



“Management of Transmission and Force Mains as Assets”

R³ = REPLACE RIGHT PIPE, RIGHT TIME, RIGHT MATERIAL

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Purpose of This Presentation

- Provide an Outline for Management of Pipeline Infrastructure
- Provide Some Information on Condition Assessment Technologies
- Provide Steps for Implementation





Why Do We Need a Plan for Pipelines?





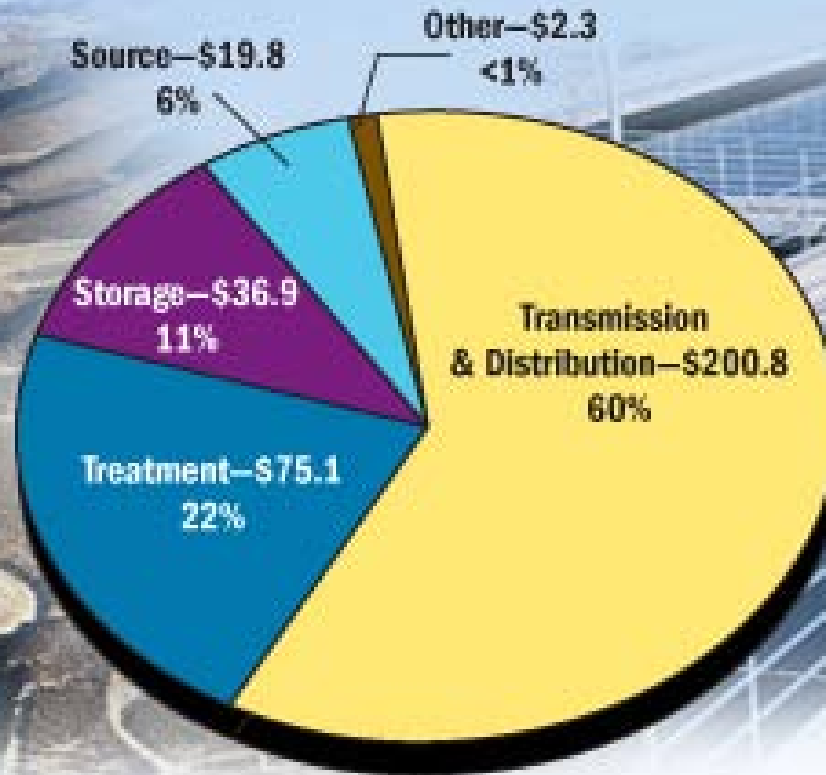
Primary Goal: Avoid Catastrophic Events



“Sewage Flowing Directly to Lake” - “Can’t Save 3 Homes” – Muskegon, 2007

EPA REPORT– 2007 DRINKING WATER NEEDS

Total 20-Year Need for Drinking Water Infrastructure by Type
(in billions of January 2007 dollars)



Transmission & Distribution \$200.8 BILLION

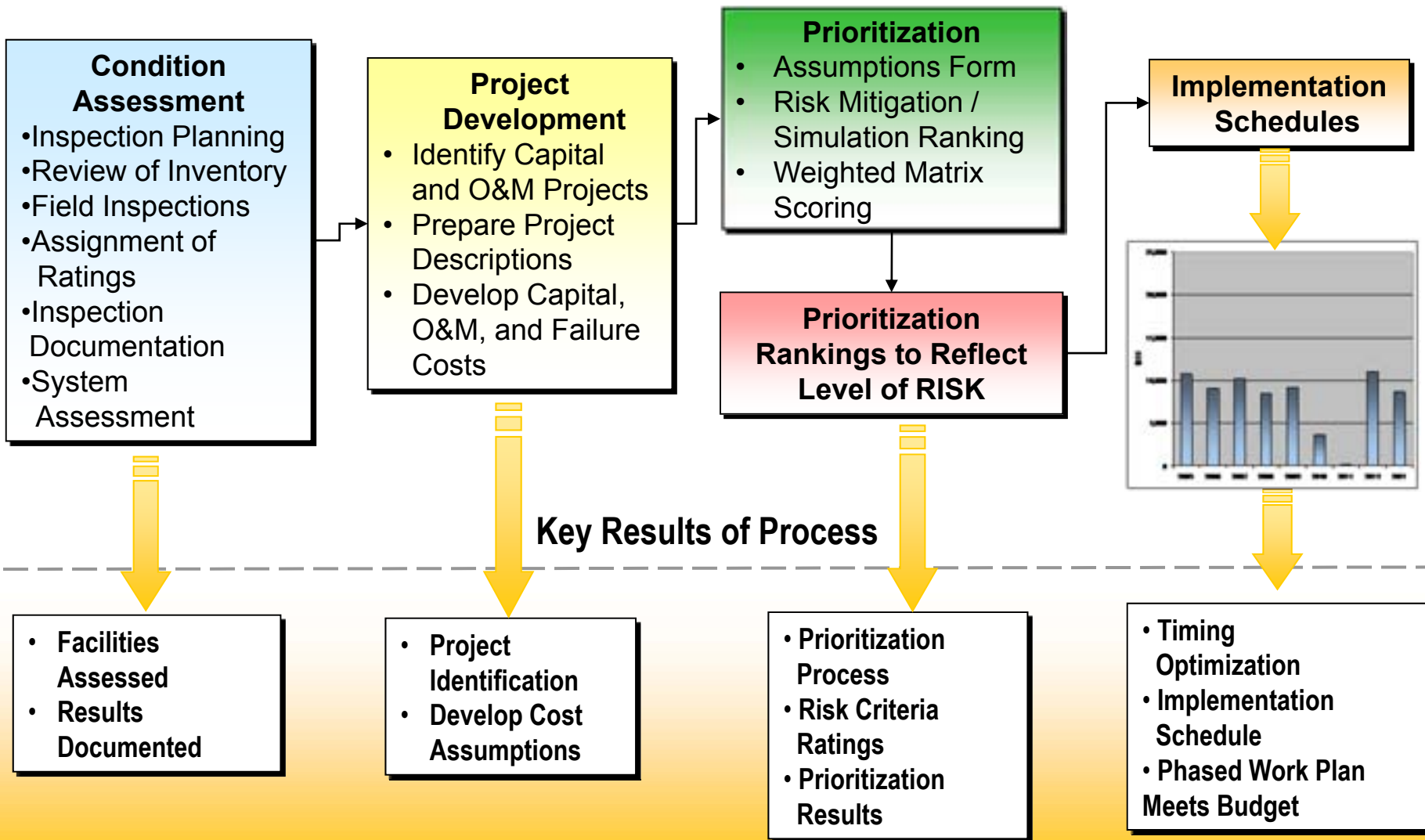


Managing Infrastructure Requires a Process



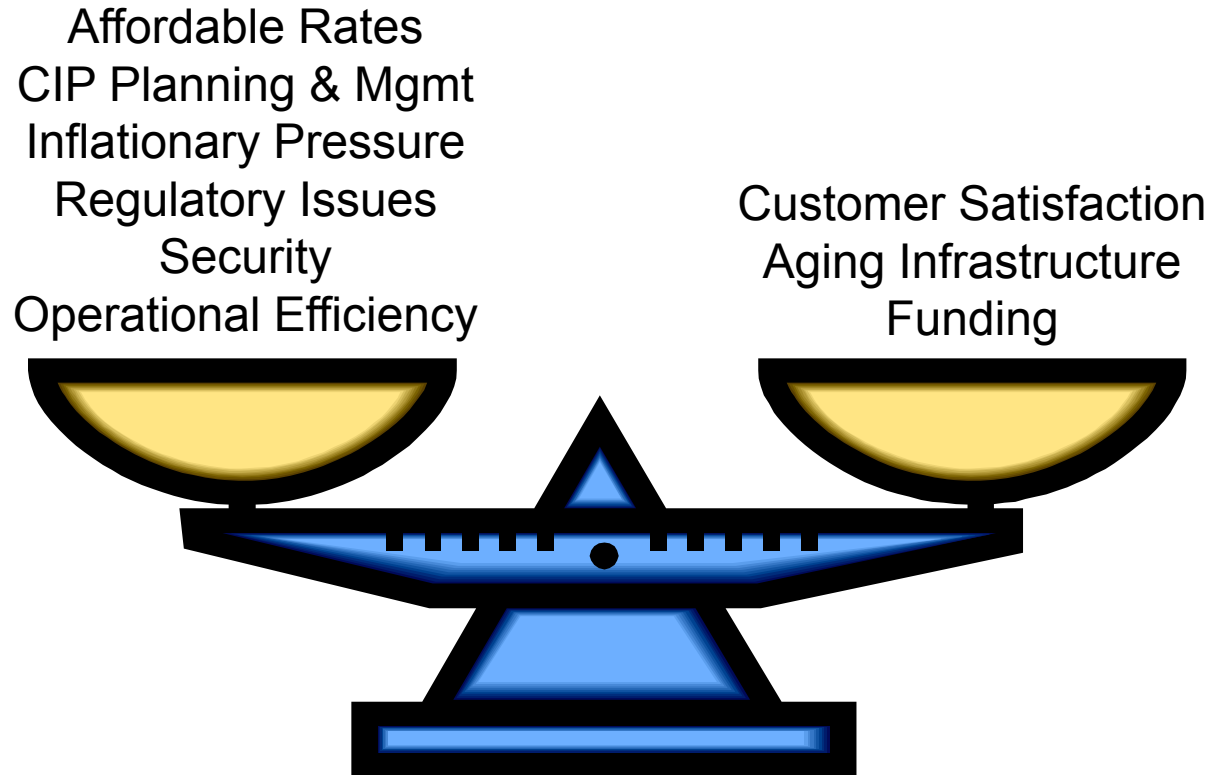


Key Steps in the Process





Management of Pipelines as Assets is the Art of Balancing Performance, Risk and Cost



Having a Process is Designed to Provide Data for Balancing the Decision Making

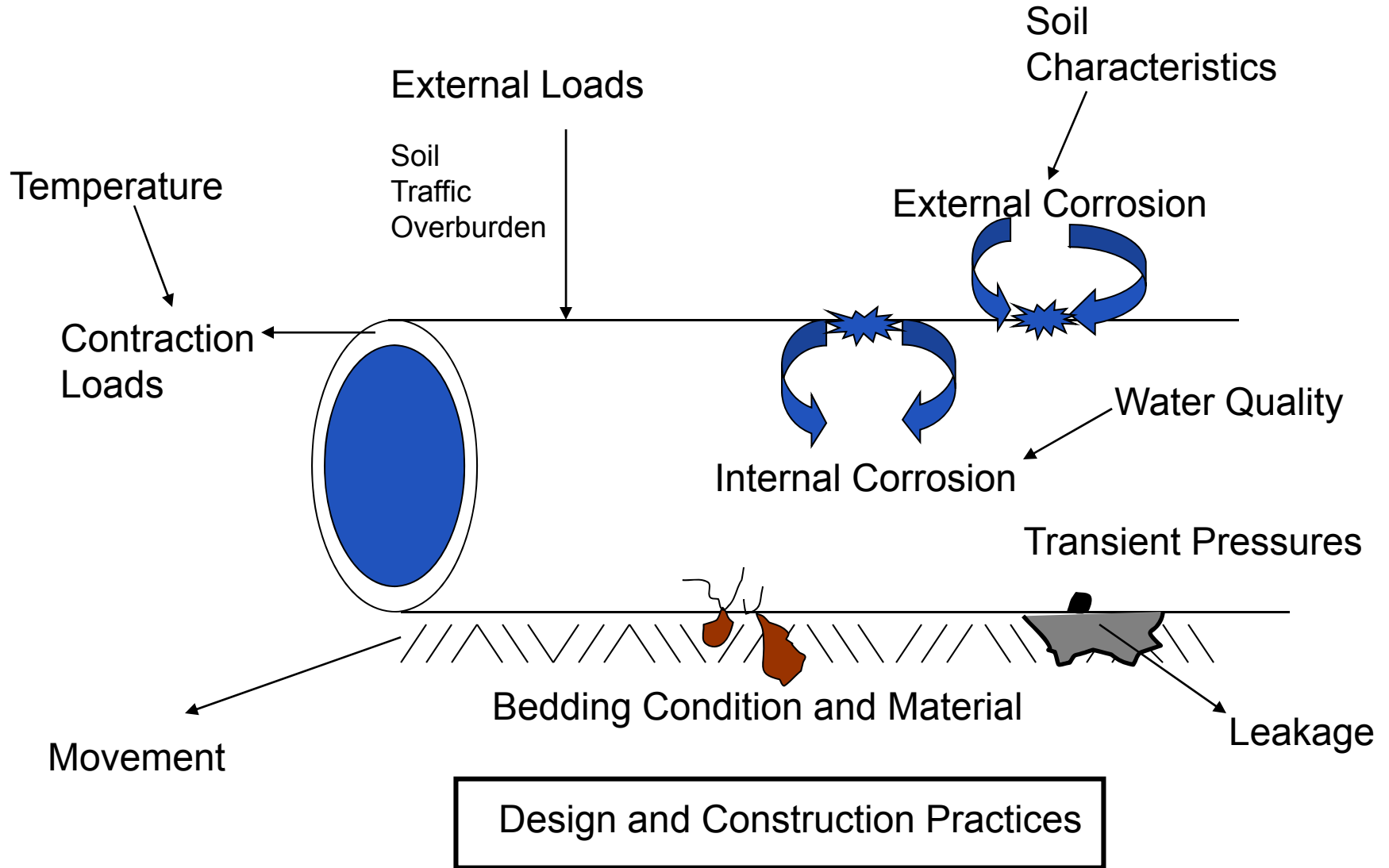


Basis for Management Plan – Limited Life of Pipe

- **PERFORMANCE** – is Knowledge of the Wear Out Process and Application of Renewal Technologies Using Asset Management Principles
- **RISK** – Pipe Life is an Unknown Variable that has to be Considered
- **COST** – Increase Annual Expenditures to Level Required to Maintain Assets. Replacement or Rehabilitation Will Require Full Cost Pricing in Rates



Several Factors Impact the Life of a Pipeline





Management By Crisis - Impacts Performance, Risk and Costs

Gazette.Net

Wednesday, May 23, 2007

**Residents still cannot return to homes
WSSC plan calls for multimillion-dollar repairs
to pipeline after flood in Chevy Chase**

by Audrey Dutton | Staff Writer



Under Pressure Officials have their fingers crossed that a crucial water main won't explode before they can replace

05/24/07 By Nate Sandstrom





Strategy – Focus on Critical/Large Diameter First

- ***Lower Risk/Small Mains: Failure Management***
 - Economical management of structural failures
 - Minimize long term cost
 - Maintain acceptable level of service
- ***Critical/Large Diameter Mains: Failure Prevention***
 - Primary emphasis on risk management
 - Minimize catastrophic failures



Are Utilities Spending Dollars on the Right Pipelines?



- Broadly Held View That a Crisis is Required to Motivate New Spending
- Competition for Funding with Visible, Tangible, and Immediate Benefit Projects
- Proactive Management with a Sustainable Program is a More Appropriate Response

Condition Assessment Provides the Information



Various Technologies Exist for Pressure Pipeline Condition Assessment

- Visual Inspection
- Closed Circuit TV
- Electromagnetics (Broad Band and Remote Field)
- Ultrasonic (G-Wave, B-Scan, Impact Echo)
- Remote Field Eddy Current/Transformer Coupling
- Acoustic Emission Monitoring
- Leak Detection
- Magnetic Flux Leakage





Homestake Colorado Project





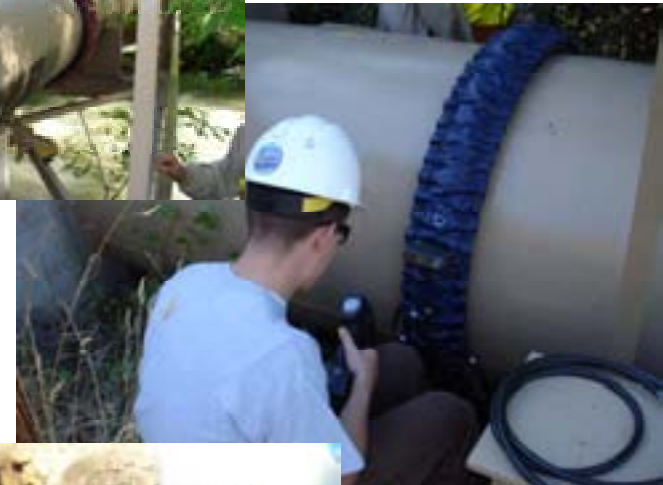
Homestake AET Installations (Hydrophone sensors)





Ogden Utah – Combined Technologies

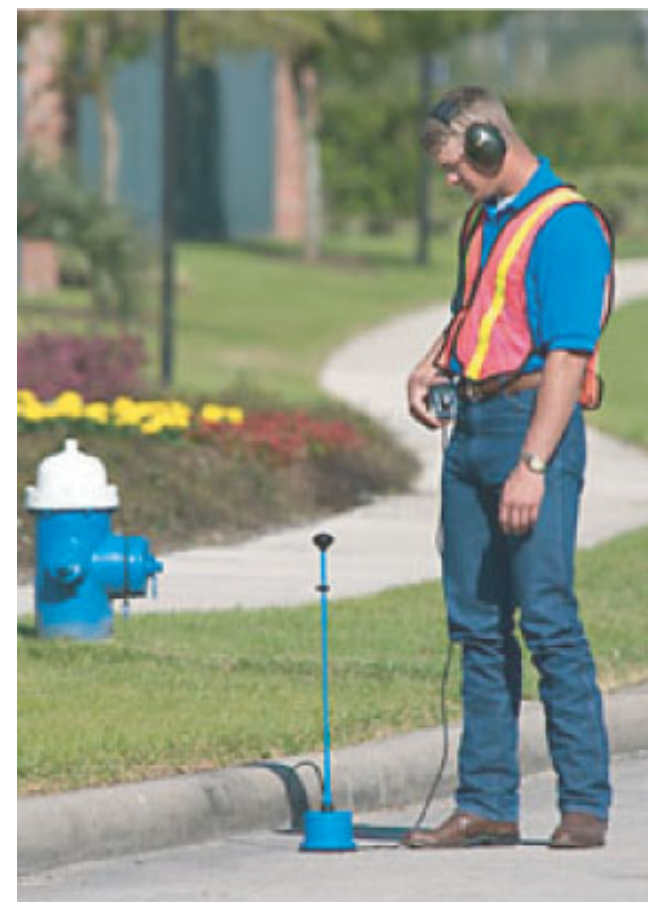
- ULTRASONIC INSPECTION ON PIPE FOR CORROSION
- LEAK DETECTION ON PORTIONS OF THE PIPELINE
- COUPONS FROM TAPS USED FOR STRUCTURAL ANALYSIS





Leak Detection in Condition Assessment

- Acoustic Leak Detection
- Metering
- Noise Correlation





Why Find Leaks?

- Leaks Can Contribute to the Advancement of Corrosion, Weaken Pipe Bedding Support – **Catastrophic Failures**
- Not All Leaks Surface Right Away – Create Sink Holes
- Leaks Waste Water and Cost Money \$\$ (10% Loss of an 30 MGD Ave is Over 1 Billion Gallons a Year.)



Available Technologies

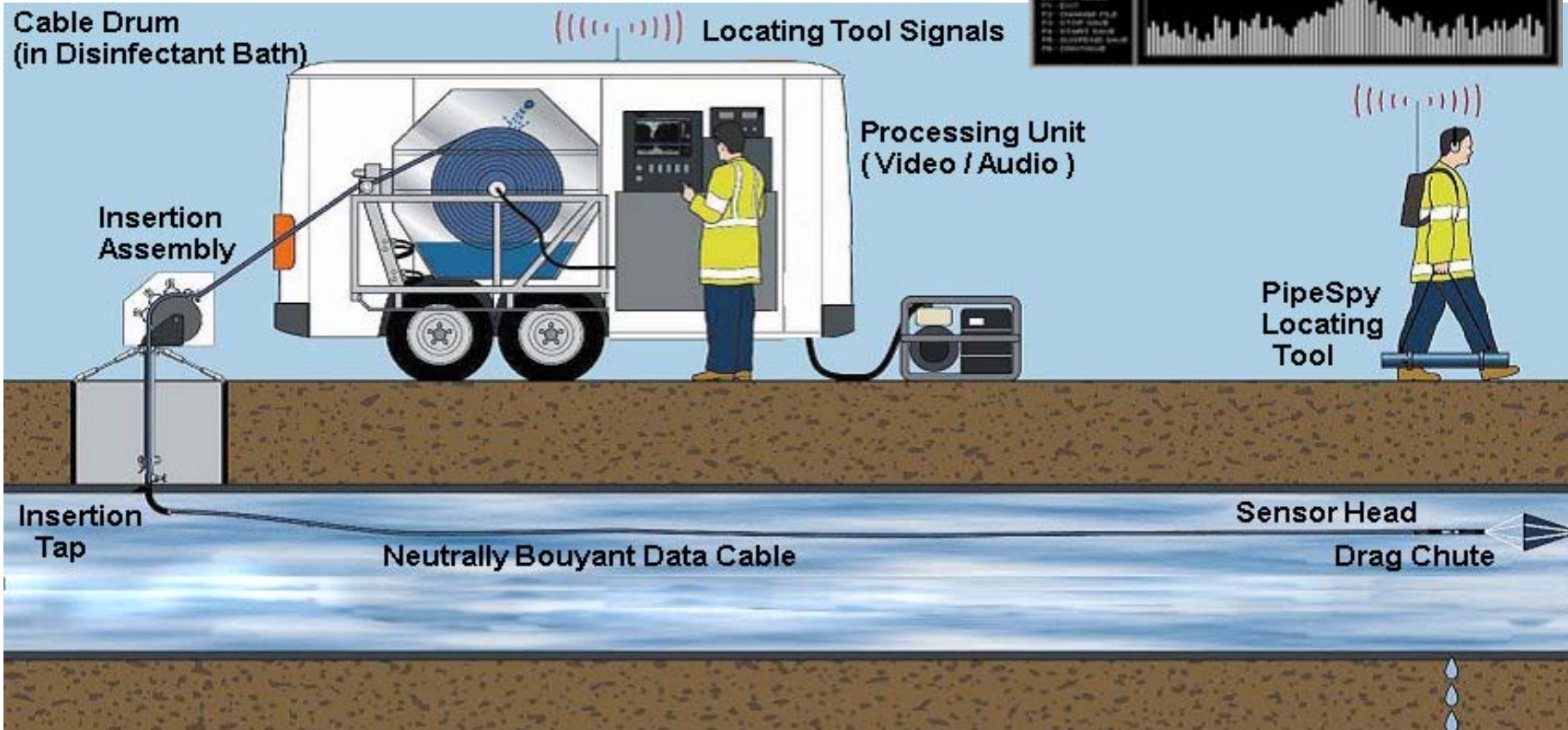
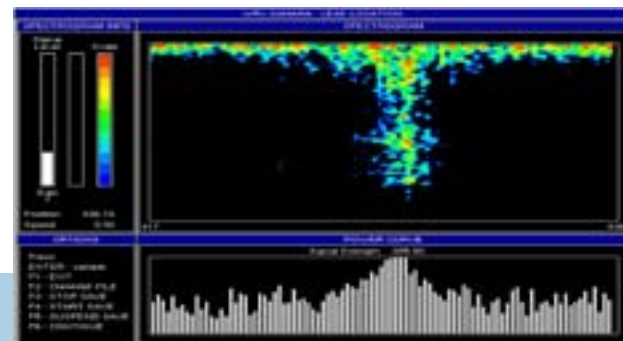
- Tethered system – Sahara®
- Correlators
- Free swimmers – Smart Ball
- Listening sticks



Sahara Leak Detection System



the Pressure Pipe Inspection Company



Detecting a Small Leak Can Prevent Catastrophic Failures



Sahara Flow Method - Parameters

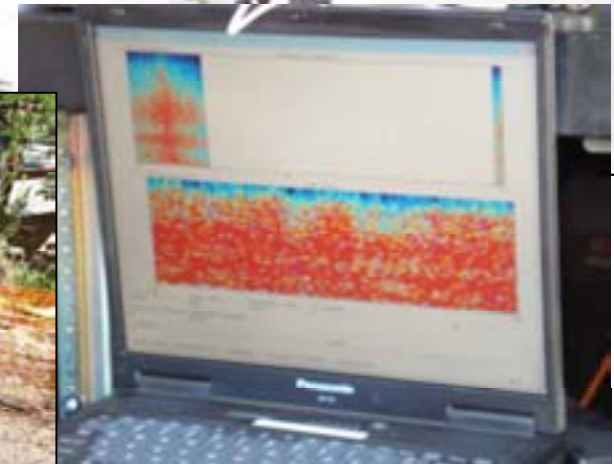


Pipeline Materials	All Types
Pipeline Diameter	12" and above
Pipeline Pressure	10 psi to 200 psi (MuleTape up to 250 psi)
Flow Velocity	1 ft/sec and above (Min is pipeline /section specific)
Insertion Point Bore	Any tap point 2" or greater on the 12:00 position on the pipe
Survey Distance	Up to 6,000 ft
Survey Distance / Day	Typically 1 mile / day
Directional Change Accomodation	Max 270 degrees of bends, except in PCCP* - interior sharp edges may damage cable
Sensitivity	Detects leaks as small as 0.25 US gallons / hr at 87 psi (.08 gal/min @ 20 psi)
Vault Configuration	Must accommodate insertion tubes (72" or 168") (dependent on riser length)



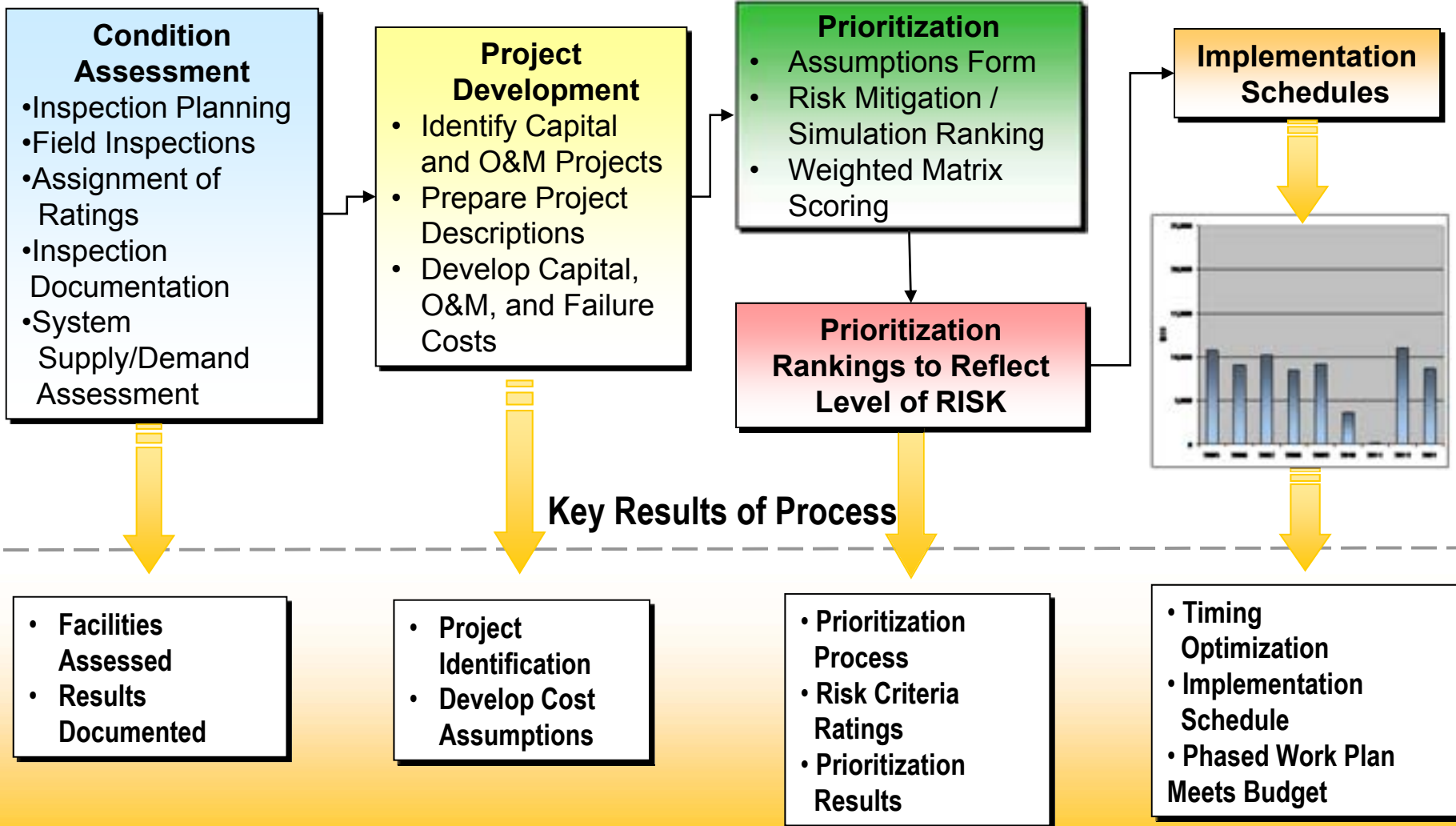
Ogden Utah Inspection Summary

- 36" Pipe In Good Condition
 - No Leaks Detected
- 24" Pipe in Poor Condition
 - 15 Leaks Detected





Implement the Process – Replace the Right Pipe, Right Time, Right Material





Select the Right Pipe Based on Condition Assessment

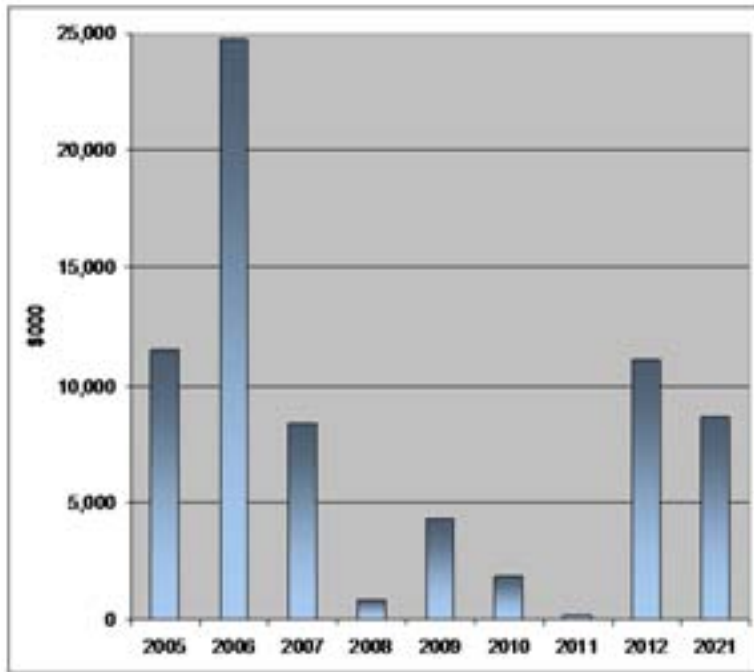
- Can Include Many Factors:
 - Physical
 - Size, Age, Material
 - Soil Type - Corrosivity, Artificial Fill
 - Functional
 - Hydraulics (Fire Flow, System Pressure)
 - Structural (break rates)
 - Quality (discolored water)
 - Impact
 - Critical Customer, Geographic Location



Right Time – Risk Analysis Provides Prioritization to Meet Budget Requirements

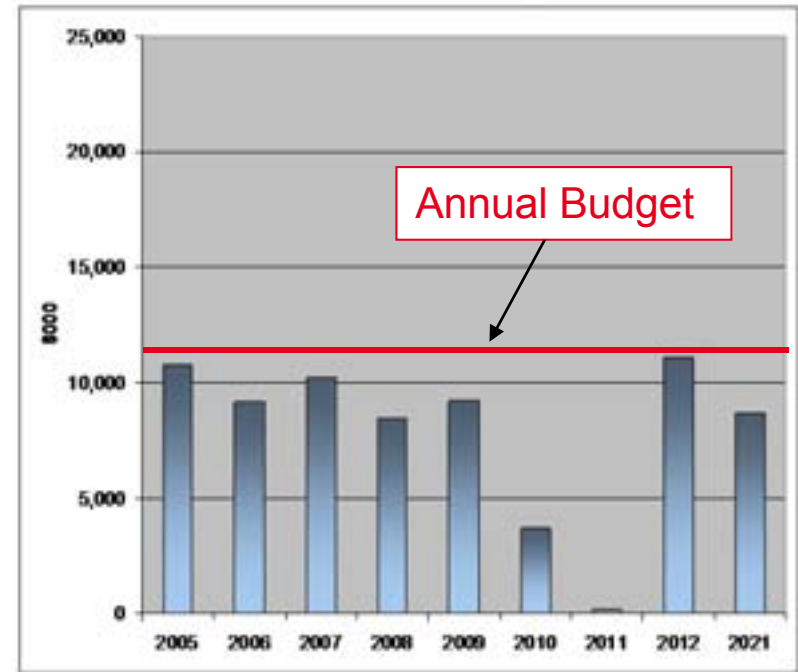
Capital cost by year – NO BUDGET

Installation years determined through Optimization Process



Capital cost by year – WITH BUDGET

Lower ranking projects are moved back in schedule to meet budget constraints



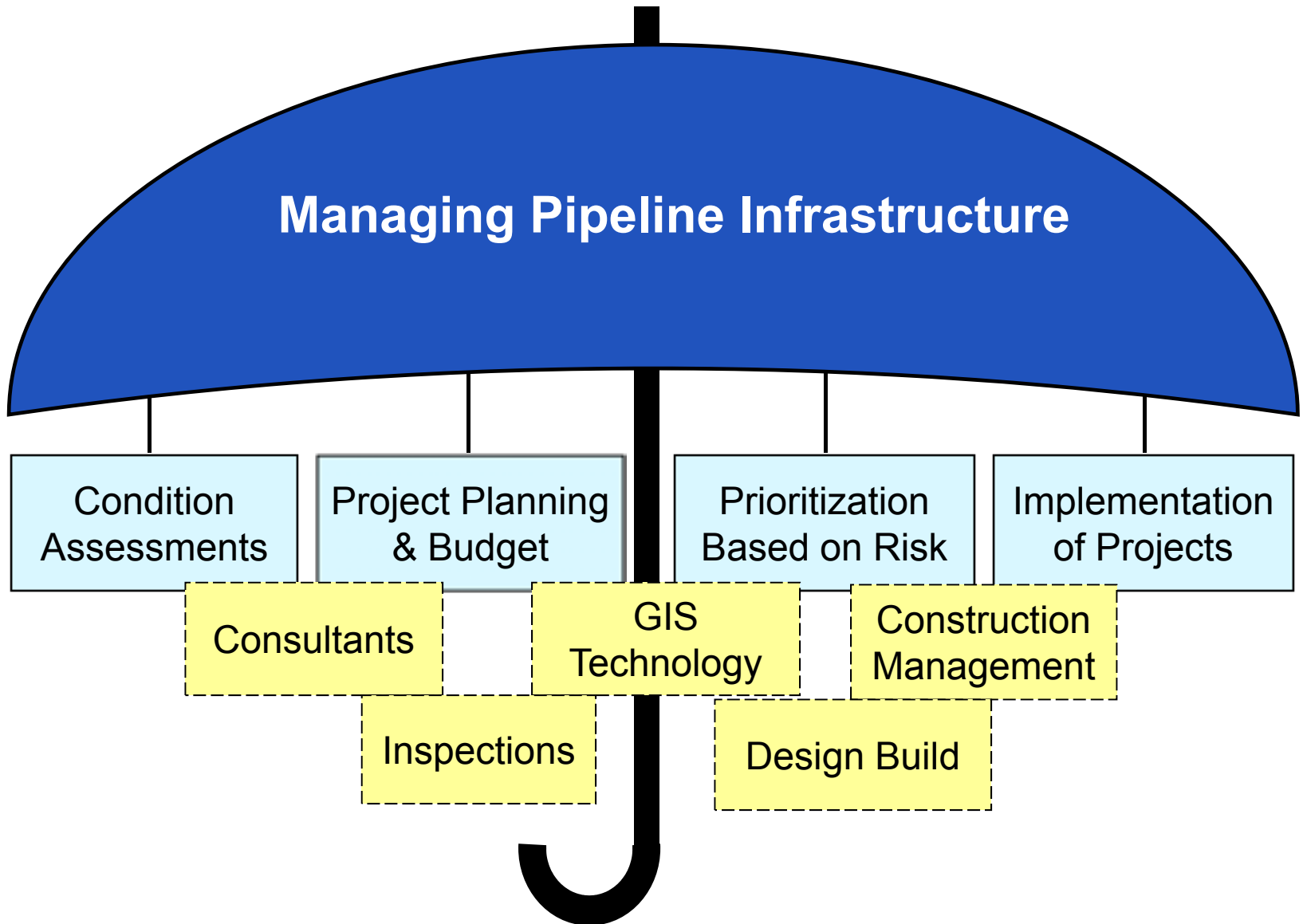


Right Material – Select the Best Material for Rehab/Replacement



Slip lining with HDPE or Fusible PVC, Fold and Form, Micro-Tunnel Replacement, Pipe Bursting and Others

Asset Management - Bringing it all Together





Questions?

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