Asset Management: the Analytical Component

What does it take to set up an advanced analytical Asset Management program for buried linear assets?

CONGRÈS | 20E ÉDITION INFRA 2014

Vers une nouvelle dynamique municipale pour une urbanité durable

1ER AU 3 DÉCEMBRE | PALAIS DES CONGRÈS DE MONTRÉAL

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- infraPLAN
- Introduction – Analytical?
- Analytical Program – What does it take?
- Case Study – AWWU

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- Solutions to manage buried (non inspected or inspected) linear assets
- Main questions:
  - How much money is needed for the next 20 years?
  - What projects should be addressed in priority?
- Consulting; tools development; training; “infraPLAN Service”
- Answers using utility data and advanced approaches
- Based in NYC

Utilities served

- Anchorage
- Apple Valley Rancho
- Aquarion Water of Ct
- Boston
- Columbus
- Dallas
- Denver
- Los Vegas
- Los Angeles (Park Water)
- Montreal
- New York
- Philadelphia
- San Diego

Introduction – Questions

- What do we mean with “Analytical”?
- What questions are we trying to answer?
- How will we do this?
- Why does it matter?

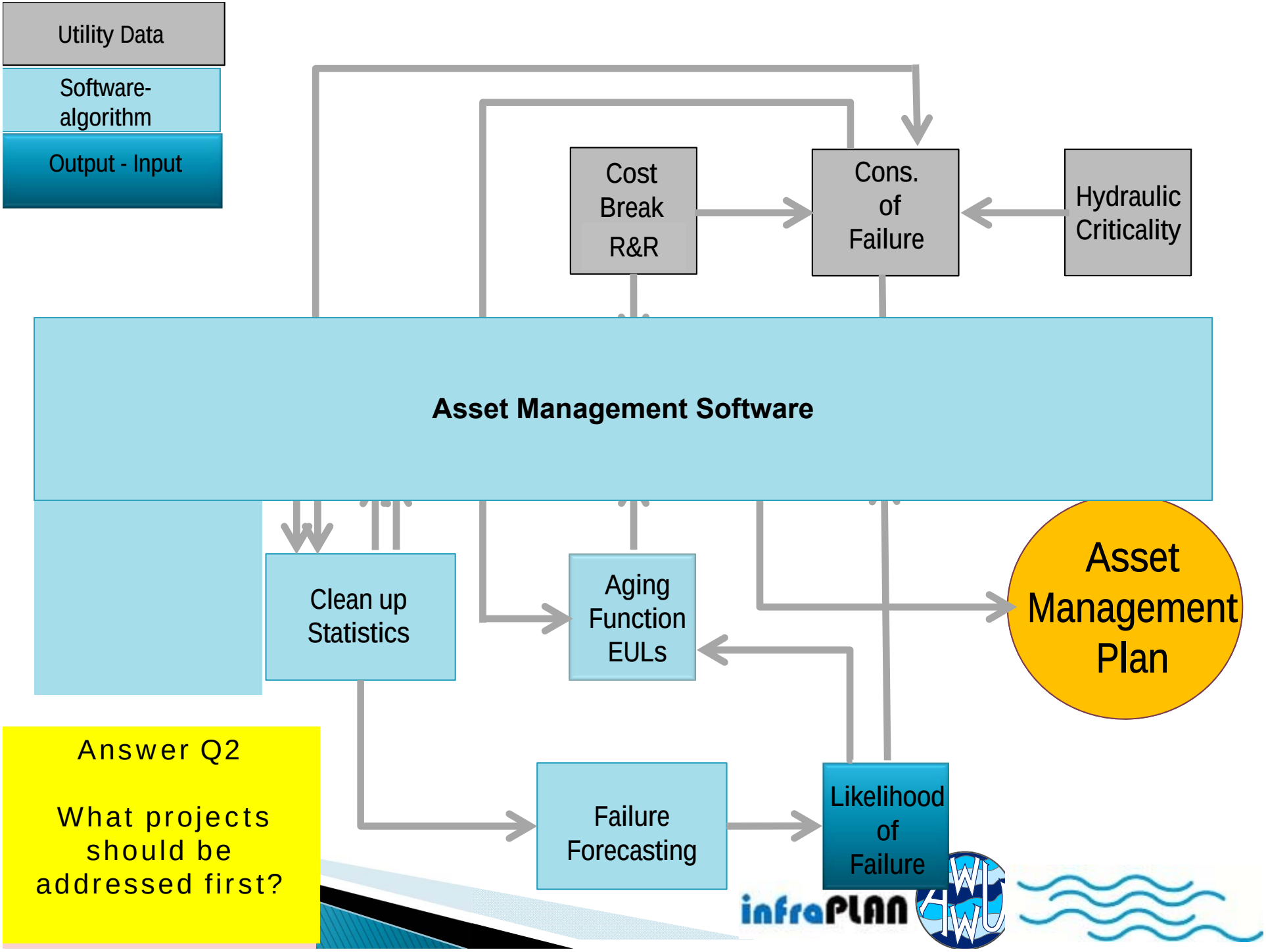
What do we mean by “analytical”?

Analytical Asset Management study or program aims at making R&R decisions based on the analysis of utility-specific data.

What questions are we trying to answer?

- How much money is needed for the next CIP?
- What projects should be selected in priority and when ?
- Given that we:
  - want to maintain a certain level of service
  - can tolerate a certain level of risk

How? Analytical AM program – Water Pipes – Framework


Utility Data
Software-algorithm
Output - Input
Cost Break R&R
Cons. of Failure
Hydraulic Criticality
Asset Management Software
Clean up Statistics
Aging Function EULs
Asset Management Plan
Failure Forecasting
Likelihood of Failure
Answer Q2
What projects should be addressed first?
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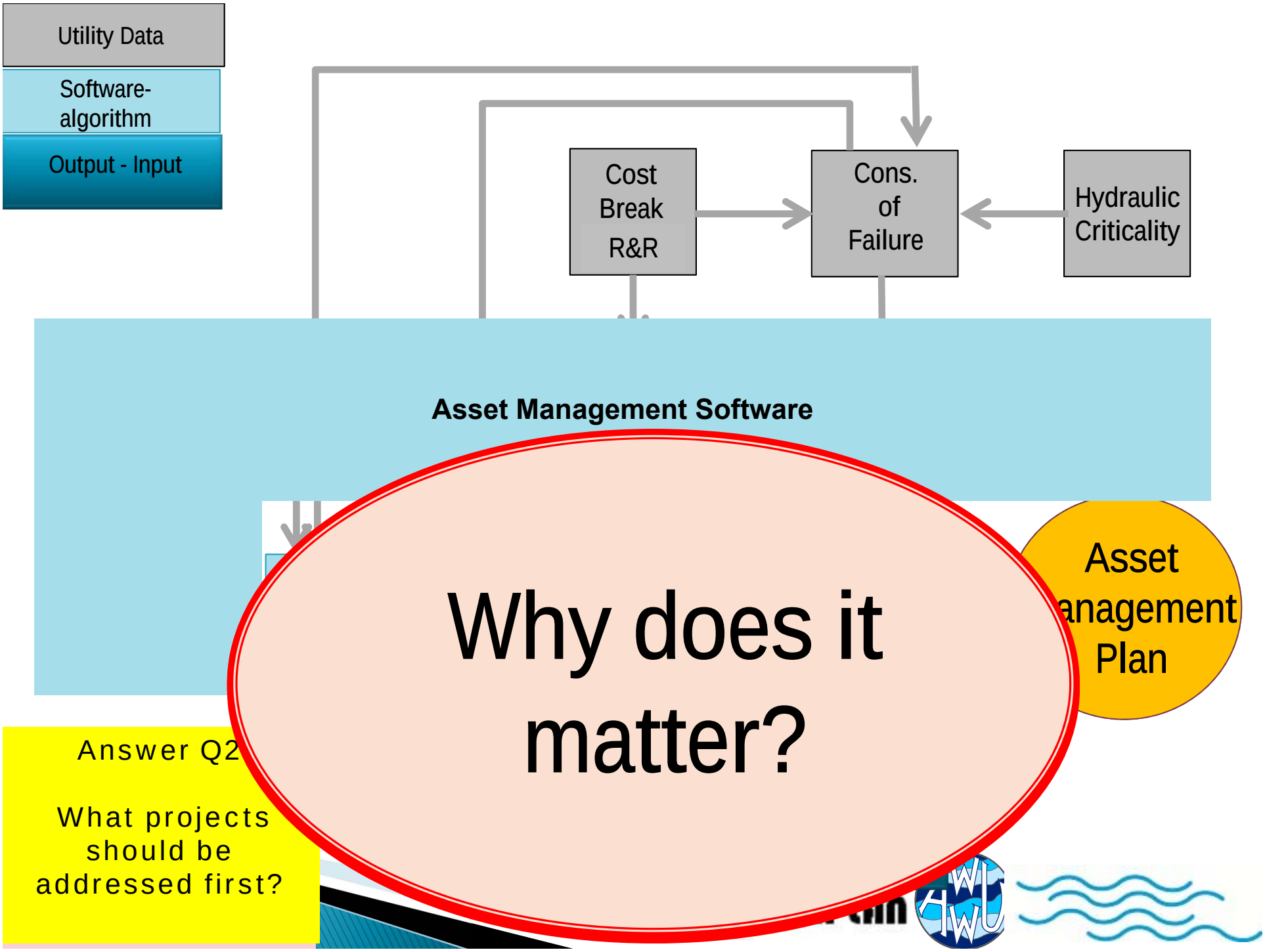
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Why does it matter?
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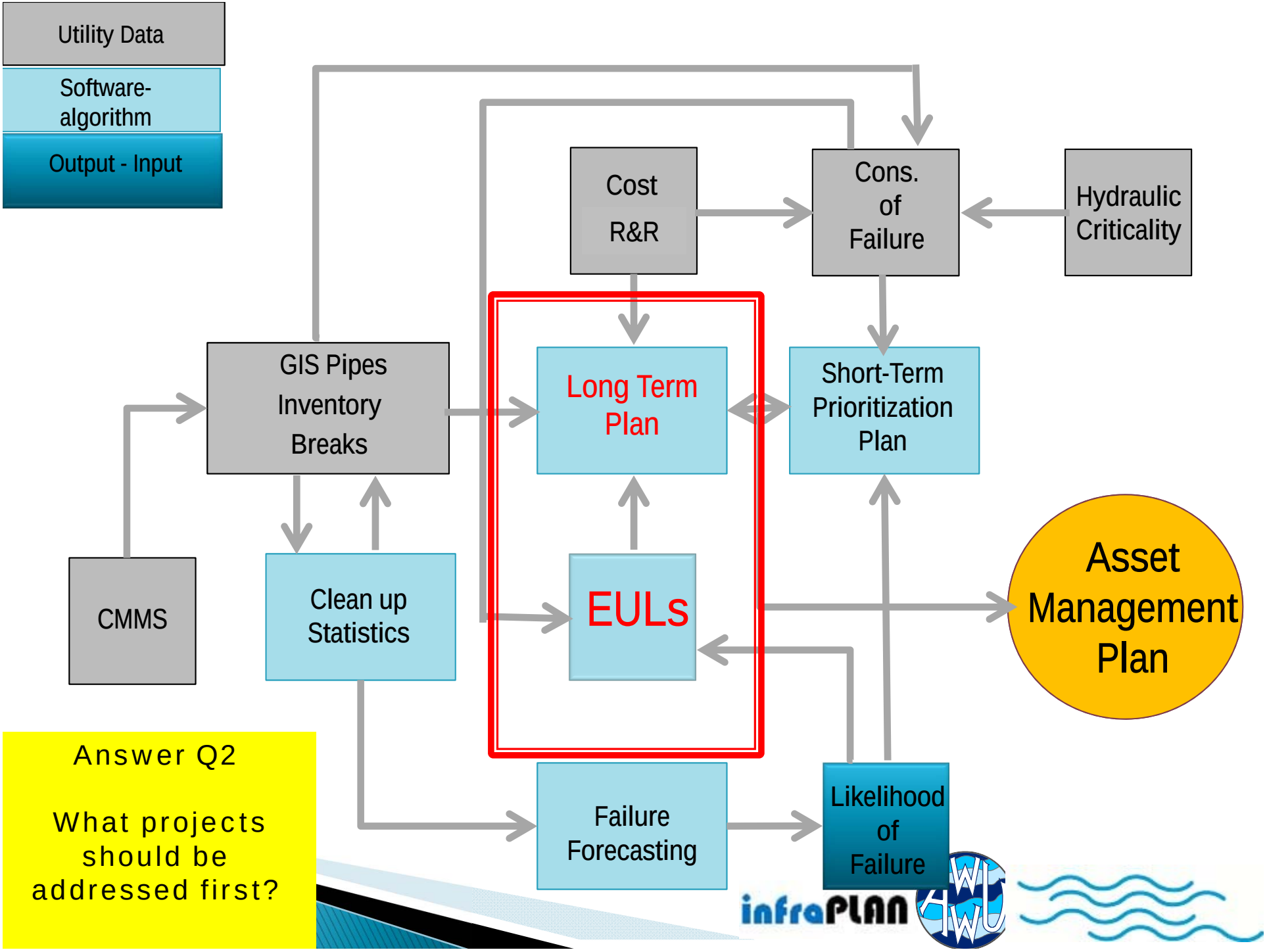
Utility Data
Software-algorithm
Output - Input
Cost R&R
Cons. of Failure
Hydraulic Criticality
GIS Pipes Inventory Breaks
Long Term Plan
Short-Term Prioritization Plan
CMMS
Clean up Statistics
EULs
Asset Management Plan
Failure Forecasting
Likelihood of Failure
Answer Q2
What projects should be addressed first?
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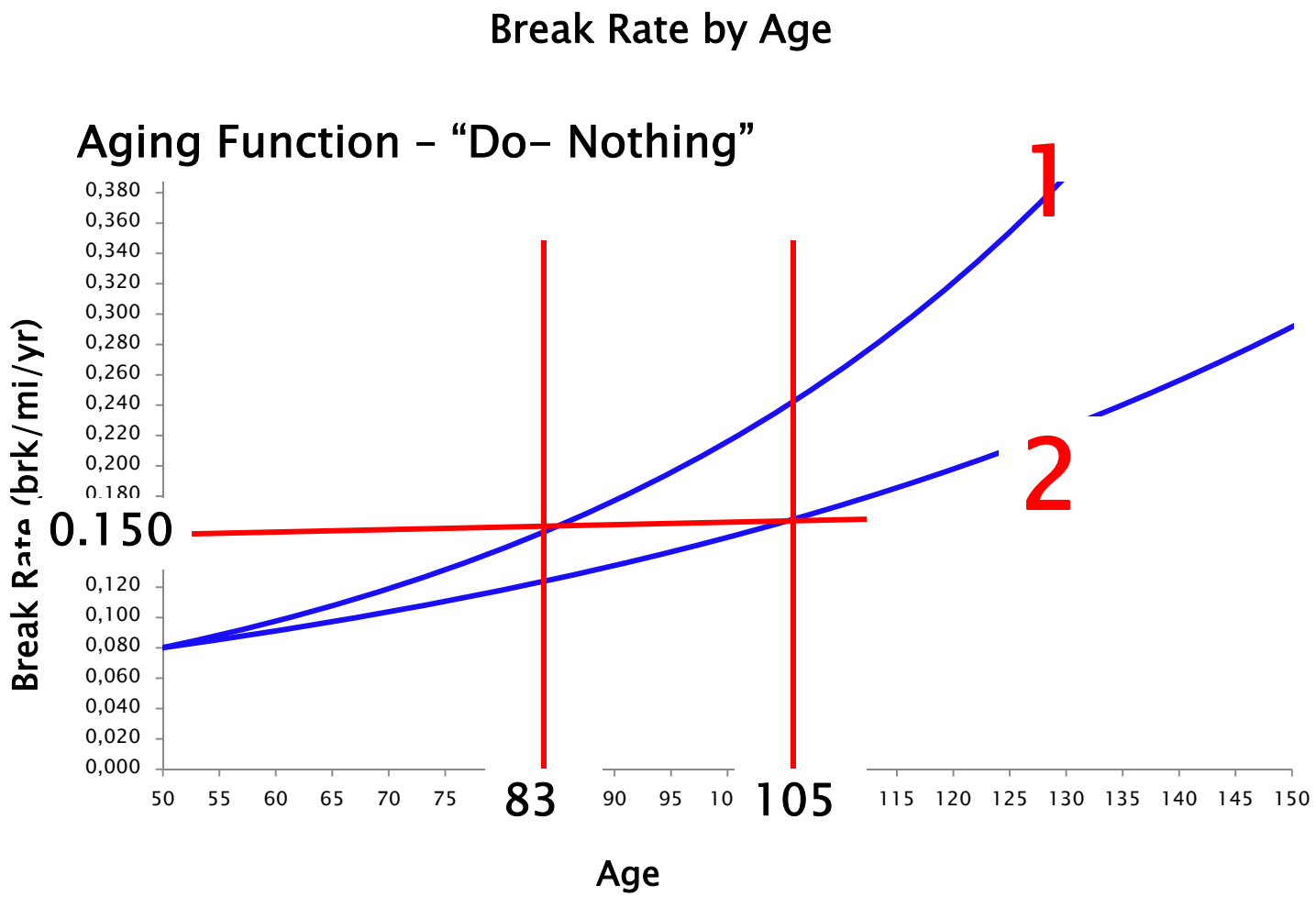
EULs: How can EULs be estimated?

- Assumed – Scoring – $0
- Lab $$$
- Field Inspection $$
- Analytics $

Utility-specific Analytics-driven EUL

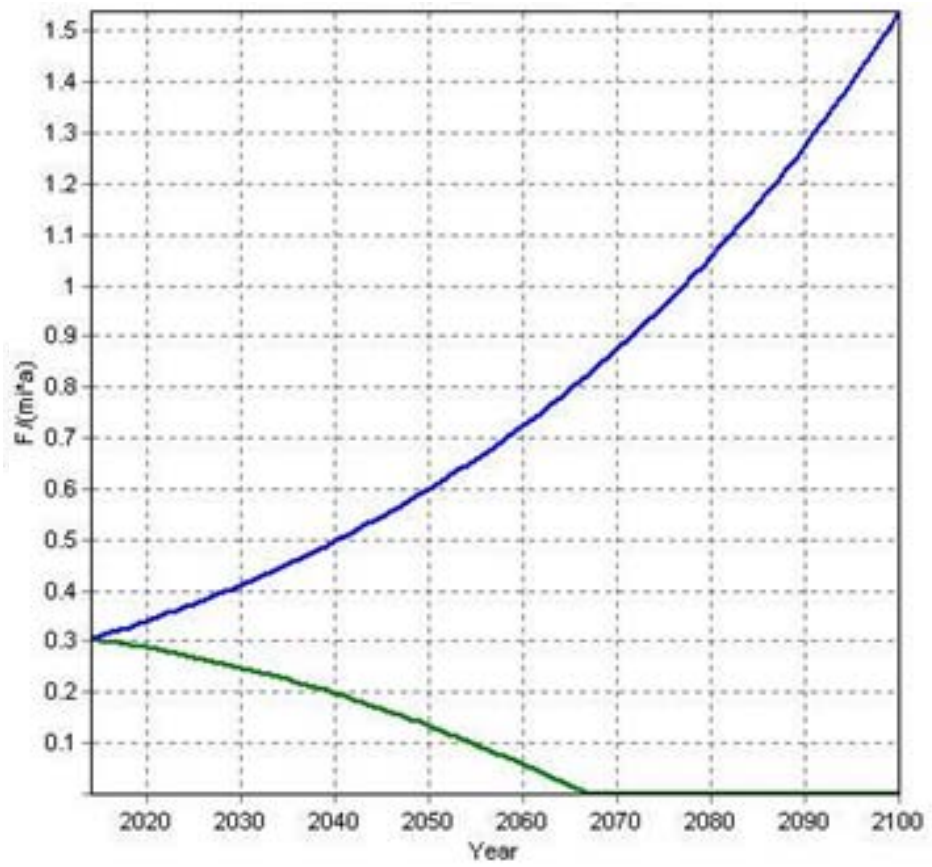


How is the Aging Function Used?

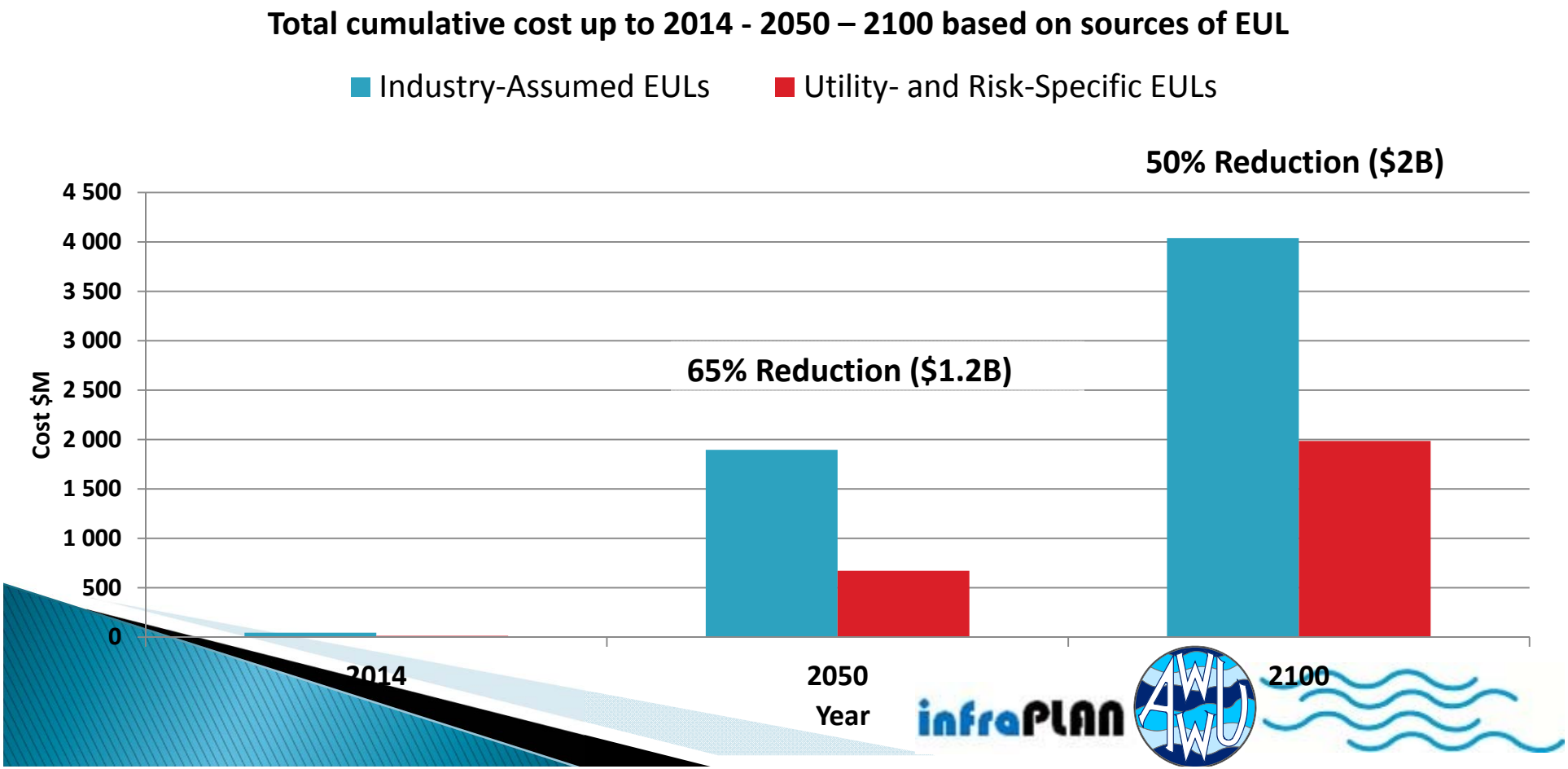
- To gauge the effect of a certain level of R&R
- It is the “do-nothing” reference

Aging Function

Blue Curve = Aging Function – "Do- Nothing"



Credibility



What does it take to set up an analytical AM program?

- Experts consider that 75-80 % of the effort going to the first analytics-driven CIP-STP project is to be dedicated to data.

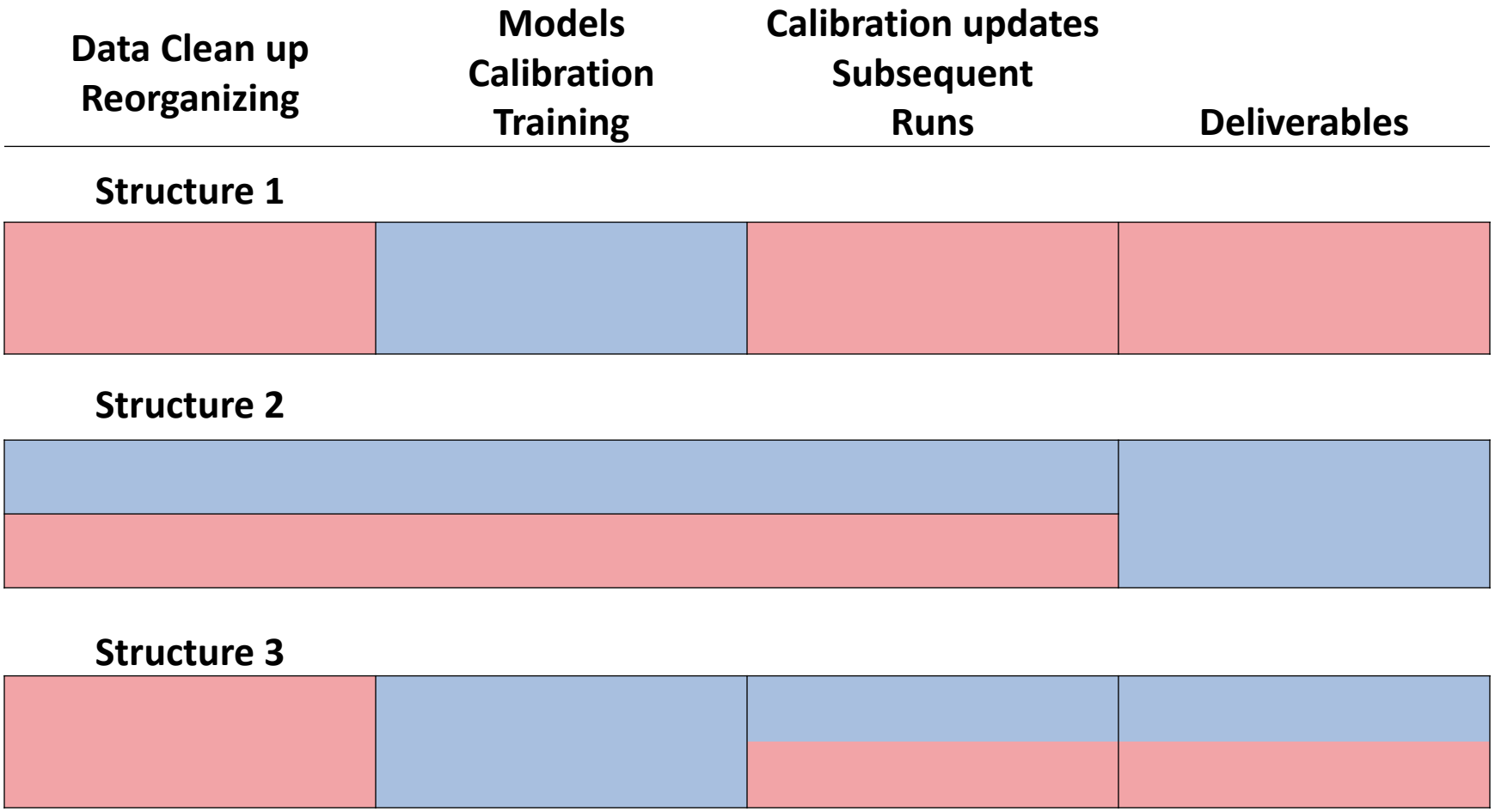
What does it take….?

- Structure
- Type of Personnel, Skills
- Tools – Analytical Algorithms
- Logistics
- Data
- Understanding of Risk and Service Levels
- Business Process development
- Leadership

3 types of structures

- Structure 1: All in house (AWWU)
- Structure 2: Nothing in house (Aquarion)
- Structure 3: Part in house (Denver Water)

Structure of AAM Program



Tasks – Deliverables

Structure 1

Data review Clean up Re-organizing	Data review Clean up –Stats Model calibration First run - Training	Statistics Model re-calibration Subsequent runs	CIP – STP Reports

Structure 2

Data review – Clean up - Stats - Model calibration - Runs			CIP – STP Algorithms Reports
Data clean up and re-organizing – overall direction			

Structure 3

Data review Clean up Re-organizing	Data review Clean up –Stats Model calibration First run - Training	Statistics – Model re-calibration Subsequent runs	CIP Standard Reports
		Simulation of scenarios of R&R	STP Standard Reports

Utility

Outside Expertise

Personnel – Skills

Data Clean up Reorganizing	Models Calibration Training	Calibration updates Subsequent Runs	Deliverables
Structure 1			
Director of Water GIS – IT		GIS – Engineer Analyst Economist	
Structure 2			
Mgr. Inf. Planning – GIS – Consultant			
Structure 3			
Planning Dept. GIS		Planning Dept. – GIS	

Utility

Outside Expertise

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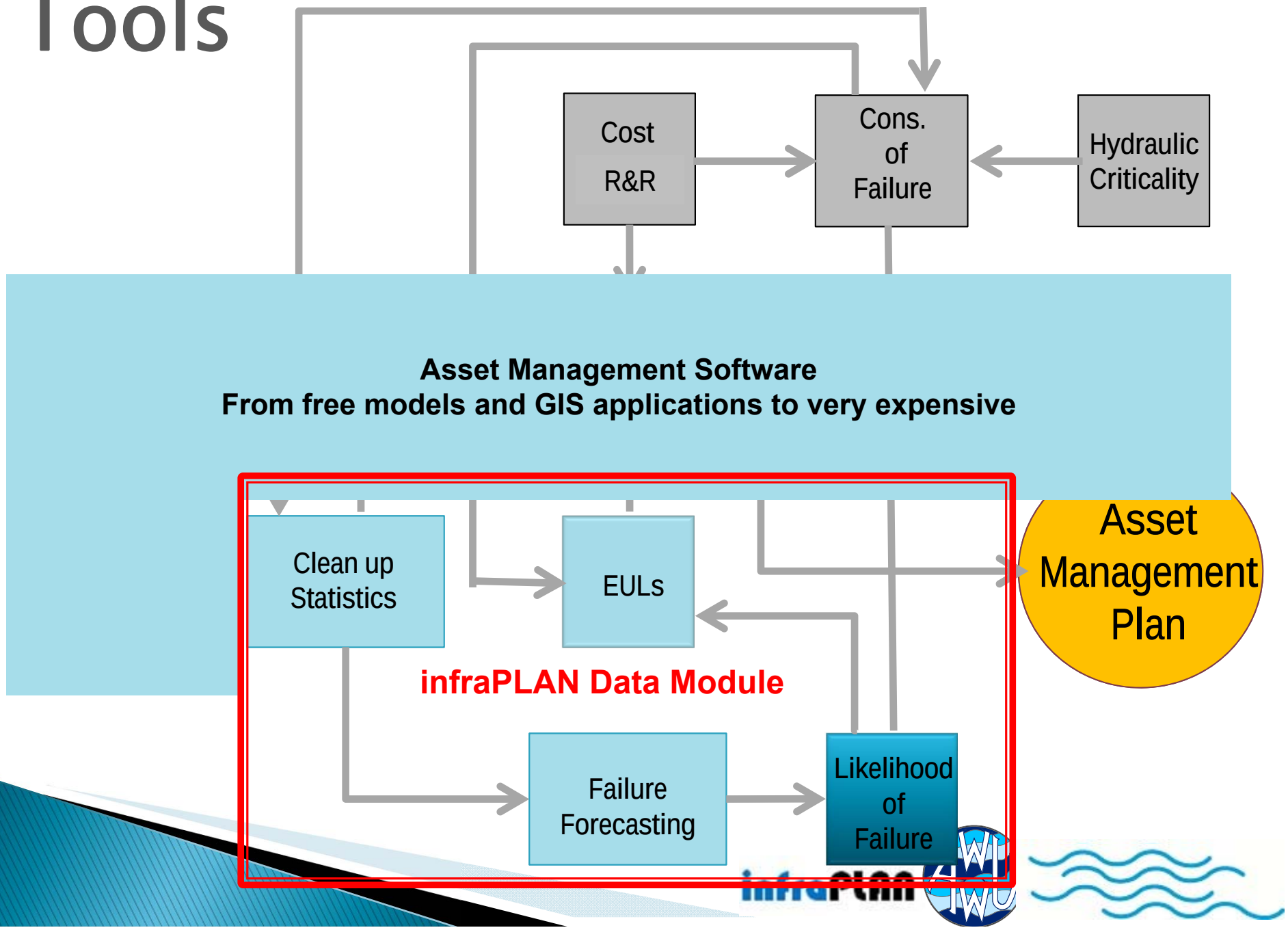
Logistics and Timeframe

- First run
  - Data review and clean up: 1-3 months
  - Data reorganizing: on-going
  - Statistics – calibration:1-3+ months (depends on type of study, size of system, deliverable)
  - Point person
  - Close and dynamic collaboration with all stakeholders
  - Webcast

- Subsequent run
  - Data review and clean up: 1+ month
  - Statistics – re-calibration: 1+ month

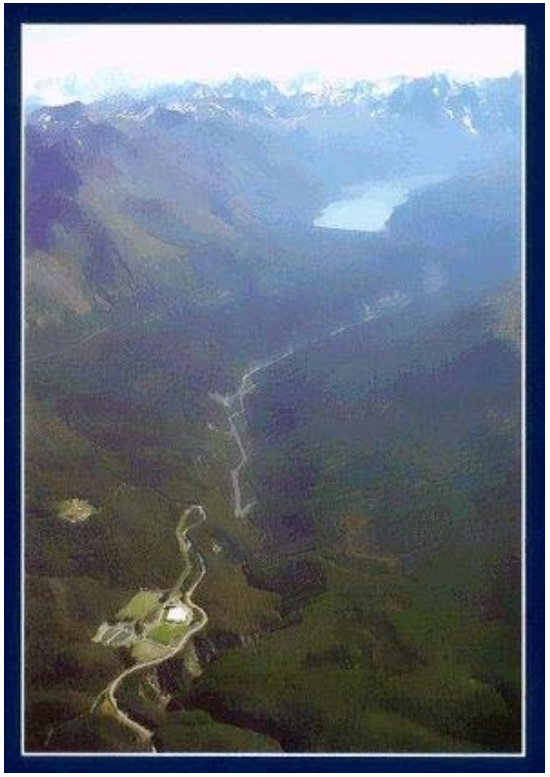
Tools


Cost
R&R
Cons.
of
Failure
Hydraulic
Criticality
Asset Management Software
From free models and GIS applications to very expensive
Clean up
Statistics
EULs
Asset
Management
Plan
infraPLAN Data Module
Failure
Forecasting
Likelihood
of
Failure

Data

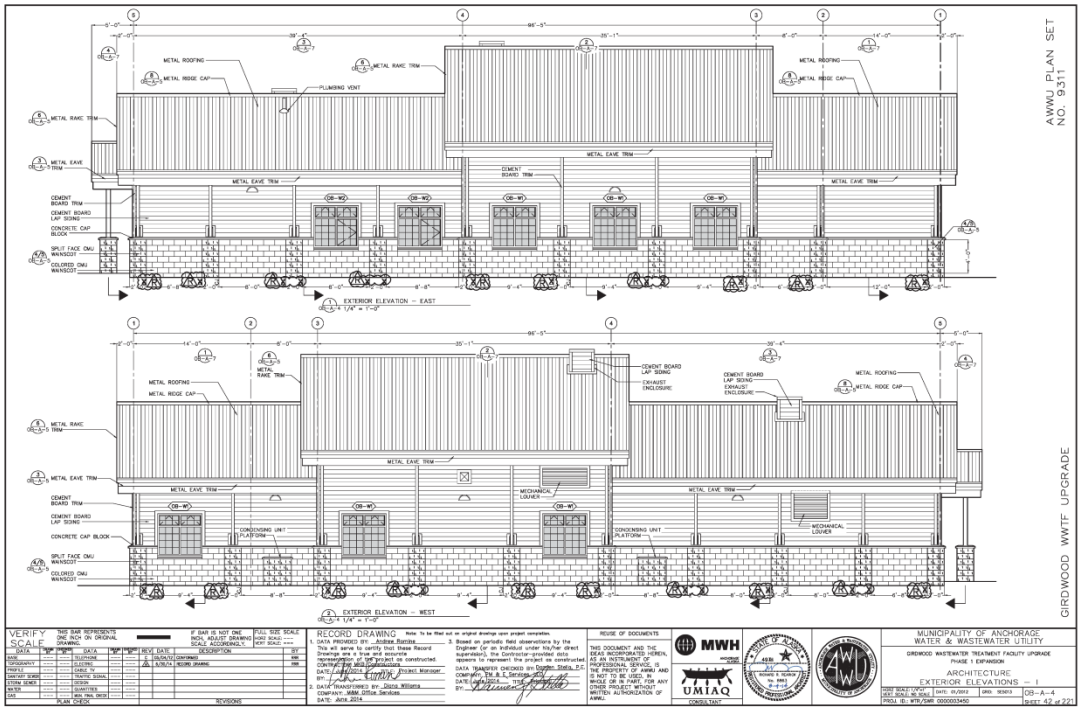
- Nature: Pipes and Breaks
- Source: GIS-CMMS-Hydraulic Model- Failure risk factors-Criticality
- Quality:
  - Breaks assigned to pipes
  - Pipes ACT and ABN
- Quantity:
  - Understand and adjust for what is missing
  - 5 yrs of breaks
- Format:
  - Shape or excel

Setting up a program: the Utility perspective



It's like building and maintaining a structure:

- Risk Policy
- Service Standards
- Business Processes
- Team Collaboration
- Leadership Buy-in
- Refinement/continuous improvement



The Foundation: a Risk Management Policy

AUTHORITY BOARD APPROVED
Date: November 2, 2011

ANCHORAGE WATER AND WASTEWATER UTILITY
BOARD RESOLUTION
No. 2011-10

Meeting Date: November 2, 2011

Risk Management Policy for AWWU

WHEREAS, AWWU is prescribed under Article XVI, Section 16.01, of the Anchorage Charter, to operate in accordance with the general standards common to utilities providing the same utility service; and,

WHEREAS, industry practice is to develop a common risk framework for use across the various business units of the Utility; and,

WHEREAS, the Board, on May 5, 2010, provided strategic direction for AWWU, intended to provide long-term direction with a horizon of five to fifteen years in the future, to guide development of the Utility; and,

WHEREAS, the Board in 2010 adopted the strategic goal to optimize Utility processes to advance asset management through incorporation of best business practices, and improved efficiencies to promote sustainability; and,

WHEREAS, the Anchorage Assembly, through Ordinance AO 2011-24(S), delegated to the Board of Directors the duties to make recommendations to the Mayor regarding the Utility's capital improvement program and maintenance strategy and operations, as well the Utility's strategic plan operating budget; and,

WHEREAS, the concept of risk management may be used to prioritize the expenditure of capital program funds by focusing attention on assets determined to provide the highest level of risk to Utility operations; and,

WHEREAS, the level of risk associated with operation of a utility asset is gauged by the probability of failure of that asset to function effectively in conjunction with the magnitude of consequences related to that failure; and,

WHEREAS, AWWU faces increased risk over the near term as physical and information infrastructure assets age to the point of reaching their estimated useful lives; and,

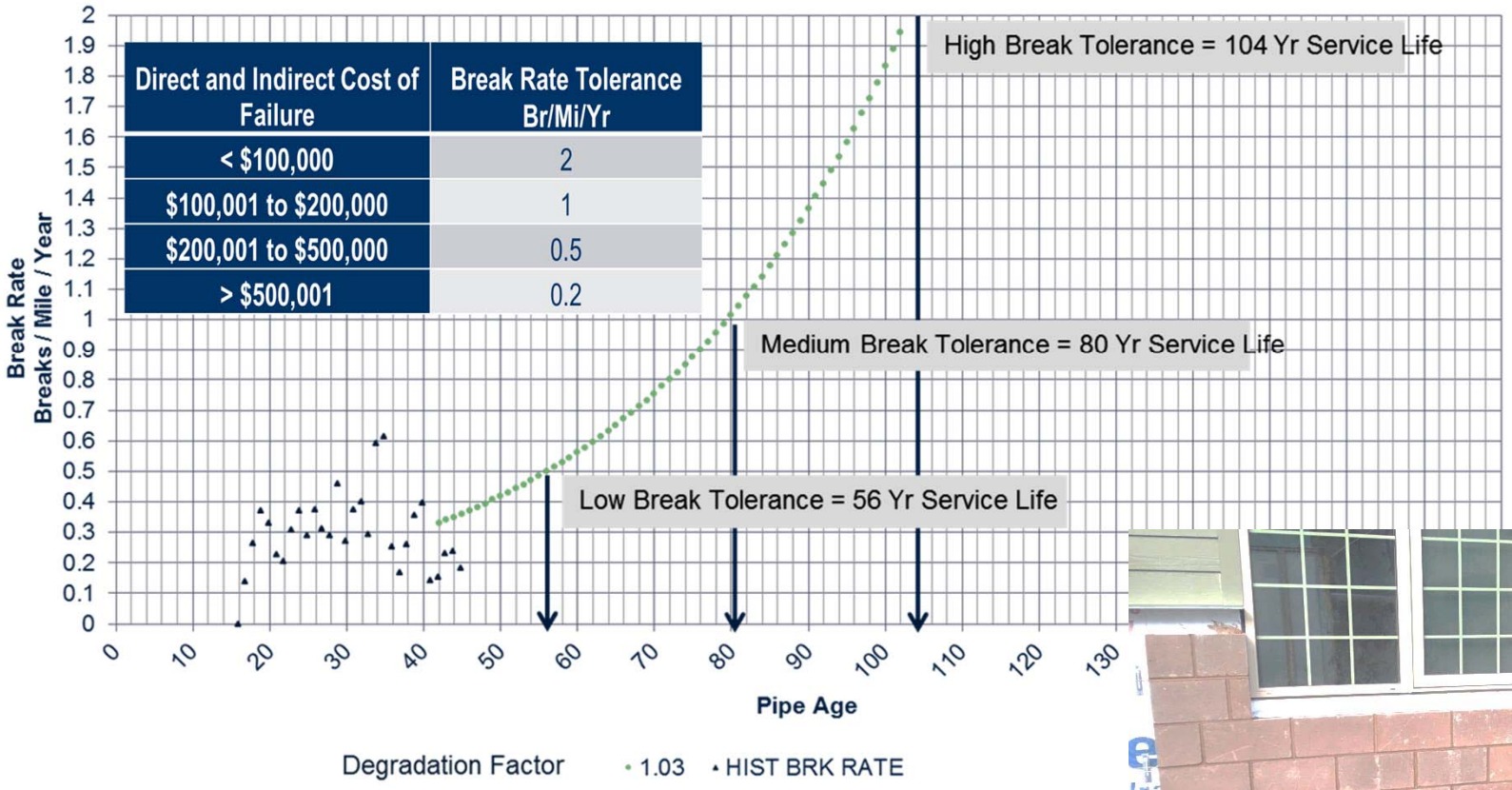
WHEREAS, AWWU is proceeding through an evaluation of risk of asset failure of all of its infrastructure on an asset-class by asset-class; and,

WHEREAS, an effective risk management policy assigns asset management actions and time frames in accordance with identified levels of risk of asset failure.

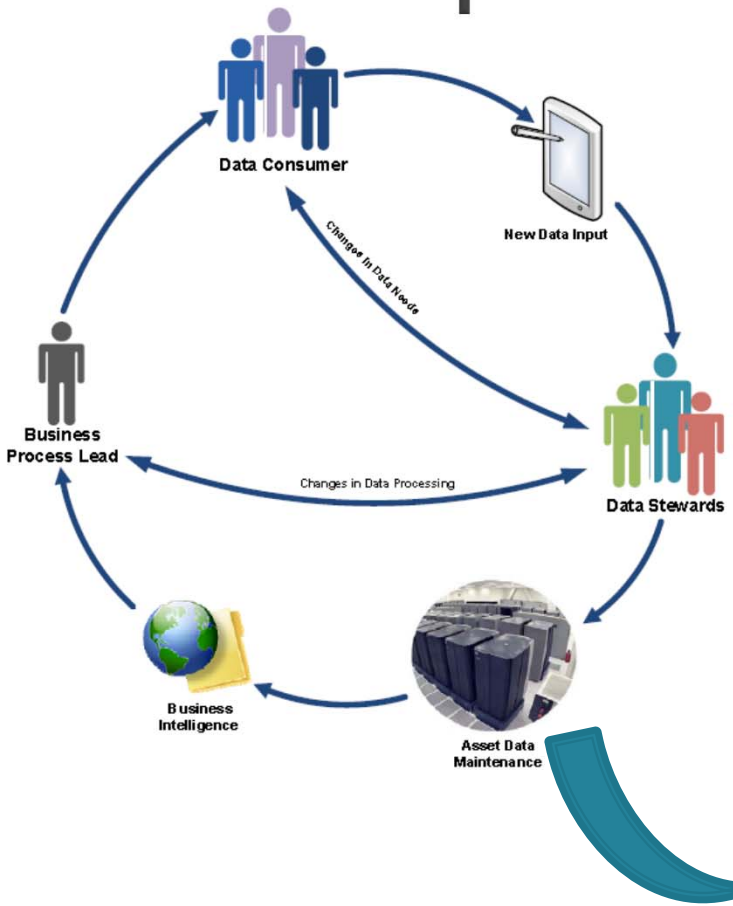
Specifying ‘Product Quality’: Service Levels

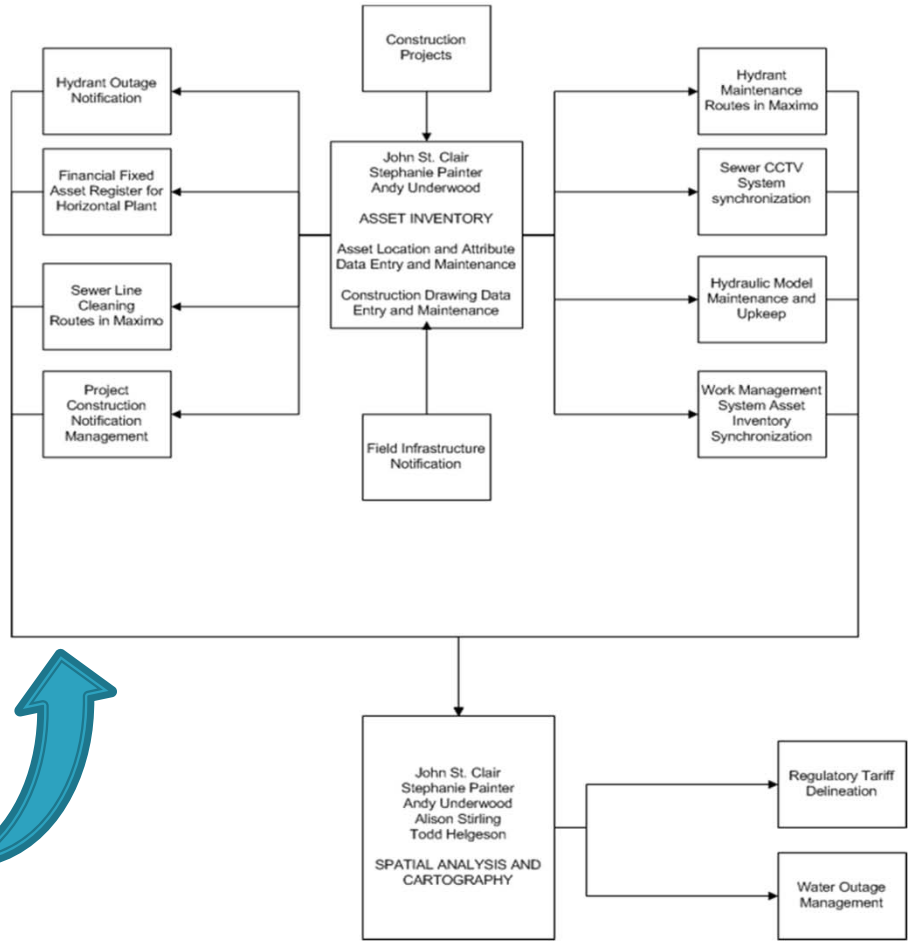
Projected Break Rate of CI Pipe installed after 1965 in Poor Soils
Service Lives Based on Tolerance for Failure

Direct and Indirect Cost of Failure	Break Rate Tolerance Br/Mi/Yr
< $100,000	2
$100,001 to $200,000	1
$200,001 to $500,000	0.5
> $500,001	0.2

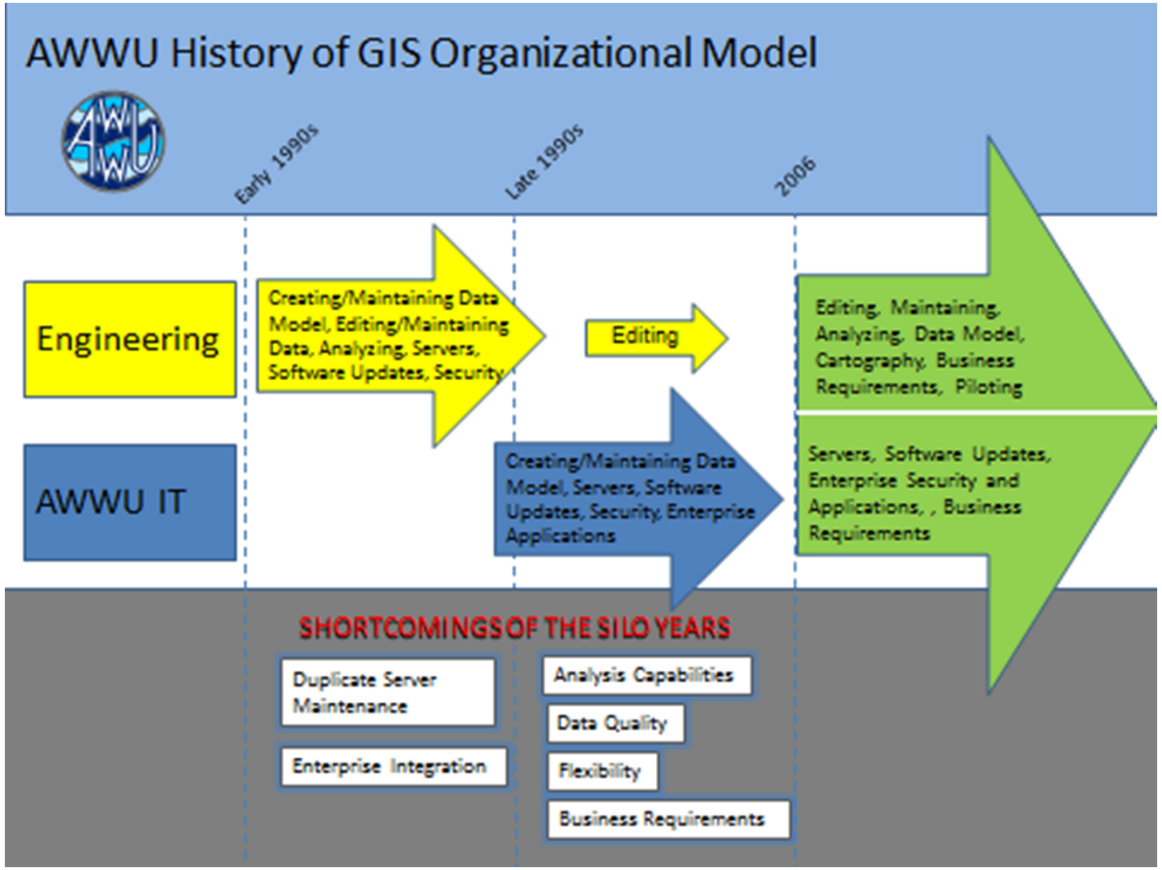


Sourcing ‘quality materials’: your business processes





Constructing your program: Team Collaboration a must



An Owner's approval: Leadership Buy-in

- Requires 3 C's (clarity, consensus, commitment);
  - Clarity of vision (specific, inclusive, honest in scope)
  - Consensus to move forward (willingness to accept the vision)
  - Commitment to achieve vision (resources, priority to attain vision,

    perseverance to overcome resistance

Maintaining the program: refinement through condition assessment

AWWU – analogy of building

- Concept that AWWU is building and maintaining a structure (work in progress)
- Need a policy foundation
- On foundation establish QA/QC product quality (back to example of EUL – want an EUL that is fool proof)
- Choose quality material /incorporate them
- Do it with business processes (needed to collect data, to move data, analyze data, etc.)
- Need work force with different trades to execute the arrows in framework/program
- Owner approval (leadership group provides the resources)
- Maintain and continually improve to refine model

Questions?

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And Thank You!