2010/TEL42/DSG/WKSP2/004

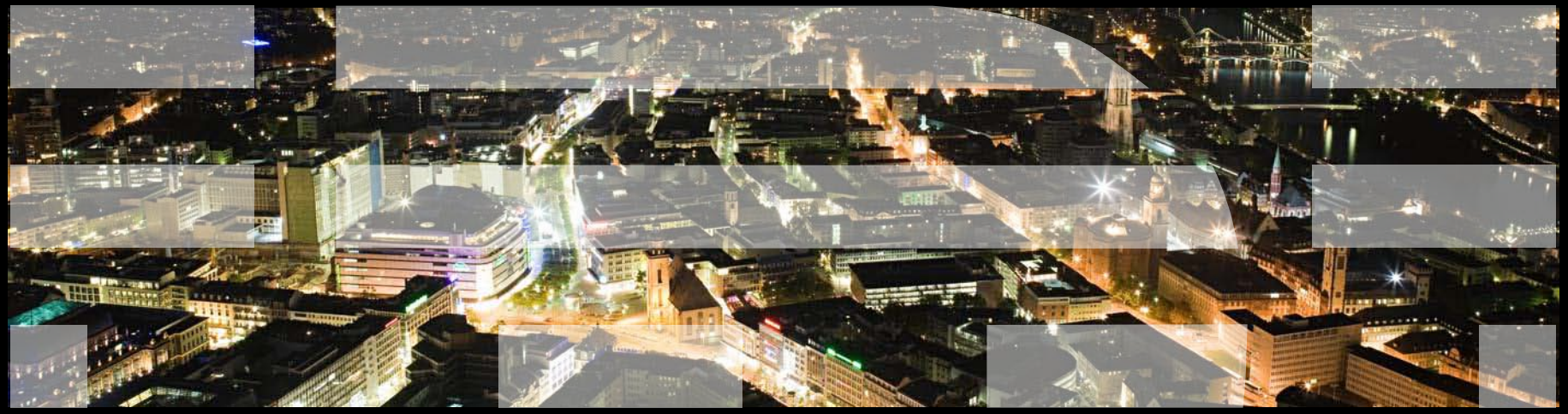
# Let's Build a Smart Planet: Smarter Cities

Submitted by: IBM Japan

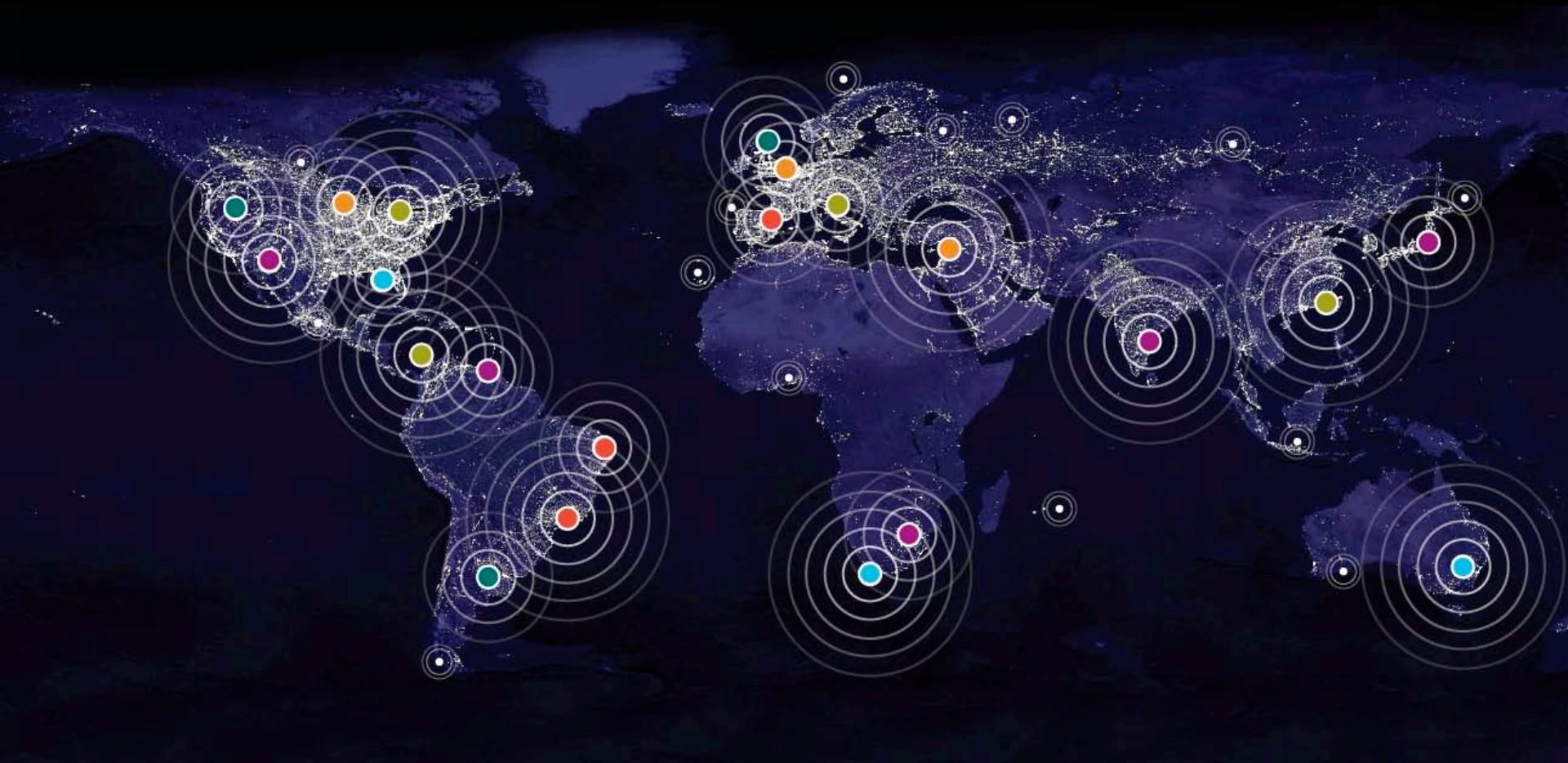
Green ICT Seminar
Bandar Seri Begawan, Brunei Darussalam
3 August 2010

Andrew Buchanan
IBM Japan

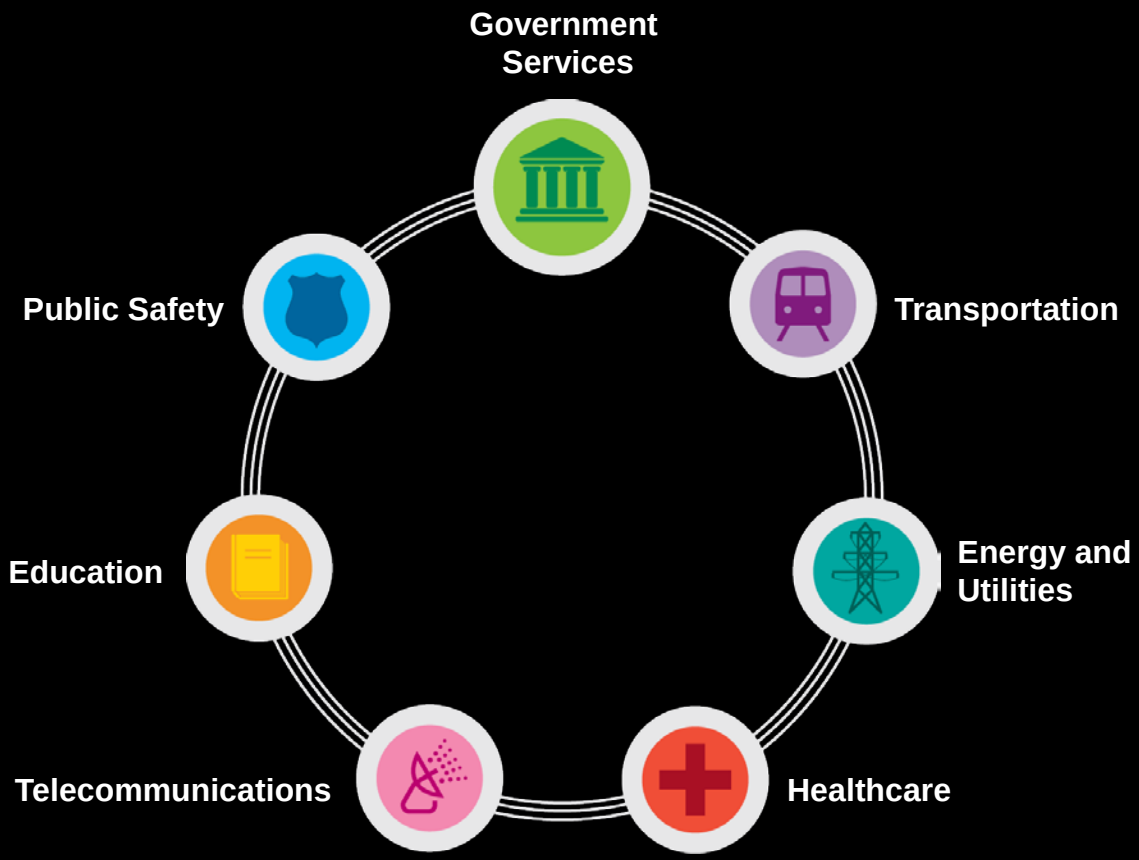
# Let’s Build a Smarter Planet: **Smarter Cities**



A planet of smarter cities: In 2007, for the first time in history, the majority of the world's population—3.3 billion people—lived in cities. By 2050, city dwellers are expected to make up 70% of Earth's total population, or 6.4 billion people.



The city is a microcosm of the major challenges and opportunities facing the planet today—intensified and accelerated. Here, all man-made systems come together and interact with one another.



# We are experiencing the reality of global integration.

The world is connected

**ECONOMICALLY.**

**SOCIALLY.**

**TECHNICALLY.**

## A series of shocks:

| | | | |
|---|---|---|---|
| **Climate change** | **Energy geopolitics** | **Global supply chains** | **Financial Crisis** |

## Plus rapidly evolving and ongoing significant trends:

| | | |
|---|---|---|
| **Changing demographics** | **Empowered consumers and citizens** | **Impact of technology** |

# The digital and physical infrastructures of the planet are converging…

*Computational power is being put into things we wouldn't recognize as computers. Indeed, almost anything—any person, any object, any process or any service, for any organization, large or small—can become digitally aware and networked.*

…because intelligence is being infused into the way the world works.

Our world is becoming

**INSTRUMENTED.**

Our world is becoming

**INTERCONNECTED.**

Virtually all things, processes and ways of working are becoming

**INTELLIGENT.**

# We now have the ability to measure, sense and monitor the condition of almost everything.

**30** billion

By 2010, 30 billion RFID tags will be embedded into our world and across entire ecosystems.

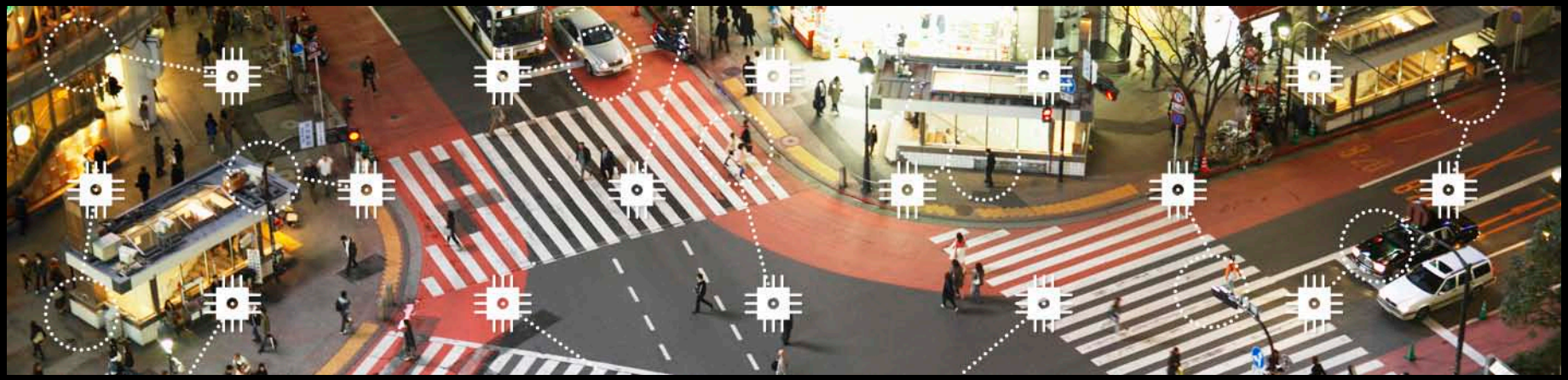
**1** billion

By 2010, there will be more than 1 billion camera phones in existence.

**85**%

Nearly 85% of new automobiles will contain event data recorders by 2010.

Instrumented Interconnected Intelligent



# People, systems and objects can communicate and interact with each other in entirely new ways.

## **2** billion

There will be an estimated 2 billion people on the internet by 2011.

## **4** billion

There are an estimated 4 billion mobile phone subscribers worldwide.

## **1** trillion

Soon, there will be 1 trillion connected devices in the world, constituting an "internet of things."

Instrumented Interconnected Intelligent

# We can now respond to changes quickly and accurately, and get better results by predicting and optimizing for future events.

## **15** petabytes

Every day, 15 petabytes of new information are being generated. This is 8x more than the information in all U.S. libraries.

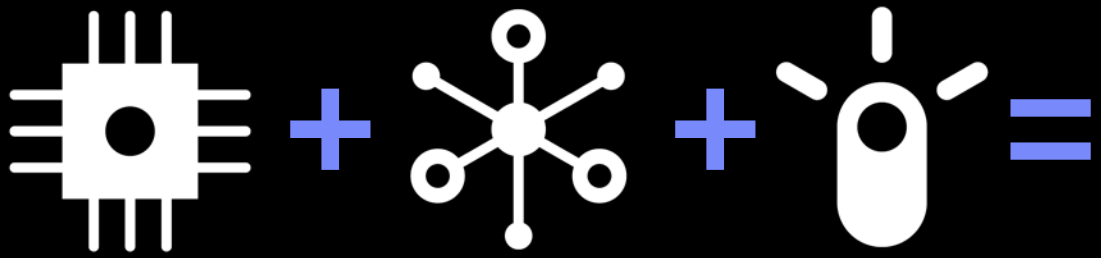
## **1** petaflop

Scientists are working to prevent influenza pandemics by modeling the viruses with a supercomputer that can operate at one petaflop, or one quadrillion operations per second.

## **1** square kilometer

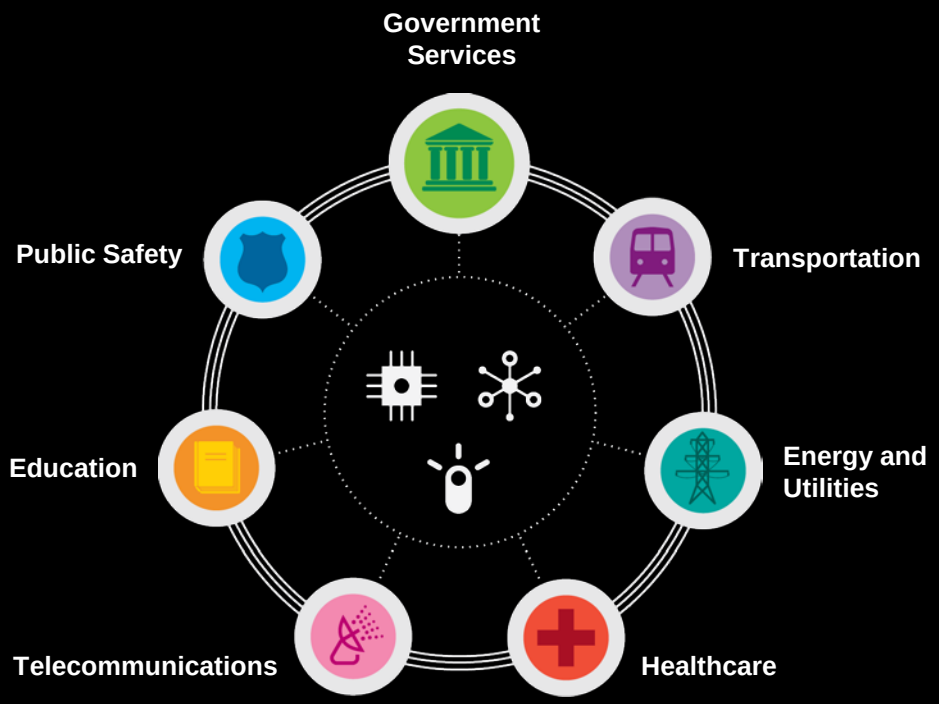
New analytics enable high-resolution weather forecasts for areas as fine as 1 to 2 square kilometers.

Instrumented Interconnected Intelligent



An opportunity for cities to think and act in new ways.

# Smarter cities are working to infuse intelligence into each of their core systems.



# Smarter energy and utilities: An opportunity to manage supply and demand

By providing real-time information about the flow of energy, an intelligent utility system helps citizens and utilities make smarter, more responsible choices about the way they buy, sell and manage utility services.

**SMART GRID**
Monitor the health and stability of the grid at all times, identifying an outage or issue as soon as it happens and dispatching crews to address it immediately. Enable customers to monitor energy prices and their own energy use in real time.

**BUILDING EFFICIENCY ASSESSMENTS**
Reduce energy consumption and $CO_2$ emissions, and save water usage, using sensors to monitor everything from motion and temperature to humidity, precipitation, occupancy and light.

**WATER MANAGEMENT**
Use the right tools to optimize consumption, monitor quality and model past and future water basin behaviors.

**ENERGY PORTAL**
Store and quickly access energy consumption data, customer data, device monitoring and sensor data at all times—empowering the consumer.

# Smarter energy and utilities: Deliver utility services more reliably and efficiently

## The Innovation:

A smarter energy grid uses smart meters and other advanced communication technologies to continuously monitor the health of the grid while better managing supply and demand. Customers can purchase electricity when it's cheapest and even generate energy to sell back to the grid.

**Monitor**
**the state of the grid.**

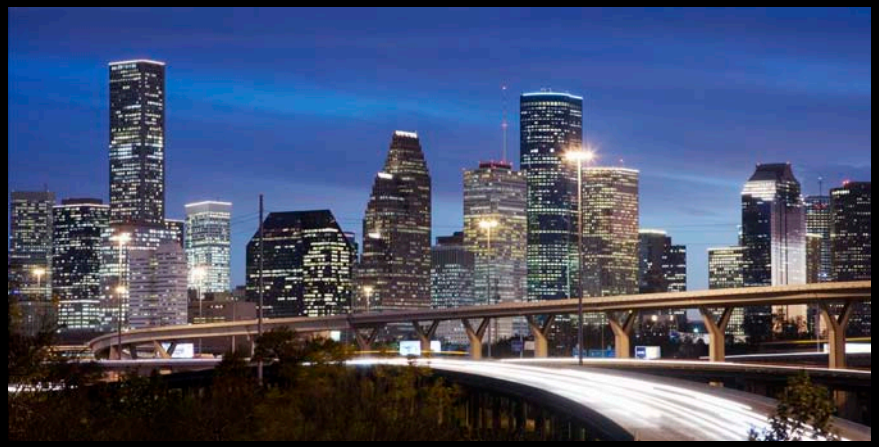

**Manage**
**the flow of energy.**

**Purchase and sell**
**energy with dynamic pricing.**

## The Benefits:

- Lower energy usage across the grid
- Reduce power outages
- Decrease carbon emissions
- Lower costs for utilities and consumers

# Smarter energy and utilities: Client transformations



CenterPoint Energy in **Houston** is installing over 2 million smart meters and in some cases an energy controller for household devices. Homeowners will be able to access their usage information in home displays or on a personal website to make smarter consumption decisions.

DONG Energy in **Denmark** installed monitoring devices across their distribution network. The increased insight into the grid's performance will potentially lessen outage times by up to 50% and reduce maintenance investments by up to 90%.

# Smarter transportation: An opportunity to improve the transit experience, reduce congestion and encourage a modal shift among users

Cities can infuse intelligence into their entire transportation system, improving drivers' commutes, giving better information to city planners, increasing public transportation usage and the productivity of businesses, and raising citizens' quality of life.

**ROAD USER CHARGING**
Employ a dynamic toll system based on the flow of vehicles into and out of a city to reduce traffic.

**ELECTRONIC FARE MANAGEMENT**
Enable rail, bus and road customers to purchase fares via SMS or online and have the fare collected automatically.

**TRANSPORTATION INFORMATION MANAGEMENT**
Gain real-time traffic prediction and intelligent route planning capabilities.

# Smarter transportation: Influence traffic patterns and increase use of public transportation

## The Innovation:

A smart toll system uses cameras and sensors positioned throughout the city, along with a central computing system that processes vehicle identification data, to charge drivers varying rates depending on the time of day.

**Embed**
transponders in vehicles.

**Record**
license plate numbers, time of day and toll rates.


**Process**
data and charge drivers accordingly.

## The Benefits:

- Less traffic
- Lower emissions
- Increased city revenue
- Greater use of public transit
- Increased roadway safety

# Smarter transportation: Client transformations

**Stockholm** implemented an intelligent toll system in the city center, which resulted in 20% less traffic, 40% lower emissions and 40,000 additional users of the public transportation system.

To encourage citizens to use multiple modes of transportation and make it easier to align the cost of transit with its impact on the environment, the **Singapore Land Transport Authority** implemented fare management with smart cards that can be used to pay for buses, trains, taxis, road-use charging and parking.

# Smarter healthcare: An opportunity to achieve better quality and outcomes, increase value and improve accountability and sustainability

A smarter healthcare system forges partnerships and makes better use of data in order to deliver excellent care, predict and prevent disease and empower people to make smarter choices.

**HEALTH INFORMATION EXCHANGES**
Enable patients, consumers, health practitioners and insurers to securely share clinical information across organizational boundaries, enabling safer, more timely, efficient and effective patient-centered care.

**CONSUMER PORTALS**
Encourage consumers to assume responsibility for health and chronic disease management through transparency of healthcare costs, quality of care and prescription drug costs, empowering them to make wiser health and financial decisions.

**DISEASE SURVEILLANCE**
Prevent and manage threats to the health of a community by capturing, sharing and modeling data to spot trends and identify causes, detect disease outbreaks early, efficiently manage cases and take action as needed to protect the public.

# Smarter healthcare: Deliver proactive, patient-centered care to support the needs of the chronically ill and promote wellness

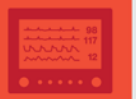
## The Innovation:

Personal medical devices used for patient monitoring, screening and routine evaluation generate data which is automatically transmitted into a patient's personal health record for sharing with a physician.

**Monitor**
**a patient's health status or condition.**

**Analyze**
**the data in real-time.**

**Act**
**to provide proactive responses to medically significant events.**



## The Benefits:

- More accurate, real-time health information
- Supports a patient in proactively managing his or her care
- Monitoring is simple and convenient
- More timely feedback from medical specialists to patients

# Smarter healthcare: Client transformations

A regional healthcare provider in France, created a regional information communication and management solution that improved the efficiency of patient care, reduced the risk of medical error and improved emergency response coordination.

A public healthcare organization, **Servicio Extremeño de Salud** in Spain, has built a regionally integrated system that lets patients go to many health centers within the region, knowing a doctor there can have the patients' complete, up-to-date records for faster and more accurate treatment.

# Smarter telecommunications: An opportunity to interconnect the systems of a smarter city and lay the groundwork for longer-term economic growth

Enhanced broadband infrastructure is the critical backbone of smarter communications and will spur advances in everything from science and medicine to business and technology, and will help billions of people join the global economy.

**SMARTER TRAFFIC SYSTEMS**
Connect the elements of the transportation system—streets, bridges, intersections, signs, signals and tolls—with a strong telecommunications backbone.

**SMARTER HEALTHCARE SYSTEMS**
Automate patient records, share patient data, conduct remote diagnostics and more with fast and robust telecommunications infrastructure and systems.

**SMARTER FOOD SYSTEMS**
Provide end-to-end visibility across the entire global supply chain to allow farmers to obtain better real-time market pricing for produce and supplies and enable retailers and manufacturers to more efficiently integrate product demand with supply replacements.

# Smarter telecommunications: Ensure food safety and freshness

## The Innovation:

RFID labels applied to food shipments at the farm are used to track it throughout the supply chain onto store shelves. There it can be monitored for freshness and easily tracked in the event of a recall.

**Embed**
**RFID tags in food shipments.**

**Trace**
**food on its journey from farm to store shelf.**

**Ensure**
**that food is fresh and safe.**

## The Benefits:

- Ensure freshness of food
- Isolate recalled food products
- Reduce spoilage rate
- Streamline distribution processes
- Significant cost savings

# Smarter telecommunications: Client transformations

Electrical cooperatives in Alabama, Indiana, Michigan and Virginia are bringing broadband Internet access to nearly 200,000 customers in rural communities via existing power line infrastructure. Broadband over power line technology modifies radio signals to transmit voice and Internet data over electric utility power lines.

A southwestern city in the U.S. transformed its IT infrastructure and launched a wide-reaching wireless mobility project in order to increase safety, security and access to city services for all its citizens. Now city employees can work from anywhere while connected to the city's computing system, enabling a new level of collaboration with first responders, improving access to city applications and increasing productivity.

# Smarter education: An opportunity to nurture our most valuable resource

Smarter cities take a systemic view of their education systems, evaluating students in multiple dimensions throughout their lifetimes and equipping them with the skills and knowledge they need to contribute to employers, communities and society.

**SMARTER CLASSROOM**
Deliver effective learning content and tools to every student and teacher according to their needs, preferences, abilities, technology and aspirations.

**SMART ADMINISTRATION**
Incorporate data across education systems to optimize operations, improve services and lower costs.

**INNOVATION IN RESEARCH**
Accelerate innovation, knowledge creation and the economic impact of science with powerful tools for researchers.

# Smarter education: Help teachers personalize learning for every student

## The Innovation:

Gain insights into personalized, effective learning strategies by integrating multiple sources of historical, current and projected data about student performance and successful strategies.

**Integrate**
**student data from many sources.**

**Analyze**
**the data to identify strengths and weaknesses.**

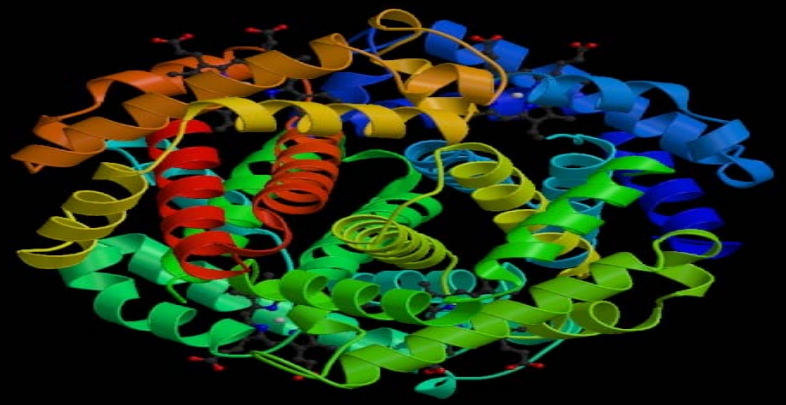
**Generate**
**strategies to improve student outcomes.**

## The Benefits:

- Understand student attendance patterns
- Gain a complete view of student progress
- Quickly identify students at risk
- Identify strategies to address issues

# Smarter education: Client transformations

**North Carolina State University** provides computing lab resources to schools and colleges throughout the state via a central service. Students, faculty and teachers are able to receive a customized image of the content and applications to meet their learning needs.



A leading research group at a prestigious university in Massachusetts obtains the powerful computing environment it needs when it leverages the IBM-powered World Community Grid to perform its innovative energy research..

# Smarter government services: An opportunity to infuse intelligence into needed services, stimulate economies and save taxpayer time and money

Increased information sharing and collaboration drives smarter decision-making.

**CITIZEN-CENTERED DESIGN**
Shift towards a citizen-centered business model to improve services, experiences and outcomes while lowering costs.

**INTEGRATED DELIVERY OF SERVICES**
Connect people to needed programs with speed and accuracy. Enable cities to predict potential issues so preventative measures can be taken.

**BUSINESS AND CITIZEN SERVICES**
Interconnect dynamically with citizens, communities and businesses to spark growth, innovation and progress. Enable online license renewals and validation of license holders.

**GOVERNMENT ACCOUNTABLITY**
Results-driven agencies manage, monitor, analyze and report on key initiatives, with measurable outcomes.

# Smarter government services: Integrating service delivery to improve access to city information and resources

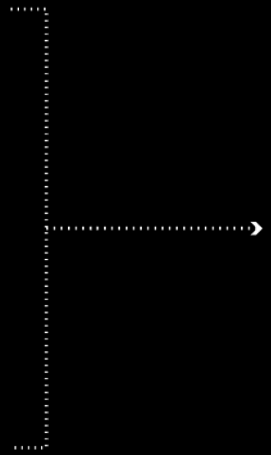
## The Innovation:

Business intelligence software automates data collection and information sharing among thousands of employees in dozens of departments, better enabling a city to inform citizens, address service requests and provide critical data to first responders.

**Compile**
**information from across city agencies.**

**Analyze**
**the information to identify needs and actions to take.**

**Distribute**
**information to city leaders and citizens.**

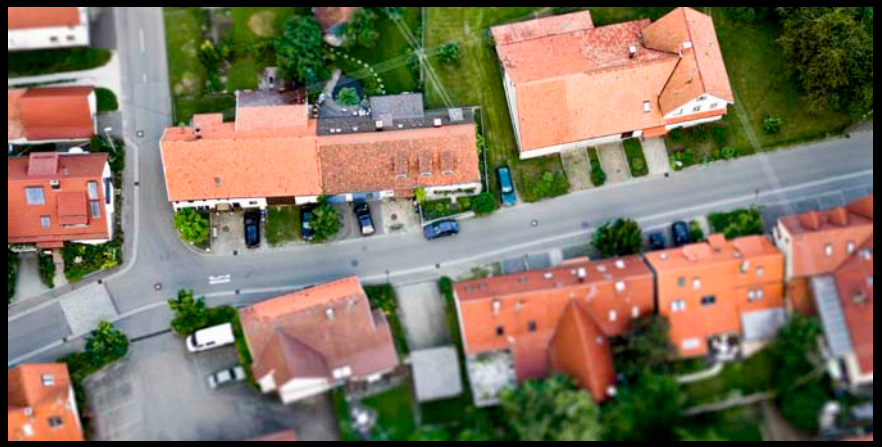


## The Benefits:

- Effective and efficient reporting, and analysis and management of resources
- Empowering citizens
- Better response time when incidents occur
- Significant cost savings

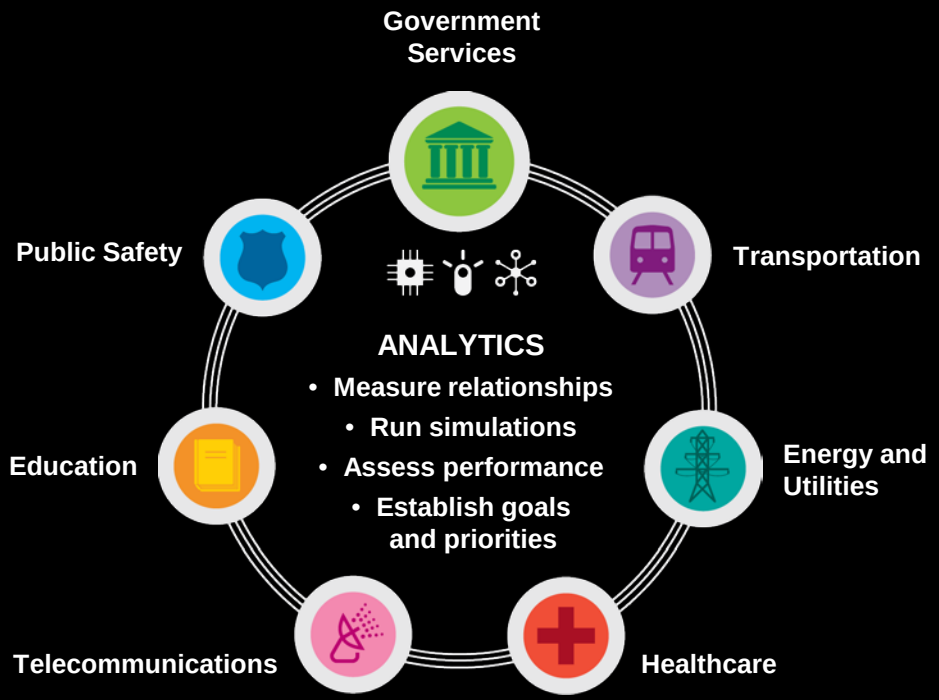
# Smarter government services: Client transformations

**City of Albuquerque** introduced a performance management system that reduces manual data collection from disparate sources while enabling actionable, timely information for citizens, emergency personnel and others—realizing an initial cost savings of almost 2,000% ROI.

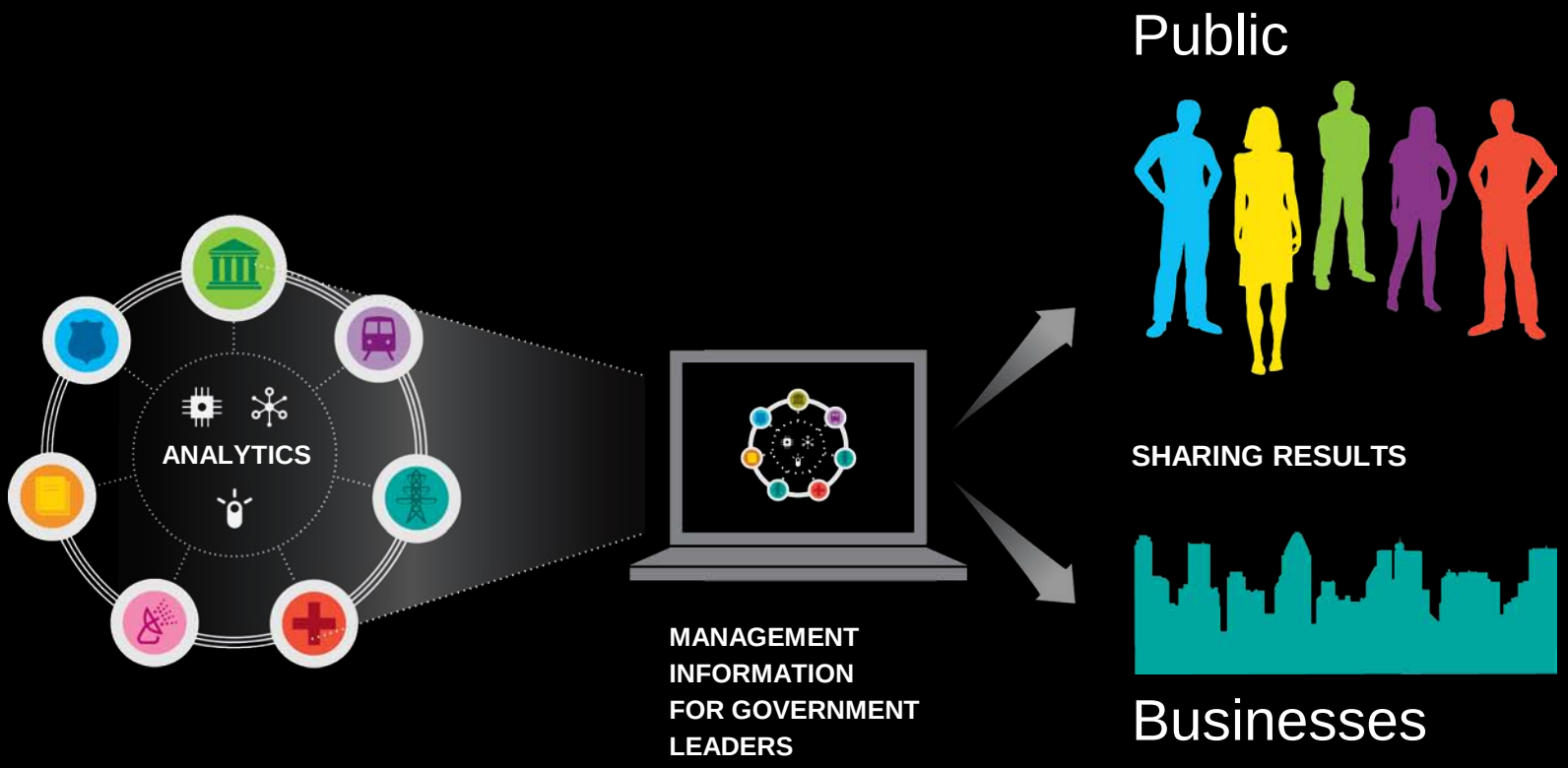


The **Cheshire County Council** achieved a 20% reduction in time and cost required to perform in-home senior visits, improving the ability to proactively manage the course of health and social care for senior citizens.

# Advanced analytics can identify challenges and potential efficiency gains across all systems.



# Performance management gives cities the ability to set priorities, assess progress and share results with the public.



Smarter cities focus on the economic health and welfare of citizens and businesses—providing needed services, creating an economically sound environment and improving the quality of life for all.


Public

SHARING RESULTS

Businesses

The new leadership requirements:

**Collaboration**

**Standards**

**Openness and innovation**

These three elements are key to your economy's long-term strategy and road-map to success.

# Thank you for your time today.

# Back up

# Devices in a smarter home connect to the cloud, reducing complexity and further empowering the consumer