Working Group #3
Automation Solutions for Integrity Management Challenges

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Attendance Breakdown

Approximate total attendance	52 persons
Pipeline Operators	10 persons
Service Providers	9 persons
Standard Developing Organizations	0 persons
Researchers	14 persons
Academics	15 persons
Government	4 persons
Other	0 persons

Top 4 Identified R&D Gaps

Gap #1 – Develop a framework/guidance document to help industry in utilizing probabilistic and AI tools (General Knowledge)

Gap #2 – Develop a process for establishing benchmarks applicable to validation of tools and technologies, AI techniques, uncertainties in truth data, and risk tolerance
(General Knowledge)

Gap #3 – Examine the Probability Of Detection (POD) for various remote sensing technologies (Technology)

Gap #4 – Development of automation (e.g., robotics) for internal and in the ditch pipeline repairs (Technology)

Associated Details
(Gap #1)

Develop a framework/guidance document to help industry in utilizing probabilistic and AI tools for (1) bridging gaps in data, (2) understanding and account for uncertainty, (3) developing and interpreting risk models (4) optimizing decision making process, (5) system of systems

Creation and Dissemination of General Knowledge

a. What pipeline type(s) or LNG/UGS operations does the general knowledge target?
   All

b. Does the gap address any regulatory, congressional, or NTSB drivers?
   Yes, NTSB multiple recommendations including P-15-021

c. Does the gap address related consensus standards?
   Yes: API 1163,1173, 580, ASME B31.8S

d. What technical details or scope items are necessary and recommended?
   Based on pipeline specific case studies and examples.
   Define criteria for the selection of methods and models.

e. What are anticipated targets or timeframes to complete this research?
   2-3 years

Associated Details
(Gap #2)

Develop a process for establishing benchmarks applicable to validation of tools and technologies, AI techniques, uncertainties in truth data, and risk tolerance

Creation and Dissemination of General Knowledge

a. What pipeline type(s) or LNG/UGS operations does the general knowledge target?
   All

b. Does the gap address any regulatory, congressional, or NTSB drivers?
   NTSB P-15-013, P-15-020

c. Does the gap address related consensus standards?
   API 1163, ASME B31.8S

d. What technical details or scope items are necessary and recommended?
   Define ranges of applicability
   Define use cases
   Include broad range of scenarios
   Focus on standardization of protocols and documentation

e. What are anticipated targets or timeframes to complete this research?
   2 years

Associated Details
(Gap #3)

Examine the POD for various remote sensing technologies such as (1) leak detection systems, (2) LIDAR (3) satellite based monitoring, (4) aerial imagery for automated threat detection, characterization, and more frequent assessment

New or Improved Technology

a. What pipeline type(s) or LNG/UGS operations does the technology target?
All

b. What pipeline operating environment(s) must the technology operate in (inside/outside-pipe, above/under-ground etc.)?
Outside-pipe, above ground

c. What are any functionality and or performance requirements?
Standard data format and calibration sources (controlled and field testing)

d. Does the gap address any regulatory, congressional, or NTSB drivers?
No

e. Does the gap address related consensus standard
Alignment with DOE standard initiative about gas leak characterization (detection, quantification and localization) for above ground production facilities

f. What technical or regulatory roadblocks or barriers prevent the technology deployment?
None

g. What are anticipated targets or timeframes to complete this research?
2-5 years

Associated Details
(Gap #4)

Development of automation (e.g., robotics) for internal and in the ditch pipeline repairs (including weld disposition automation for metal loss repair, HAZ, etc.) including the location tracking. Focus on higher TRL technologies.

New or Improved Technology

a. What pipeline type(s) or LNG/UGS operations does the technology target?

All

b. What pipeline operating environment(s) must the technology operate in (inside/outside-pipe, above/under-ground etc.)?

All

c. What are any functionality and or performance requirements?

Cost effectiveness, reliability, safety of operation, ability to be inspected or provide self-monitoring

d. Does the gap address any regulatory, congressional, or NTSB drivers?

None

e. Does the gap address related consensus standards?

No

f. What technical or regulatory roadblocks or barriers prevent the technology deployment?

No

g. What are anticipated targets or timeframes to complete this research?

2-5 years since focusing on higher TRL technologies.

Additional Identified Gaps

Development of risk based decision support systems
Developing low cost platforms for monitoring (UAV, satellites, LIDAR, ILI, etc.). Art of the possibility from other applications. Making the systems more resilient.
Development and implementation of process control tools for capturing managing and monitoring asset data to enable robust integrity management from fabrication to service including localization, material traceability
Merging datasets for global analysis and analytics. (interoperability, normalization, integration)