

# Smarter Water Management

Metropolitan Planning Council and Openlands– Water Wise: What We Need to Know about our Water Resources

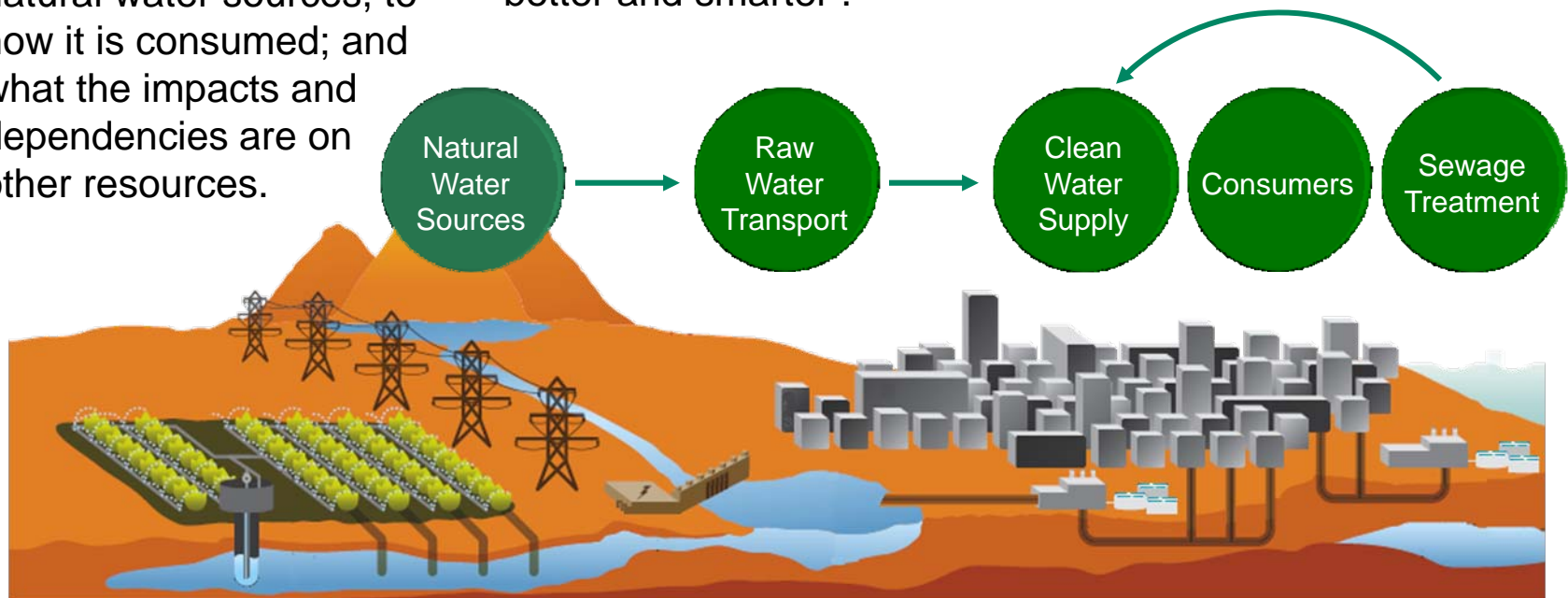


# Smarter Water Solutions Enable Higher Levels of Collaboration and Innovation Across Value Chains and Ecosystems

A lot more data is needed to fully understand, model and predict how water flows around this planet – from natural water sources, to how it is consumed; and what the impacts and dependencies are on other resources.

Access to this information will ensure that we don't just fix or rebuild existing infrastructure, but to do it better and smarter .

Allowing us to become smarter in how we consume and pay for water.



# What is Smarter Water Management?

- **Use of existing and new water/wastewater data**
  - Operational data (SCADA systems)
  - Sensor-based data
  - Maintenance data
- **Combined with other sources of data**
  - Share data between disparate systems (operations, maintenance, asset management)
  - Web-based data (USGS, weather)
  - Geographical Information System (GIS) data (demographics, soil type, etc.)
- **To provide new insights and support better ways of making decisions**
  - Visualization (graphs, charts)
  - Analytics (historical analysis, optimization)
- **To have a positive impact on the environment**
  - Improve water supply
    - Improved water delivery, leak detection
  - Reduce untreated wastewater discharges
    - Combined Sewer Overflows
  - Reduce/optimize energy usage (reduce GHG emissions)
    - Pump optimization
    - Route optimization/work order optimization



# Collaboration Platforms

Parameters being monitored (storage tanks, pumps, flow meters, etc.)

Geo-spatial map of service area, showing selected parameters of interest (tanks, production units, flow meters, stream flow gauges, etc.)

Numerical SCADA tag data displayed as appropriate (river levels (USGS), tank levels, flow, turbidity, etc.). Values refreshed automatically.

Mode Select: Geo-Spatial Mode

Geo-Spatial Map

Location Control

- Dam
- United States Geological Survey
  - Gualala River
  - Dry Creek
  - Santa Rosa Creek
  - Laguna De Santa Rosa
  - Russian River
  - Colgan Creek
  - Austin Creek
  - Copeland Creek
  - Big Sulphur Creek
  - Matanzas Creek
  - Sonoma Creek
- City of Rohnert Park
  - Storage Tank

Refresh Control

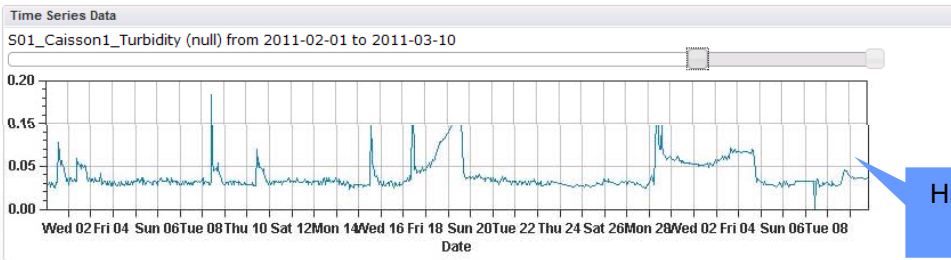
- Overlay Data
- Overlay Auto-Refresh -12:29:40 GMT-0600 (Central Standard Time)
- Message Board Auto-Refresh

Location Information

Name	Caisson1
Area	Sonoma County Water Agency
Type	ProductionUnit
Elevation	42 feet

Current Data

Tag Name	Unit	Current Reading	Time Stamp	Time Series
Wohler Plant Caisson1 Flow	MGD	0.0	Mon Mar 07 12:19:03 CST 2011	<input checked="" type="checkbox"/>
Wohler Plant Caisson1 Level	feet	54.062	Thu Mar 10 09:58:46 CST 2011	<input checked="" type="checkbox"/>
S01 Caisson1 Turbidity		0.036	Thu Mar 10 10:13:22 CST 2011	<input checked="" type="checkbox"/>



Bulletin Board

SCWA	Santa Rosa	Rohnert Park	Cotati
<b>Current Operations</b> Jeff test "current operations" at 2011-02-09 10:46:16 by wpsadmin This is a test at 2011-02-03 10:02:56 by sadanand Enter new Current operations here		<b>Planned Operations</b> 5 user test planned for today at 2011-02-09 10:55:32 by portalmam Planned OPS at 2011-02-09 10:48:24 by wpsadmin Enter new Planned operations here	

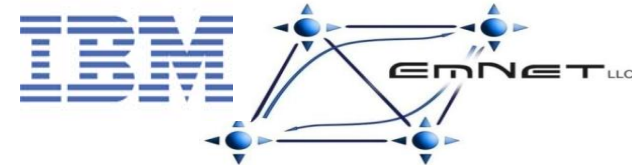
Planned outages, maintenance and important information (Operator updated text)





# Combined Sewer Overflows

## Collection System Management – Process Control



### Business Challenge

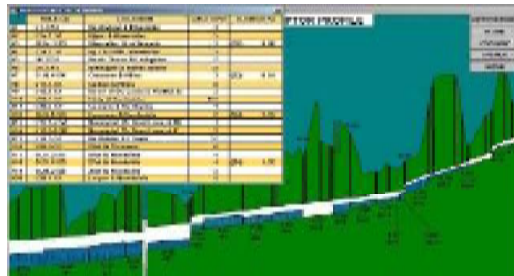
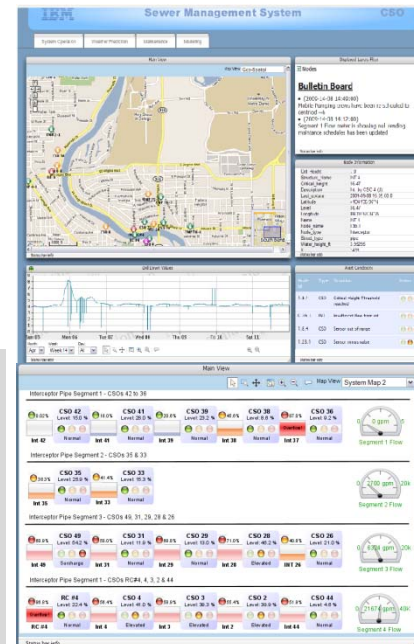
1. Required a comprehensive real time monitoring system for Fort Wayne's combined and sanitary sewer overflow.
2. Lack of information to optimize operation and maintenance activities.
3. Aid in the design, prioritization, and post construction evaluation LTCP.

### Project Approach

- Integrated solution for CSM
- Wireless network of sensors and control points ,gathers and reports data
- 💧 Monitors hydraulics and water quality
- 💧 Enables Optimized, Distributed Control

### Key Achievements

- Provide critical information such as pipe capacity during storm events for the implementation of real time controls.
- Prioritize capital improvement projects consistent with LTCP.
- Track the return on investment (ROI) (CSO reduction vs. \$\$\$)
- Comprehensive data integrating precipitation + flow + levels

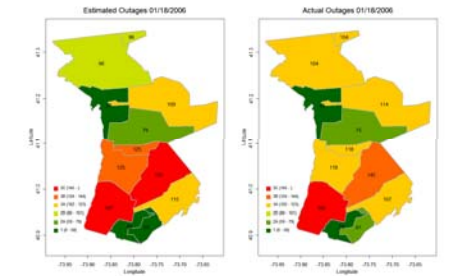
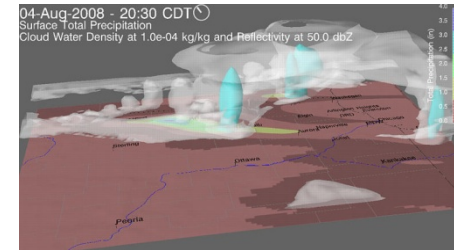


# Optimizing Weather Sensitive Operations With IBM Deep Thunder

*Environmental modeling, data analysis & visualization*

## Business Challenge

- Optimizing weather-sensitive business operations are often impacted by lack of reliable data at the time and spatial resolution best suited for an effective decision
- These tools enable more efficient and/or safer operations by providing predictive information at the appropriate temporal and spatial scale integrated into the decision support process, leveraging multi-modal, real-time and historical data from the client, partners and public sources



## Project Approach

Services-led engagement includes:

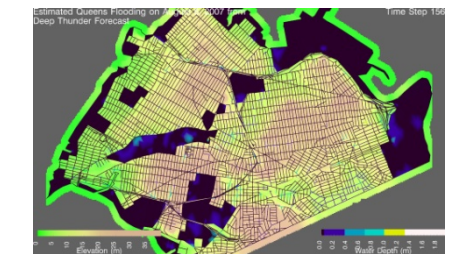
- Custom development of models as per specific user scenarios
- Remote hosting & access of web-enabled visualization content
- Consulting and support services

Partners (eg AWS) to be utilized for additional data sources and/or support services

## Key Achievements

Industry-leading weather, damage and urban flood forecast models for:

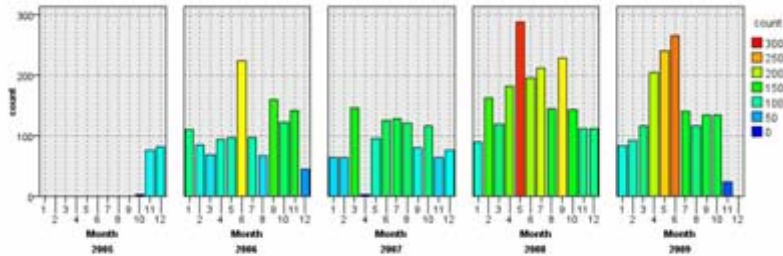
- water management (e.g., flooding, stormwater impacts),
- energy management (e.g., electricity distribution outages)
- weather-sensitive decision making (e.g., emergency management)



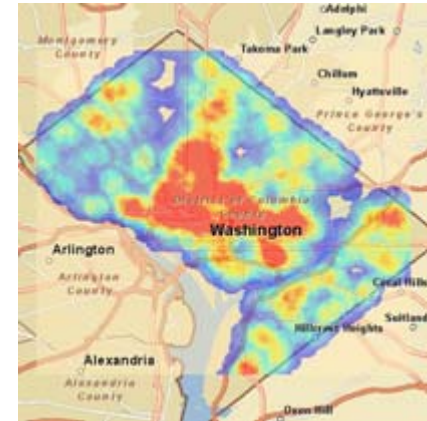
# Asset Management: DC Water



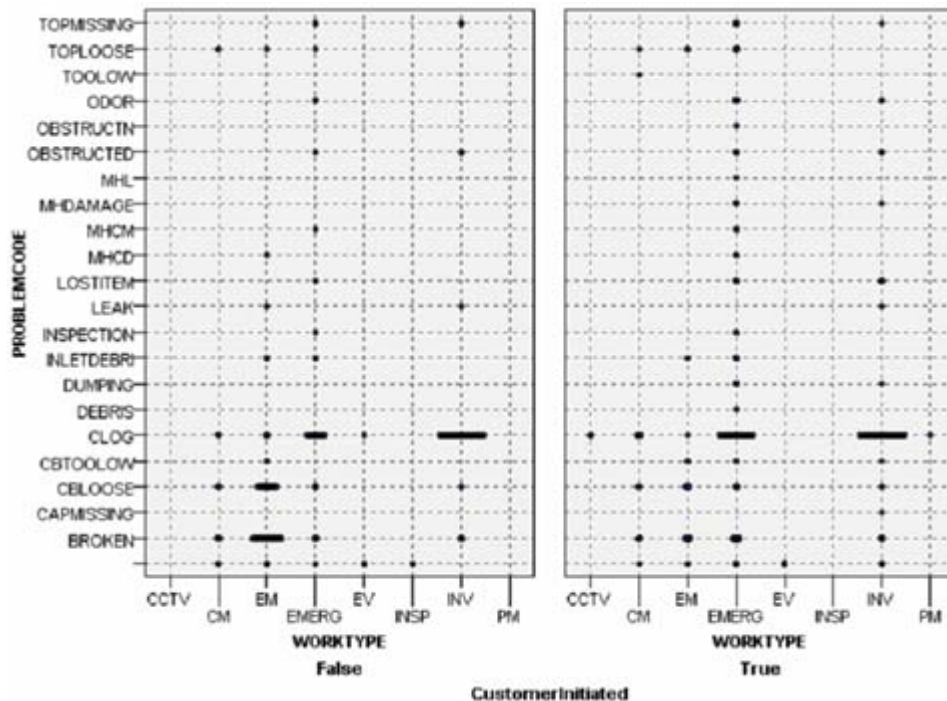
Catch Basin



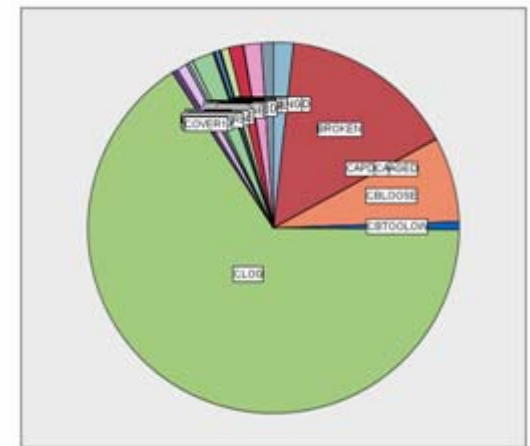
Temporal Analysis of Work Order Patterns



Spatial Distribution of annual work



Work classification vs Problem code visualization

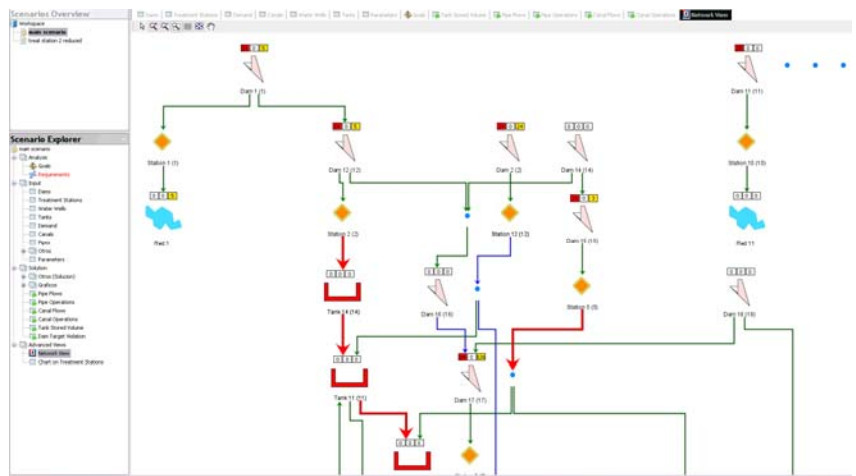


Catch basic problem code distribution



# Energy-Water Nexus: Canal de Isabel, Spain

- Energy management integrated with water routing and flow management for Madrid's water supply.
- Analytic solution created with IBM ILOG Software
- IBM also partners with Derceto (maker of dynamic energy optimization application) to offer a solution that optimizes:
  - Actual and predicted demand
  - Pipe network layout – distance alternative routes
  - Tank-turn/quality requirements
  - Pump performance, maintenance
  - Weather
  - Energy price, lowest cost
  - Dynamically, every 30 minutes...
  - And integrates with Maximo asset management to enable end-to-end pump management





# SmartBay Project with Ireland Marine Institute

## Marine Monitoring System and Collaboration Portal for Galway Bay



### Business Challenge

- Bringing together diverse stakeholders together to demonstrate the value of activities in the region and provide new services for the marine and coastal environment
- Allowing researchers to deploy quicker reactions to the critical challenges of the Galway bay management including as pollution, flooding, fishing stock levels, green energy generation and the threats from climate
- Helping identify sustainable business models to extend services and revenue opportunities

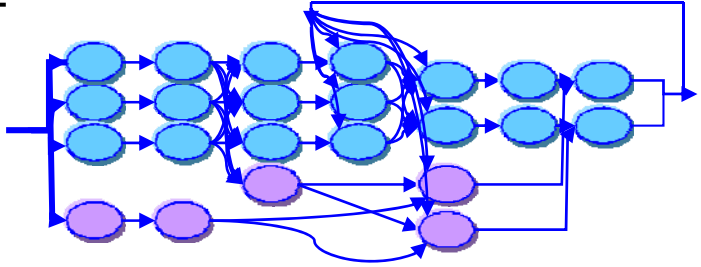


### Project Approach

- IBM Ireland Water Management COE partnered with Ireland Marine Institute
- Improve exploitation of the Marine Institute's investment in data, information, and knowledge
- Enable commercial-grade, standards-based, scalable, end-to-end platform
- Utilize mostly SWG components including WS, J9 JVM, MQ Microbroker, System S, etc.

### Key Achievements

- Integrated cyberphysical environment for sensors
- Developed innovative user interface and advanced visualization supporting multidisciplinary users
- Enabled remote sensors and data collection and aggregation platforms with real-time distributed stream analytical fabric.



# Smart Levees: Ijkdijk (“Calibration Levee”)



smart levee solutions,  
from finger in the dike  
to finger on the pulse

- Netherlands project to understand what this instrumented levee will “look and feel like” as it breaks
- Multiple sensor types create a reference real-time “signature” from inside the levee, as hydraulic pressure builds up. Also tests:
  - Effectiveness of different sensor types
  - Applicability of numerical models
- IBM is undertaking integration task, working with TNO (NL Government scientific research organization)



*“A more accurate and more continuous insight into the functional quality of water management infrastructures will become increasingly important...occasional measurement and manual data processing procedures will no longer be sufficient...”* Source: “The Ijkdijk” (Ijkdijk brochure)

**Flood Control**  
2015

