CO·EVOLUTION

A New Systems Framework to Shape the Future

Smarter Planet – **The Genesis**

In the last twenty years, the world has

- Deployed a global, high-bandwidth network

- Created a population of over 1 billion Internet users

- And another population of some 4 billion mobile telephones

- Embedded some billions of sensors in our environment and infrastructure

- Invented globally-integrated business processes

![IBM logo]

Let's Build a Smarter Planet

IBM

Smarter Planet – **The Core Idea**

Across many domains of human activity it is no longer necessary to make guesses about what is happening today or what might happen tomorrow

…we can extract insight about today and we can make good predictions about tomorrow

…in many cases we already have the data

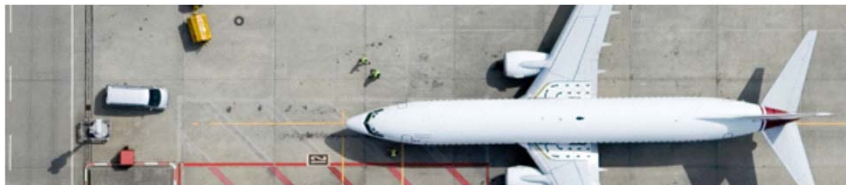The planet is now wired for data…what are we going to do with it all?

IBM

Business and government leaders face staggering challenges

75% **Estimated energy consumption by cities of the world today**

80% **Estimated emission of greenhouse gases by cities of the world today**

$41 trillion **Investment needed for infrastructure in developing countries by 2030**

20% **Portion of water lost within cities due to infrastructure leaks**

Cities – more than states, provinces or even nations – will increasingly determine the success or failure of our planet

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As the world becomes more instrumented, interconnected and intelligent…

Smart traffic systems

Intelligent oil field technologies

Smart food systems

Smart healthcare

Smart energy grids

Smart retail
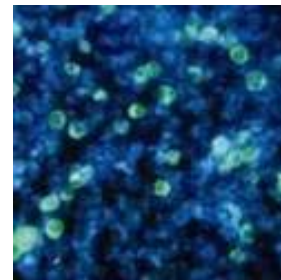
Smart water management

Smart supply chains

Smart countries

Smart weather

Smart regions

Smart cities

…it creates new opportunities across industries and countries to address the challenges

A Planet of Smarter Cities

In 2007, for the first time in history, the majority of the world's population lived in cities. By 2050, city dwellers are expected to make up 70 percent of the Earth's total population.
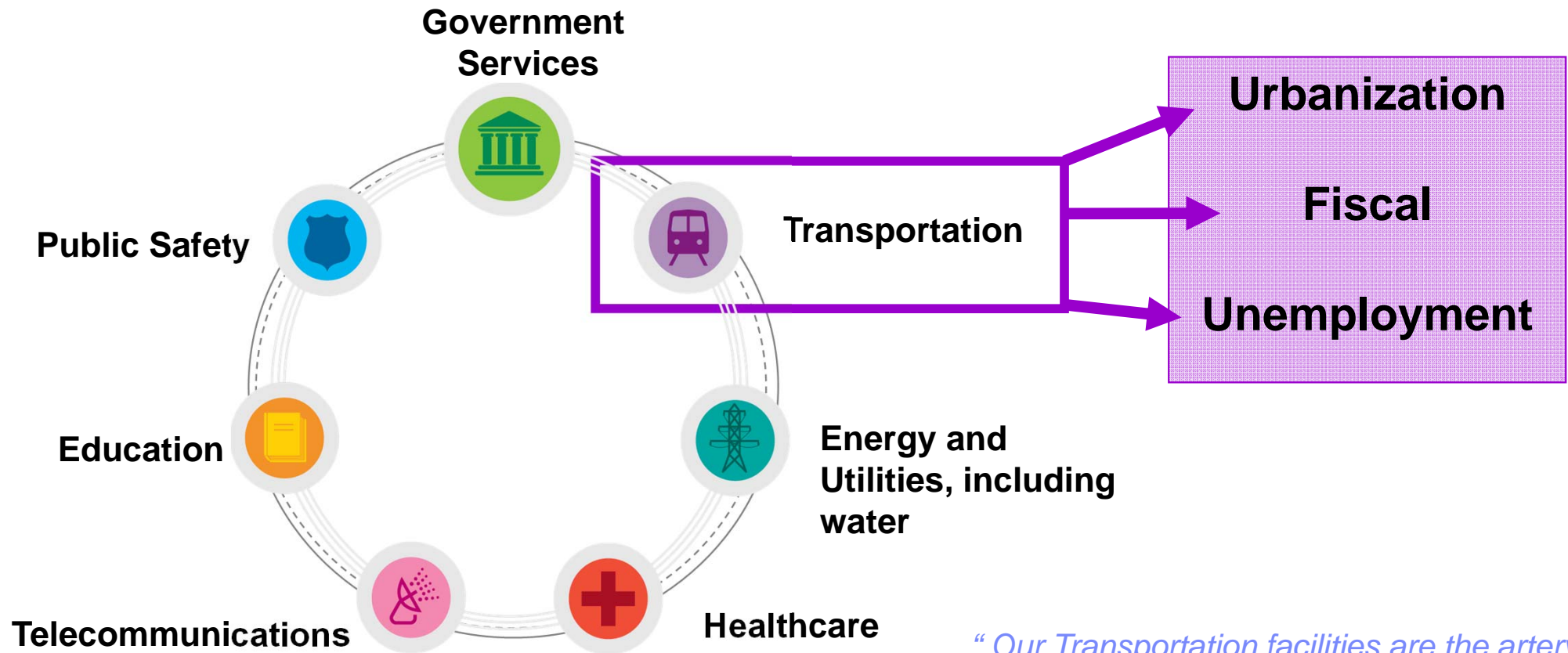
"And a city is a system—indeed, a city is a complex system of systems. All the ways in which the world works—from transportation, to energy, to healthcare, to commerce, to education, to security, to food and water and beyond—come together in our cities."

IBM
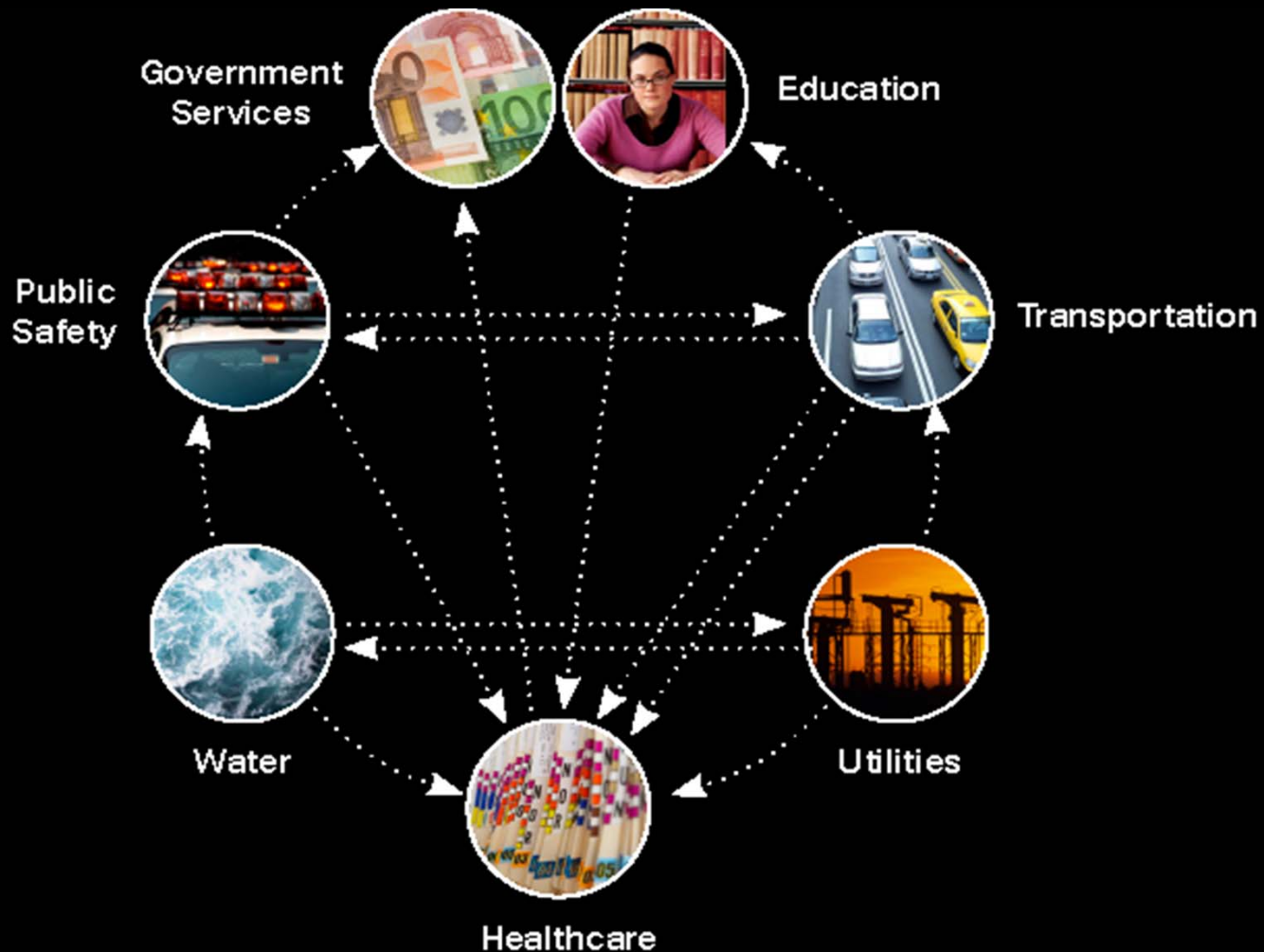
All cities are made up of a complex system of systems and transport is one of these core systems that is key for growth and job creation

Government Services

Public Safety

Transportation

Education

Energy and Utilities, including water

Telecommunications

Healthcare

Urbanization

Fiscal

Unemployment

" Our Transportation facilities are the artery for economic growth"

Abbas Mohaddes

President and CEO, Iteris Inc.

Source: IBM Center for Economic Analysis

Perspective : System-of-Systems, Just a new System...

Interactions between systems : Citizen, Operations manager and City managers

Source: Sterman, John, "Business Dynamics: Systems Thinking and Modeling for a Complex World," 2000, p. 187

Our example : Constructing new roads, changing behaviors, impacting public transportation systems…

Interconnections improve outcome, **analytics** convert data into value

Easing traffic congestion improves emergency response

Public Safety increases use of public transit

Protecting city water increases public safety

Better student health positively impacts attendance

Public Safety

Govt Services & Education

Transportation

Water

Healthcare

Utilities
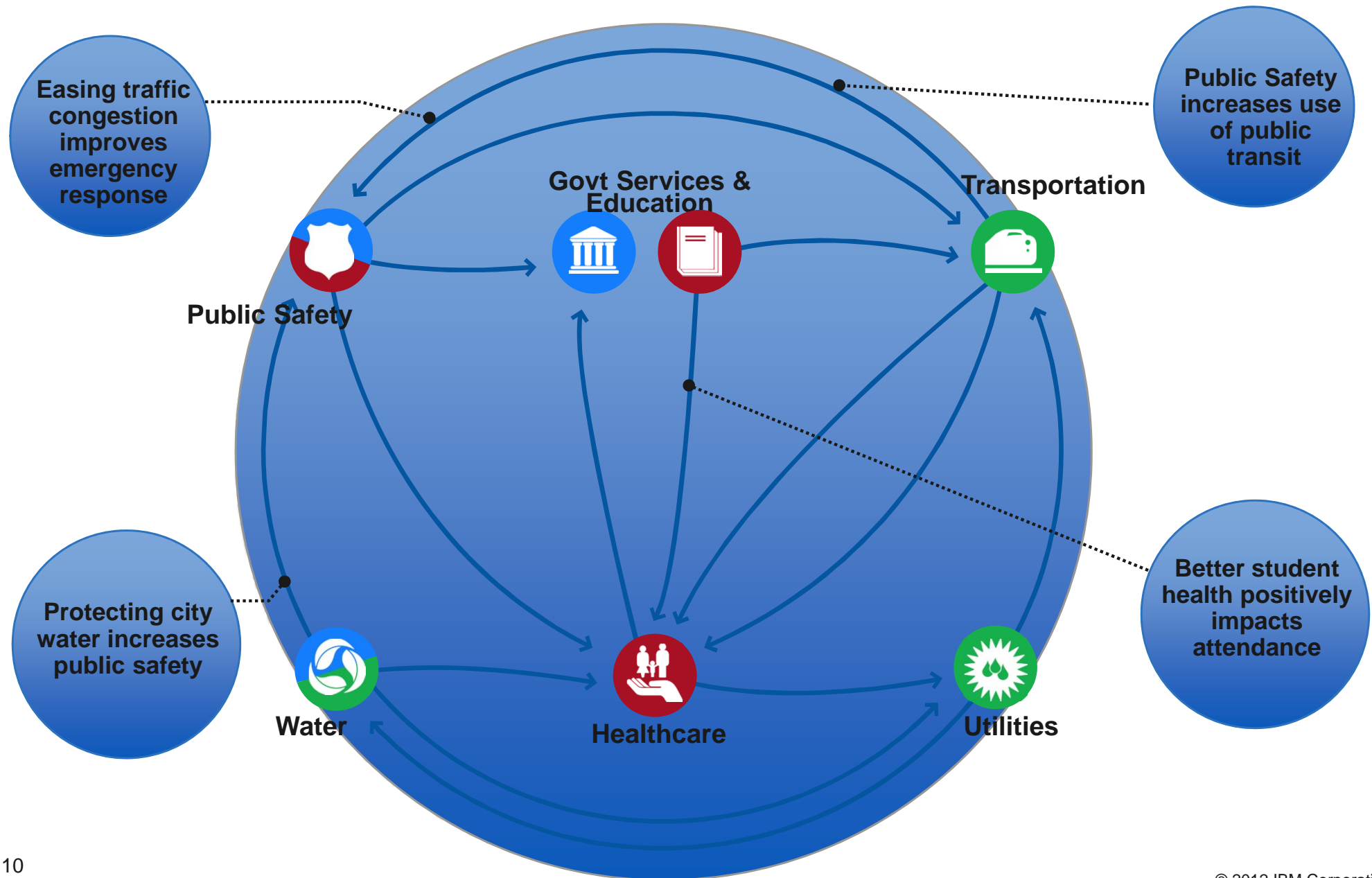
The IBM Intelligent Operations Center for Smarter Cities enables city leaders to apply global best practices

Inspired By

Public Safety

- Predict, monitor, and mitigate crisis situations
- Automatically analyze video streams for threats
- Analyze data to detect and act on criminal patterns

Transportation

- Improve traffic management
- Optimize roadway capacity
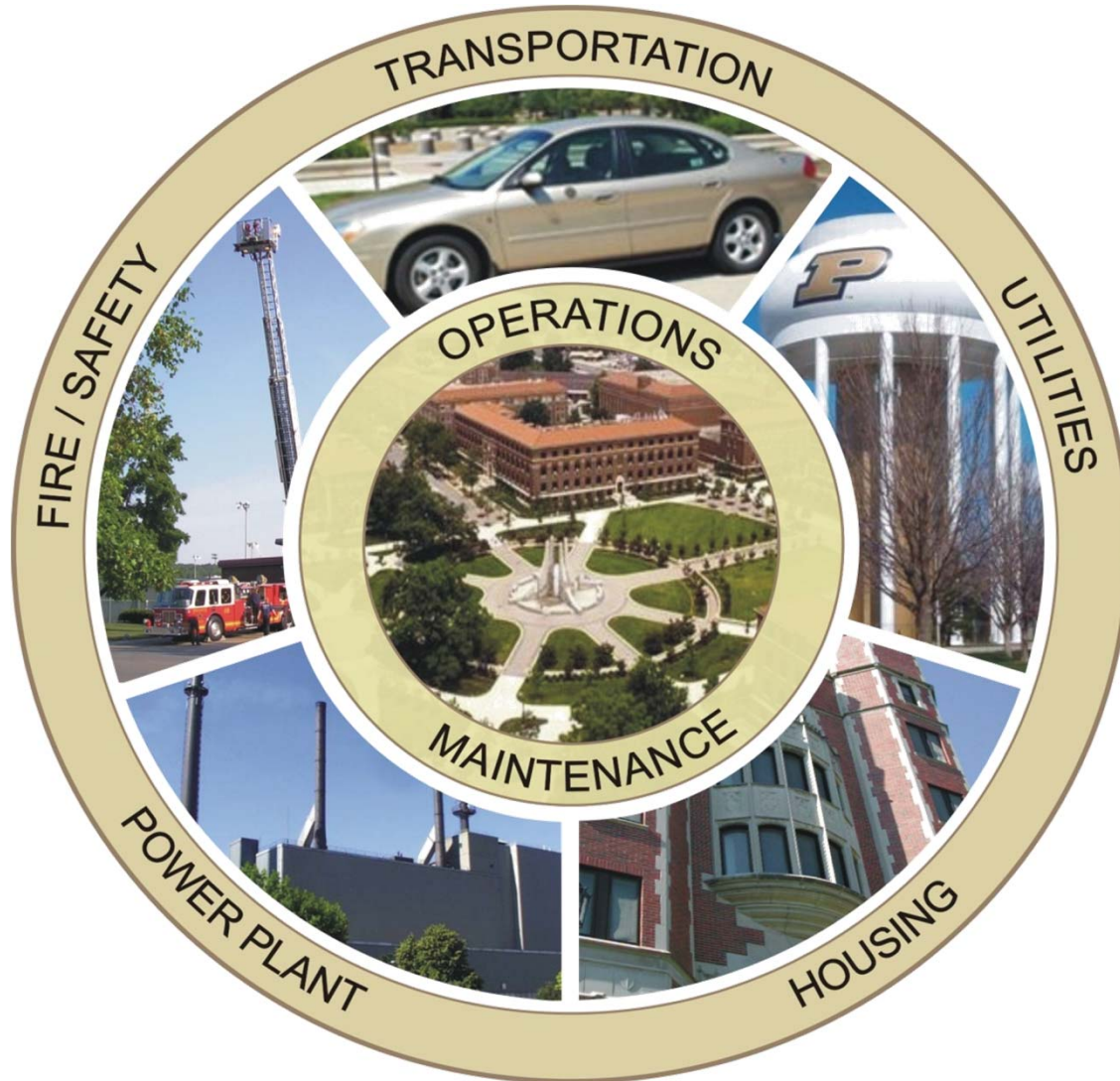- Enhance travel experience

Water

- Analyze water use and consumption patterns
- Predict asset failures to reduce costs
- Optimize work orders to improve service

Over 25 new and enhanced use cases based on lessons from inspirational leaders.
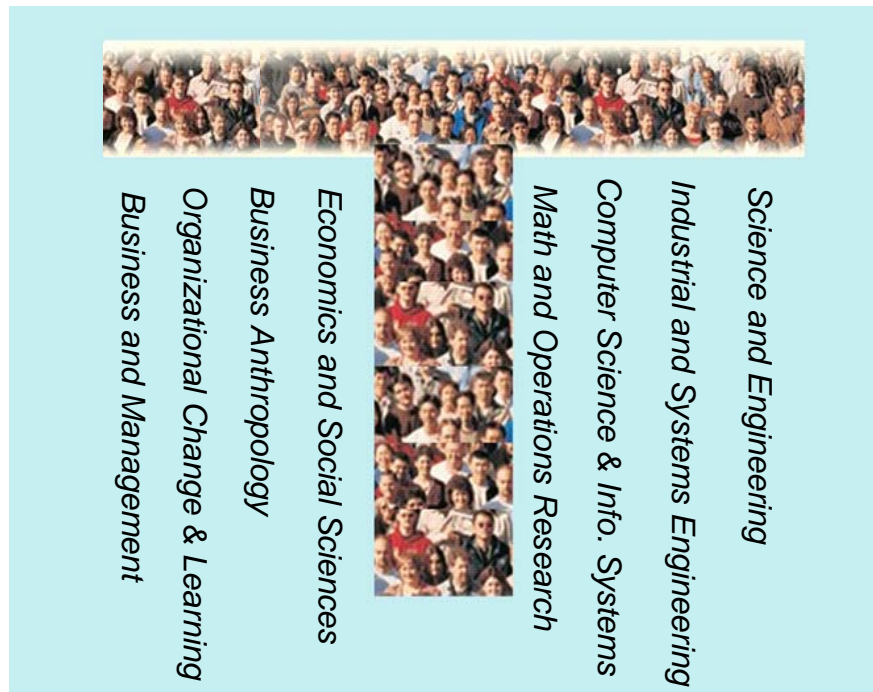
Universities are mini-Cities: System of Systems

- **Universities** can be the innovation centers for Smart Cities ; associated business incubator & entrepreneurship parks for job & business creation

- **Cities** can be living labs for **University** research ; associated hospitals, medical centers, life science parks

- **Universities** produce the skilled workforce for cities and government.

- **Universities** are among the largest employers (top 10) in a city.

- **Universities** faculty, deans, provosts, presidents are often well connected & influential in city governments.

Developing the services skills for tomorrow's economy

The skills needed for services innovation are in short supply

Business and Management
Organizational Change & Learning
Business Anthropology
Economics and Social Sciences
Math and Operations Research
Computer Science & Info. Systems
Industrial and Systems Engineering
Science and Engineering

"Need I-shaped, T-Shaped people …" Stuart Feldman (Oct 6, 2006)

"T-shaped" skills with depth in subject skills and breadth in workforce skills:

- Practical Experience
- Communications
- Teaming
- Management
- Innovation
- Entrepreneurship
- People Management
- Strategic Planning
- Problem solving via informatics
- Problem solving via social networks
- Flexible, adaptive and entrepreneurial
- Produced on demand

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