

# Advances in Remaining Useful Life Analysis for Large-Diameter Pipelines

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## Enhancing Pipeline Condition

- Overview of RUL estimation methods
  - Data scrubbing
  - Degradation factors
  - Model (statistical, machine learning, deep learning)
- Importance of accurate condition assessment
- Predictive modeling for pipeline longevity
- AI implementation

## Assessments Through Technological Innovations



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# Corrosion, Deformation, and Failure Likelihood: A Data-Driven Approach

- Key factors affecting pipeline deterioration in example:
  - pipe material
  - soil conditions
  - corrosion
  - ground movement
  - improper installation
  - blockages
- Evaluating corrosion and deformation trends
- LOF (Likelihood of Failure) analysis



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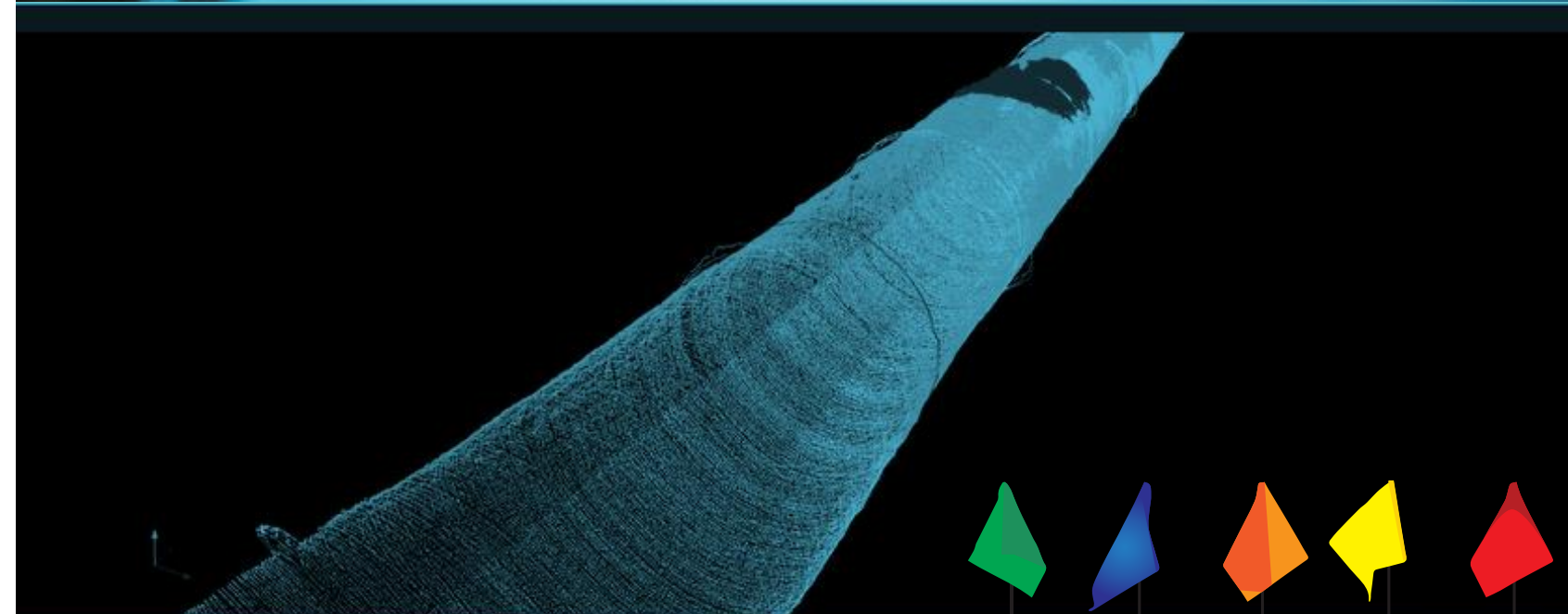
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# New Inspection Technologies

- Advanced sensors and data collection
- Challenges in underground pipeline assessments
- Standardizing inspection methods for accuracy



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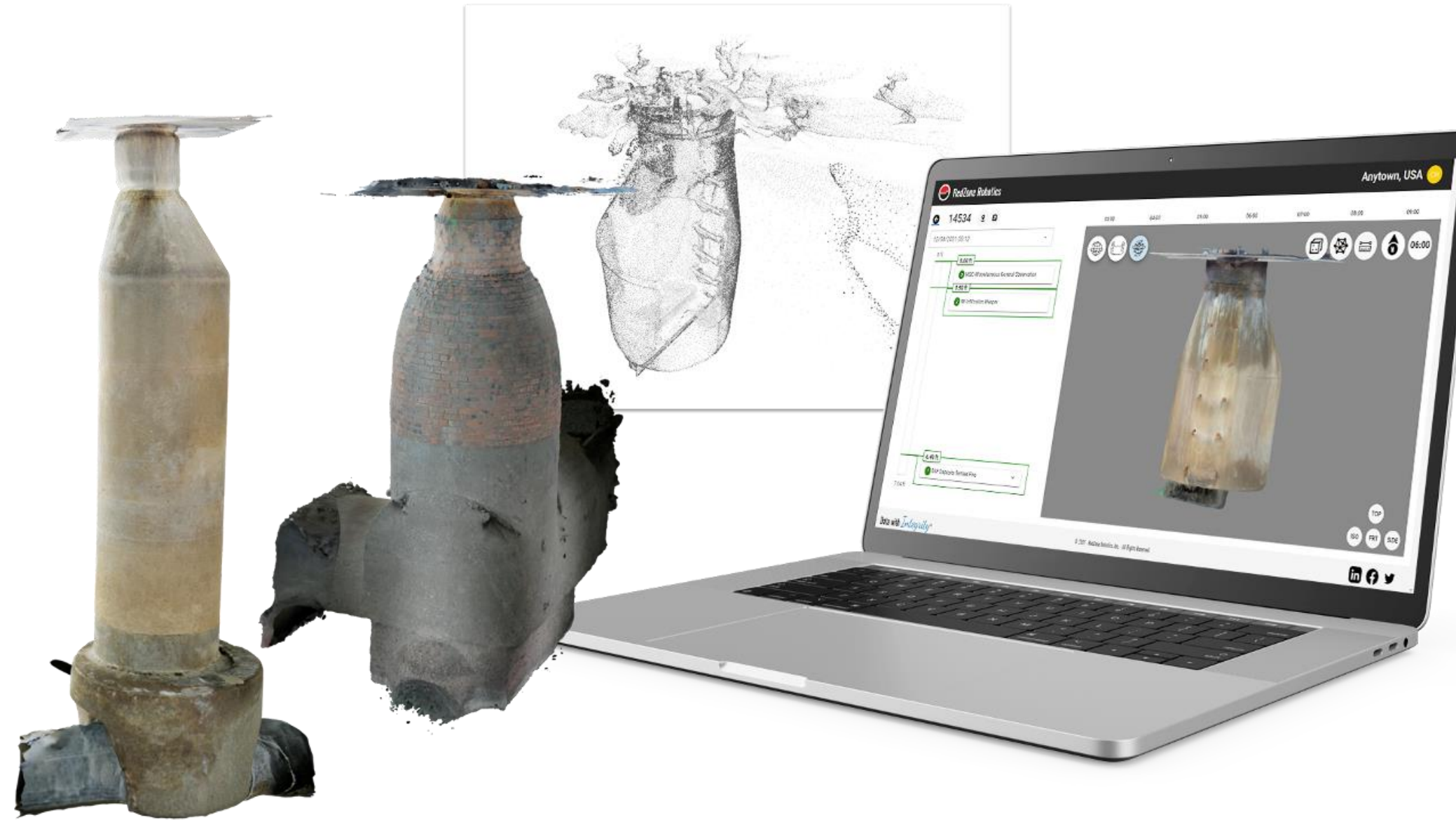
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# Standardizing Data Capture: Industry Best Practices

- Importance of consistent evaluation criteria
  - capture and collect in a uniform and reliable manner throughout all stages of pipeline
- NASSCO coding standards for pipeline data



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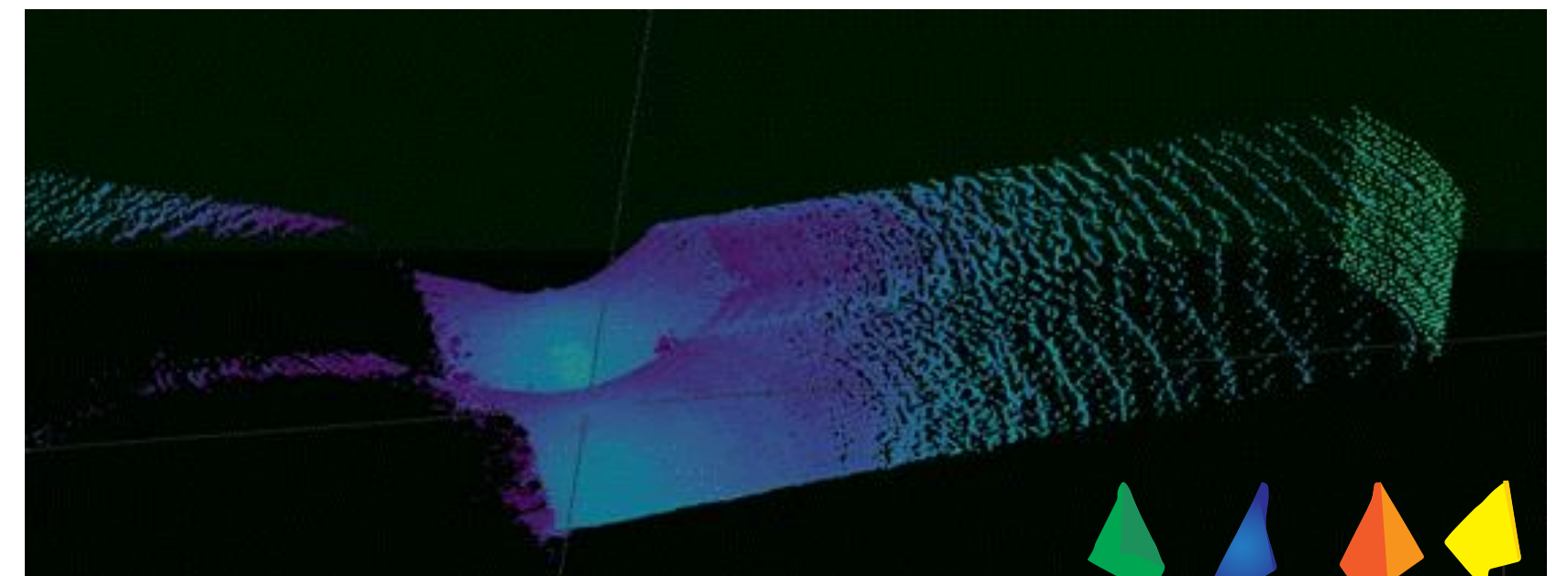
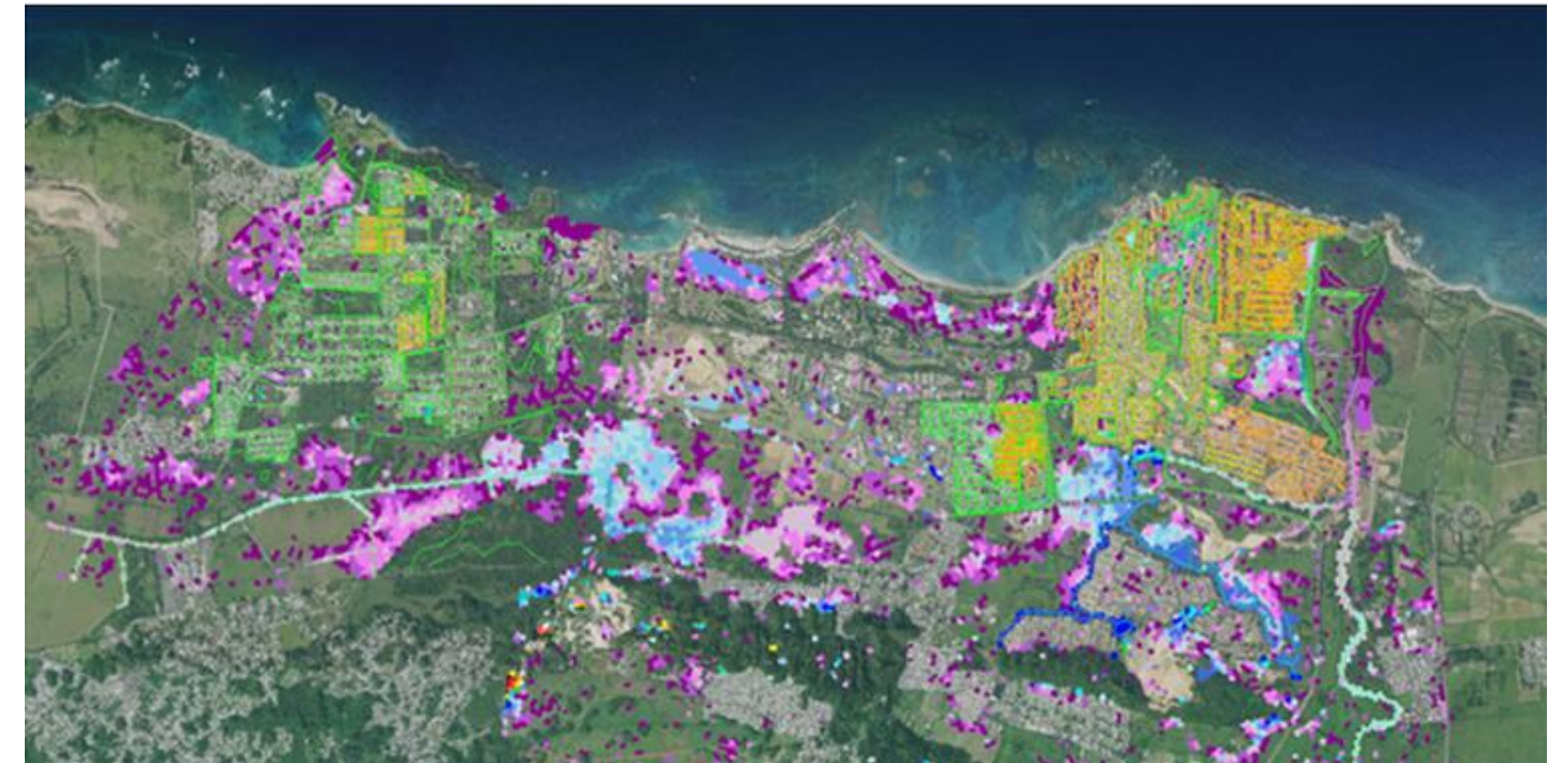
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# Optimizing Utility Budgets Through Accurate Pipeline Degradation Modeling

- Predictive maintenance for cost savings
- Extending pipeline life with proactive strategies
- Data-driven investment prioritization



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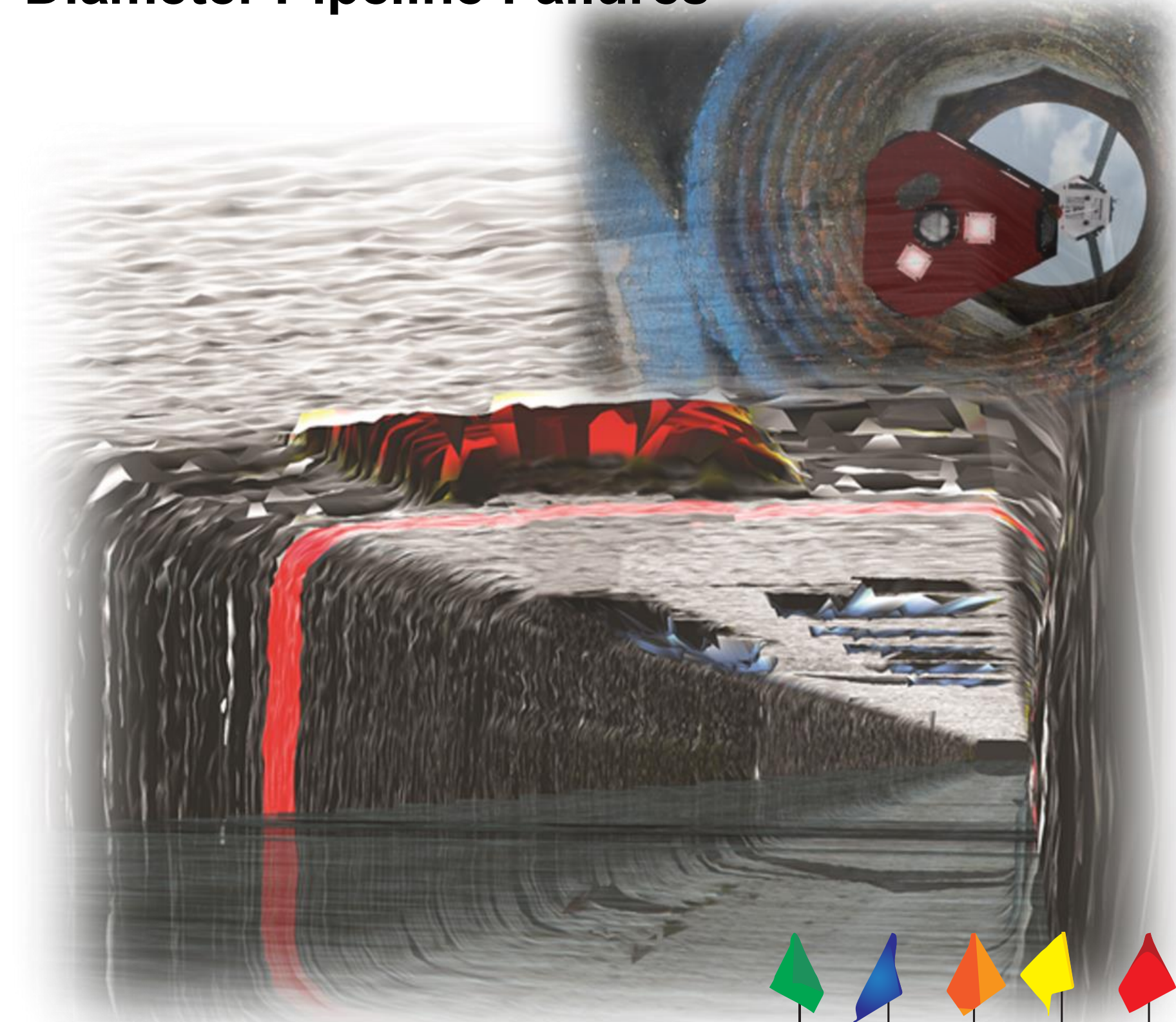
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# The Role of Sensory Data in Predicting Large-Diameter Pipeline Failures

- Integrating multi-sensor data for accuracy
  - laser
  - lidar
  - sonar
  - ppr
  - gas
- Understanding equipment limitations
- Material and diameter-specific considerations



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# Evaluating Inspection Technologies: Accuracy, Limitations, and Applications

- Comparing different pipeline inspection methods
  - size limitations
  - access restrictions
  - flow impacts
- Improving assessment techniques over time and comparing values on RUL





# Long-Term Infrastructure Management

- Evolution of pipeline monitoring techniques
- Best practices for sustainable asset management
- Ethical AI practice and incorporation



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# QUESTIONS

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