Building Smarter Sustainable Cities

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Cities Will Lead The Way to a Smarter Planet

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.
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.

<table>
<thead>
<tr>
<th>Our world is becoming Instrumented</th>
<th>Our world is becoming Interconnected</th>
<th>All things becoming Intelligent</th>
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</thead>
<tbody>
<tr>
<td>By 2010, 30 billion RFID tags will be embedded into our world</td>
<td>An estimated 2 billion people will be on the Web by 2011 … and a trillion connected objects</td>
<td>Every day, 15 petabytes of new information are being generated.</td>
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Building a Smarter Planet

We Have An Opportunity to Build a Smarter Planet

To think and act in new ways to make our systems more efficient, productive and responsive

New Intelligence
Data is exploding and it’s in silos”
I Need Insight

Green and Beyond
“Our resources are limited”
I Need Efficiency

Smart Work
New business and process demands”
I Need to Work Smart

Dynamic Infrastructure
“My infrastructure is inflexible and costly”
I Need to Respond Quickly
Today’s cities are facing serious global challenges

- Terrorism, crimes, and emergencies
- Supply of clean water and air; affordable and reliable delivery of energy
- Road congestion, expanding public transit
- Citizen expectations for open government
- Increasing impact of buildings on energy consumption and emission of greenhouse gases
IBIs helping cities manage sustainability in an integrated way

*IBM Research working with City of Dubuque to create the first smarter city in US.*

Dubuque will be a living lab, where pioneering research will be conducted to develop international smarter sustainable city model and a set of reusable assets.

Starting with Water Consumption Management
- Dubuque is rolling out advanced water meter replacements throughout the city coupling them with locally manufactured low-flow devices.
- Research will create a web delivered service prototype that will integrate meter data and analytics of consumption trends to detect potential leaks to drive down consumption and wastage of water.
- 1 year pilot will cover 250 residences where advanced meters are being installed.
- Research will work with pilot residences and build a water consumption management solution for all stakeholders (residents, city management, water utility) with primary emphasis on behavior.

IBM and Dubuque working together on multiple smarter city services
- Transit & Transportation: Overhauling Transit to make it convenient and efficient.
- Energy: Energy Efficiency through smart metering and demand shaping.
- Housing & Urban Development: Cross-tower integration for urban planning.
- Social Engagement: Public awareness and engagement through incentives.
- Health & Wellness: Preventive and proactive management of personal health & wellness.
- Parking: Integrated Parking and transit optimization.
IBM Smarter Cities Sustainability Model Cloud

• Cities need to upgrade services to residents in the era of smart meters and instrumented and interconnected infrastructure

• Cities need to empower city management, utilities and residents in the areas of water, energy, transportation and healthcare management

• The IBM Smarter Cities Sustainability Model provides a platform and an implementation for bringing heterogeneous real time data streams of energy, water, mobility, health and other such information, integrating the information and providing analytics, optimization and decision support to all stakeholders.

• The Model also allows domain solutions to be built on top of the platform leveraging the information processed.

• This solution is enabled through the Cloud lowering barrier of entry costs, and enabling a pay as you go service model. Cloud model also addresses extreme scalability through resource scaling in such scenario.

• The goal is to have cities leverage the cloud solution to quickly realize the value of this innovative Smarter Cities Sustainability Model
Solutions leveraging the IBM Smarter City Sustainability Model

CITY MANAGEMENT and Utilities can design and implement policies for optimal resource management.

RESIDENTS can optimally manage individual resource consumption, incentives, mobility and wellness.

Real-time Sensor Data Feeds

Smart Water Meters
Smart Energy Meters
Traffic Sensors
Health Wellness
Economic Dev. Sensors
Environment Sensors

Policy Engine

Decision Support-Modeling, Simulation and Optimization
Metrics, Monitoring, Analytics and Insights
Information Integration and Sensor Data Management
Instrumentation Infrastructure Management

Advanced City Services

Smarter Cities Sustainability Model Cloud

Web Delivered Smarter City Services Layer

Energy Mgmt for Buildings
Community Health & Wellness
Adv. Water Consumption Mgmt
Demand Mgmt for ENERGY
Demand Mgmt for PARKING
On Demand TRANSIT

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Examples of Cross-silo Benefits

Cross-silo Optimal Decision Making is the “holy grail” of Smarter Cities Innovation

Dubuque will use smarter city capability to

- Create carbon footprint across silos and manage reduction in footprint in an integrated manner
- Influence planning of warehouse district
- Make inner core livable and walkable
- Integrate planning for parking and transit
- Make economic growth environmentally sustainable
- Attract new businesses, create sustainable services economy
- Develop unique Brand
Scenarios

*Cities can design and implement policies and services to manage resources optimally*

- Baselining and then Optimizing City-wide Carbon & Energy Footprint
- Managing population migration and its strain on city resources
- Designing on demand public transit that reduces congestion, carbon and energy consumption
- Implementing sustainable urban development and growth without causing urban sprawl
- Creating net zero neighborhoods
- Conserving natural resources like water smartly
- Empowering citizens with information, analytics and insight for enabling them to conserve resources, save money and improve environment simultaneously
- Creating a brand for the city as smarter and sustainable allowing it to attract new businesses and business models
Sustainability:
A community’s ability to meet the environmental, economic, and social equity needs of today without reducing the ability of future generations to meet their needs.
Citizen-Defined Vision for a Sustainable Community
## Citizen-Defined 11 Principles of Sustainability

<table>
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<th>Economic Prosperity</th>
<th>Social/Cultural Vibrancy</th>
<th>Environmental Integrity</th>
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<tbody>
<tr>
<td>Regional Economy</td>
<td>Green Buildings</td>
<td>Healthy Air</td>
</tr>
<tr>
<td>Smart Energy Use</td>
<td>Healthy Local Food</td>
<td>Clean Water</td>
</tr>
<tr>
<td>Resource Management</td>
<td>Community Knowledge</td>
<td>Native Plants &amp; Animals</td>
</tr>
<tr>
<td>Community Design</td>
<td>Reasonable Mobility</td>
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IBM/Dubuque Smarter Sustainable City Partnership

• Announced Sept. 17, 2009
• IBM’s first “Smart City” in the U.S.
• Goal: Replicable model for cities under 200,000
Smarter, Sustainable Dubuque

• The SSD project has the ability to **change everything** about the way communities discuss and achieve sustainability.
What does it mean?

- Outreach and education campaign
- New meters and sensing technology
- Increased identification of leaks and inefficiencies
- Free auditing and cost support for improvements
- ISS driven info to citizen on:
  - direct $ savings
  - direct water savings
  - community electricity savings
  - community carbon reductions
  - improvement in "personal" footprint
- New jobs, new markets, and new industries
Smarter Sustainable Dubuque (SSD) Partnership

- **IBM**: Investing millions to build internal data platform to support SSD vision
- **Utilities**: Investing millions to assure smart infrastructure is in place to advance the SSD vision
- **Local Industry**: Investing millions to develop needed projects/services to enable SSD vision
New Jobs, Markets, and Industries

• Impact of SSD is significant:
  - New local manufacturing jobs
  - New local auditing and analysis jobs
  - New local skilled trade jobs
  - New sustainability market enterprises

• Water already having impact and electricity, gas, transit, waste, health and others will be even greater.
Energy Efficiency in Iowa:
Time for Revolutionary Ideas

Monica Stone
Director of Policy and Communication

Iowa Office of Energy Independence
Success for Iowa

Now is not the time for small, incremental tweaks to the system. It is the time to reach our goals.

Iowa Office of Energy Independence
We are ready for new thinking about energy efficiency

“A revolution doesn’t happen when a society adopts new tools, it happens when a society adopts new behaviors.”

-Clay Shirky,

Expert on technology and how it impacts business
Iowa 2010 Energy Independence Plan

It is time for Iowa to re-imagine what it means … and what it takes… to manage our energy future.
Plan Envisions:

• Programs that engage, motivate and mobilize the public to take action
• Incentives and assistance to cities, businesses, community organizations and others to be creative in adopting their own practices
• Partners to help in removing barriers and in providing targeted information, tools and technical assistance

Iowa Office of Energy Independence
Plan Establishes Targets for Iowa

• 30% reduction in energy use in facilities in Iowa by 2025 through energy efficiency
What now … What next?

• Statewide outreach
• ARRA
• “The Big One”
• Focus on Communities
Statewide Outreach

- Use the engineering to make sure things work
- Use the outreach message to make sure people want what works
ARRA

- Awarded more than $10 million
- Will save Iowans $4.7 million in energy costs
- $33.4 million in matching funds
- Create or retain 328 direct jobs
“The Big One”

- Partnership with Dubuque
- Create community energy centers
- Community blitz
- Financing risk reduction pool
Community Focus

- Understanding local needs
- Providing necessary technical infrastructure
- Putting local interests in context with state energy picture
- Meeting money saving, environmental and job creation goals for all of Iowa
Partnership Opportunities

Iowa Office of Energy Independence
Greater Dubuque/State of Iowa Smarter Cities Retrofit Ramp-up

• Greater Dubuque Residential Ramp-up

• State of Iowa Retrofit Ramp-up

• IBM Smarter Cities Demonstration Pilot
Greater Dubuque/State of Iowa
Smarter Cities Retrofit Ramp-up

• The level of partnership is unprecedented
• The leverage is significant and real
• Designed, supported and funded to spread
• Even if application is not funded Federally, the concept may be able to move forward with OEI (albeit more modestly)
• This is a locally led, sustainable model.