INTELLIGENT PIPELINE INTEGRITY PROGRAM

A Disruptive Government / Industry Team Changing the Narrative on Pipelines

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Changing the Narrative on Pipelines

Tioga oil pipeline spill cleanup nearing milestone after 4 years, but work continues

Program Overview

- iPIPE mission
  - Foster development of emerging technologies to prevent pipeline releases.
    - Fund development work,
    - Provide live, operating pipelines upon which technology is developed,
    - Provide user feedback to hone products.

- Unique collaboration between nine pipeline operators, the ND Industrial Commission, and technology providers.
- $6M investment over 3 years.

Technology Selection Process

Modeled after ABC TV's "Shark Tank" Program

- The program coordinates annual technology selection events.
  - Technology providers pitch solutions to expert selection committee.
  - Presentations summarize technology overview, cost model, demonstration schedule, expected outcome.
  - An expert panel selects technologies in which to invest.

Three Technology Selection Rounds to Date

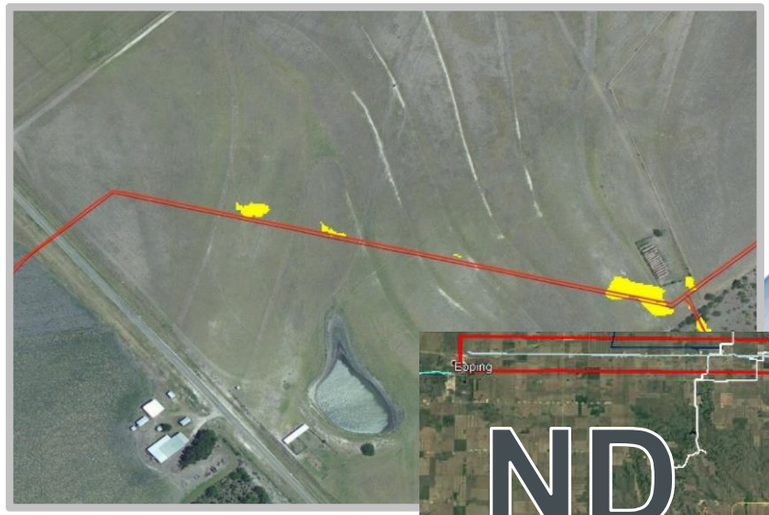
First Round – May 2018	Second Round – Oct 2018	Third Round – Oct 2019
• 9 invited	• 22 invited	• 65 invited
• 7 proposals	• 10 proposals	• 14 proposals
• 7 presented	• 9 presented	• 8 presented
• 2 selected	• 4 selected	• 2 selected

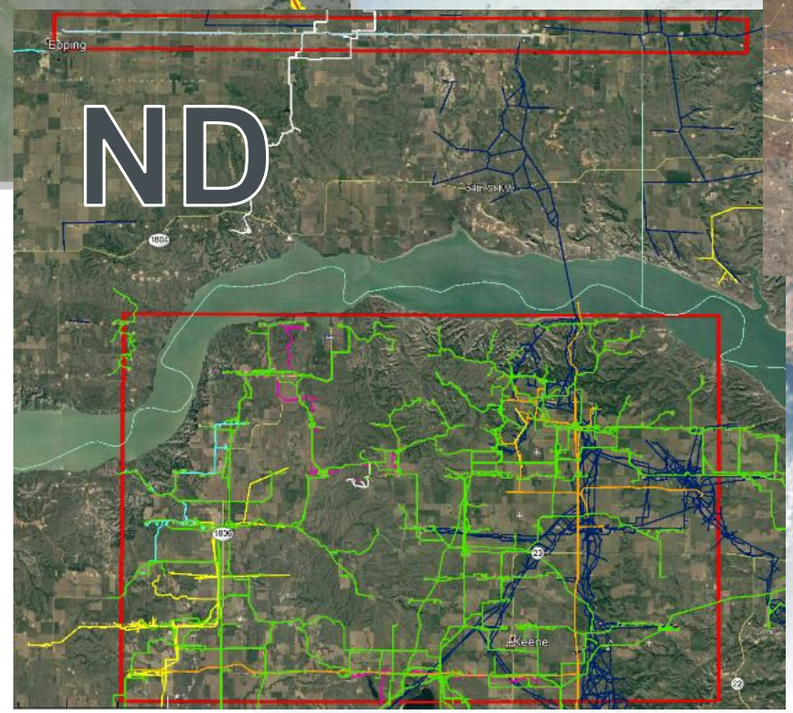
iPIPE is highlighting technology needs, and technology providers are quickly adapting to fill the gap

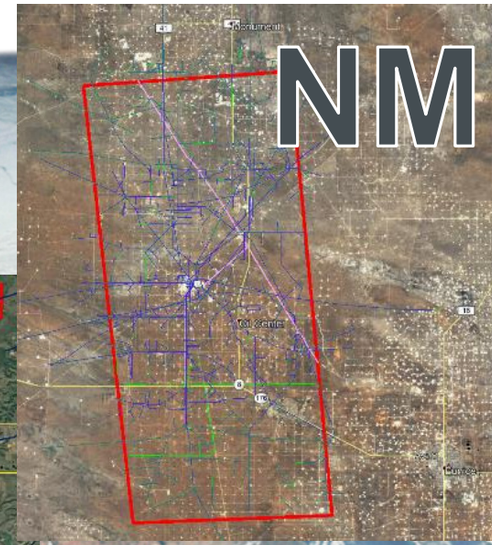
Machine Learning + Satellite = Eye In the Sky

Leveraging Big Data:

- Data Acquisition
- Spectra
- Bands
- Algorithms
- Analytics
- Alerts and Dashboards







Leveraging Technology

Satellites

Nano-satellites

Aircraft

Drone/UAV

Fixed/Persistent Platform

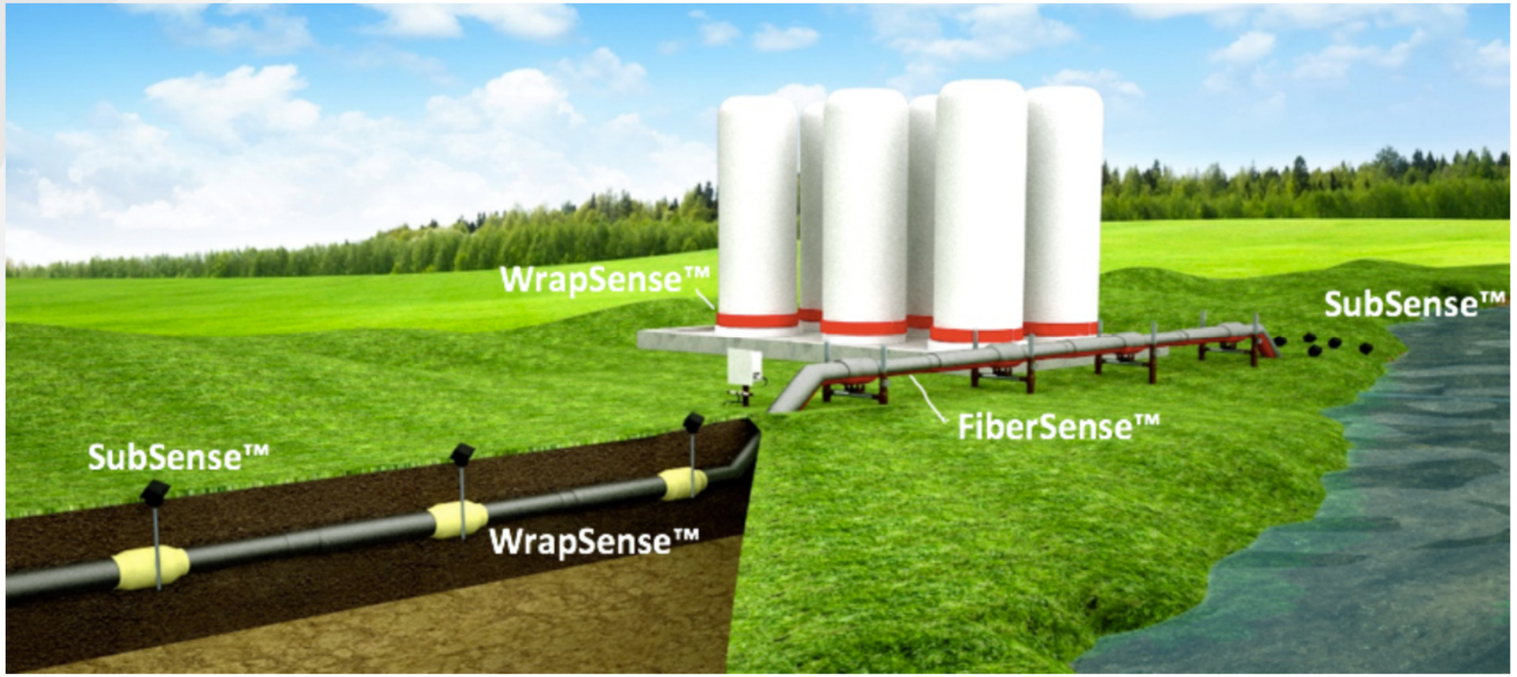
“Golf Ball” Pipeline Sensor

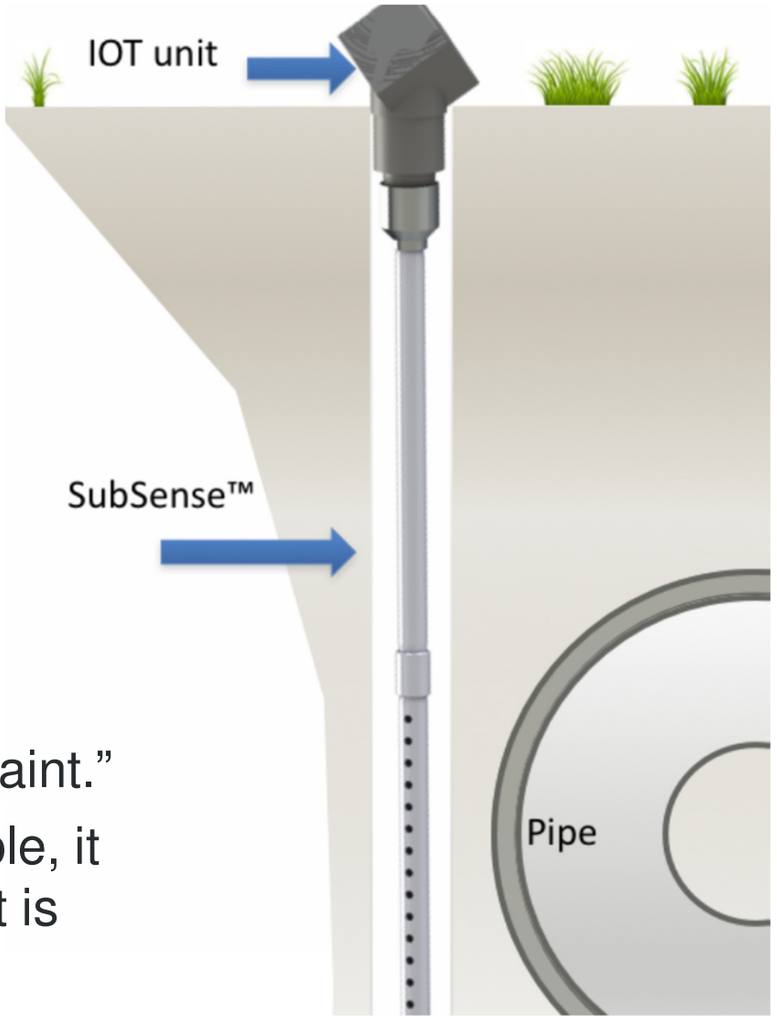
- Deploy when needed in all pipelines
- No downtime

- Golf ball-sized (1.5 inch)
- Free-flowing; adjustable weight
- Current sensors
  - Pressure
  - Temperature
  - Position (acceleration/rotation)
  - Magnetic fields
  - Acoustics

- Detect leaks
- Locate deposits
- Identify pipe wall flaws
- Locate pipeline centerlines

Intelligent Paint Sensor





- Uses polymers mixed with nanoparticles to create an “intelligent paint.”
- When applied to a PCB board, flexible substrate, or fiber optic cable, it creates a sensor to indicate presence of different fluids for which it is tuned (hydrocarbons or brine).

iPIPE Is Already Producing Results!

- Early iPIPE efforts have already resulted in commercial contracts of developed technologies with select iPIPE members.
  - New technologies are being invented to meet iPIPE needs!
  - iPIPE is moving the needle!

- Early success has led to new program members.
- Consortium will continue to grow!


http://www.ipipepartnership.com
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