



WELCOME & OPENING REMARKS

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REPAIR Annual Meeting

Rapid Encapsulation of Pipelines Avoiding Intensive Rplacement

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What Problem Are We Trying to Solve?

- ▶ Replace quickly and cost-effectively >50,000 miles of legacy gas utility distribution pipes
 - Cast iron
 - Bare steel material
 - Current pace finish ~20 yrs
 - Current cost \$1-10MM/mile, not including disruptions to public
- ▶ *Technologies address >500,000 miles of water/sewer pipes*
- ▶ *May provide insights for oil and gas transmission pipelines and legacy gathering systems*



REPAIR Deliverables/Advances

Work Categories

1. Testing (UC Boulder)

- Codes and standards for techniques
- Predictive models with latest Bayesian statistics for DIMP

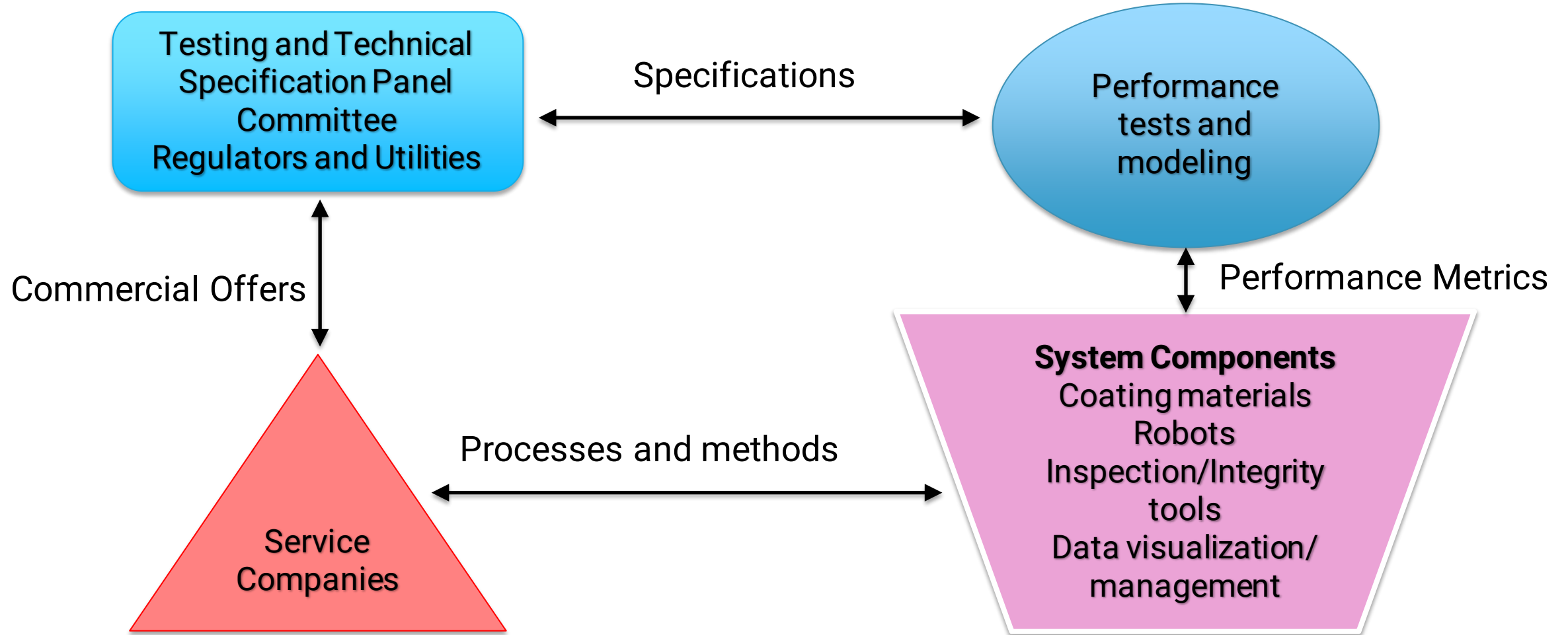
2-5. Integrated coating, deposition tool, integrity inspection tools (7 teams, polymers and metal)

- Coating with 50-year life without reliance on legacy pipe
- Stronger than steel, non-corroding, self-healing and self-reporting capability
- In-Line Inspection tools that can be incorporated into DIMP

6. Mapping (2 teams)

- 3D maps of gas pipes and adjacent underground infrastructure
- Real-time visualization tools for utilities, One-Call, and contractors
- GIS-enabled database with locations, material certs, deposition conditions, inspection results to allow work planning and forecasting

Teamwork, Communication, and Coordination



Creating the Ecosystem: Coordination with PHMSA

PHMSA Annual R&D Workshop Nov. 30-Dec 2, 2021

- <https://primis.phmsa.dot.gov/meetings/MtgHome.mtg?mtg=153>

Working Group #1: Rehabilitation of Aging Cast Iron Pipelines

1. **Introduction to Working Group—Working Group Leadership**
[PHMSA Leader: Chris McLaren, Program Manager](#)
2. [Industry Co-Leader: Saadat Khan, Director of Gas Distribution Asset & Engineering NYS, National Grid](#)

Research Funding Organization Presentations

[Jack Lewnard, Program Director, Department of Energy/ARPA-E](#)

1. [Khalid Farrag, Senior Institute Engineer - R&D Manager, Gas Technology Institute, Operations Technology Development](#)
2. [Rick Trieste, Department Manager - R&D, ConEdison & Gautam Kakaiya, Project Manager - R&D, NYSEARCH, Northeast Gas Association/NYSEARCH](#)
3. [Rehabilitation Vendor Perspective: David L. Wickersham, President, Progressive Pipeline Management](#)

Report out/recommendations

- <https://primis.phmsa.dot.gov/meetings/FilGet.mtg?fil=1211>

Creating the Ecosystem: Mapping

- ▶ Programs/Stakeholders
 - NYSEARCH, GTI, PHMSA programs for pipe locating
 - CEC mapping program
 - Cross-bore programs to avoid intersecting pipes
 - DOT Federal Highway Safety Administration underground mapping tools, including RUMI
 - DOD experience with UEX, IEDs, and SubT programs

- ▶ Opportunities
 - Multiple, “orthogonal” detection/mapping tools
 - Electromagnetic induction
 - Ground penetrating radar
 - Forced resonance imaging
 - In-pipe laser and optical imaging, coupled with sonde
 - RUMI autonomous surface robot with GPS/data links
 - 3-D data visualization, Machine learning, integration with utility asset and maintenance software tools
 - Opportunities for blind field tests ahead of excavation projects

Creating the Ecosystem: Coatings and Inspections

- ▶ Coatings and Inspections
 - Utility experience with CIPP liners
 - Water and Sewer experience with Class 2, 3, 4 spray-on liners
 - DOE Gas Infrastructure Office experience with liners for transmission
 - DOD and industry experience with coatings and metal spray
 - DOD and industry experience with real-time inspection robots
- ▶ Opportunities
 - Leveraging water and sewer experience: operations, materials, codes and standards, regulatory approvals
 - Identifying funding pathways for in-pipe metal coatings, for “spot repairs” and rehabilitation for transmission pipelines, steam systems, confined spaces