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Smarter Planet, *Smarter Cities*

How to get to a Smarter Planet?
Lessons to take away from Smarter Cities

Technology trends, though, are universal

Our world is increasingly

INSTRUMENTED

Our world is increasingly

INTERCONNECTED

Systems are becoming increasingly

INTELLIGENT

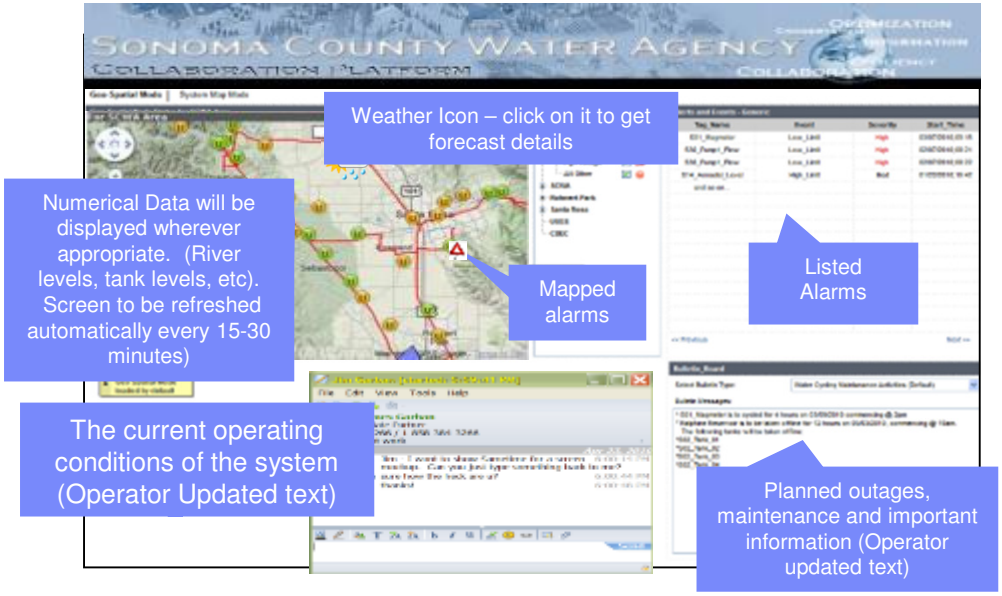
This gives us an opportunity to think differently about problems

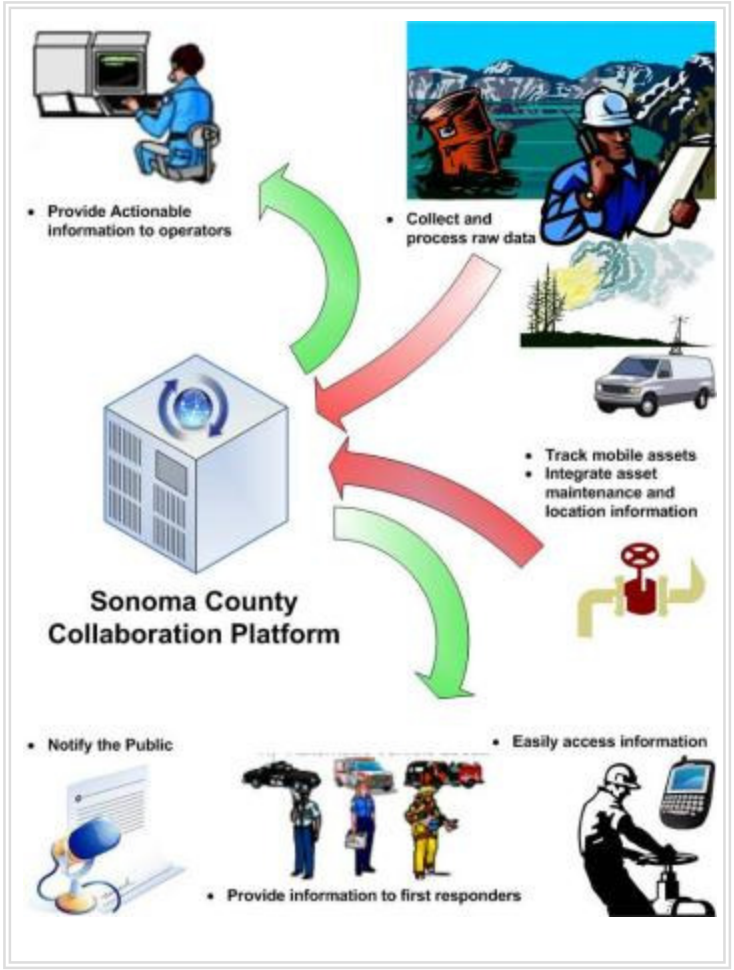
Smarter Cities are about….

Visualization and Advanced Analytical Tools

1

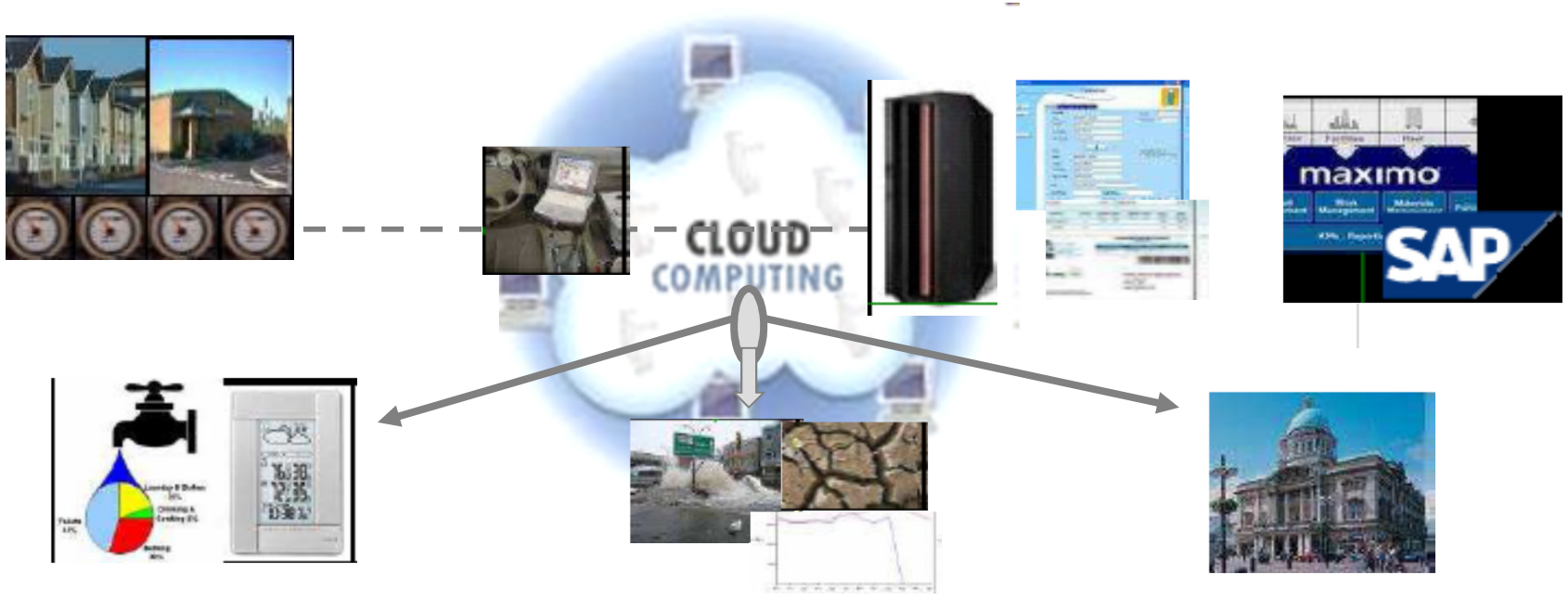
Intelligent Water Operations Center





Advanced devices to track and report water consumption data

Smarter Water Meter Management



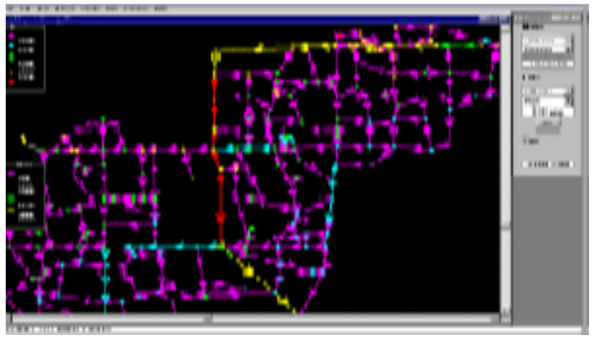
Detecting leaks and thefts via optimization models to reduce operational costs and wasted resources

Leakage or Theft Detection at the Residential Level

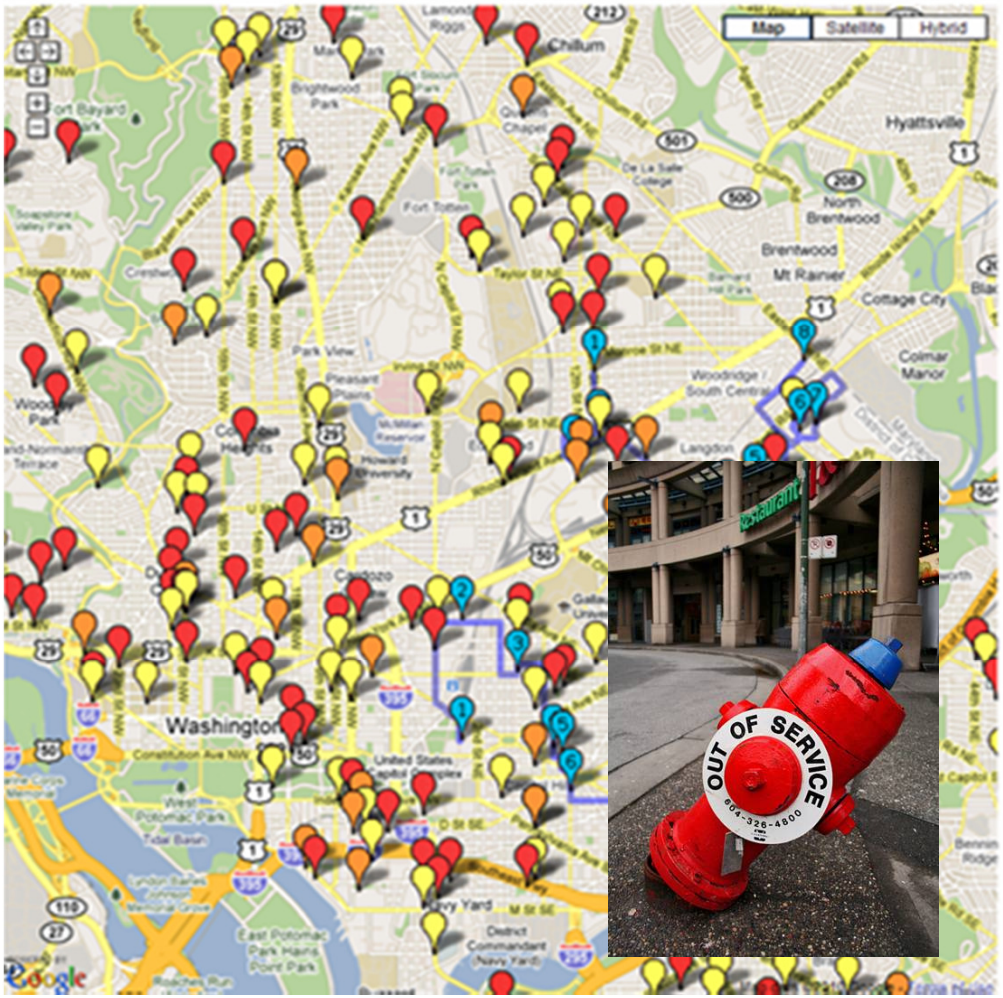
Leakage Detection at the Network Level using optimization

Leakage Reduction using Dynamic Pressure Control

Optimal Valve Placement for Pressure Reduction



Automated work team allocation



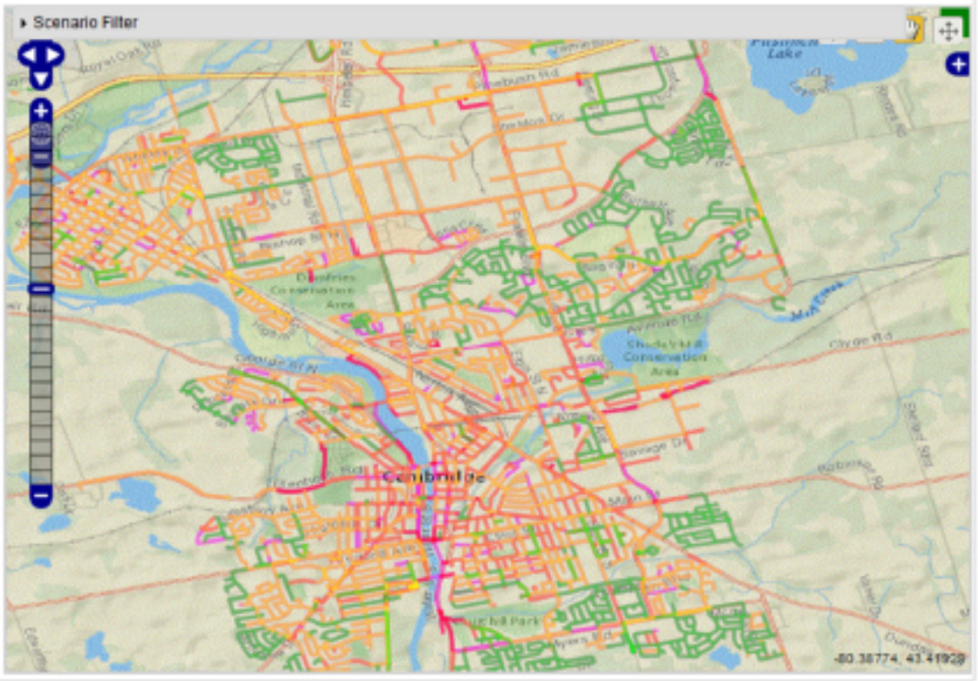
Number of routes 2 Total number of work orders 0 Total travel 0 mi (0 mins)

Route id 1 Number of work orders 0 Travel 7.6 mi (about 25 mins)

WoNum	Problem	Duration	Priority	Location	Reported
09-103707	LEAKBONNET / LEAKOPSTEMNU	60	100	26TH ST NW & Q ST NW - NW	Aug 10, 2009 11:57
09-111355	LEAKBONNET	30	40	46TH PL NE & CENTRAL AVE	Aug 25, 2009 09:29
09-114073	LEAKCAPS / BRKOPNUT / OPS	120	100	BRYANT ST NE & DOWNING ST	Sep 10, 2009 09:26
09-114075	LEAKCAPS / MISSGASKET / M	110	100	34TH ST NE & CLAY ST NE	Sep 10, 2009 09:12
09-115494	LEAKCAPS / MISSGASKET	50	80	11TH ST NW & S ST NW - NW	Sep 21, 2009 08:52
09-115500	DEFECTIVEBANDING	15	70	FT DAVIS ST SE & S ST SE	Sep 21, 2009 08:29
09-115528	LEAKCAPS	30	30	CONDON TER SE & XENIA ST	Sep 22, 2009 07:47
09-115529	LEAKBONNET	30	40	1ST ST SE & WILMINGTON PL	Sep 22, 2009 07:38
09-115531	LEAKBONNET / LEAKCAPS / M	80	80	1ST ST NW & PIERCE ST NW	Sep 18, 2009 11:35
09-115532	LEAKBONNET / LEAKCAPS / M	80	80	C ST INT DELAWARE AVE SW	Sep 22, 2009 07:54
09-115533	LEAKBONNET / LEAKCAPS	60	40	7TH ST NE & ACKER ST NE -	Sep 22, 2009 08:33
09-115534	LEAKCAPS / INOPERCAP	50	60	26TH ST INT QUEEN ANNES L	Sep 22, 2009 08:19
09-115535	LEAKBONNET	30	40	37TH ST & YUMA ST NW - SW	Sep 22, 2009 08:43
09-115536	HYDRNOT2GRD	120	50	SHERIDAN RD SE BET BOWEN	Sep 22, 2009 08:41
09-115540	LEAKBONNET	30	40	7TH ST NW & MASSACHUSETTS	Sep 22, 2009 09:32
09-115543	LEAKBONNET	30	40	39TH ST INT GEORGETOWN CT	Sep 22, 2009 09:27
09-115544	LEAKBONNET	30	40	MADISON PL NW & H ST NW -	Sep 22, 2009 09:46
09-115546	LEAKCAPS / MISSGASKET	50	80	25TH ST NW & G ST NW - SW	Sep 22, 2009 09:43
09-117628	LEAKCAPS / MISSGASKET	50	80	RIGGS RD INT EASTERN AVE	Sep 23, 2009 09:54

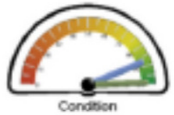
Solution enables prescribing of treatments for assets

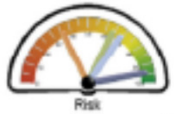
Using Sample Data



Scenario ID:	1005	Scenario Name:	Water Scenario - New
Analysis Owner:	IBM Research	Status:	Completed
Create Date:	undefined	Description:	Water Scoring - New

Asset Class Score | Driver Score | Factor Score





Factor Name
- Material
- Road Class Above Pipe
- Service Connection
- Size

Driver Name

		Total Length	% Length
Age	0-35		
	36-50		
	51-50	4,405	21
	71-100	16,213	79
Material	0-35	6,377	12
	36-50	15,251	30

CambridgePerformancescoreLeftTreeMenu

- PerformanceScore Attributes
- PerformanceScore Mapping
- Treatment & Degradation
  - Treatment Details
  - Driver Score Treatment
- Performance Score Analysis

CambridgePerformanceScoreContentLayout

Add Asset X Treatment | Delete

Choose	Treatment	Unit	Unit Cost	Service Life Extension	Service Life Improv
○	Lining-Cement Mortar	m	400	10	30
○	Lining-CIPP	m	500	80	80
○	Lining-SPRAY ON	m	300	40	80
○	Replacement	m	800	80	100

Smart is: Mitigating flooding incidents and managing wastewater effectively

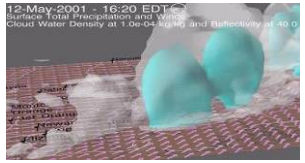
Intelligent Wastewater/Stormwater Management

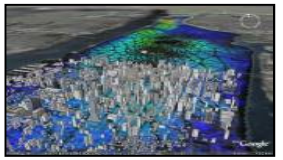
Innovative technologies such as Smart Manhole Covers are used to detect sewer flow levels

Wireless network links monitoring devices to central command center

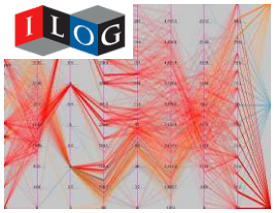
Data can also drawn from more traditional SCADA/sensors systems.

High resolution weather and flooding models are used to generate accurate flood maps with specifics on impact areas





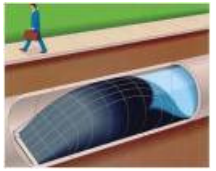
Stormwater Management Command Center



Advanced analytics and optimization engines generate recommended actions for flood avoidance

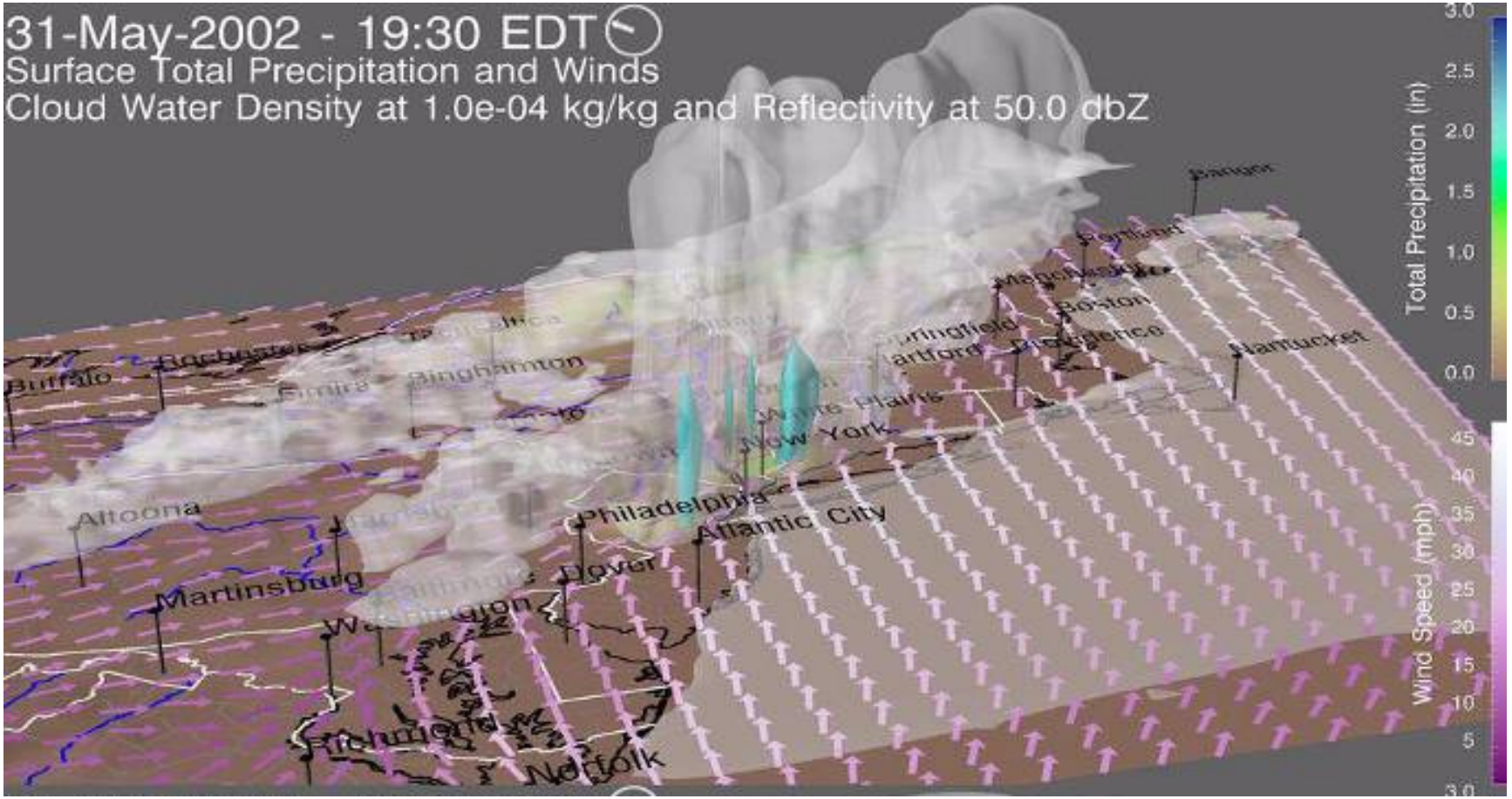
Sewer system data can also be linked with asset & workflow tools to manage any specific maintenance requests

Valves, pumps or inflatable dams are controlled dynamically to balance inline sewer storage and avoid potential overflows.



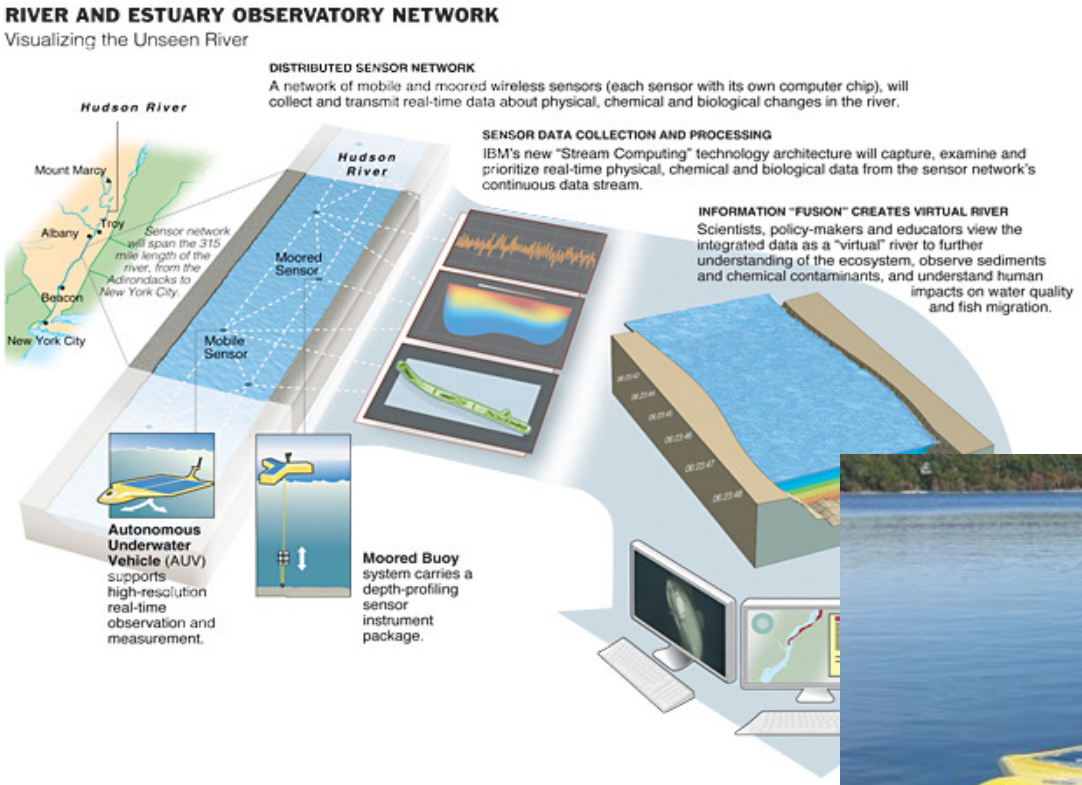
Integrating forecasts in to decision-making

3



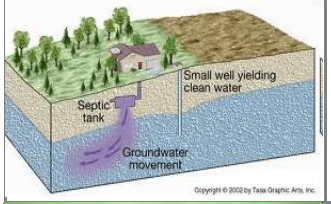
Galway Bay

Benefits through water management prediction and protection: From the Hudson to the Grand River



Smarter River and Estuary Protection :
Working with the Beacon Institute, IBM is helping enable minute-to-minute monitoring of New York's Hudson River via an integrated sensor network, robotics, and computational technology throughout the 315-mile river to understand and predict the effects of global warming, the movements of migrating fish, and transport of pollutants

In summary

Issue	Description	How tech can enable Smarter Water
	▪ Climate change	▪ Downscaled Climate models
	▪ Fragmentation of water resource management/ data	▪ "Collaboration platforms" - Integrate multiple sensor networks and data sets ▪ Application and data integration
	▪ Surface Water Contamination, Ground Water Contamination ▪ Availability of water	▪ Water flow and quality, run-off management sensing & systems ▪ Groundwater resource mapping ▪ Land-use tools ▪ Water accounting systems
	▪ Agricultural practices	▪ Precision irrigation ▪ Run-off management sensing and systems
	▪ Social attitudes, water pricing	▪ Smart metering for water (to enable differential pricing)
	▪ Leakage, losses	▪ Leak detection and management systems ▪ Loss of water because of theft or miscoded customer (commercial customer not paying commercial rates because of mistake)
	▪ Risk of levee failure ▪ Storm surges	▪ Sensing for structural health – "smart levees" ▪ Topological models ▪ High resolution weather forecasting

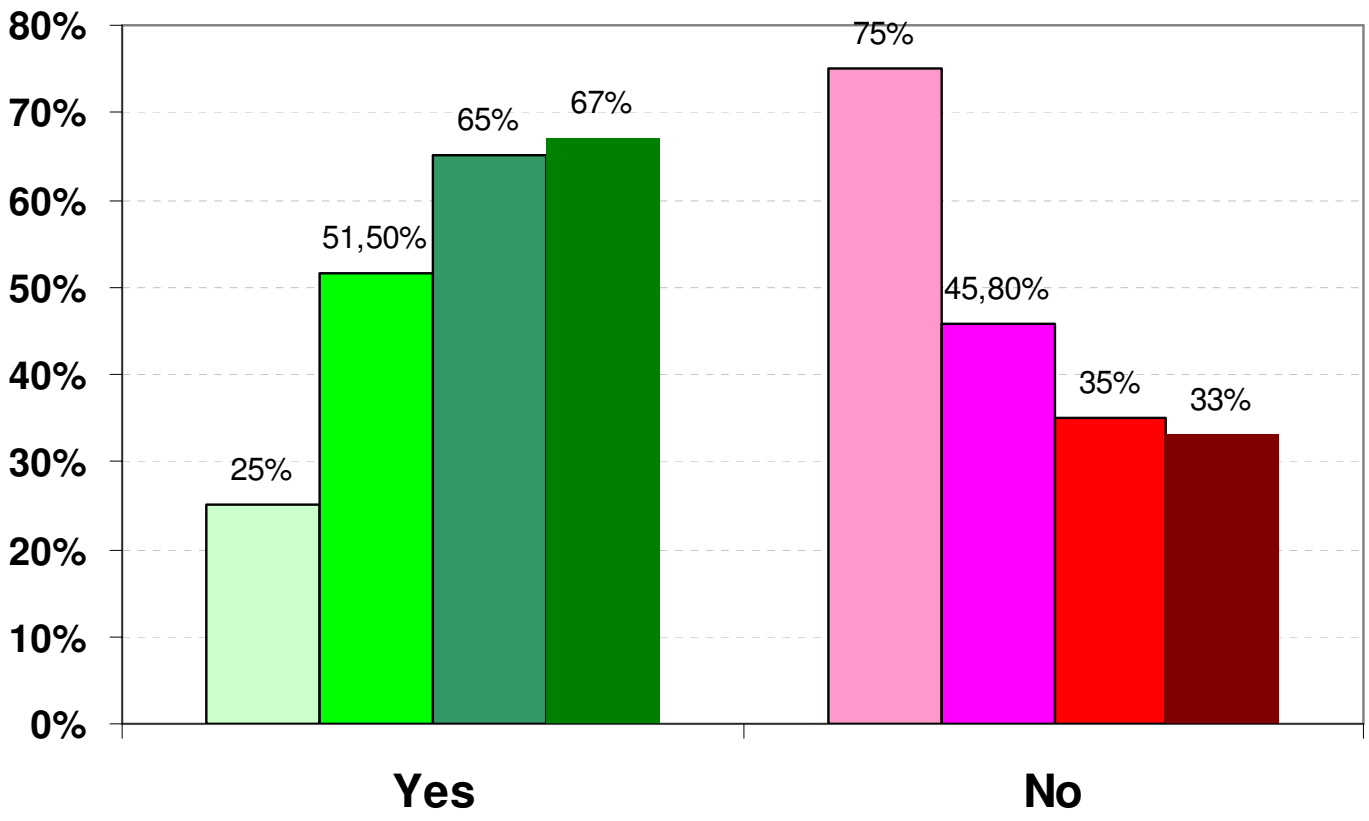
Lesson # 1:

Cities are the place where many environmental problems must be solved

Lesson # 2:

The solution is not to build more physical infrastructure

Public opinion 2005, 2006, 2007, 2010



Lesson # 3:

Changing habits is not necessarily expensive

Lesson # 4:

Technology is not the biggest obstacle.

Lack of planning is!

Lesson # 5:

Governance is KEY!

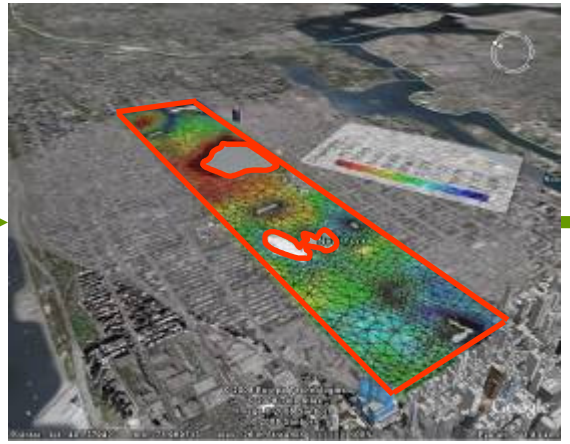
Lesson # 6:

You are going to have to deal with lots, and lots, of data – so once again: PLAN AHEAD!

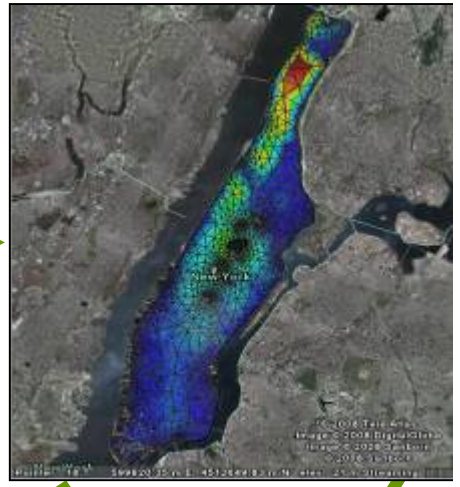
Flooding in NYC

Prévisions et mesures météo

Estimations



Analyse des précipitations

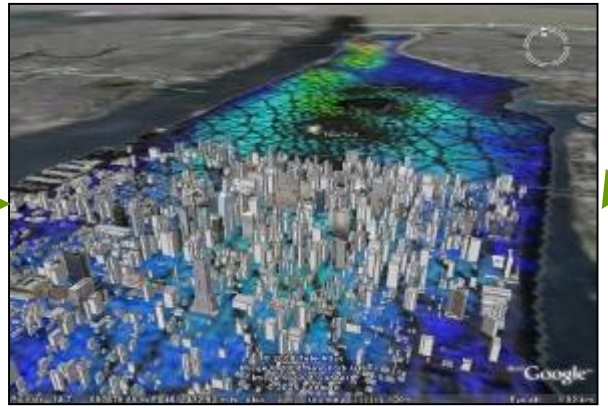


Prévisions des inondations

Recalibration des senseurs

Inondations

Calibration des modèles



Prévision de l'impact

Lesson # 7:

Realtime is NOT good enough!

Lesson # 8:

There is a real need for inter-departmental collaboration

Lesson # 9:

Help citizens help you

Lesson # 10:

There is no single correct definition of a Smarter City