

# *Pipeline Research Council International, Inc.*

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## **Managing Threats to Pipeline Integrity Through R&D Programs**

### **Gaps & Challenges for the Industry**

**US DOT PHMSA R&D Forum**

**Working Group #1**

**Arlington, VA**

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**Mark Piazza**

**Director, Pipeline Technical Committees**



**LEADING PIPELINE RESEARCH**

## Presentation Topics

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- **Current and recently completed efforts and what we learned**
  - Follow the numbers – data mining
  - Public Awareness - One call works when applied
  - The Human Element is often a factor
- **Some ideas on new thoughts and approaches to address threat prevention/management**
- **PRCI member views on top challenges and gaps to threat prevention**

# Consensus Points

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- **Follow the numbers – data mining; the industry has shown improvements but seems to be stalled**
- **Public Awareness - One call works when applied but the message has not been as effectively communicated as we would like**
- **Human factors are often involved**
- **There is existing industry guidance that provides valuable information on Damage Prevent measures**
  - CGA Best Practices Manual
  - API RPs 1162 and 1166
  - Various reports available on Damage Prevention studies by all trade organizations, PHMSA, and R&D community
- **The world is experiencing an unprecedented level of communication and new technologies developments emerge every day**

# PRCI Current Project Profile

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- **ROW Right-of-Way monitoring and management (4 MM+)**
  - ROW 1 – Technologies to Accurately and Cost-Effectively Detect and Identify Unauthorized Activity Near Pipelines
  - ROW 2-1 - Measuring the effectiveness of current ROW monitoring techniques/practices
  - ROW 2-2 Establishing KPIs for Damage Prevention Through Industry Data
  - ROW-3 RAM Program – Right of Way Automated Monitoring
  - ROW 4 – Development of a Pipeline Encroachment Prediction Model
  - ROW 5 – PIGPEN project; Infrasonic, acoustic monitoring technology
  - ROW-6 Analysis of Second Generation Satellite Systems for Pipeline Encroachment Monitoring
  
- **DP Damage prevention technologies (\$500K+)**
  - Survey of good operator practice (DP1-1)
  - Utilization of a ground positioning satellite device in conjunction with a current one-call system (DP 1-4)
  - DP-2-1 Guidelines and Best Practices for Avoiding Subsurface obstructions During Horizontal Directional Drilling
  - DP-3 - Human Factors Analysis of Pipeline Monitoring & Control Operations
  - DP 3-2 - Influence of Human Factors on Pipeline Damage Prevention
  - Acoustic monitoring – ThreatScan (ROW 1A)

# Threat Prevention from the Air RAM Program Concept of Operations

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No single, cost-effective system, service or suite of technologies has been developed to apply over the entire pipeline system network to address the three primary threats:

- Machinery threats (3<sup>rd</sup> party damage)
- Leaks
- Geologic activity/natural forces

## Automating ROW Monitoring:

**Detect** – sensing & imagery collection

**Process** - data analysis via algorithms

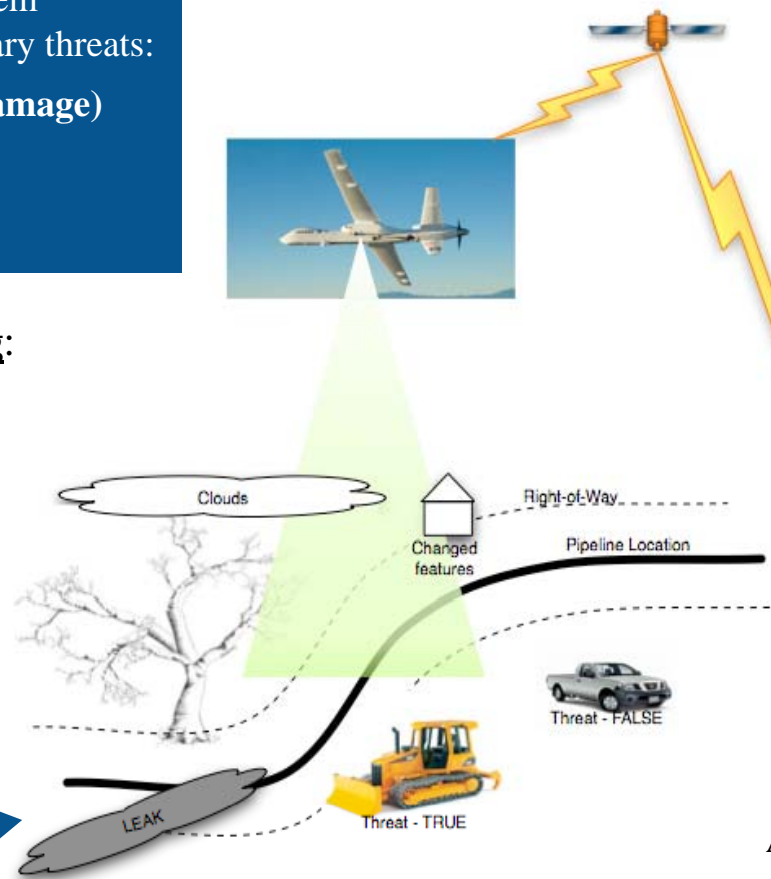
**Distribute** – communication

**Archive** – improved data management processes and predictive modeling

## LEAK DETECTION

**Gas + Liquids**  
**(Working Group #2)**

Courtesy of NASA Ames Research Center



Standard aerial surveillance with regular manned aircraft



Automated processing and communication – timely transfer to ground-based operations personnel to address the identified threat Management

# PipelineWatch.com

Transforming Public Awareness into Public Engagement

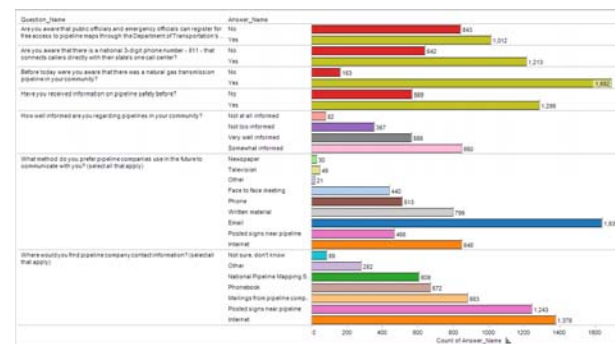
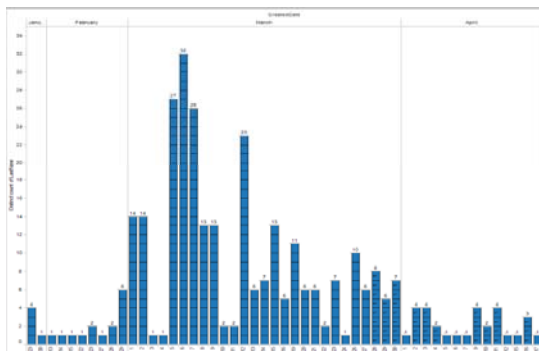
PipelineWatch.Com will support a safer pipeline environment utilizing community outreach to transform public awareness into public engagement through the provision of information, effective communications, education and training to all four stakeholder groups.

## What We Need Stakeholders to Know

- Pipelines are essential to our nation's energy supply system
- Where they live, work and congregate relative to the pipeline
- How to recognize and report issues along the ROW
- How to respond in the event of an emergency
- Call Before You Dig... 811

## You Can't Manage What You Don't Measure

- Measure effectiveness of activities that achieve your organization's goals
- Measurement is critical for continuous improvement



## Damage Prevention – Why is this so challenging?

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- **Development of cost effective approaches**
  - Substantial mileage of energy transmission and distribution systems
  - Varying needs based on unique conditions for individual operators
  - No single technology can address all pipeline issues – tiered approach, multiple technologies
- **Resource limitations**
- **Accuracy of databases**
- **Sensitivity of Measurement systems**
- **Effective communication with multiple stakeholders, and existing databases – DIRT, One Call, etc.**
- **“If You Build it They Will Come” – Increasing Encroachment**
- **Application of non-traditional Pipeline Technology**

## PRCI Roadmap – Damage Prevention

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- **Better understanding of current situation – successes and failures – identify ‘menu’ of good practice for each pipeline location**
- **Identify gaps and weaknesses in current practice – techniques, procedures, human factors – and develop solutions**
- **Explore opportunities for ‘next generation’ solutions, incorporating technologies from other industries**

*our goal ..... zero hits*



## Expected Outcomes – Damage Prevention

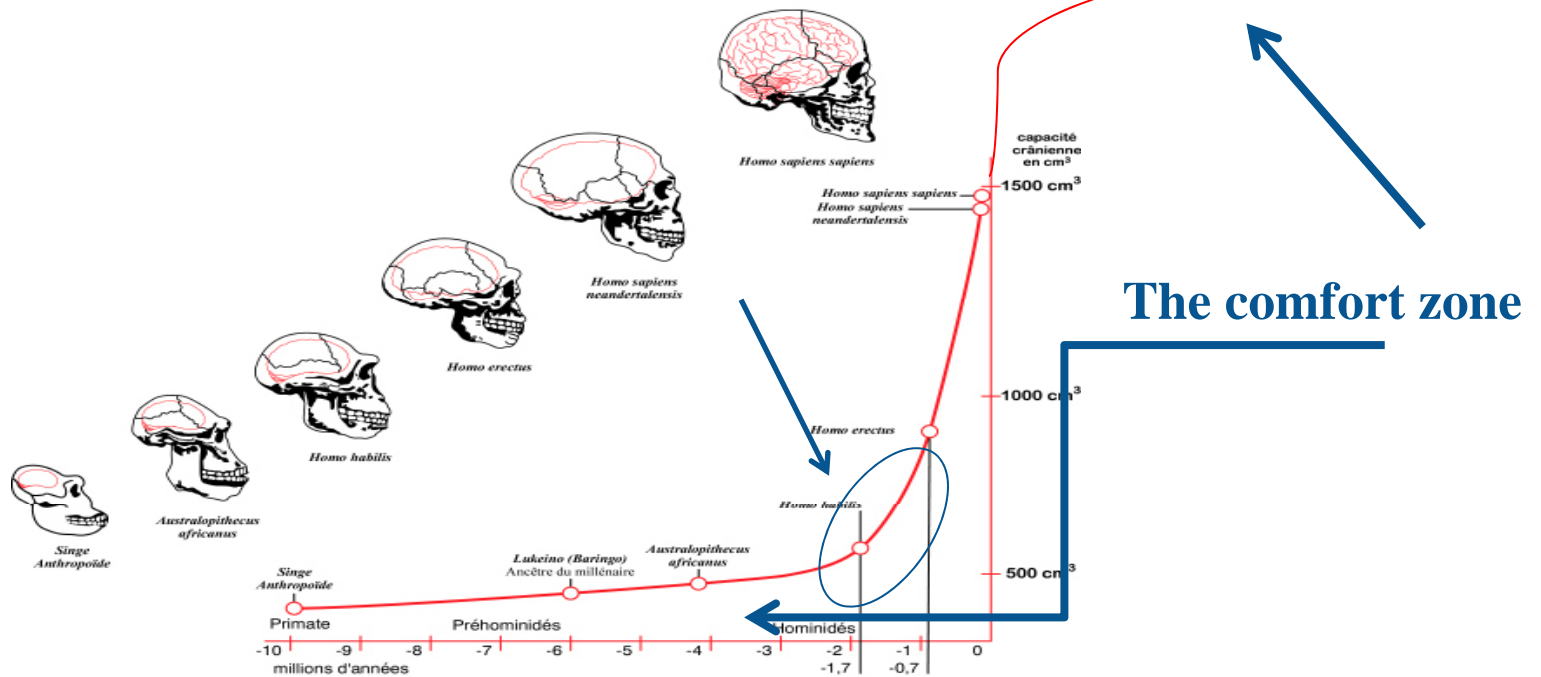
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- **A benchmark of current mechanical damage prevention practices/measures and their effectiveness - KPIs**
- **A ‘menu’ of good damage prevention practices and technologies, taking into account individual pipeline locations, attributes and operational circumstances**
- **Improved public awareness, including guidance and behavioral compliance measures for controlling ROW activity**
- **Identified opportunities for developing and demonstrating ‘next generation’ technologies for ROW monitoring and pipe/facility location**

# Technology Development

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- Industry slow to adapt/change – challenges to technology development and application
- Evolution and “step change”
- “move the needle quickly” - requires protein
- Balancing the R (or “r”) with the D&D



**Closing Slide**  
**Thank you for your attention**  
**Questions?**

**Follow-up questions or information needed:**

**Mark Piazza**

**[mpiazza@prci.org](mailto:mpiazza@prci.org)**

**678 339 3645**