

# This presentation premiered at WaterSmart Innovations

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# Advances in the Integration of Acoustic Leak Detection With Fixed Network AMI Systems Provide a New Level of Achievement in Water Resource Management

WaterSmart Innovations '09  
Presentation - October 9, 2009

- Aclara and the Intelligent Infrastructure™

An Intelligent Infrastructure™ encompasses the design and implementation of smart strategies, technologies, and networks that allow utility operations and services to communicate, interoperate, and enhance service delivery effectively and efficiently.

- Utilities and the Intelligent Infrastructure™

An Intelligent Infrastructure design is a transformational event. A utility-driven, thriving interoperable ecosystem that provides information, communications, control, and automation to all levels of resource delivery and services.

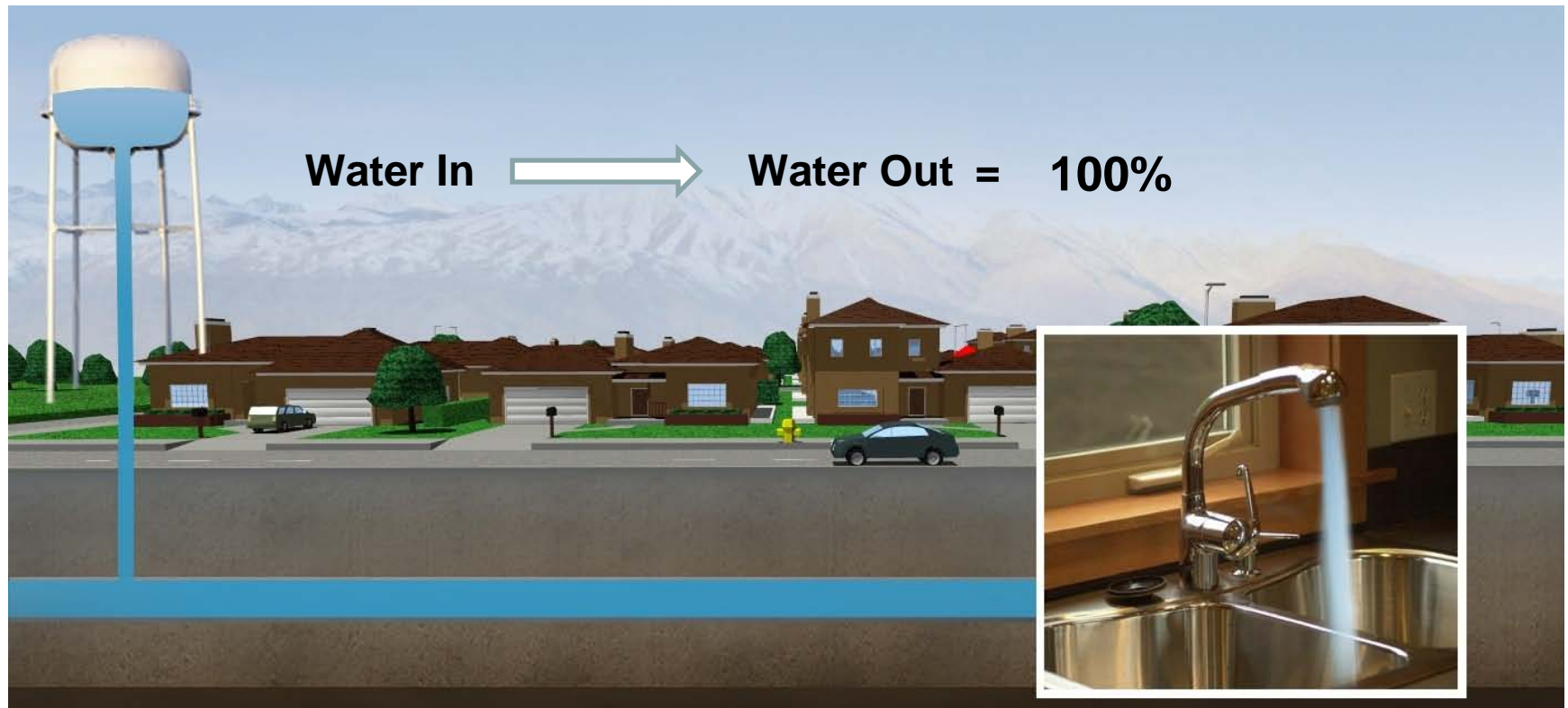
- Aclara's Solutions Include
  - Utility-wide data/communications networking
  - Advanced Metering Infrastructure (AMI)
  - Meter Data Management solutions
  - Customer analytics and data presentment
  - Demand Response and load management
  - Outage notification and assessment
  - Remote connect/disconnect solutions
  - Conservation and customer choice tools

An Intelligent Infrastructure design is a transformational event based on adapting and creating new solutions.

As technology advances, the solutions to high impact conservation and efficiency become attainable.

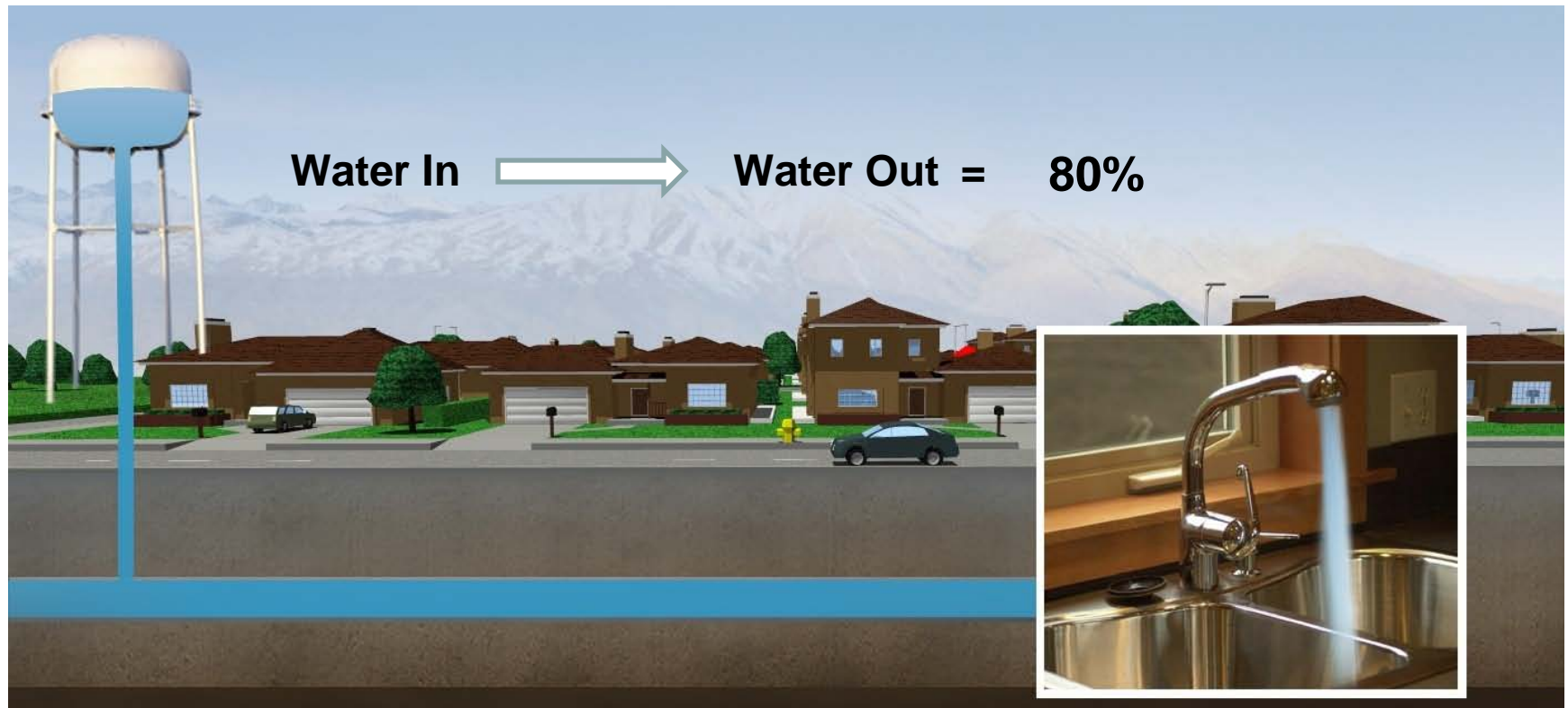
# The Less Than Ideal Water System

In a perfect world, 100% of the water that enters a system would be accounted for and billed.



# The Less Than ideal Water System

**There will never be a 100% transfer of water usage from when the water leaves the water tower to when it reaches the customer.**

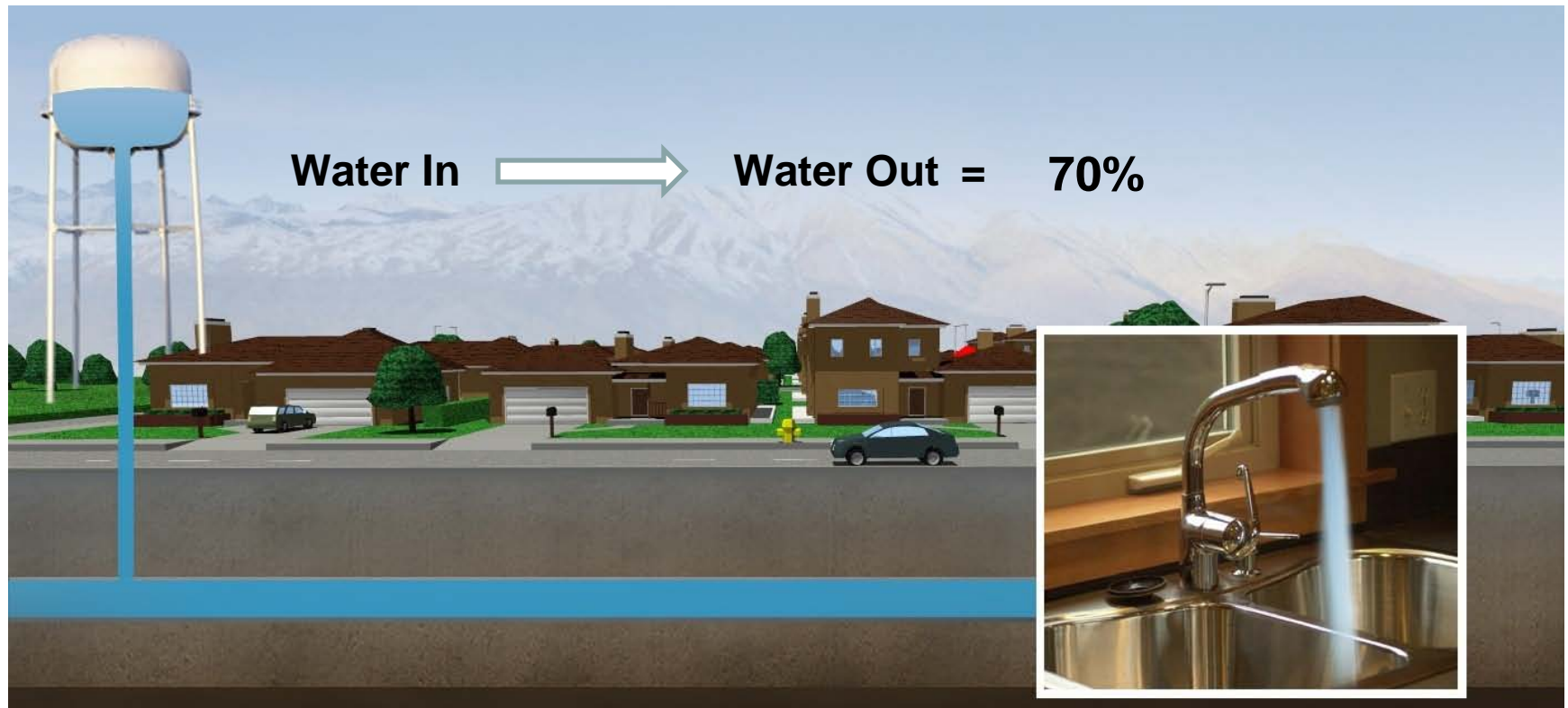


**As water travels through the system, leaks and breaks in the main lines will affect the utility and the bottom line.**



# The Less Than Ideal Water System

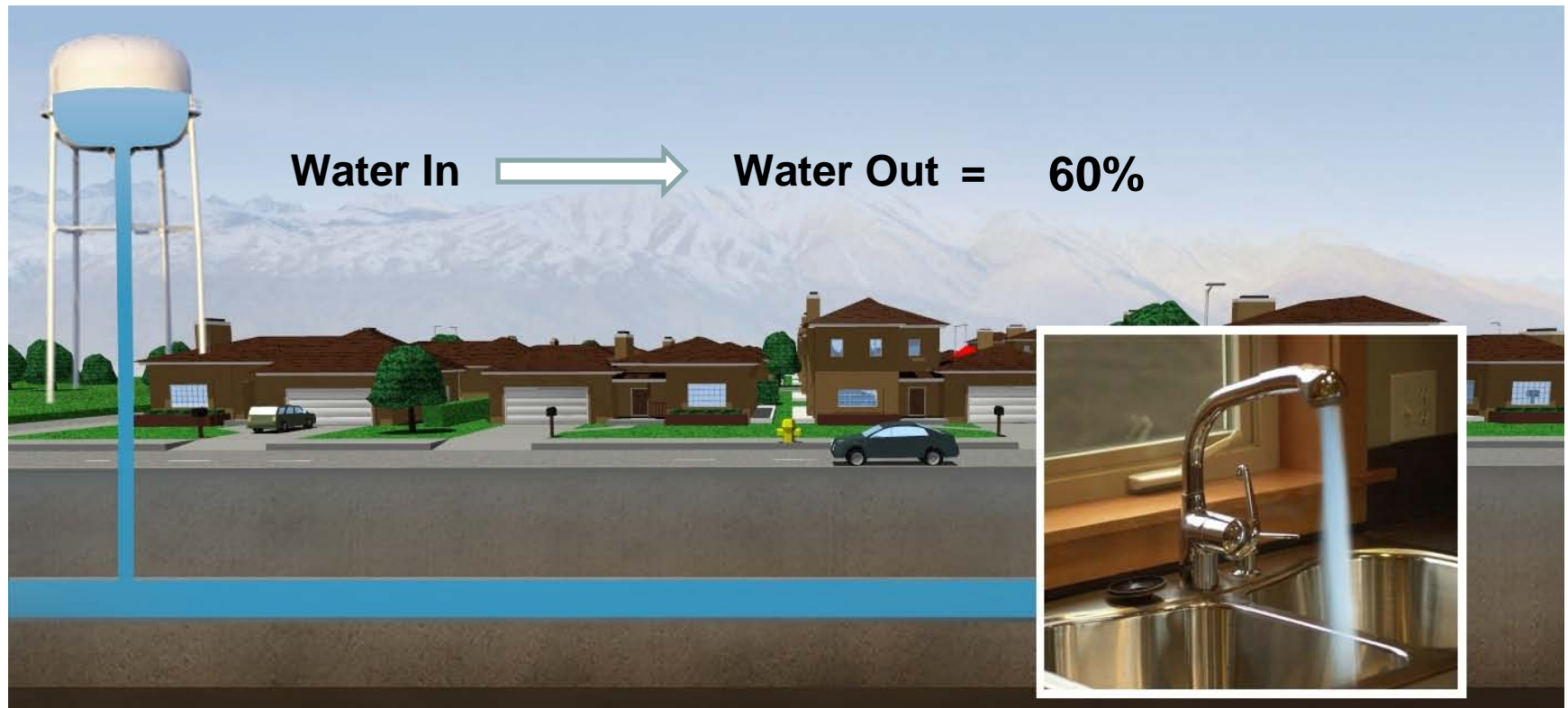
**There will never be a 100% transfer of water usage from when the water leaves the water tower to when it reaches the customer.**



**As water continues through the system, distribution connections, hydrants and an increasingly aging, stressed infrastructure adds to the losses.**

# The real water system?

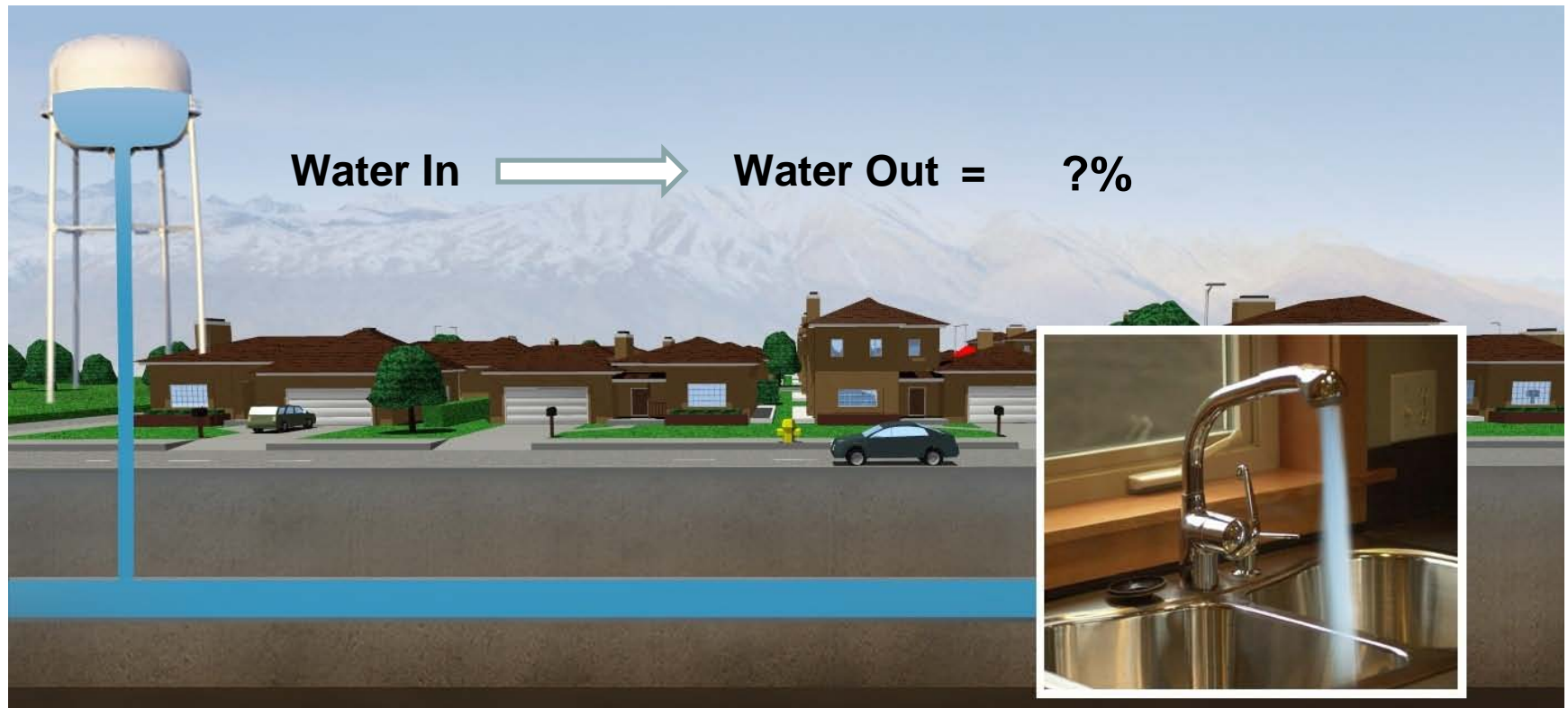
**There will never be a 100% transfer of water usage from when the water leaves the water tower to when it reaches the customer.**



**At the customer's premise supply lines leak prior to a meter point, within the premise even small leaks are magnified by the mass of the population.**

# The ideal water system

**There will never be a 100% transfer of water usage from when the water leaves the water tower to when it reaches the customer.**



**Our aging infrastructure and expanding systems will require significant investment. Full replacement is impossible.**

# Leaks – The Hidden Water Loss

- As devastating as a water main break can be, these are not what water utilities are continually fighting against.



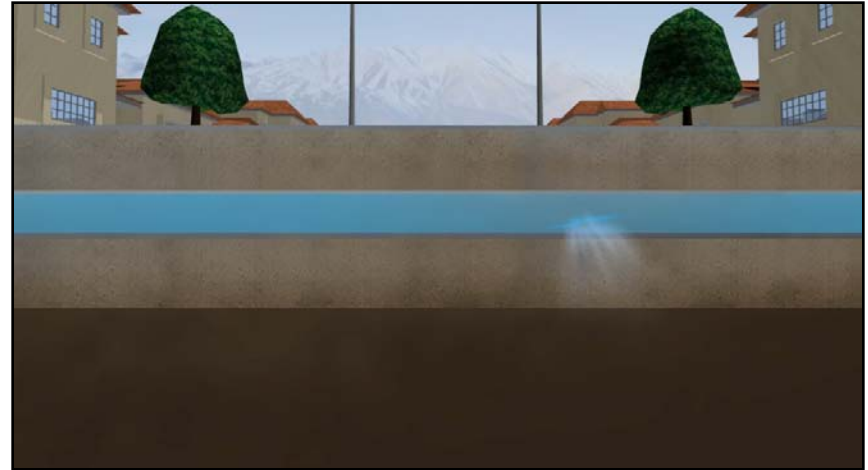


# Leaks – The Hidden Water Loss

- Typically, breaks such as these does not happen in an instant.
  - A small growing leak has typically been active for weeks or months
  - The high impact water last has already occurred when discovered by “more visible” means.



- Impact of Leaks:
  - Resources: water conservation and environmental efforts
  - Revenue: losses for the utility and reduced in capital for system investments
  - Rates: increases for the customer and cost for water not put to use
  - Safety: undermining roadbeds, reducing delivered quality
  - Trust: loss in trust is a loss in support

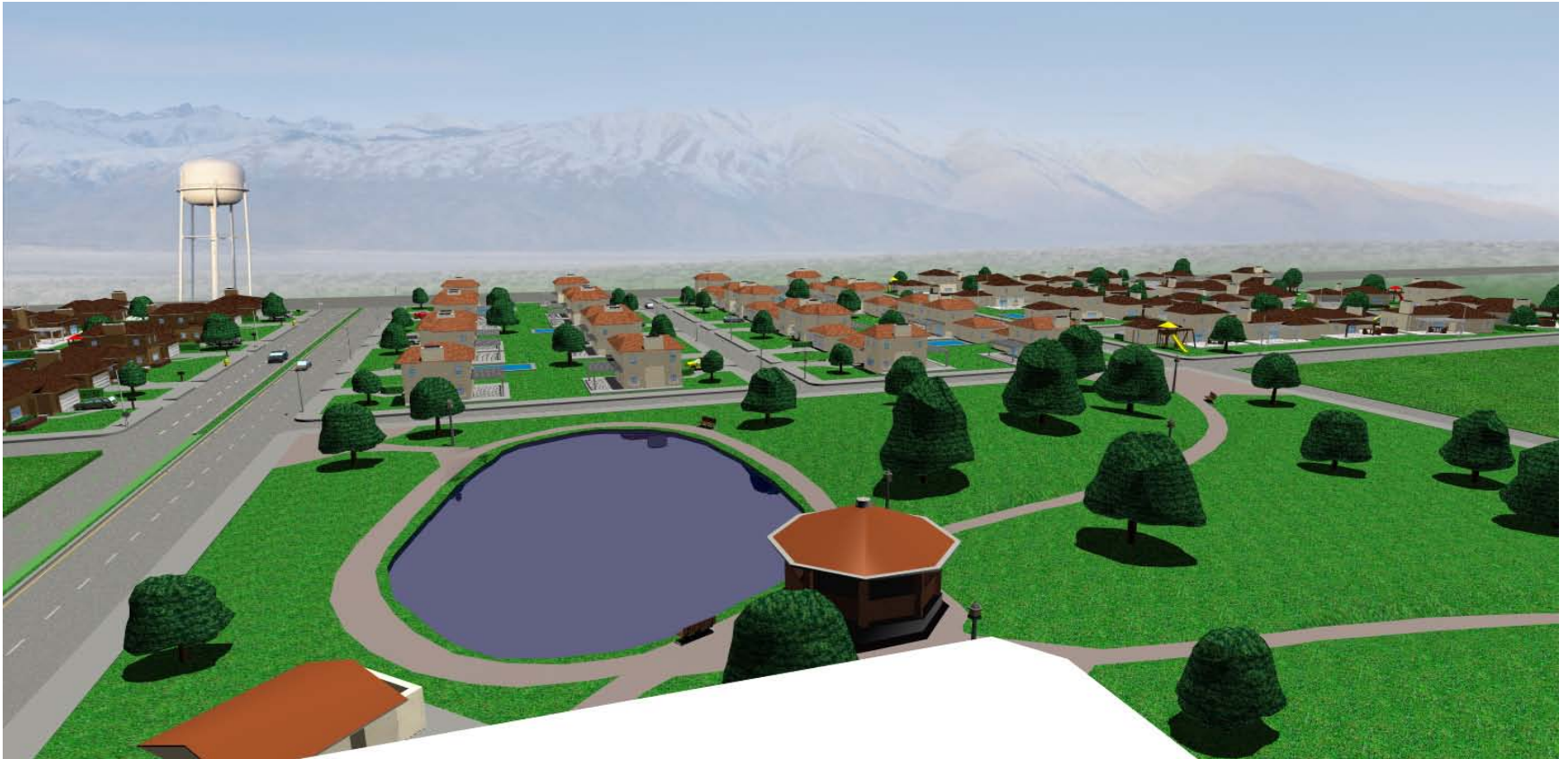


# Leak Detection, A Pre-Emptive Conservation Tool





- Successful leak detection is an “End-to-End” effort.





# Three Steps for Leak Detection

- Localization
  - Post meter
  - Pre-meter



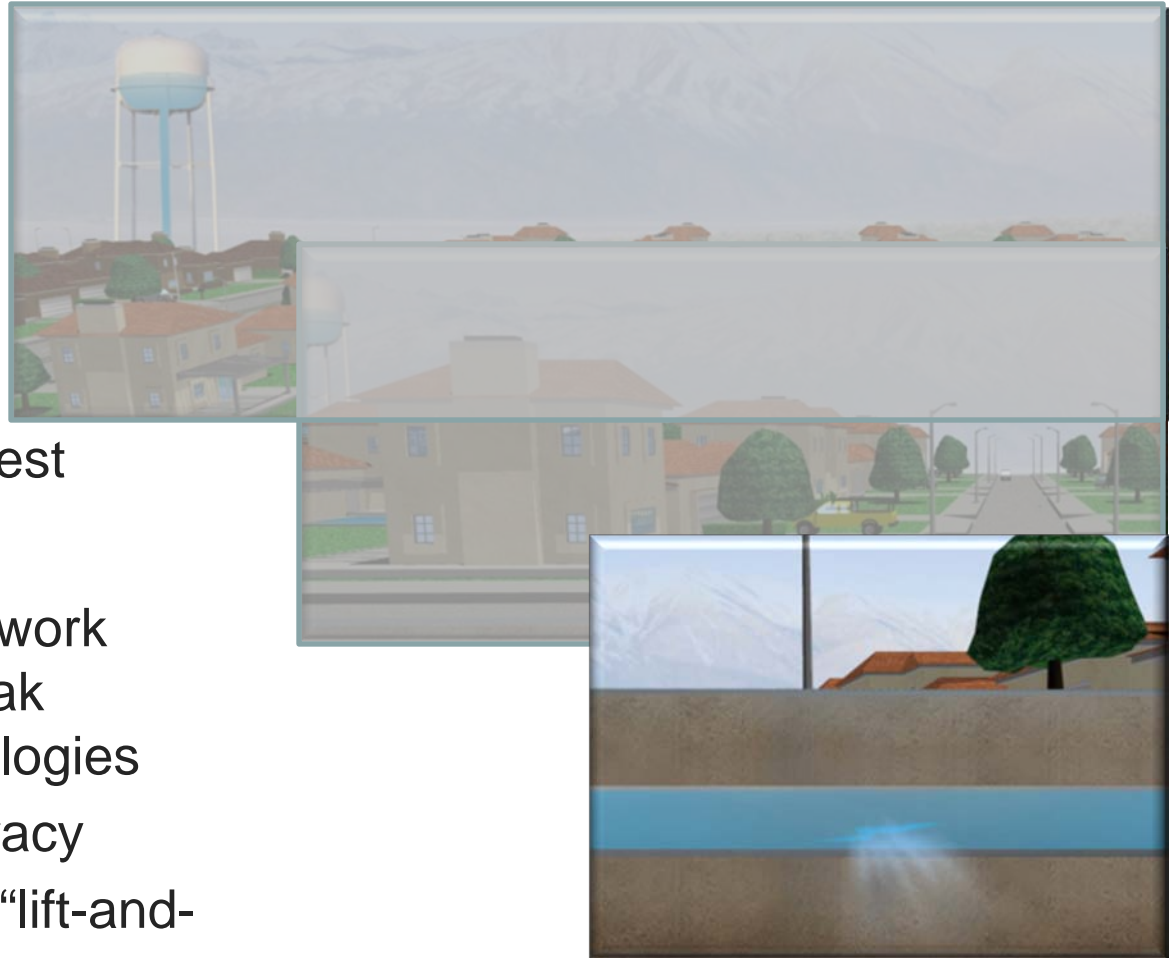
# Three Steps for Leak Detection

- Localization
  - Post meter
  - Pre meter
- Location
  - Using Data
  - Using amplitude test



# Three Steps for Leak Detection

- Localization
  - Post meter
  - Pre meter
- Location
  - Using Data
  - Using amplitude test
- Correlation
  - Linking Fixed Network with acoustic Leak Detection Technologies
    - Pinpoint accuracy
    - Permanent or “lift-and-shift” capabilities



- Customer pays without the benefit the resource provides
  - One small leak impacts the user
  - Aggregate all small leaks and we impact the enterprise



### **Water Loss with a Faucet Leak**

30 drops/minute = **1,008 gallons/year**

60 drops/minute = **2,016 gallons/year**

90 drops/minute = **3,036 gallons/year**

120 drops/minute = **4,044 gallons/year**

- Fixed Network AMI data can provide probable leak or theft/tamper flags via high resolution data
- Simple data analysis can predict likelihood of premise issues by:
  - Abnormal consumption
  - Continuous flow
  - Total consumption
  - Zero consumption
  - Negative consumption
  - Reception review
  - Tamper flags



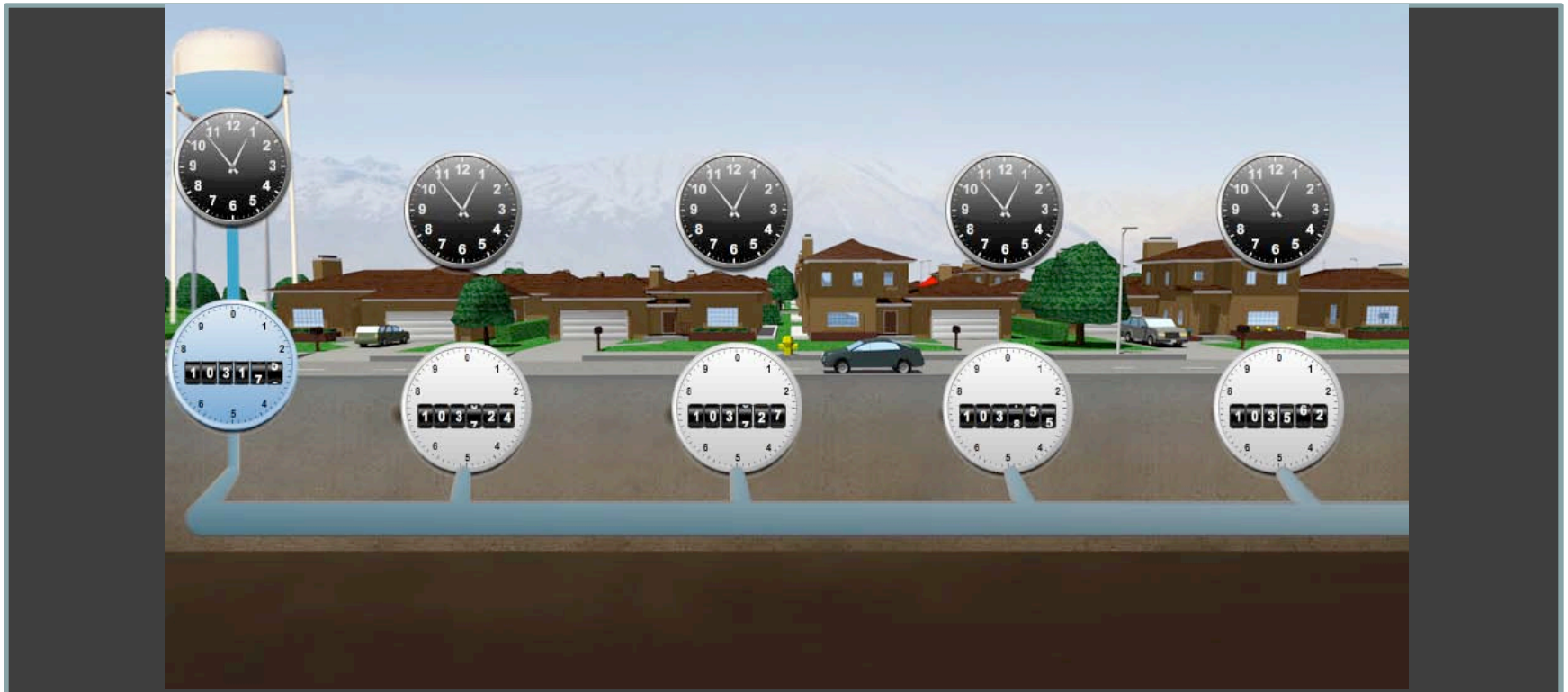
- Non-Revenue water loss does not contribute to the operation, delivery or services by the utility
- Anything less than a major leak may take weeks/months/years to surface
- On Average a line lead:
  - Takes 182 days to “find”
  - Loses 6500 gallons/day
  - Loses 1.2 M gallons/year



**It can take an average of 182 days to learn of a leak...find the leak...and then repair the leak.**



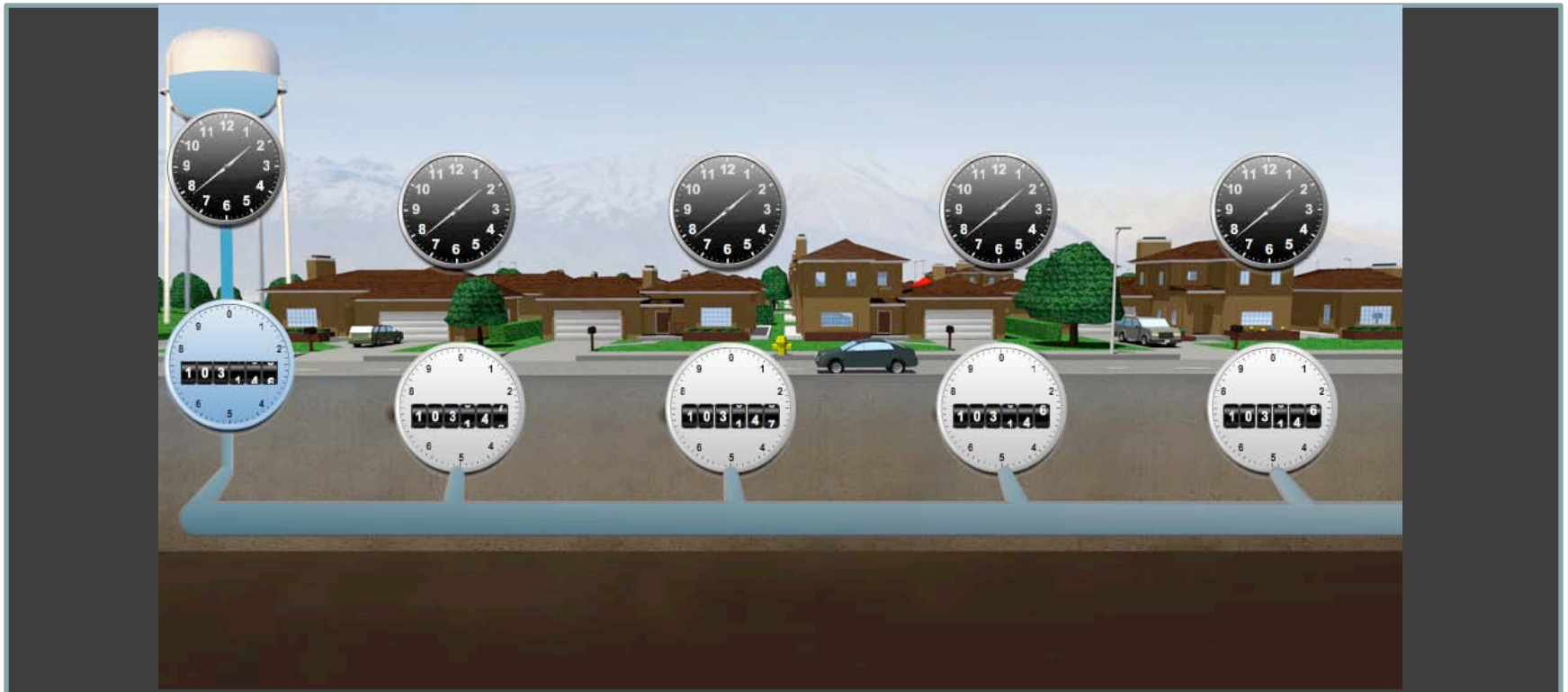
Traditional AMR systems provide asynchronous meter reads. You cannot accurately compare the amount of water entering a system to the water leaving a system.



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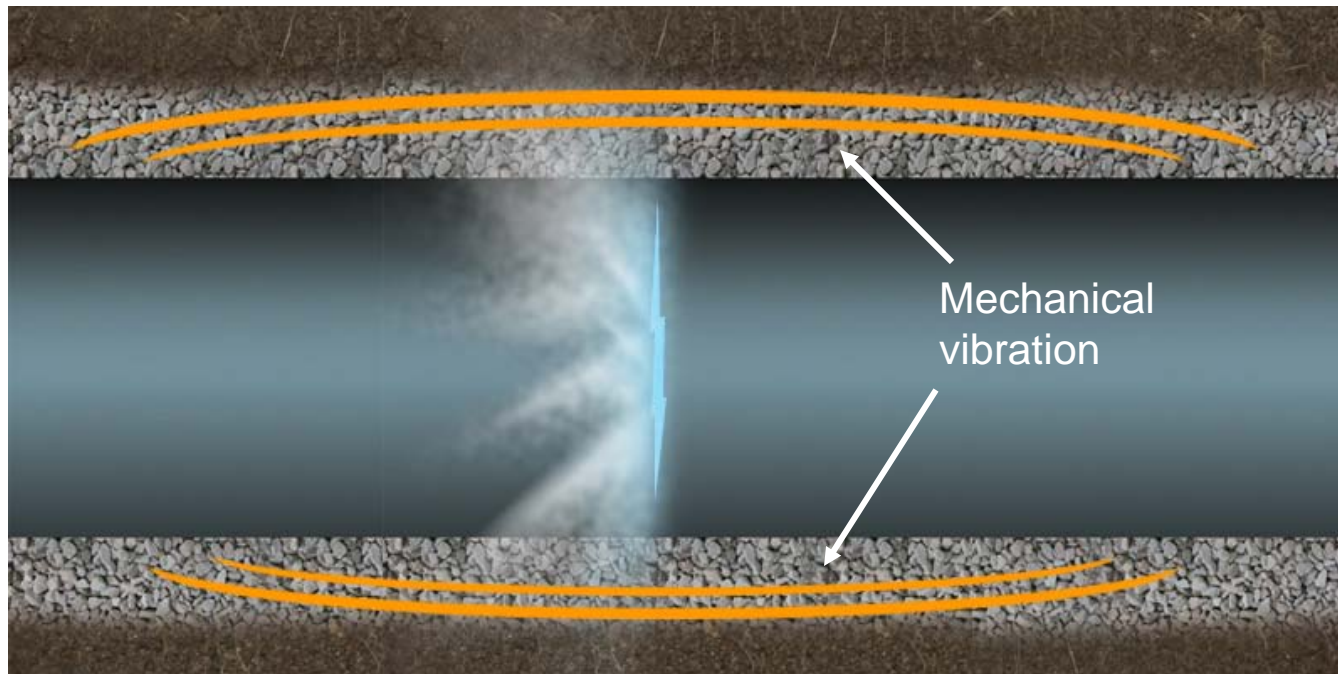
A fixed, two-way water AML system uses a time-synchronized approach that allows a utility to take a network-wide reading at the same time.



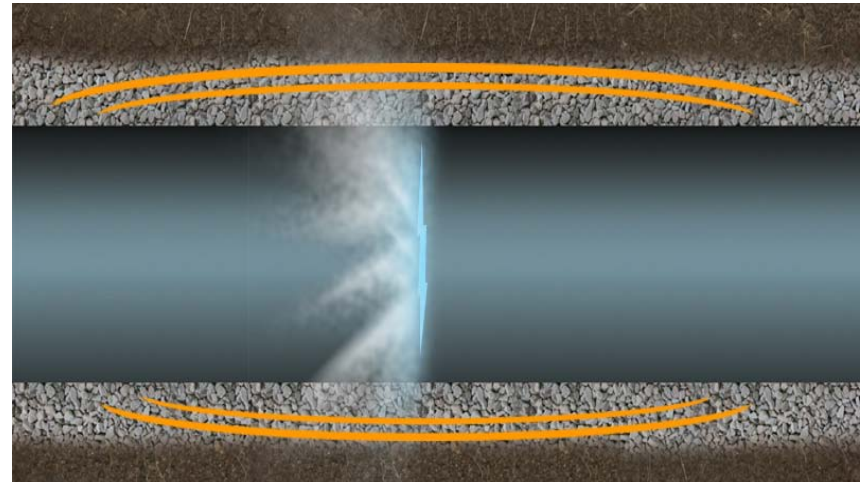
The system may wait until the system provides the system localized approach to all information by the magnitude of all systems at the same time.

# What is a Leak Amplitude Test?

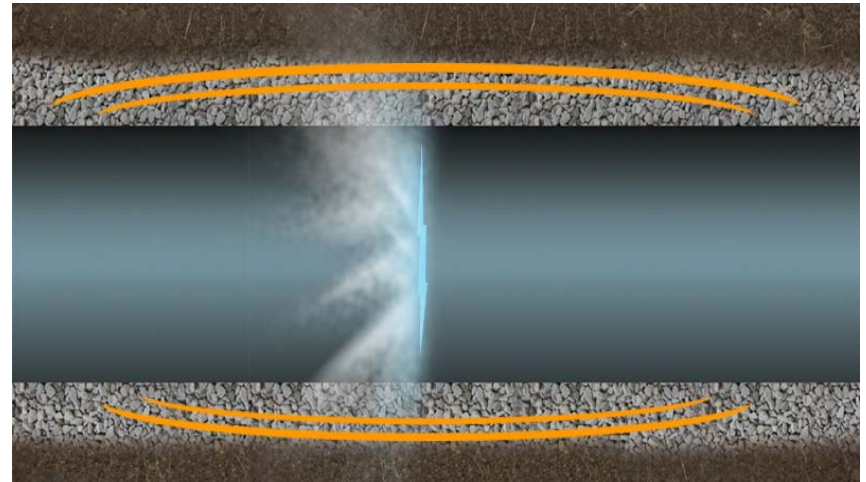
- Leak noise generation
  - The mechanical vibration traveling through a pipe is always present as noise
  - Leak noise is created by a large pressure differential between the water in the pipe and the area outside the pipe



- Factors producing good leak noise
  - High water pressure
  - Sandy backfill
  - Small rupture
  - Clean pipes
  - Metallic pipes
  - Small diameter pipes

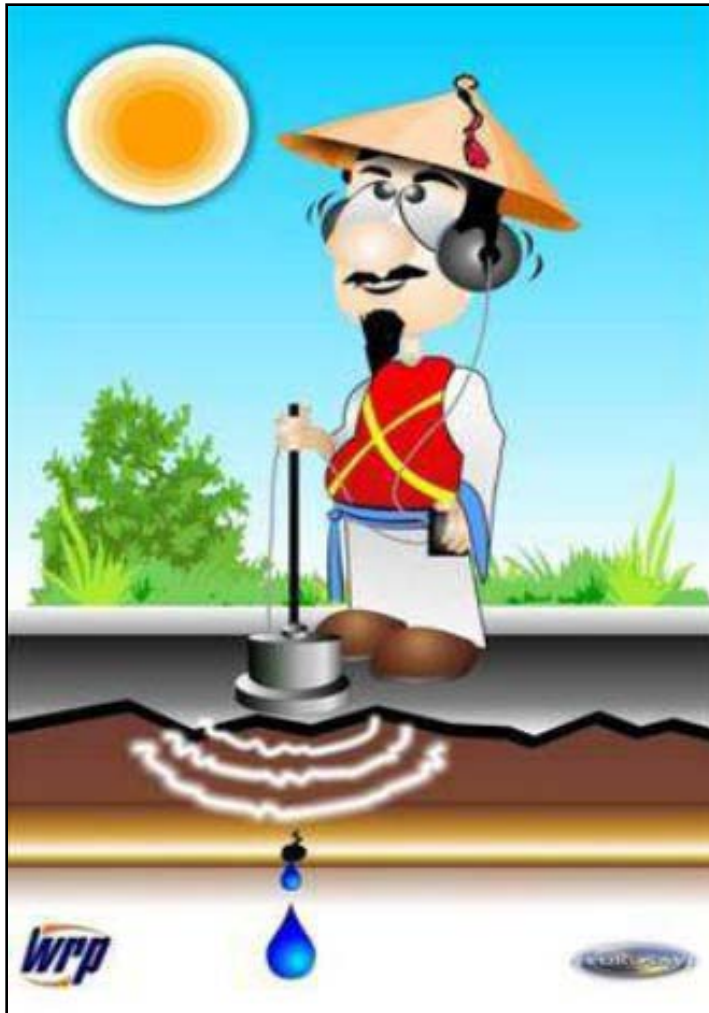


- Factors producing poor leak noise
  - Low water pressure
  - Clay backfill
  - Split mains
  - Encrusted pipes
  - Soft /Lined pipes
  - Large diameter pipes





# Locating with Fixed Network Amplitude Test



# Locating with Fixed Network Amplitude Test

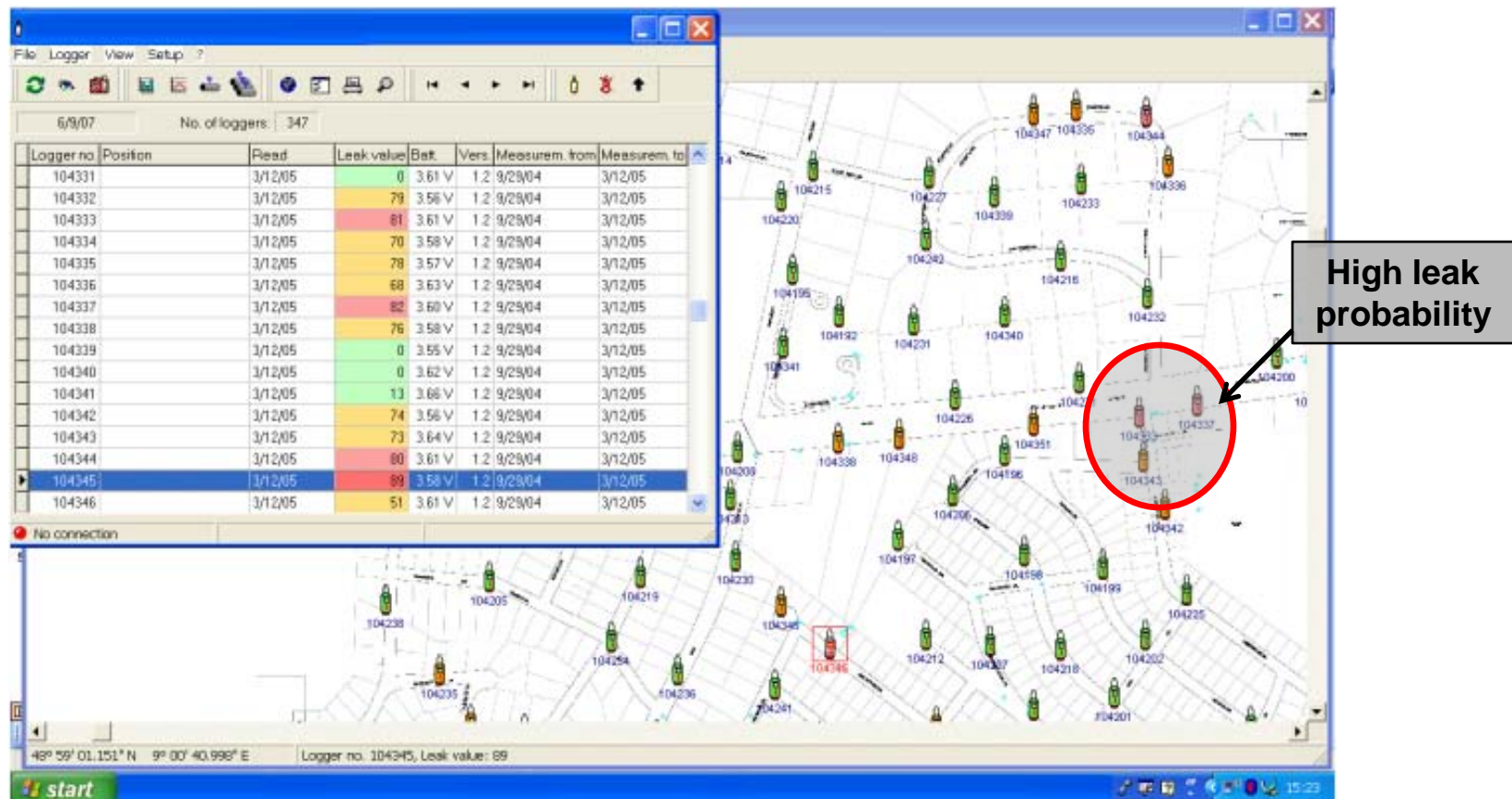


Acoustic leak detection is used to locate a leak in a localized area.



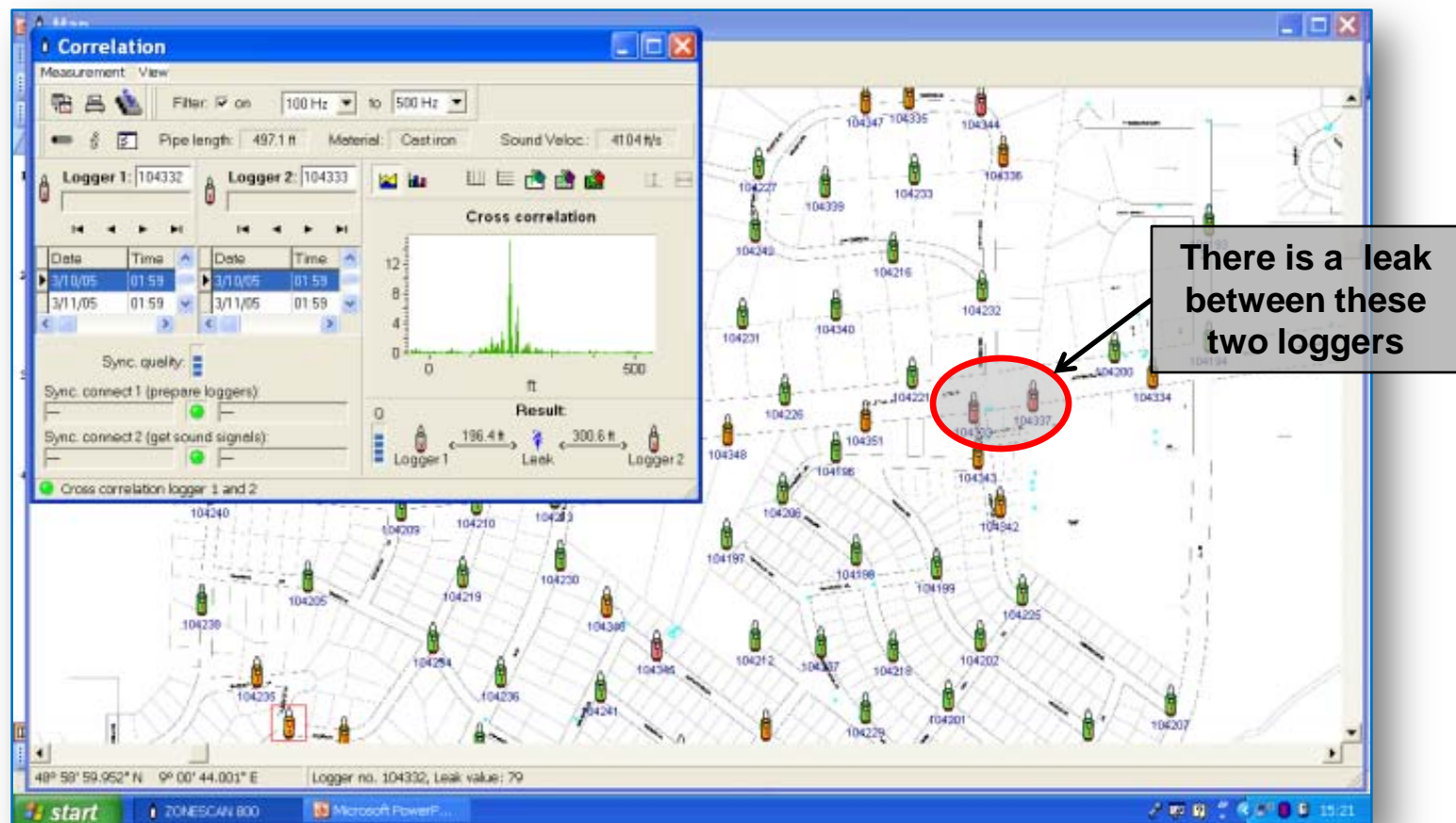
# Data Value Improved With Correlation

- Fixed Network Leak Detection uses a snapshot of a wide area with highly synchronized data allowing for correlation of multiple data points



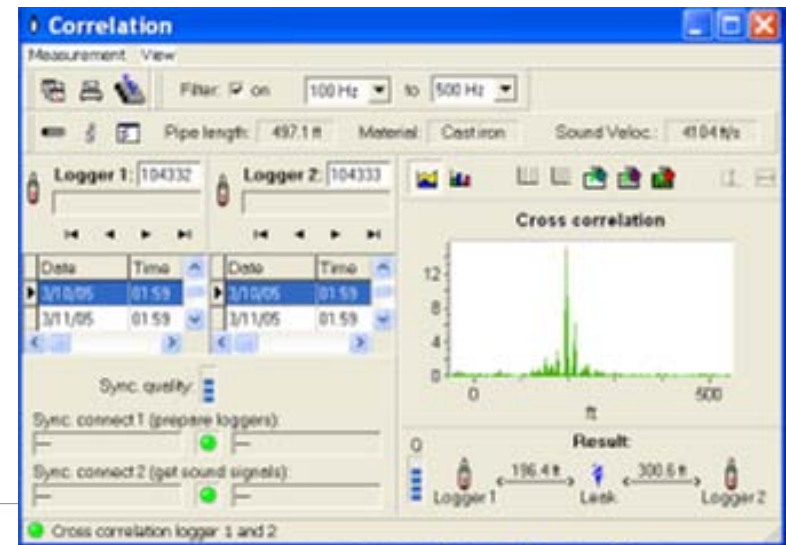
# Validating Leak Data

- Fixed Network Leak Detection provides repeatable events allowing trend analysis and validation



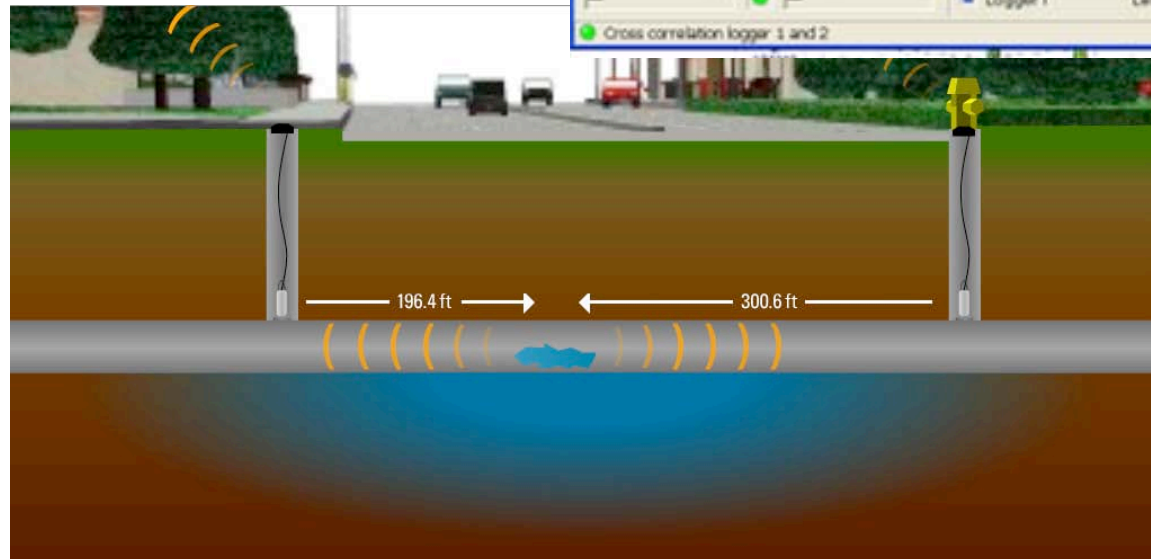
# Pinpointing The Leak

- Fixed Network Leak Detection allows highly correlated locations
  - Triangulation from multiple points
  - Precise time synchronization
  - Validated by repetition



Data Required:

- Distance between loggers
- Pipe material
- Pipe diameter





# Benefits of AMI Leak Detection

- Improves business case for infrastructure investments
  - AMI, Leak Detection, sensor and control elements...
- Improves effectiveness of capital and resource spends
- Drives resource and delivery efficiencies
- Improves customer and stakeholder confidence
- Transforms business processes



## Create Your Intelligent Infrastructure™

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