



# IEEE 9th International System of Systems Engineering Conference

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Fire fighters visibility to building plans help mitigate losses in fire accidents

Smarter Buildings help optimise energy consumption

## Urban Systems

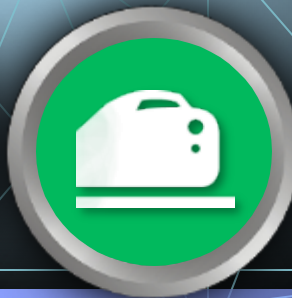
Lower crime increases use of public transit



Easing traffic congestion improves emergency response

City = 'system-of-systems'

Improving waste water systems improves environment



Optimising land use decisions can help better locate schools & community facilities

## Urban Systems

Improved public health increases early years school attendance

Higher adoption of public transit helps improve air quality



# Cloud, Analytics, Mobile & Social (CAMS) reshaping the IT landscape & creating new dynamics for Transport Customers



Cloud

Social

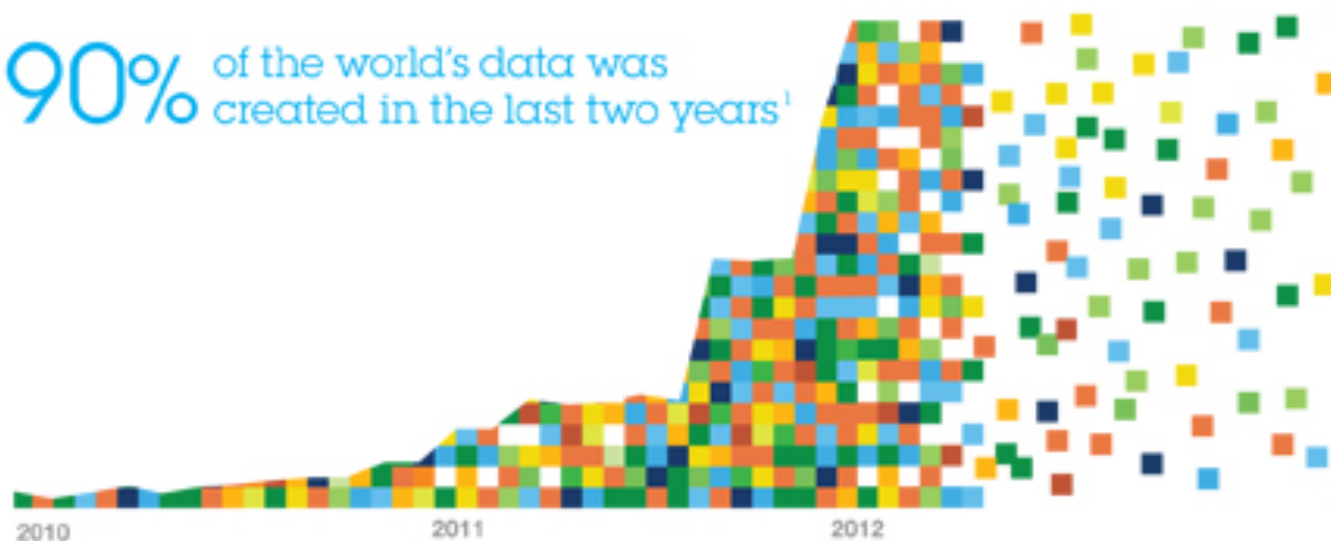
Mobile

Big Data

Internet of Things

# Why Big Data?

90% of the world's data was created in the last two years<sup>1</sup>



80% of the world's data today is unstructured<sup>2</sup>



1 in 2 business leaders don't have access to data they need<sup>2</sup>



83% of CIOs cited BI and analytics as part of their visionary plan<sup>1</sup>

54%



of companies use analytics for competitive advantage<sup>1</sup>

# Cities are transforming core citizen services with significant impact

## Healthcare



**City of Bolzano used remote monitoring of patients and saved 30% in assistance & care services**

## Transportation



**Stockholm's congestion charge: 15% reduction in CO2 emissions \$92m annual gain in revenue**

## Public Safety



**UK Ministry of Justice improve violent crime recidivism prediction by 10% using predictive analytics**

## Education



**Hamilton County, Tennessee reduced annual student dropout rate by 25% using predictive analytics**

## Water



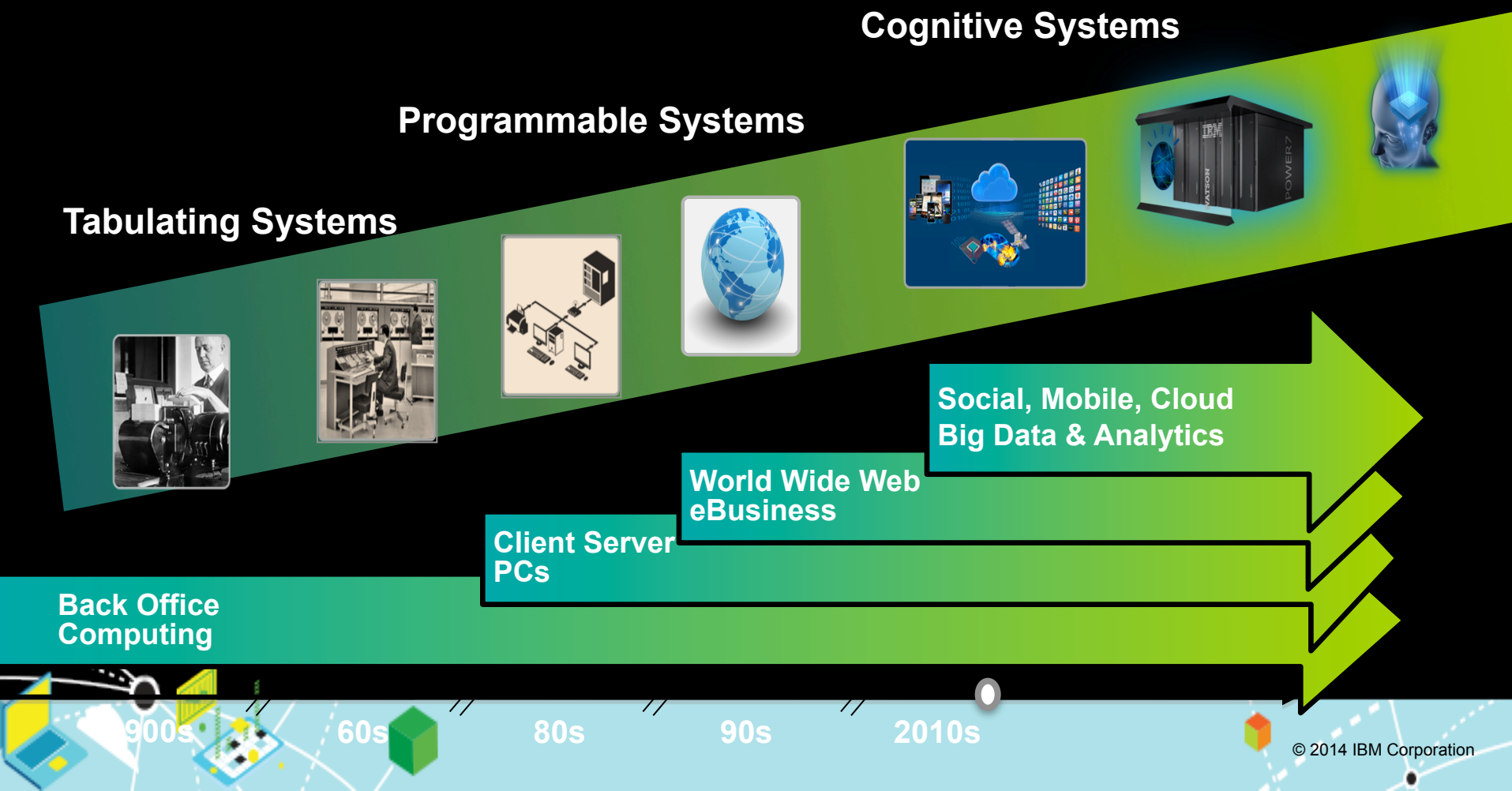
**Miami-Dade County Parks and Recreation saves \$1m annually with proactive leak detection**

## Energy



**Malta's integrated energy and water systems transformed the consumer relationship Water consumption reduced 15% and energy by 25%**

# Advances in technology and computing intelligence are ushering in a new era for Cities



# Era of Smart....Investing in innovative enabling technologies is critical for industry and cities to create services-led value



- Heavy dependence on digital technology including **broadband, cloud, mobile**
- **Cloud** models are changing the economics and scalability of citizen services
- Engaging and Understanding empowered citizens through **social media**
- New **connectivity** demands of workers and customers 24/7 any place e.g. **smart work hubs & connected homes**
- New wave of **intelligent systems** for industry and cities including M2M, robotics and RFID
- **Big Data** is changing decision making



# India's Bharat Light & Power India leverages Analytics and Cloud to optimize power delivery across its wind farms



**2-3% improvement**  
in power generated for  
delivery to the national grid

**Enables visibility**  
of asset performance

**Improved decision making**  
through reporting analytics

**Provides scalability**  
& efficient delivery of IT resources  
without the need for extensive  
capital budgeting





# Townsville is using smarter systems to save water with an innovative engagement of citizens



## CASE STUDY 2

### Small Business – 20 employees

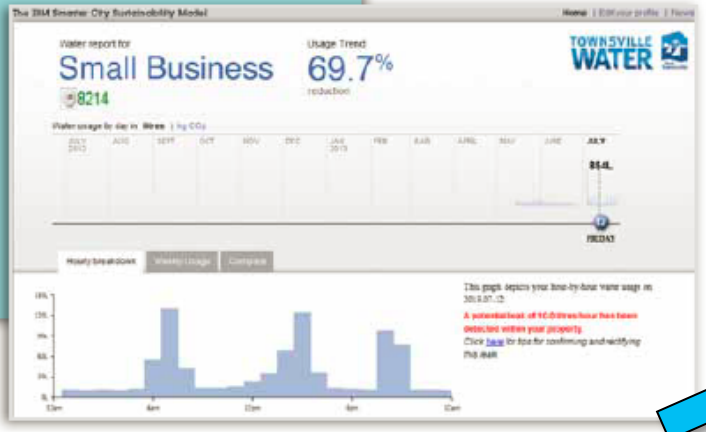
(Site with office building and grounds)

The Smart Water Portal has already saved our company money on preventable leaks. Recently, while we were away at a trade show, I logged in to the portal and I realised that we had sprung a leak of about 80L per hour! I thought someone might have left a hose on our leaky toilet was playing up again. I went back to the office to find a tap with a hose connection left on.

I logged in to the water portal in the morning and confirmed that the leaky tap I turned off was the source of the problem. The portal was now showing zero consumption.

“...every litre saved is dollars not wasted!”

If I hadn't checked the portal and discovered the leak, it would have continued over the weekend resulting in thousands of litres of wasted water not to mention bogging or flooding. While a relatively small leak from a hose might not sound like much, if left undetected the cost can escalate, especially for us because we are charged at commercial water rates, this means every litre saved is dollars not wasted!



A work-in-progress, building the foundations to leverage Social Media and gaming techniques to drive positive behavioural change



### Detected

A potential leak of 20L per hour. To report click [here](#) report or call 01 2233 4455



“Using the portal has raised our awareness and has helped us to work on changing our behavior”

# Digital Delta uses Big Data & Cloud to transform management of the Dutch Water System and help keep the country safe



**15% water management cost savings by leveraging Open Data and reuse of IT services**

**75% reduction of development time (2 years to 6 months) for new science, applications and services**

**Integrated end-to-end solution from a multitude of local fragmented point solutions**

## Big Data Water Analytics and Optimization



**More timely maint of tunnels, sewers, and levees saving costs while reducing flood risk**



**Water balancing across districts to optimize discharge and containment while reducing energy costs**



**Scalable early flood warning method through integration of real-time water flow data, weather forecasts, and simulation models**



# Innovative leadership in Rio de Janeiro transformed emergency and incident management

- Initial focus - prevent deaths from annual flooding and mudslides now expanded to all emergency response issues
- Advanced weather forecasting enables up to 49 hour early warning of potential issues and triggers proactive processes
- 30 city departments integrated into processes
- Increased efficiency in resource deployment and coordinating all agencies in response
- Inspired Mobile Command Centres for each of the 20+ FIFA World Cup Football venues

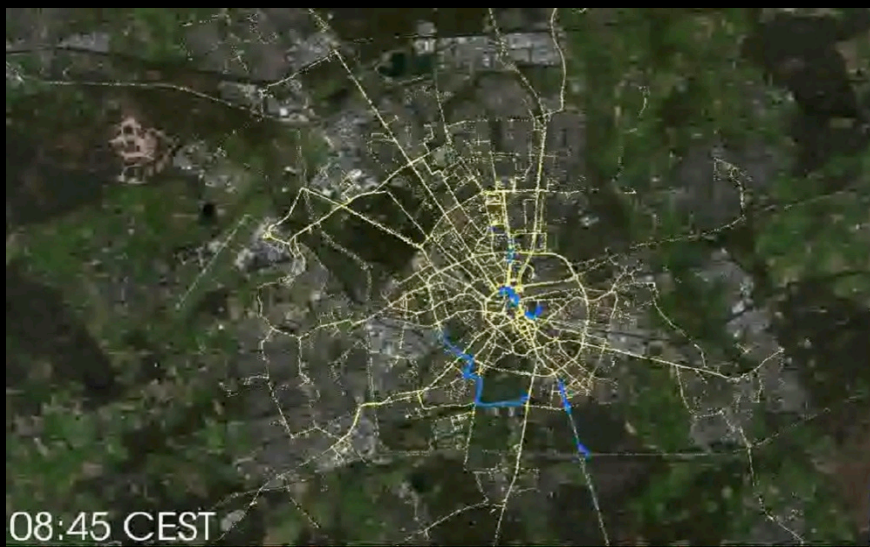


*“With our emergency response system, we can react and respond to disasters faster and more efficiently. It’s helping us save lives.”*

~ Eduardo Paes, Mayor, City of Rio de Janeiro

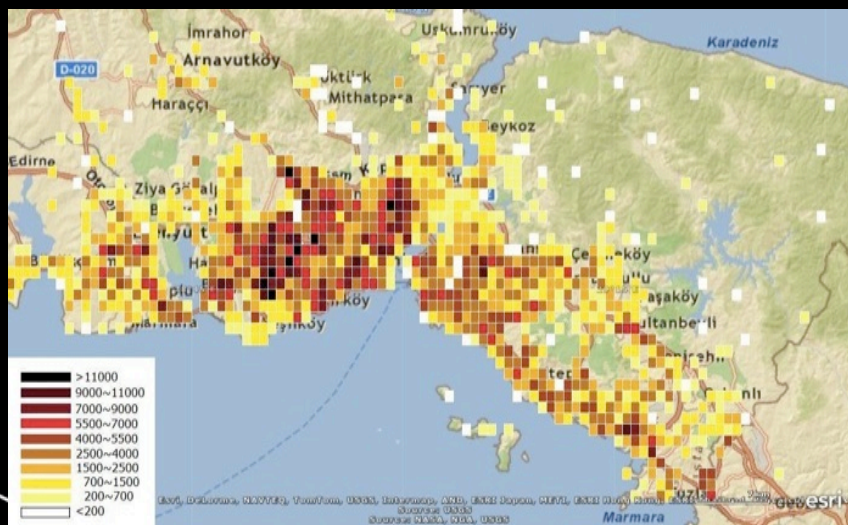


# Insights from Internet of Things (Machines, Mobile, Social Networks) can enhance city planning, operations and citizen services



## Real-time Sensed Cars - Eindhoven

- Pervasive braking combined with weather data identifies snow & ice issues
- Smartphone application notifies citizens of issues
- Identifies road maintenance needs early, saving costs
- Managed taxi fuel consumption by at least 10%
- IBM, Nokia & university partnership



## Citizen as a Sensor – Istanbul

- Anonymous big-data analysis of citizen movements over the course of a day (150m events per week)
- Created city planning maps 7 times more detailed
- Synchronized bus routes with city's new subway lines
- Precisely determined where traffic congestion begins - before commuters even reach the main arterial routes
- IBM & Vodafone partnership



# Leverage City Data using IOW, Analytics, SPSS to support Water Efficiency

Assurer des services d'urgence, prévision et anticipation d'évènements, gestion opérationnel, plateforme industrialisée



VIDEO



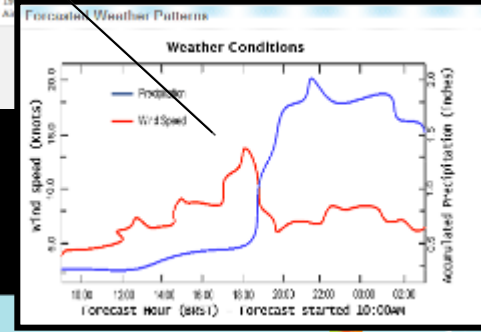
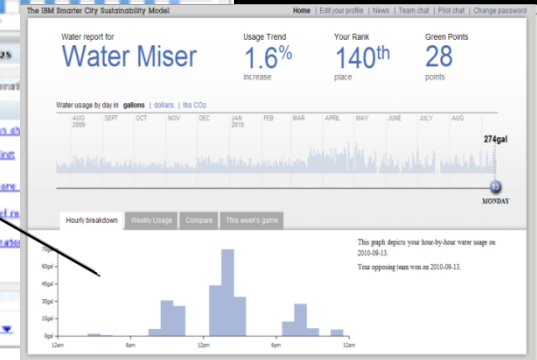
Citizen Collaboration

The dashboard features a central map of Montpellier with various colored markers. Below the map is an 'Event List' table:

Send	Code	Ops	Headline	Category	Severity
2011-11-09 04:07:10		Event	Severe Traffic Accident involving multiple vehicles	Transportation	Severe
2011-11-09 04:07:00		Event	Water quality has affected over 1000 h	Infrastructure	Severe
2011-11-09 04:07:00		Event	Size of the crowd gathering has exceeded	Security	Severe
2011-11-07 17:01:43		Incident	Storm Coverage	Geophysical	Severe
2011-10-28 21:04:28		Event	Water quality plant in North sector has	Infrastructure	Moderate
2011-10-28 21:04:21		Event	Congestion predicted on main ring road	Transportation	Moderate
2011-10-28 21:04:28		Event	Congestion has reached cautionary level	Transportation	Minor
2011-10-28 21:04:21		Event	Congestion has reached cautionary level	Transportation	Minor
2011-10-28 21:04:28		Event	Congestion has reached cautionary level	Transportation	Minor



Sentiment Analysis to support decision



Prediction



Capteurs/Sensors

Common Procedure



# Bold Leadership Builds Smarter Cities



It takes strong leadership to seamlessly bring together the physical infrastructure, operations and people to make change happen.

**Leadership**

**Commitment**

**Accountability**

*vision*

*plan*

*results*



Let's Build Smarter Cities in the **Era of Smart**

