# How the Smart Cities efforts of Newport News Waterworks enhances resiliency in the region

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**March 20, 2019**

Newport News Waterworks Department

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# INTRODUCTIONS AND AGENDA

- Why should water utilities be involved in Smart Cities?
- Practical Applications of Smart Cities Capabilities
- Newport News Readiness Workshop
- Waterworks Department AMI

# HOW TECHNOLOGY INFLUENCES OUR LIVES

**Technology has changed *the way* we live for some time**

**At some point we started using technology *to* live**

**Really, we want smart technology to *help* us live**

**Everyday our world is becoming more connected – it is becoming smarter**

- Internet of things
- Machine learning
- Big data
- Social change

# WHAT THE PEOPLE WANT: IMPROVED QUALITY OF LIFE

# What is a Smart City?

- A smart city uses information and communications technology to enhance livability, workability, and sustainability.

# What does “Smart” City mean?

- Future City
- Intelligent City
- Resilient City
- Green City
- Sustainable City
- Sharing City
- Compassionate City
- …. or Community?

# Water and other Departments

- Infrastructure beyond life expectancy
- Increased demand without increased capacity
- Transitioning workforce
- Uncertain technology impacts
- Forces of change

# We are already doing it: Use the Data We Have!

- According to the AWWA State of the Water Industry Survey

**1/3**

Use data for system understanding

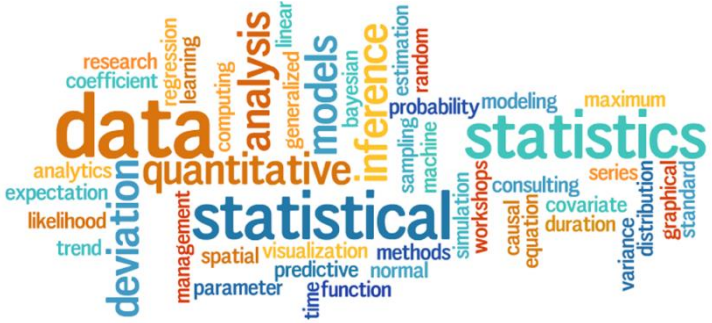
**25%**

Use data to improve customer understanding

- Regulators can encourage increased integration of data through updating regulations and incentivizing smart operations.

# Workforce Strategies

- Welcome next generation of water professionals by bolstering adoption of data analytics and smart technology processes
- Learn basic data analytics and problem-solving skills that will improve success as an operator for a rapidly evolving future
- Expanded skill set attracts more young talent




SmartCitiesCouncil®

Livability
Workability
Sustainability

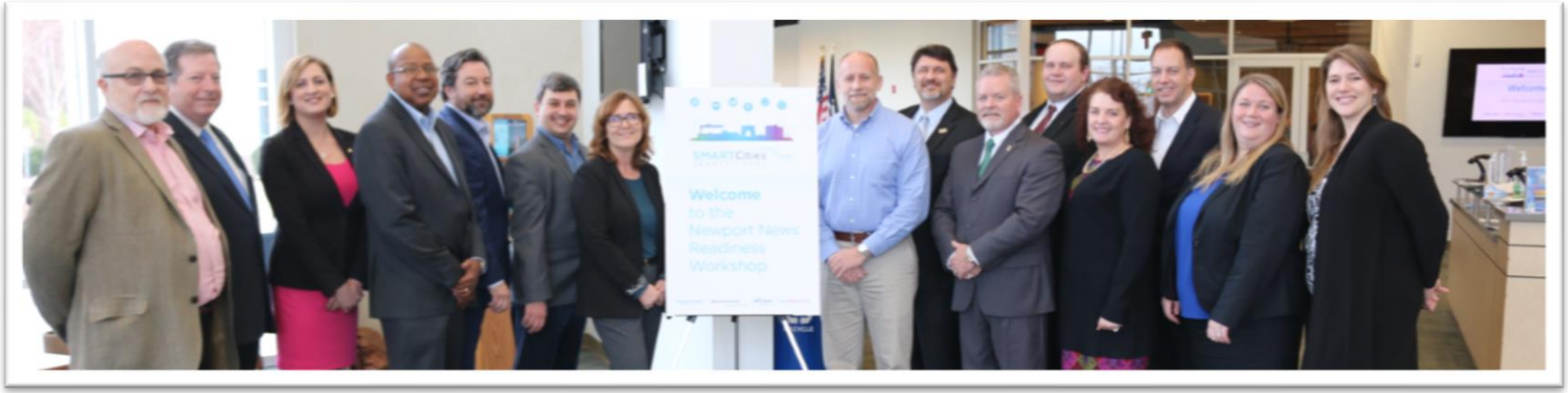
- Launched in 2012
- Smart Cities Readiness Guide provides guiding principles and best practices for an integrated, cross-cutting smart city.
  - Framework used to produce Readiness Workshops, which are delivered all over the world to help cities create their smart city roadmaps.
- North America, Europe, India and Australia/New Zealand
- More than 120 partners and advisors
- $2.7 trillion in annual revenue
- More than 10,000 smart city projects

# Readiness Challenge Grant Program

- Over 130 cities applied, including Newport News
- The winning cities received a tailored Readiness Workshop
  - to develop a roadmap for applying smart technologies to further innovation, inclusion and investment within their cities
  - receive supporting products and services from Council member companies and advisors
- Focus on breaking down the departmental silos is a key challenge in developing a smarter city.
  - Key element for selection: demonstrated the ability to work across departments to solve problems
- Goal: make smart use of technology to become more livable, workable, sustainable and resilient

# Newport News Smart Cities Readiness Workshop

- Goal: work with internal and external partners to encourage innovative projects within the City and the region.
- Led by the City IT Department
  - Smart Cities Council, Gannett Fleming and Sensus

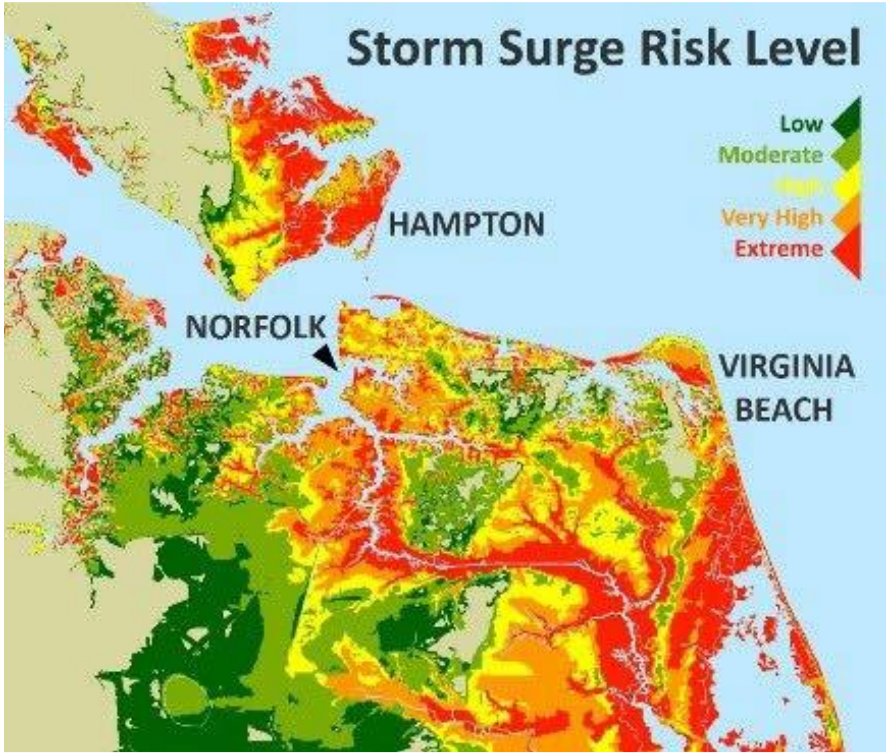


# Agenda Highlights

- Over 125 in attendance across the region
  - Cities, universities, businesses, regional entities
- Mayor McKinley Price, Newport News
- Andy Stein, Director of IT, Newport News
- Opening Keynote : Karen Jackson, Former Virginia Secretary of Technology
- Setting the Foundation for a Smart City
- Pillars of a Smart City
  - Communications
  - Solution Showcase – Smart Cities Council Partners

# Over 125 in attendance across the region

# Hampton Roads Storm Surge Risk Level




*Courtesy of HRSD*

# StormSense: Predicting Flooding from Storm Surge, Rain and Tides

- Dr. J. Derek Loftis, Research Scientist
- Funded by NIST : Replicable Smart City Technologies Grant
- Ultrasonic sensors on structures
- Skiffe’s Creek Dam

# Use and Implementation of StormSense

- Water supply/dam operations
- Better use of data for emergency action plans
- Long term planning for cities
- Currently still in academic mode


SMARTCities
NEWPORT NEWS
Breakout

# Breakout Sessions

- Emergency Management
- Transportation
- Public-Private Partnerships
- Utilities
- Open Data
- Public Safety

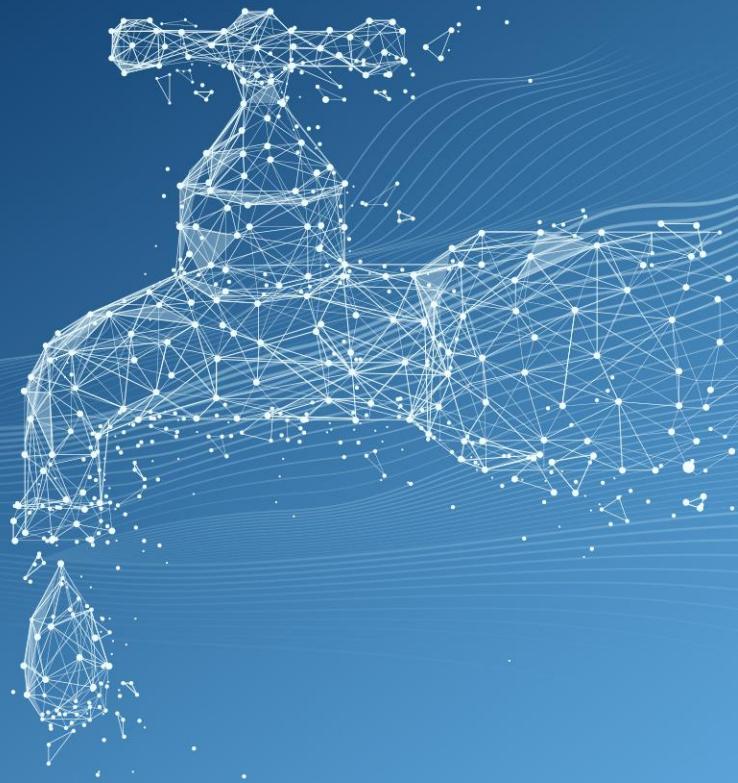
# Emergency Management: Creating Next Generation Resilience

- StormSense
  - Build on the success, looking for other hazards to apply the logic
  - Use the tool to pre-plan sophisticated evacuation techniques, relocation needs, and staging requirements
- Interoperability is key
- Improve communication networks
- Maintain robust GIS to support unified visualization platform for response
- Integrate UAVs into both the planning and response phases to increase situational awareness and clearly identify response needs
  - Response: equip UAV's with body heat sensors to improve responder safety and quickly locate evacuees
- Use gamification to incentivize community data collection

# Smart Utilities: Transforming Urban Infrastructure

- Focus on conservation, rain capture and leak capture
- Collaboration with private utilities
- Gamification incentivizes community data collection
- Raise customer awareness and improve the experience
  - Explain benefits of the system and provide anecdotal evidence to build case for further investment
  - Fully support AMI across public and private utilities
  - Educate citizens on how to budget energy use as part of their personal financial planning
  - Inventory existing environmental conservation and sustainability groups to start the education process

# How Waterworks is leading with the first AMI in the region

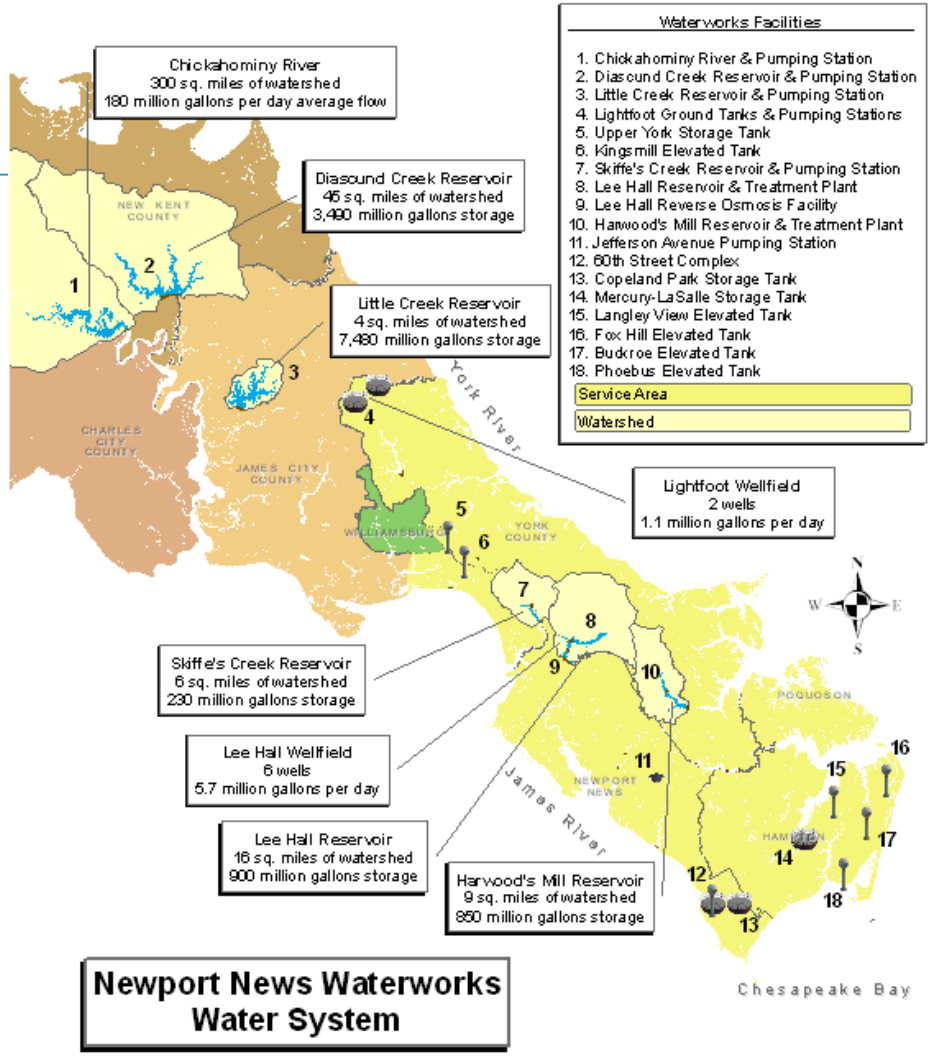


# AMI's in Virginia

- Blacksburg
- Christiansburg
- Culpeper
- Loudoun Water
- Spotsylvania County (Fredericksburg)
- Western Virginia Water Authority (Roanoke)

# Newport News Waterworks

- Regional Utility
- Owned and operated by the City of Newport News
- Serves over 400,000 people in Hampton, Newport News, Poquoson, York County and part of James City County
- System beyond borders of City of Newport News
- 130,000+ connections



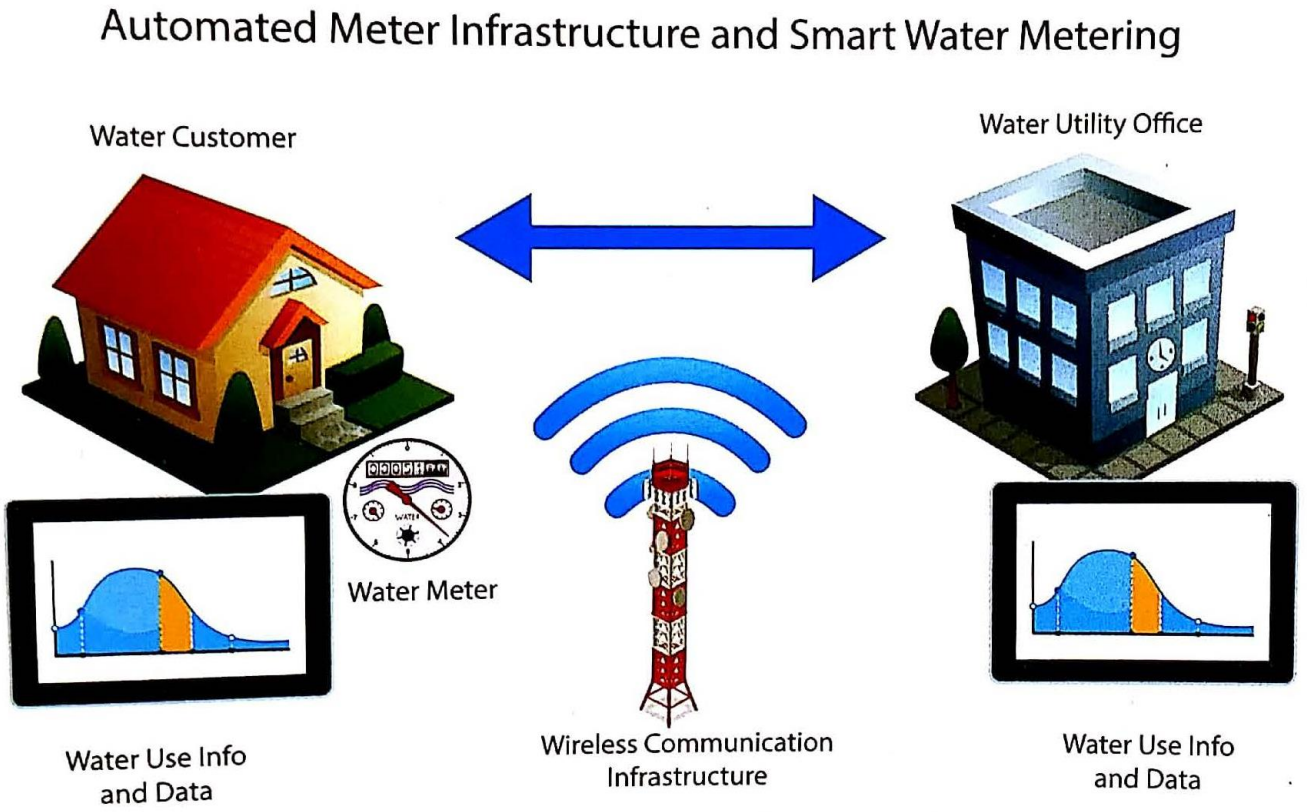
# Advanced Metering Infrastructure

- Goals
  - Improve customer service and system efficiency
  - Desire real-time reads
  - Remote meter turn on – turn off
  - Eliminate re-reads
  - Water quality enhanced data/ leak detection
- Solution: AMI
  - Innovation/ Embrace Smart Technology

# Philosophy of Financials

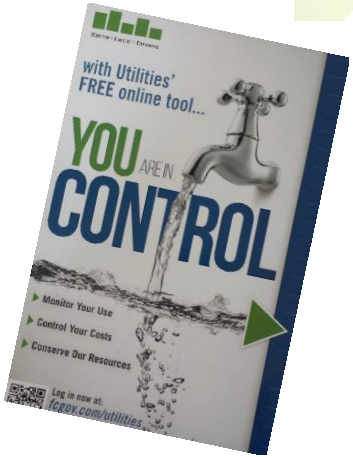
- ROI not immediate
- Plan CIP in advance (not 2-year budget cycle)
- Buy-in from City leadership as part of Smart Cities drive toward innovation and technology

# Phase 1 To-Be System/Logical Architecture (Changes anticipated)



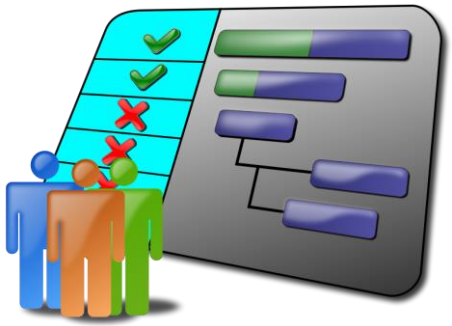
# Schedule and Phasing

- Phase 2 Professional Services / Expertise
  - Design, Plan and Procurement Strategy
  - Refresh Architecture Solutions and Components
  - RFP to Vendors / Vendor Evaluations (NOW)
- Phase 3 Implementation
  - Project Management
  - Stakeholder Engagement
  - Business Process Transformation
  - Systems Testing & Acceptance
  - Org Change as needed/ Operational Training

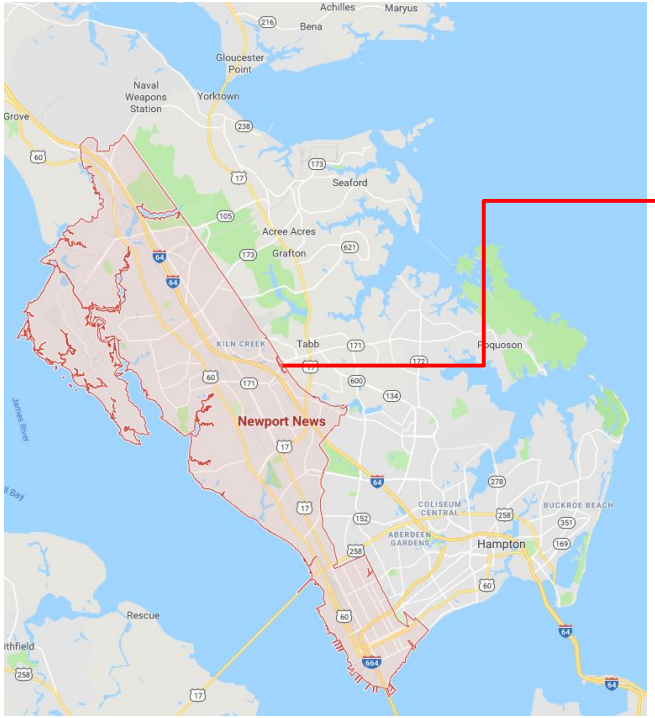



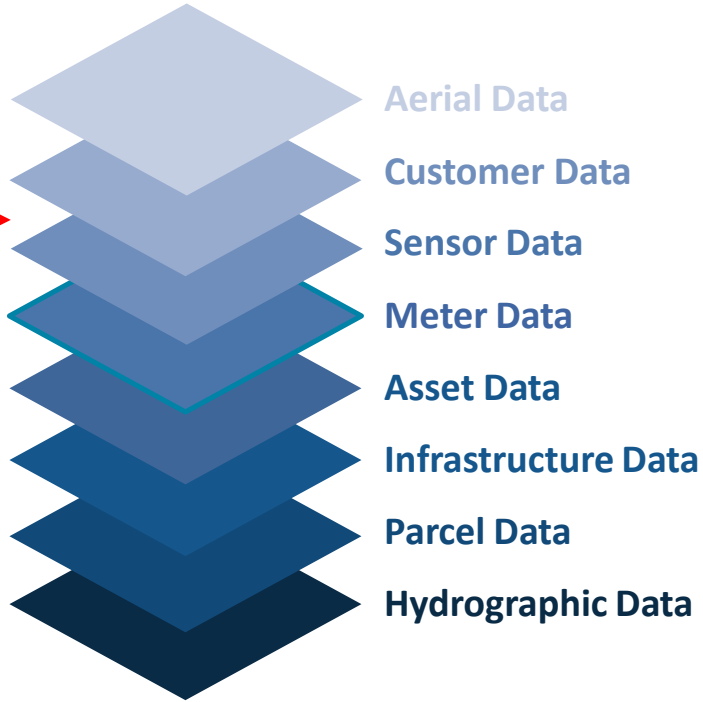
# What do you want to collect from AMI?

- Register reads for billing
- Interval data for display, analysis/analytics, distribution planning, etc.
- Event/alarms
- “Information” via analytics



# Meaningful metrics for daily operations

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# Potential improvements and benefits to support long-term resilience

- Customer Portal
  - Credit card services
- Leak Detection
  - Customer – via analytics
  - System leaks
- Leveraging AMI network for Operations
  - Reduce Physical and Data Errors – Reduce Expenditures (Meter Reading)
  - Pressure Monitoring
  - Water Quality Monitoring
  - Fire Demand Support
- Leveraging AMI data in Analytics
  - Choices in platforms

# How can AMI be used for increased short-term resilience?

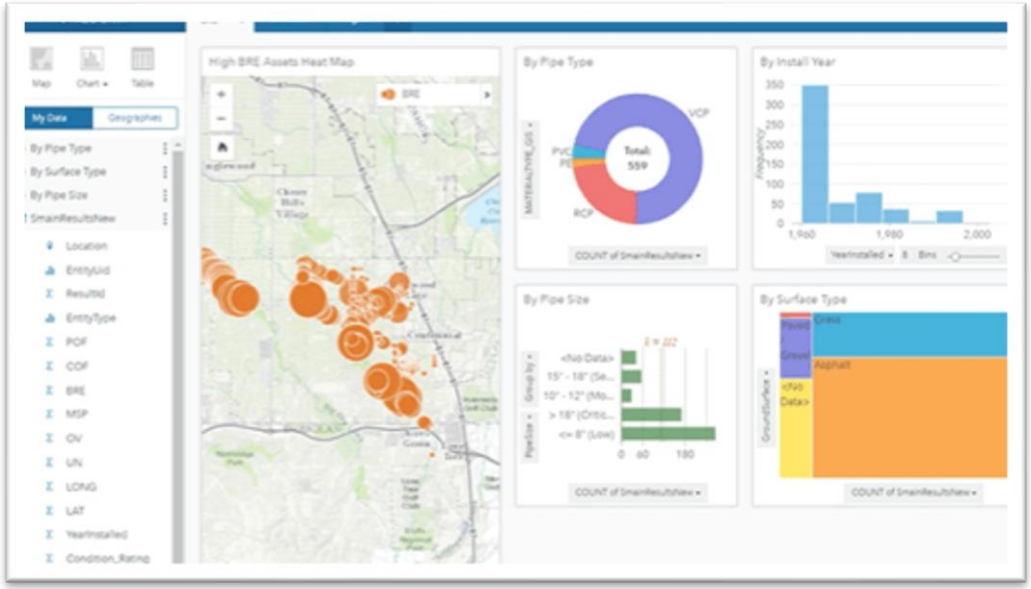
- Assistance to Emergency Management
  - Coordinated fire response (turn water off in one area to build pressure in another, if needed by the Fire Department)
  - Can track areas where zero consumption was recorded before, during and after events, saving first responders vital time and energy in rescue efforts
  - During repairs, shutoff service until lines are flushed of debris
- SCADA can use AMI network as primary or back up communication; won't have to send out an employee to monitor certain areas/situations
- AMI gives Waterworks another communication path with its customers; this helps with both outage and restoration reporting

# Future enhancements

- Acoustic Analysis Sensors can piggyback on the AMI system
  - provides insight into the size of the leak, because different sized ruptures generate different frequency characteristics
  - enables Distribution to prioritize repair efforts
- Other sensors include
  - Flood (proximity)
  - Piezo (pressure)
  - Optical (cameras)
  - Temperature

# Can we take it even further?

- Leverage geospatial data within system
  - Correlation with location
  - Discover trends and patterns
- How AMI data might be relevant to other departments or the private sector?
  - Traffic predictive analysis
  - Collaboration with private utilities (gas)




Graphic courtesy of esri

Thank you!

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