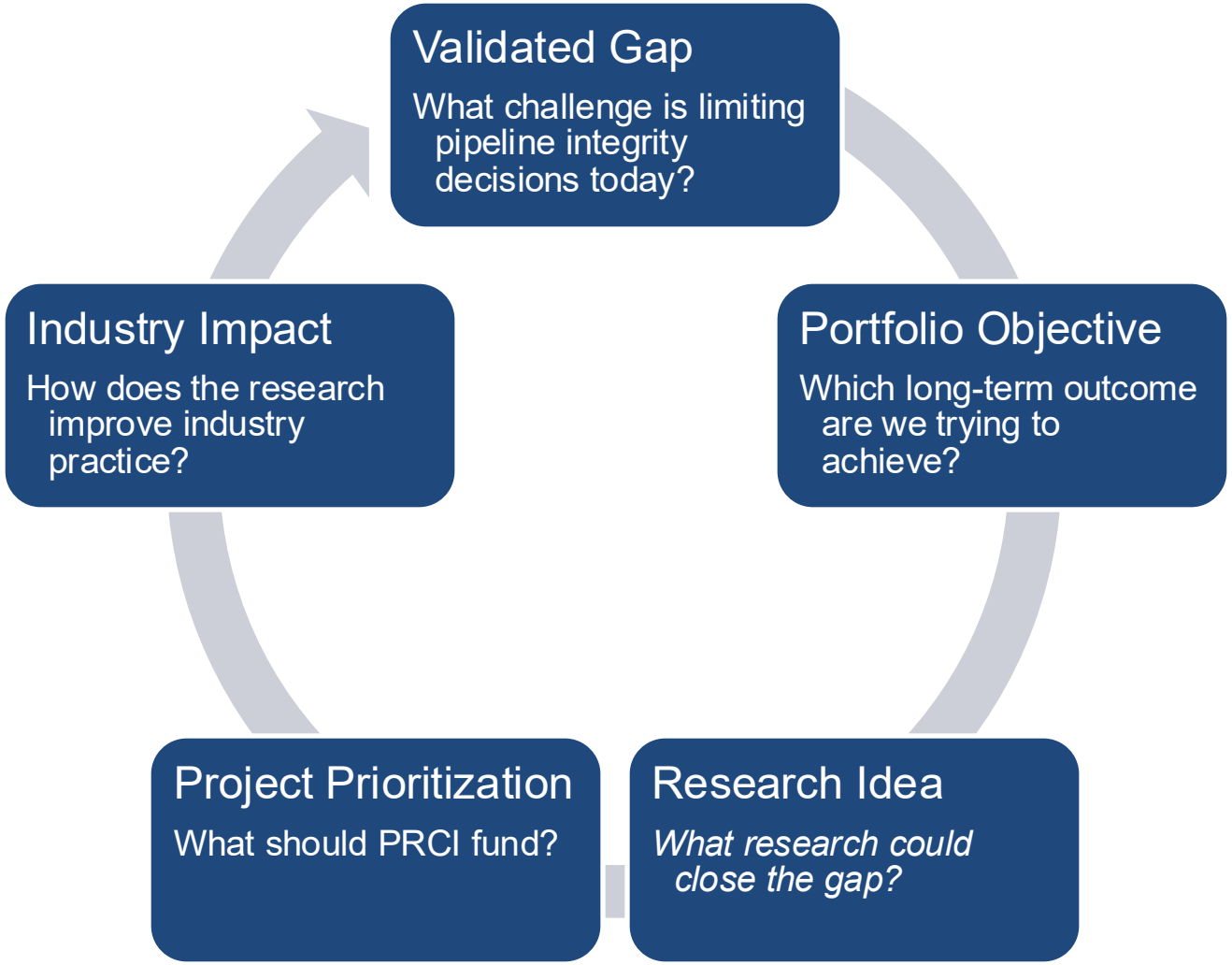
- Individual projects
- Subcommittee-specific planning
- Annual funding decisions
- Research outputs considered separately

Toward:

- Shared industry outcomes
- Cross-cutting research portfolios
- Connected multiyear programs
- Clear links from gaps to implementation

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How the Roadmap Works



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I&I Objectives

- Inline Inspection (ILI) Performance & Next-Generation Technology
- Crack Inspection & Characterization
- Advancing NDE technology & processes
- Difficult-to-Inspect (DTI) Integrity Assessment Methods and Models
- Crack Integrity Management
- Corrosion Integrity Management
- Interacting Threats
- Mechanical Damage and Dents
- Risk Assessment & Decision Support
- Industry Harmonization

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Key Areas Contributing to Gaps

Inspection Technology & Data Quality

- Improve NDE detection, characterization, and interpretation of complex anomalies.
- Improve consistency of NDE data collection, analysis, reporting, and validation.
- Improve ILI performance, validation, standardization, and next-generation capabilities.
- Address uncertainty in inspection measurements and technology performance.

Crack & Corrosion Management

- Improve crack detection, characterization, and assessment.
- Improve SCC and crack-management methodologies.
- Improve SSWC characterization, growth prediction, and assessment.
- Improve corrosion growth prediction and management.

Mechanical Damage & Interacting Threats

- Improve dent assessment methodologies and decision-making.
- Better understand interacting threats such as dents with corrosion, cracks, welds, and gouges.
- Improve assessment tools, screening methods, and engineering models.

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Key Areas Contributing to Gaps

Difficult-to-Inspect Assets

- Improve inspection and monitoring of unpiggable assets.
- Develop alternative inspection technologies and monitoring solutions.
- Improve material property verification and integrity assessment methods for DTI assets.

Risk Assessment & Decision Support

- Improve fitness-for-service methodologies.
- Improve risk evaluation, uncertainty management, and decision support.
- Improve prioritization of integrity activities and resource allocation.
- Improve integration of data, models, and integrity decisions.

Industry Harmonization & Implementation

- Improve standards alignment and implementation.
- Standardize terminology, reporting, and defect definitions.
- Improve workforce competency and training.
- Increase adoption of research outcomes through guidance and best practices.

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I&I Roadmap Examples

PRCI Research Objective	I&I Objective	Gap(s) to be Addressed	Desired Outcome(s)	Research Project Idea(s)
WORKFORCE - Maintain a competent and efficient workforce and reduce incidents related to human factors.	Industry Harmonization - Promote industry consistency through competency frameworks, aligning best practice and knowledge transfer	The industry lacks consistent defect definitions, reference materials, training expectations, and qualification requirements for personnel performing NDE evaluations. This can lead to inconsistent interpretation and reporting of defects across organizations.	A standardized NDE knowledge framework including defect definitions, reference imagery, terminology, training guidance, competency expectations, and recommended qualification requirements for NDE personnel.	1. Development of industry-standard defect definitions and terminology. 2. Creation of visual references for anomaly identification. 3. Establishment of workforce competency requirements. 4. Development of training and qualification guidance.
TECHNOLOGY - Stimulate the development and improvement of new technologies, tools, processes, and evaluation methodologies that enhance efficiency and accuracy of results.	Advancing NDE technology & processes - Improve NDE technology, processes and the procedures used through advanced inspection methods, improved analytics, qualification programs, and standardization.	Industry practices for surface preparation, crack truth data collection, data acquisition, analysis, and reporting vary significantly among operators, service providers, and inspection technologies. This variability can result in inconsistent inspection quality and reduced comparability of results.	Standardized industry guidance and best practices for NDE surface preparation, data acquisition, data management, analysis, and reporting. Improved consistency and interoperability of NDE data across the industry.	1.Standardization of NDE surface preparation requirements. 2.Development of consistent crack truth data collection methodologies. 3.Standardization of data acquisition and reporting practices. 4.Digital data management and interoperability.

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I&I Roadmap Statistics

I&I Gaps, Ideas and Projects

- Gaps – 13
- Ideas – 22
- Projects - 43

PRCI Research Objectives

- Technology – 36 (7)
- Integrity – 45 (4)
- Workforce – 4 (2)

I&I Objectives

- Advancing NDE technology & processes – 14 (2)
- Corrosion Integrity Management – 4 (-)
- Crack Inspection & Characterization – 2 (1)
- Crack Integrity Management – 14 (-)
- Difficult-to-Inspect (DTI) – 8 (5)
- Industry Harmonization – 5 (3)
- Inline Inspection (ILI) Performance & Next-Generation Technology - 11 (2)
- Integrity Assessment Methods & Models – 5 (-)
- Interacting Threats – 3 (-)
- Mechanical Damage and Dents – 8 (-)
- Risk Assessment & Decision Support – 13 (-)

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The 2027 Ballot Ideas Put the Roadmap into Action

Inspection and Detection
- Stress Tool Monitoring
- Longitudinal Seam Toughness NDE Validation
- Spiral Welded Pipeline ILI
- IMU Qualification Standards

Risk and Decision Support
- RBI for Gathering Lines and Pipeline Facilities
- Lifecycle Management of Legacy Repairs
- Benchmarking Corrosion Growth Rate Methods

Threat Assessment
- Reliability Model Framework for Crack Assessment
- Dent Failure Probability Tool
- Machine Learning for Dent Severity
- SSWC growth, characterization, and fracture mechanics

Implementation and Harmonization
- Defect Definitions
- Training and Certification Requirements
- ASME B31.8S state-of-the-art review and update

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What Success Looks Like and Need for Partnership

Success looks like:

- Greater confidence in inspection and assessment results
- More consistent, defensible integrity decisions
- Better prioritization of inspection, excavation, repair, and mitigation
- Research outputs that become usable tools, guidance, training, and standards
- Coordinated programs rather than disconnected projects

Partnership is needed for:

- Gaps that cross Technical Committee boundaries
- Access to representative data, pipe samples, field sites, and validation opportunities
- Alignment with standards and implementation activities
- Avoiding duplicated research across PRCI Technical Committees
- Identifying where Strategic Research Programs are more appropriate than isolated projects

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thank you

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