Water Smart Innovation 2019

What happened in Vegas?

Massachusetts Water Resources Commission, December 12, 2019

watersmart INNOVATIONS 2019

What is WSI?

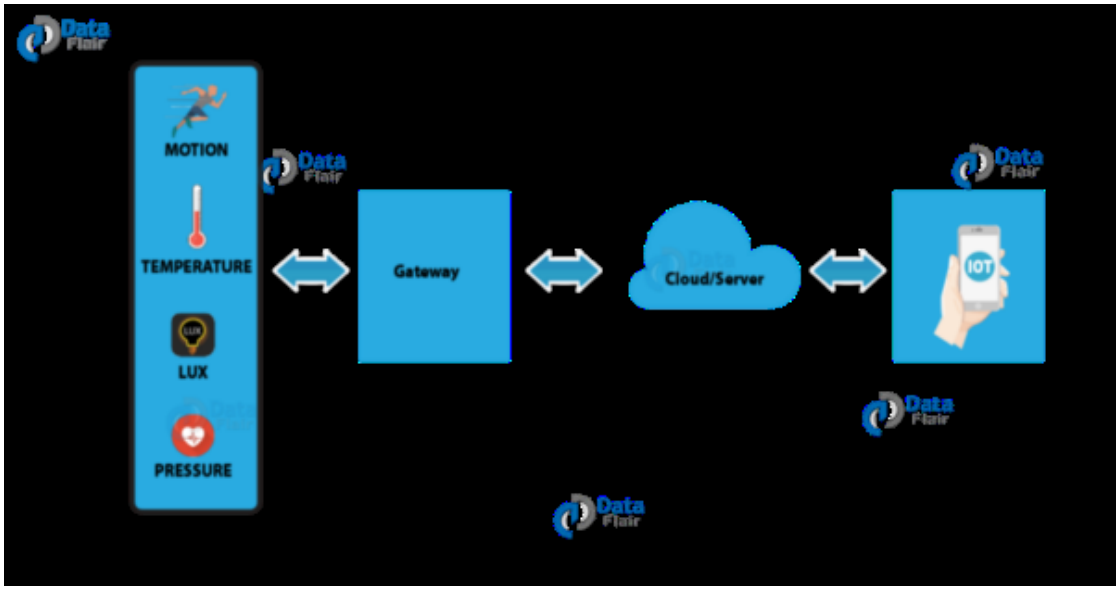
- The WaterSmart Innovations Conference and Exposition (WSI) is the world's pre-eminent urban water efficiency conference- the largest of its kind
- More than 100 professional sessions and panel discussions
- 1,000 participants from 39 states and the District of Columbia, and 21 foreign nations

Major Themes We Noticed

1) The Internet of Things
   - Smart Water Meters
   - Smart Water Software
2) Greater data "granularity"
   - Low vs. high resolution- pros and cons
   - Program opportunities & challenges
3) Robust Research to Support Management
   - Data and research to inform programs
   - Evaluate Rebate Programs- turf removal, irrigation controllers

What is the Internet of Things (IoT)

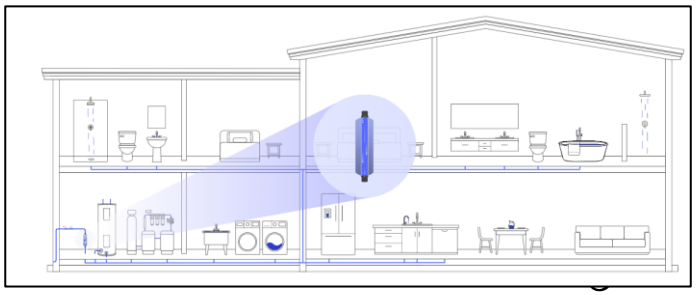
- A system of physical devices, vehicles, appliances, and other things that have the ability to connect, collect and exchange data over a wired and wireless network
- Allows integration and data exchange between physical devices and the computer



Smart Water Meter Hardware

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

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

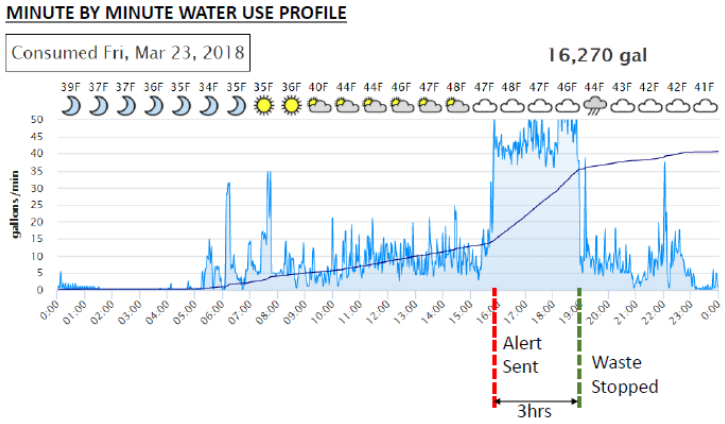


Flow Sensors

Does Smart Phone Enabled Flow Sensor Data Help Save Water; Pilot Study Results – San Antonio Water System

EVENT
Hidden toilet failure.

MINUTE BY MINUTE WATER USE PROFILE



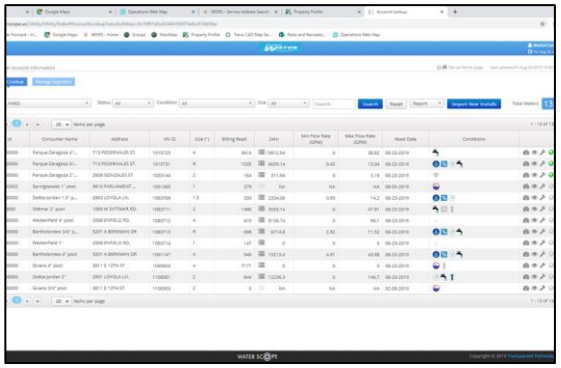
Software Platforms

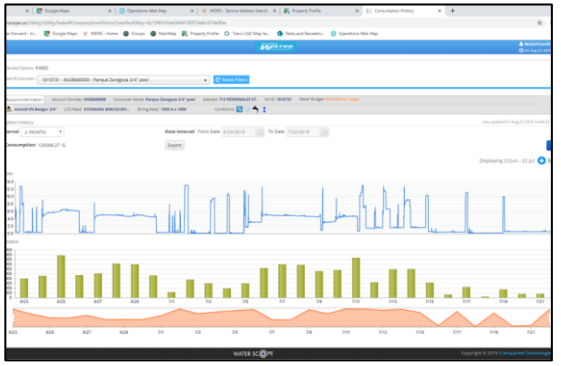
- Meter Vendor Supplied Platforms
  - Typically has administrative based applications
  - Platform typically provided with hardware

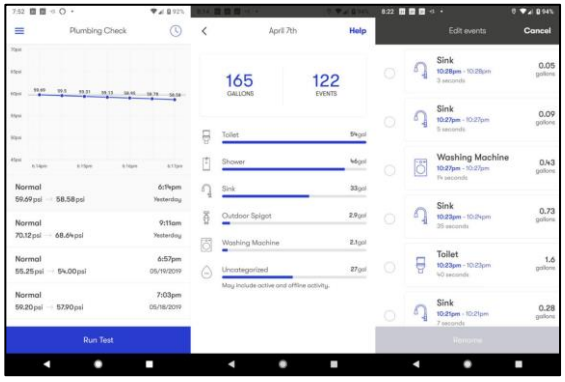
- Third Party Platforms
  - Typically has end-user focused and administrative applications
  - Competitive additional cost
  - Integration with existing data streams necessary

- 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

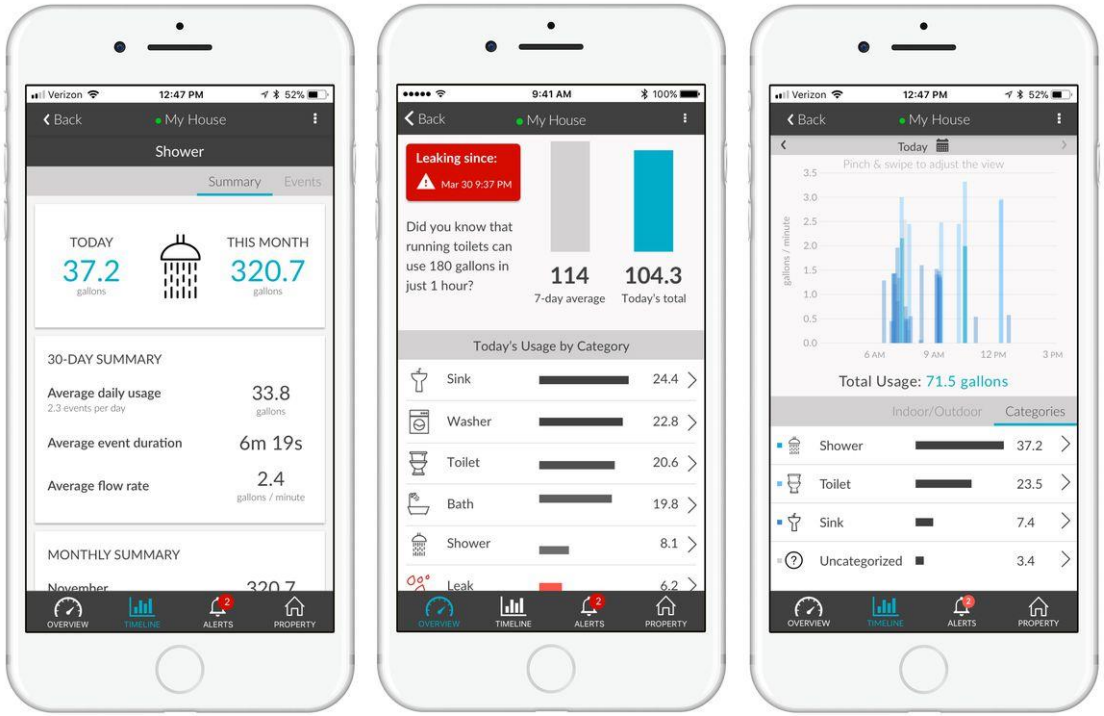






Smart Water Software

- Real time leak/high bill alerts to customers
- Machine learning to categorize water usage
- Water use comparison



Why granularity is important to demand management

Low Resolution (quarterly/monthly)

Advantages:

- Typical Overhead/O&M Costs
- Industry Standard
- Large Selection of Vendors
- No Digital Infrastructure
- Tiered Volumetric Rates

Disadvantages:

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

Medium Resolution (weekly/daily/hourly)

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

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

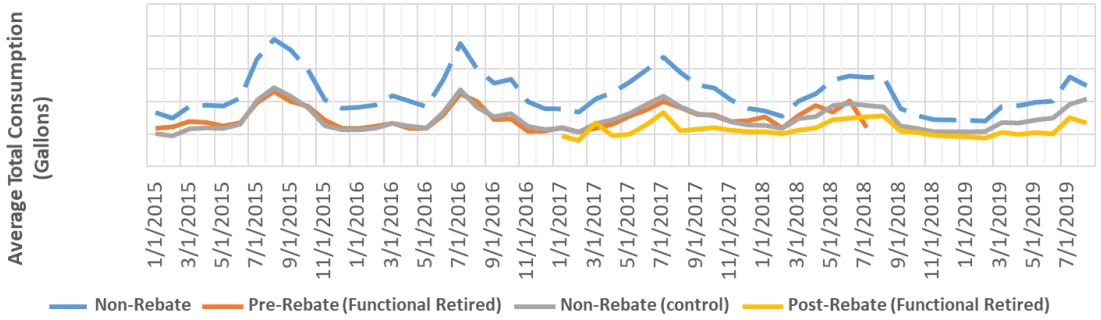
- Due diligence required
- Consultant or Third Party guidance preferred
- Design system based on local need
- Future proof selected technology

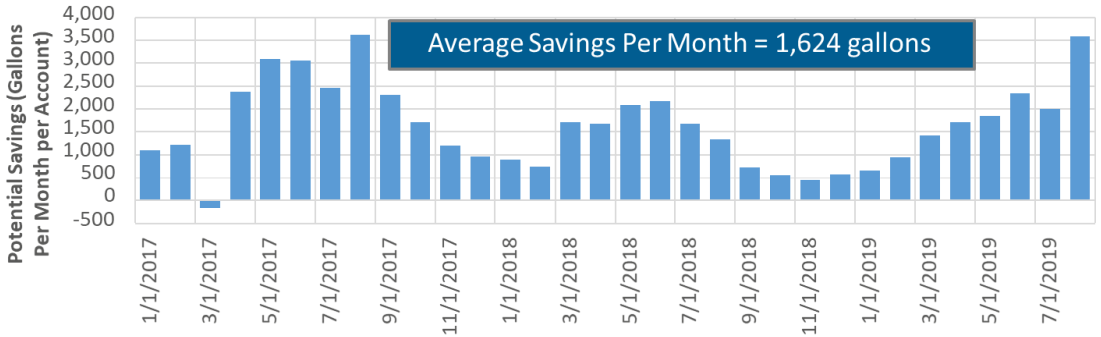
- Look for overlap opportunities with energy provider
- Be innovative with network deployment
- Be careful with 1st generation technology

Research to inform management

- Irrigation Rebates: Which Ones Saved Water? SAWS

Type Of Rebate	Count	Estimated Savings (gallons/month)
All	571	666
Functional System Retired	140	1,624
N/F System Retired	34	874
Drip Only	55	548
PRS Only	41	479
Capped Only	128	580
Mixed		
Capped and Drip	52	1,317
Drip and PRS	25	2,768
Capped and PRS	35	197
All Three	61	325



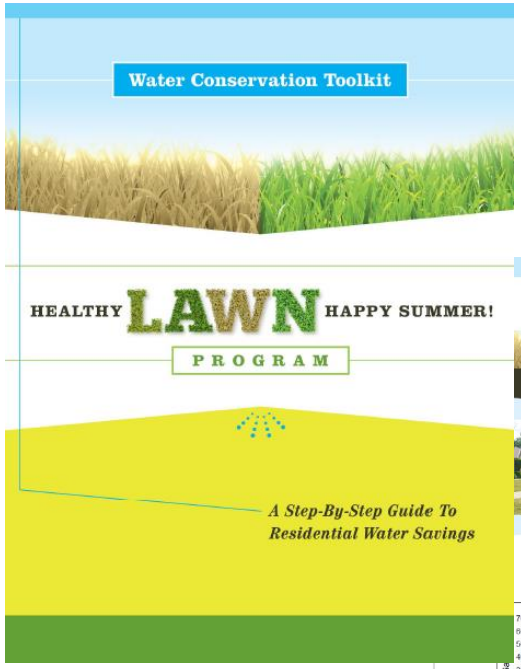


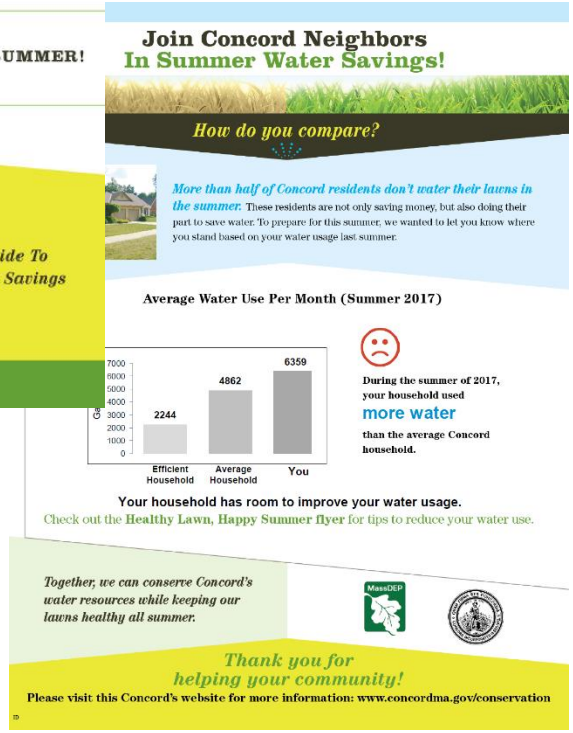
Programs & Research

Research has helped us determine if new technologies should be rebated because of water savings:

- Watering Group Assistant
  - Devices installed that keep irrigation systems in compliance with watering restrictions
- Smart Sprinkler Study
  - Lawn sprinkler systems retrofitted with multi-stream rotational spray heads
- Pools Evaporation Study
  - Estimation of water loss through evaporation from residential swimming pools

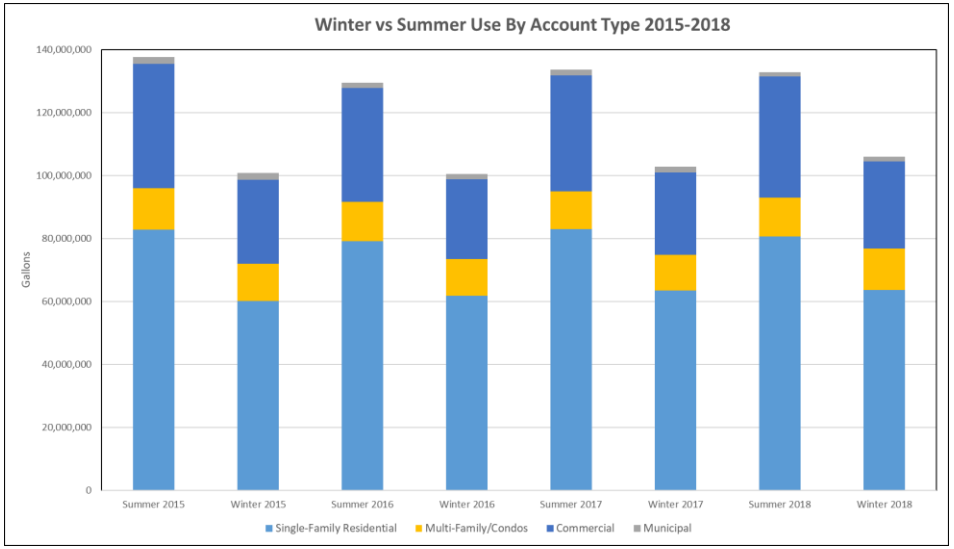
What is the state doing?



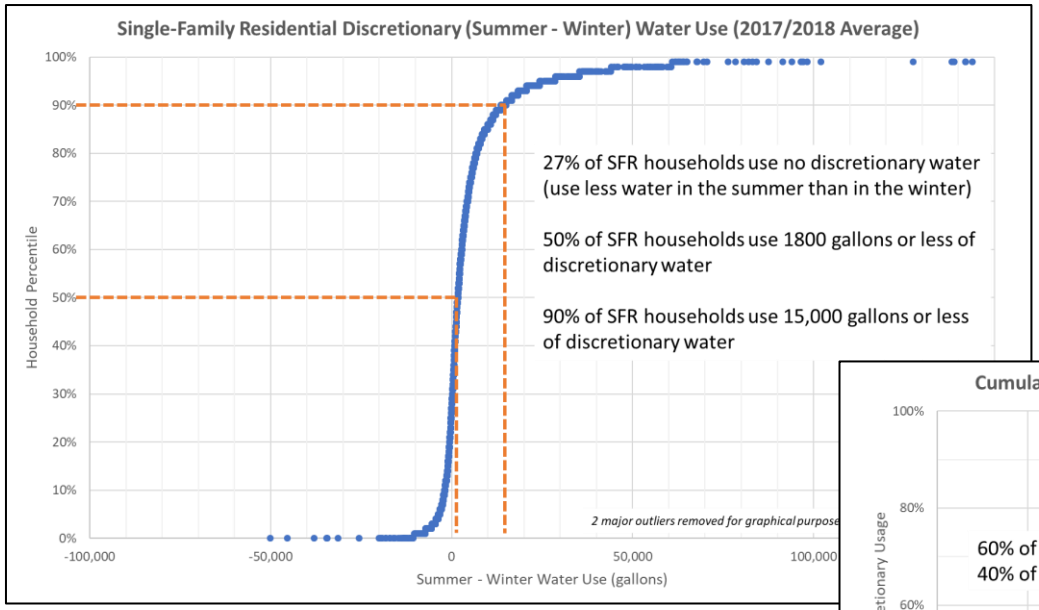


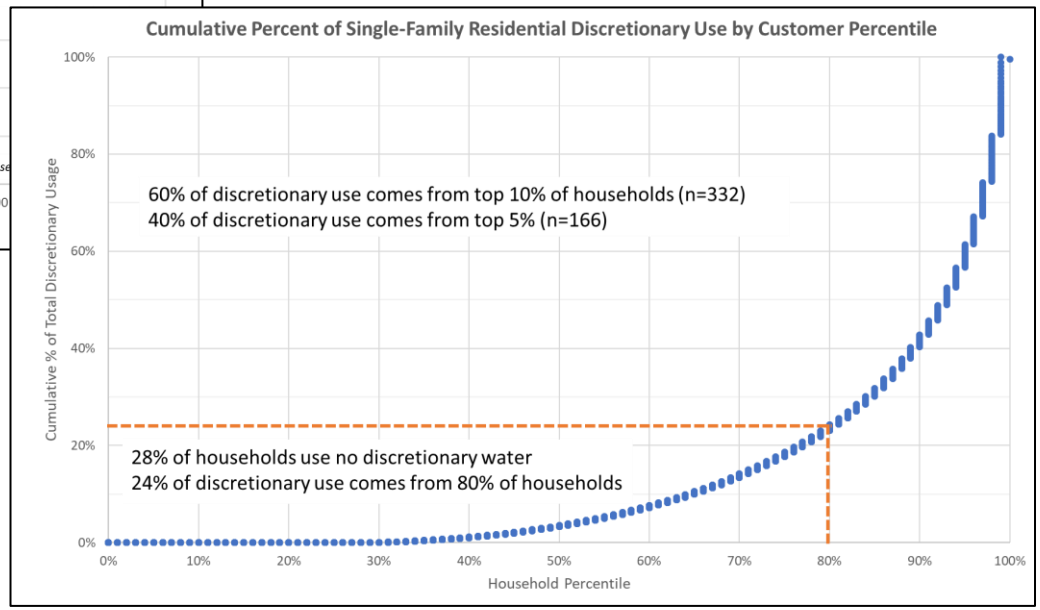
Data analysis to examine:

- Annual long-term consumption trends
- Seasonal variation
- Usage by customer class
- Residential use by sub class
- How single family customers use water
- Relative impact on peak demand by high water users
- Relative contribution of top users on seasonal revenue



Analyze relative impact on peak demand by high water users





Discussion

- Does anyone have experience with these new technologies?
- How can we support exploration/use of new approaches in MA?
- What should be our highest priority?