This presentation premiered at WaterSmart Innovations

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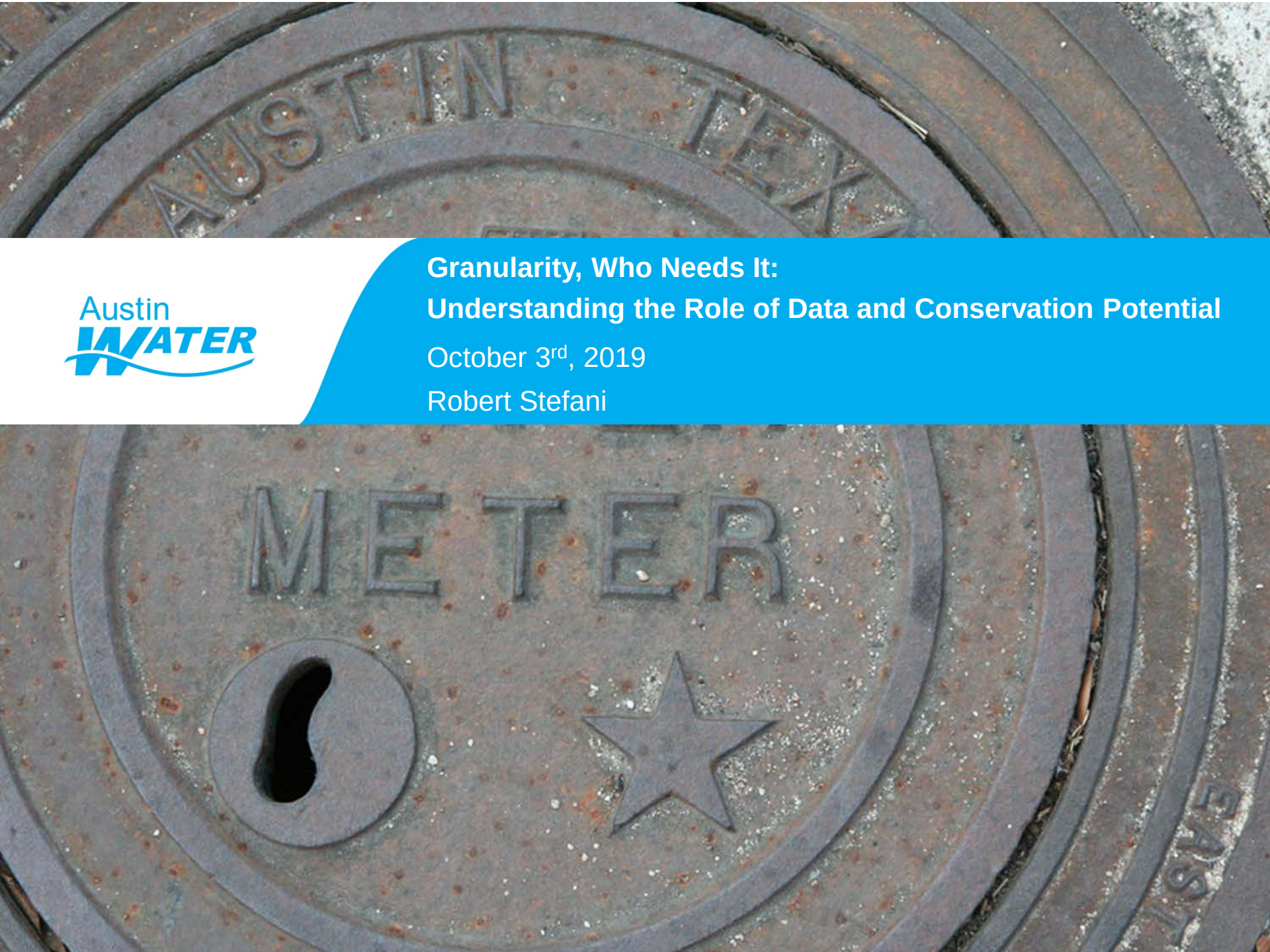


Austin WATER

Granularity, Who Needs It:
Understanding the Role of Data and Conservation Potential

October 3rd, 2019

Robert Stefani

About Austin Water

- 100% surface water from Lower Colorado River
  - Firm water rights backed by stored water contract up to 325,000 acre-feet
  - Prepayment agreement up to 201,000 acre-feet
  - 2018 withdrawal ~ 149,000 acre-feet
- Large metropolitan utility
  - ~ 548 sq miles
  - ~ 223,000+ connections
  - ~ 3,807 miles of mains
  - ~ 1,000,000 customers
  - ~ 1,100 employees

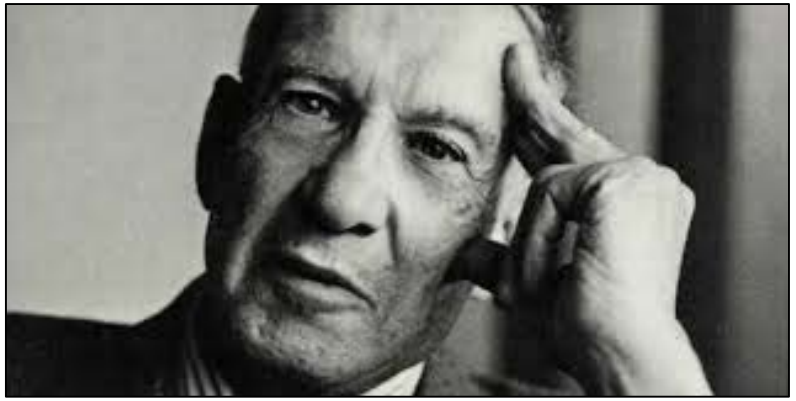
What is Granularity

“The *granularity* of data refers to the size in which data fields are sub-divided.”

Why is granularity important to demand management

“If you can not measure it, you can not manage it.”
-Peter Drucker

- Allows for advanced conservation techniques:
  - Disaggregation of end-uses
  - Premise Leak Detection
  - System Water Loss Analysis
  - Stand alone Customer Engagement tool
  - Data Stream to Customer Relationship Management (CRM) Platforms
  - Precise quantification of program effectiveness



Evolution of Meter Technology

- No metering

- Coin Operated Meters

- Analog Meters
  - Positive displacement (PD)
  - Static
    - Ultra-Sonic
    - Turbine

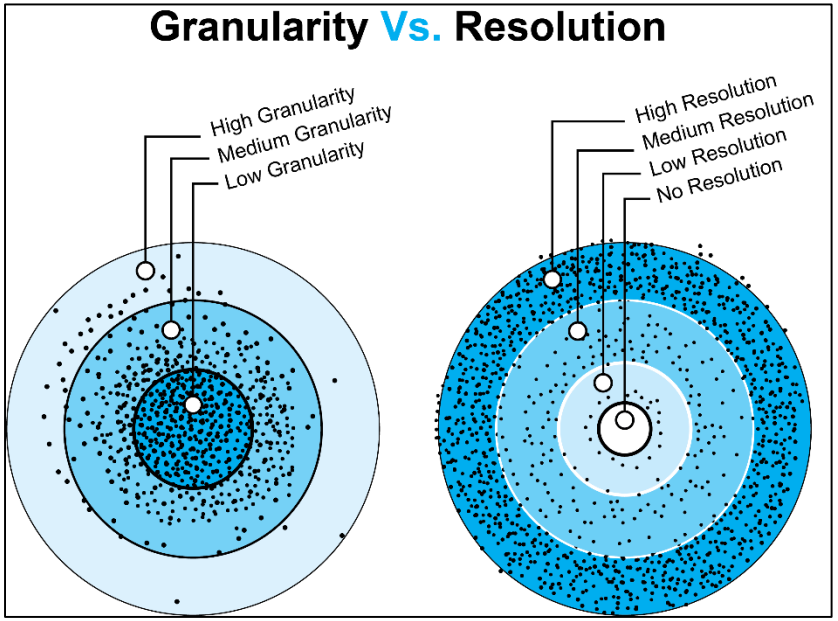
- Digital Meters
  - Advanced Metering Infrastructure (AMI)
  - Automatic Meter Reading (AMR)
    - Positive displacement
    - Static
      - Ultra-Sonic
      - Turbine

Granularity and Resolution

- Granularity, also referred to as Resolution

- Granularity has in inverse relationship to Resolution
  - Low Granularity is the same as High Resolution

- Four levels of Resolution
  - No Resolution
  - Low Resolution
  - Medium Resolution
  - High Resolution



No Resolution

- Typically, no meter infrastructure
- No volumetric reads
- Allocation methodology
- Typically, no volumetric relation

<u>Advantages:</u>

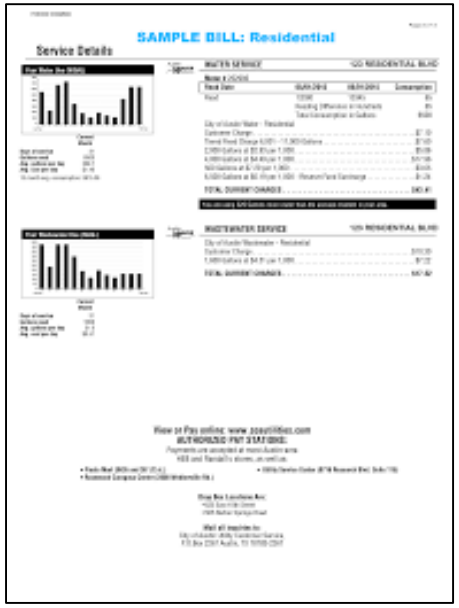
- Low Overhead Cost
- No O&M Costs
- No Digital Infrastructure
- Simplified Billing Structure

<u>Disadvantages:</u>

- No volumetric detail
- No volumetric baselines
- No tiered volumetric rates
- Difficulty with quantifications
- Difficulty with end-user engagement
- No real time reporting
- No disaggregation

Low Resolution

- Typically, analog technology
- Reads: Quarterly, Monthly
- Typically, relates to volumetric consumption
- Records in gallons



<u>Advantages:</u>

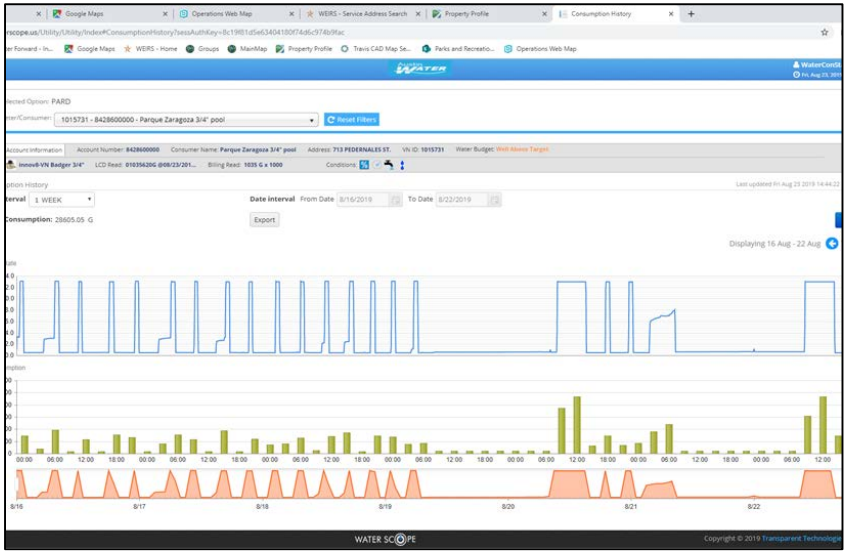
- Typical Overhead Cost
- Typical O&M Costs
- Industry Standard
- Large Selection of Vendors
- No Digital Infrastructure
- Tiered Volumetric Rates
- Low Level Disaggregation

<u>Disadvantages:</u>

- Low level disaggregation of use
- Difficulty with quantifications
- Low level of volumetric detail
- No real time reporting
- Customer issues difficult to address

Medium Resolution

- Typically, digital technology
- Reads: weekly, daily, hourly,15 minute
- Records in gallons



Advantages:

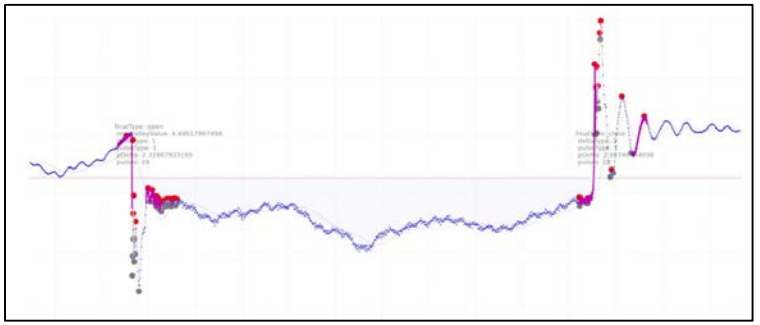
- Real Time Reporting
- Real Time Alerts
- More Precise Quantifications
- Varying Levels of Granularity
- Medium Level of Volumetric Detail
- Ease of Customer Engagement

Disadvantages:

- High Overhead Costs
- High O&M Costs
- Staff Training Needed
- Network Outages

High Resolution

- Based in digital technology
- Minute or sub-minute resolution
- Records sub-gallon volume



Advantages:

- Fixture based disaggregation
- Real Time Reporting
- Real Time Alerts
- Precise Quantifications
- Varying levels of granularity
- High level of volumetric detail
- Ease of customer engagement

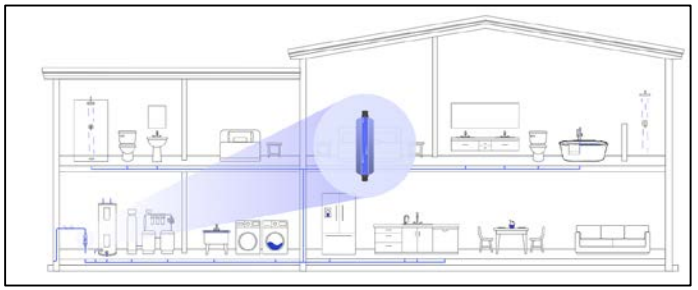
Disadvantages:

- High Overhead Costs
- High O&M Costs
- Staff training needed
- Network Outages

Hardware

- Ancillary Attachable Devices
  - Data Logger
  - Sensor Based Device
  - Optical Reader

- In-line Devices
  - Analog Meter
  - Digital Meter
  - SCADA Type Systems
  - Flow Sensors
    - Stand Alone
    - Fixture Based
    - Irrigation Only
    - Whole House



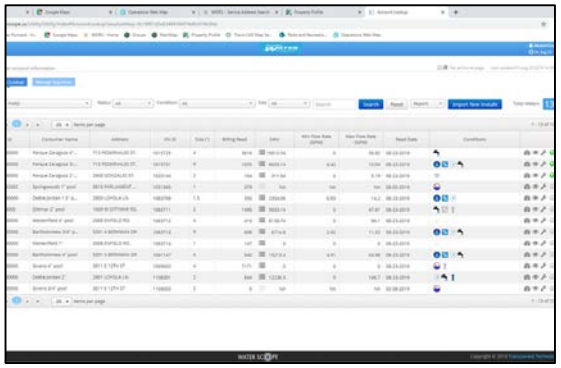
Software Platforms

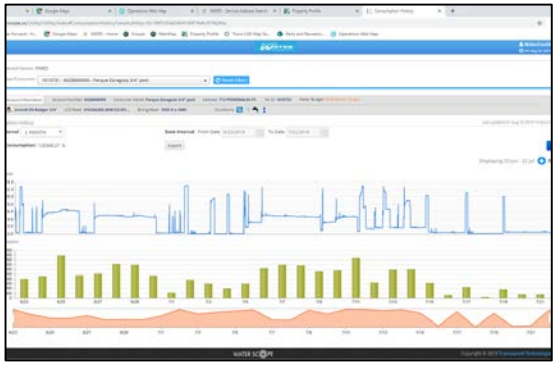
- Meter Vendor Supplied Platforms
  - Typically has administrative based applications
  - Platform typically provided with hardware

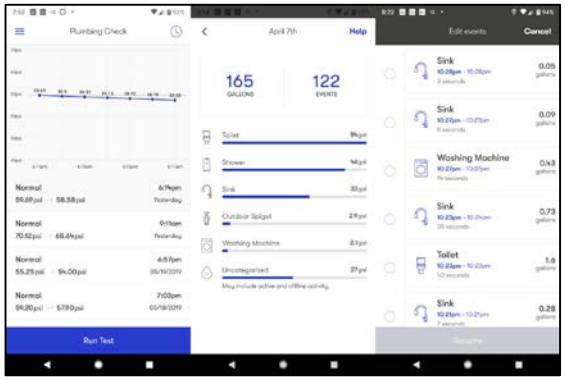
- Third Party Platforms
  - Typically has end-user focused and administrative applications
  - Competitive additional cost
  - Integration with existing data streams necessary

- In House Platforms
  - Typically has end-user focused and administrative applications
  - Variable additional cost
  - Integration with existing data streams necessary

- Custom Platforms
  - Typically has end-user focused and administrative applications
  - High additional cost
  - Integration with existing data streams necessary

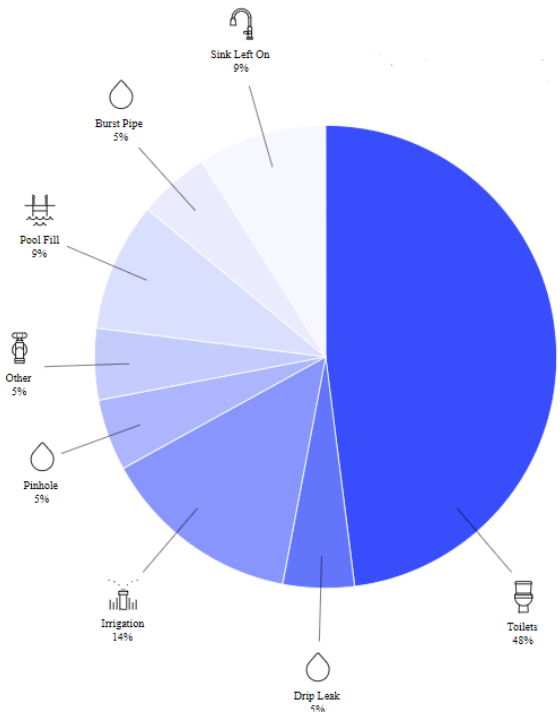






The Future of Data Granularity

- Integration with CRM platforms
- Fixture Level Disaggregation
- Consumer Electronics
- Home Automation Packages
- Second Generation Smart Irrigation Controllers



Program opportunities

- Home Audit Kit
- Diagnostic Tool
- Leak Detection
- System Water Loss
- Customer Satisfaction
- Meter Sizing
- Water Restrictions Enforcement
- Firm Quantifications
- Non-Potable Water Budgeting
- Water Use Monitoring Rebates

Lessons Learned

- Due diligence required
- Consultant or Third Party guidance preferred
- Design system based on local need
- Future proof selected technology

- Look for overlap opportunities with energy provider
- Be innovative with network deployment
- Be careful with 1st generation technology

Next Steps for Granularity

- Open source fixture level disaggregated algorithms
- Roll up disaggregation algorithms
- Standardization of data streams
- Expansion of sensor technology
- Overlap with water quality monitoring
- Customer Relationship Management Platform integration

Questions?

Robert Stefani

Environmental Program Coordinator

(512) 974-9302

robert.stefani@austintexas.gov

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