Water Asset Management CONFERENCE

Leveraging AMI Data to Support Leakage Management

Jim Walsh

10/11/17

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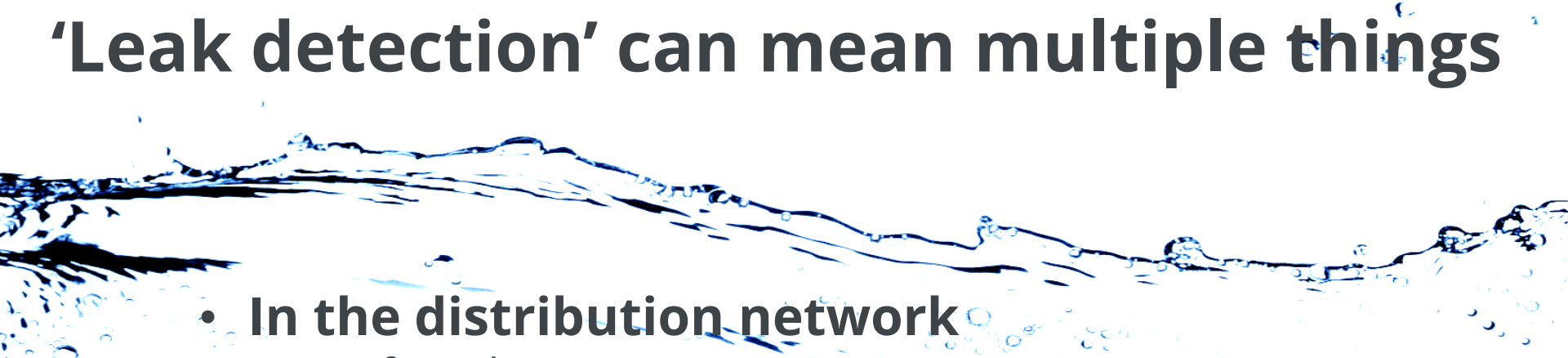
‘Leak detection’ can mean multiple things

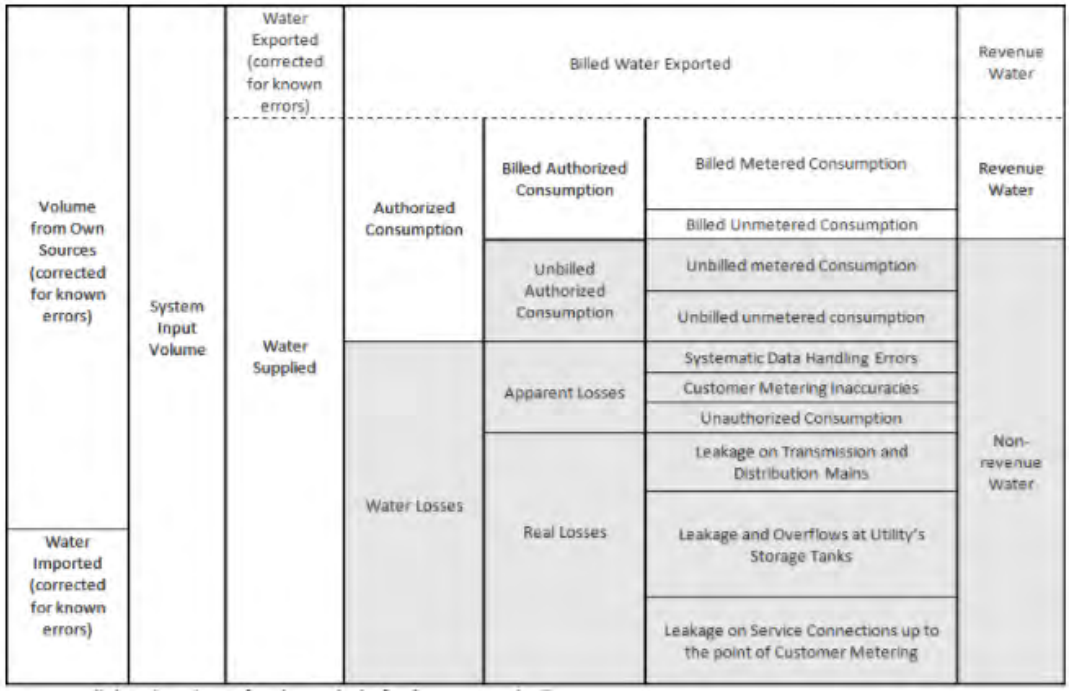


- **In the distribution network**
  - Before the meter
  - Non-revenue water
  - May never surface
- **Consumer-side**
  - After the meter
  - Revenue water
  - Leak on premise (service line, toilet, dripping faucet, faulty sprinklers)

Why Distribution Network leak detection?

Regulatory pressures to reduce water loss

- At least 29 states with some form of water loss control*
- AWWA water audit being used more and more, can effect bond ratings
- Water loss is key input into audits and understanding Non Revenue Water



* Jernigan, Will. 2012. State of the States: Emerging Water Loss Regulations in the United States. Presentation at the WaterSmart Innovations Conference.

http://www.allianceforwaterefficiency.org

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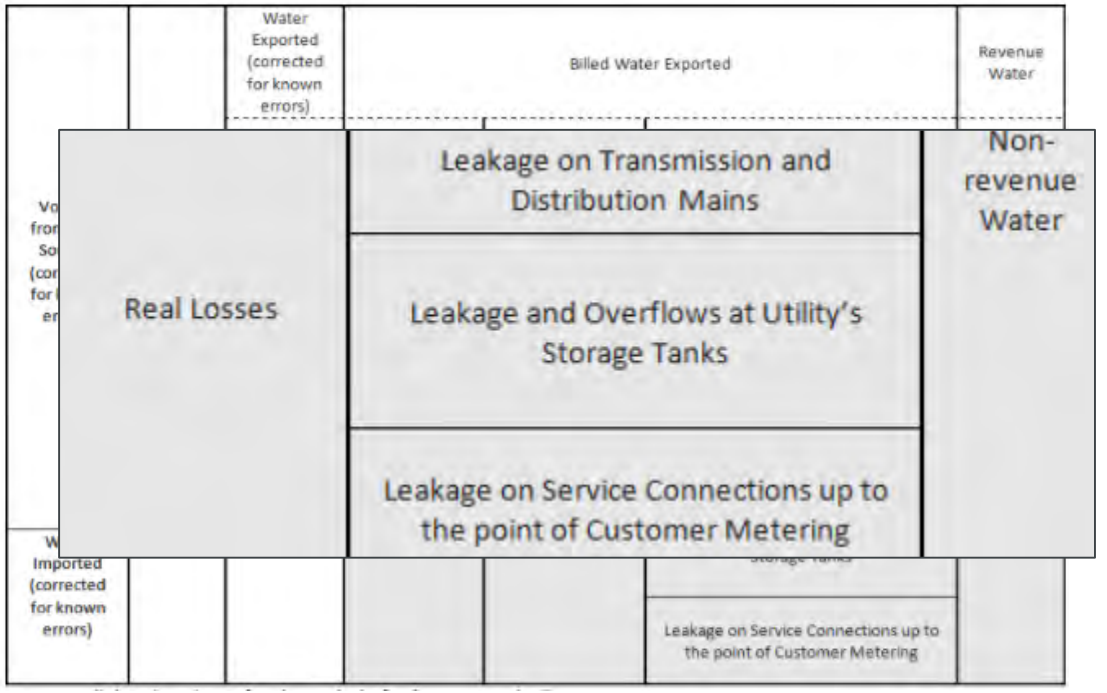

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Why Distribution Network leak detection?

Monitor aging infrastructure

- Identify leaks and bursts
- Reduce durations
- Extend asset lifetimes
- Use maintenance and repair budgets more efficiently

"According to the American Water Works Association, an estimated $1 trillion is necessary to maintain and expand service to meet demands over the next 25 years."

"Many (current pipes have) a lifespan of 75-100 years… averaging pipe replacement rate of 0.5% per year…estimated 200 years to replace the system"

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Why Distribution Network leak detection?

Cost reduction

- Non-revenue water loss is 11-18% across US*
- Estimated 6 billion gallons of treated water lost PER DAY (costing $4B/year)
- 80% is real loss through leaks
- Wasted power to pump lost water -75% of cost is electricity

*Center for Neighborhood Technology, The Case for Fixing the Leaks: Protecting people and saving water while supporting economic growth in the Great Lakes region, November 2013

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Why Distribution Network leak detection?

Water scarcity

- Growing population and urbanization
- Draw down of traditional resources
- Climate change and droughts

"According to state water managers, experts, and literature GAO reviewed, freshwater shortages are expected to continue into the future. In particular, 40 of 50 state water managers expected shortages in some portion of their states under average conditions in the next 10 years"

Supply Concerns Continue, and Uncertainties Complicate Planning
GAO-14-430: Published: May 20, 2014. Publicly Released: May 22, 2014.

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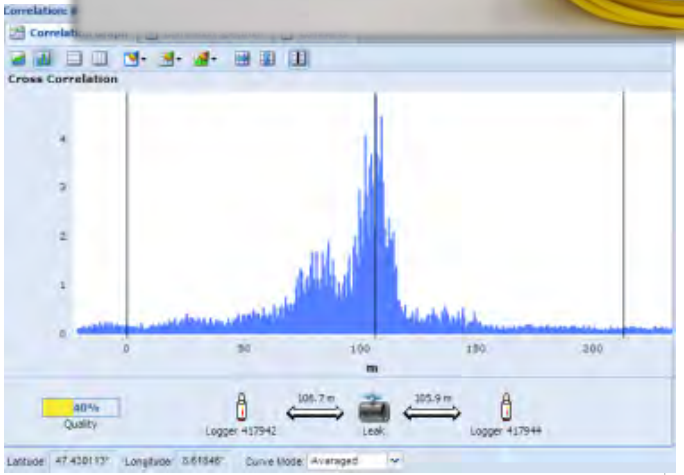
AMI and Distribution Network leak detection

- Acoustic loggers (microphones) are placed on valves
- Loggers listen for and record leak “noise” transmitted through the pipe
- Recordings are uploaded over the AMI Network to the head-end
- All recording activity, data upload, and analyzing is automated and continuous



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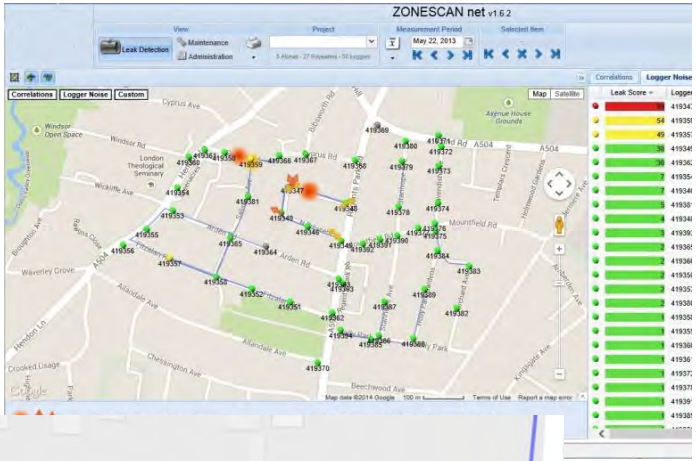
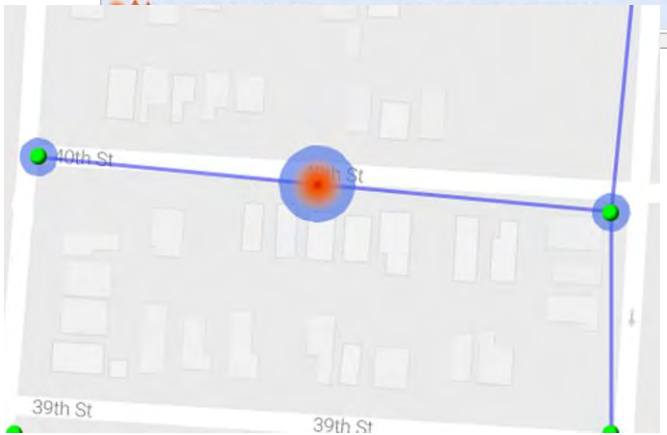
AMI and Distribution Network leak detection

- Algorithms in the head-end analyze the recordings for unique sound of water leaks
- Delays as sounds reach multiple loggers are correlated to give leak locations
- Head-end software displays leak ‘scores’ and color coded GIS maps for instant identification of problem areas
- Correlations between loggers are highlighted with locations
- Leak and correlation notifications can be ‘pushed’ to key personnel





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Benefits of AMI Distribution Network leak detection

- Reduce the run-time of a leak
- Reduce the man hours spent searching for leaks
- Reduce false alarms
- Identify a leak before it becomes a major incident
- Reduce the amount of night-work and over-time
- Find quiet leaks that are inaudible during the day
- Reduce repair costs through earlier intervention
- Improve public image and customer service of utility

Continuous and automatic leak detection monitoring with no manual intervention, coupled with powerful analytics, leads to the fastest actionable data available

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Leak detection at the residence

Increased Customer Satisfaction

- Proactive notification of potential problems
- Avoid bill disputes
- Reduce write-offs

Constant consumption and abnormal-use analytics quickly identify residences that may have leaks

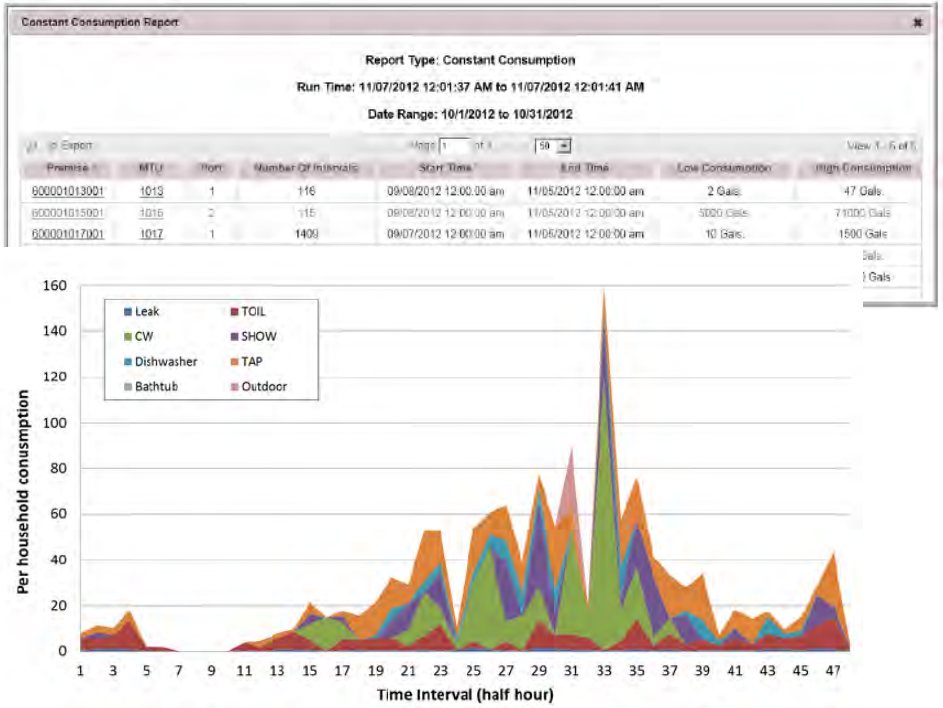
"We now have more outgoing calls on the customer service side than we have incoming calls..." Large eastern city utility manager

"The Aclara report tells us which accounts have continuous usage over a three day reporting period. We notify those users…" West coast utility manager

"By analyzing the constant consumption data we can even tell the resident if it's likely a fill or flapper valve leak…" Northwest city utility manager

User-side leak detection using AMI

- Typical residences have no water use at some part of the day (middle of the night)
- AMI system continuously monitors consumption and identifies lack of zero flow
- Automated analytics and reports mine large quantity of data to uncover ‘constant consumption’ locations



Duncan, H & Mitchell, Valerie. (2008). A stochastic demand generator for domestic water use. Conf. Proc. Water Down under 2008. 725-736.

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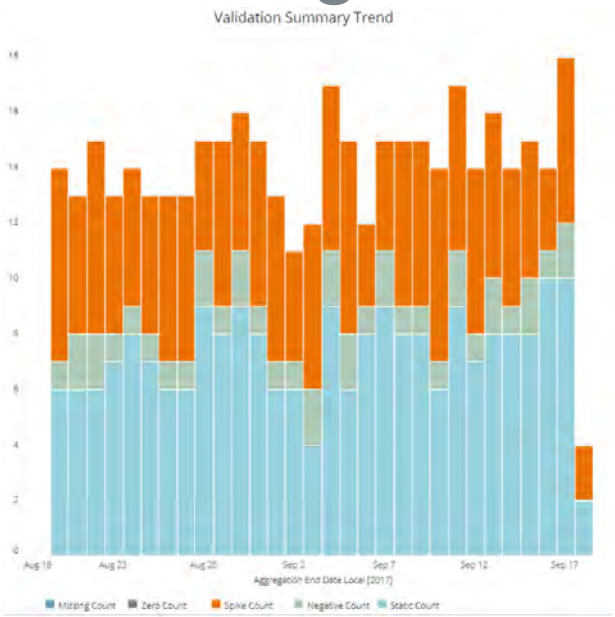
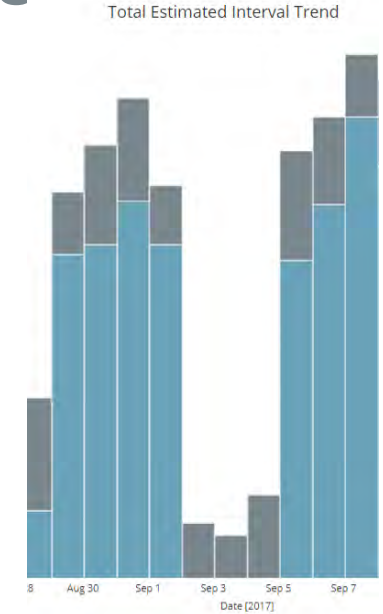
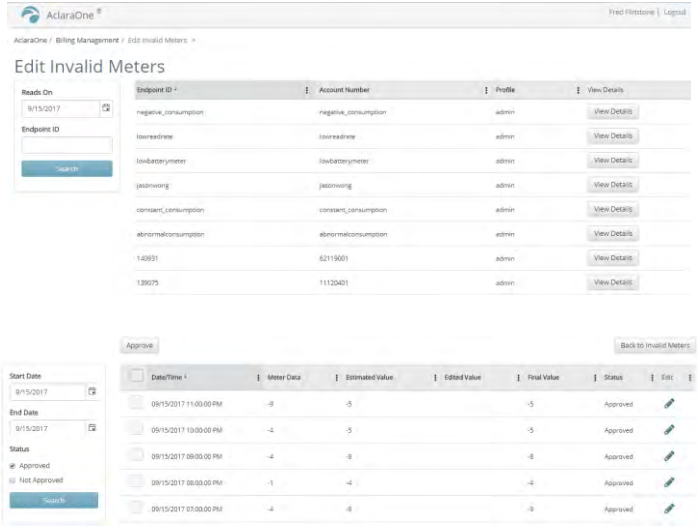
Billing Management - VEE







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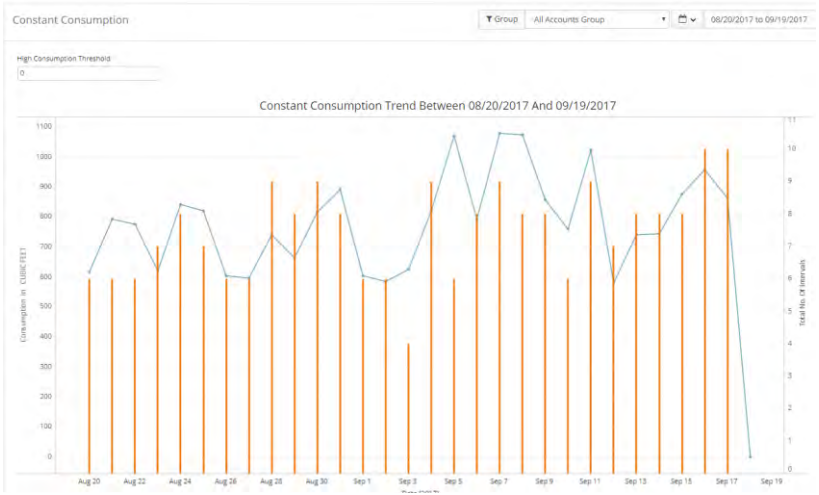
Constant Consumption

- Leaks from:
- Toilet: 1-10 gph
- Faucet/Shower: 0-2 gph
- Hose/irrigation: 5-20



Date	Account #	Mtu Serial #	Endpoint ID	Meter Type	High Co..	Low Cons..	Average C..
09/17/2017	20279301	47412031	131833	Nept/Schlum T-10 2 ProRe..	50.00	0.00	22.22
	jasonwong	111111	jasonwong	Nept/Schlum T-10 1 ProRe..	12.00	12.00	12.00
	lowbatterymeter	46346257	lowbatterymeter	Nept/Schlum T-10 1 ProRe..	12.00	12.00	12.00
	62119001	46176622	140931	Nept/Schlum T-10 5/8 ProR..	10.00	0.00	1.67
	81180801	47412154	144597	Nept/Schlum T-10 3/4 ProR..	10.00	0.00	3.54
	90393401	6117807	131147	Nept/Schlum T-10 5/8 ProR..	10.00	-1.00	5.39
	20003101	47303473	117790	Neptune T-10 5/8 E-Coder ..	6.27	0.10	0.85
	abnormalconsumption	46346257	abnormalconsumption	Nept/Schlum T-10 1 ProRe..	6.00	6.00	6.00
	constant_consumption	46346257	constant_consumption	Nept/Schlum T-10 1 ProRe..	2.00	2.00	2.00

Benefits of AMI User-side leak detection

- Positive interaction with customers
- Reduce the run-time of a leak
- Proactively notify customers
- Avoid bill shock
- Quick notification lowers write-offs
- Improve public image and customer service

Granular data at hourly intervals and automated analytics quickly identify potential leaks in the residence, while reducing the data analysis and customer service burden on utility personnel

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Questions

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