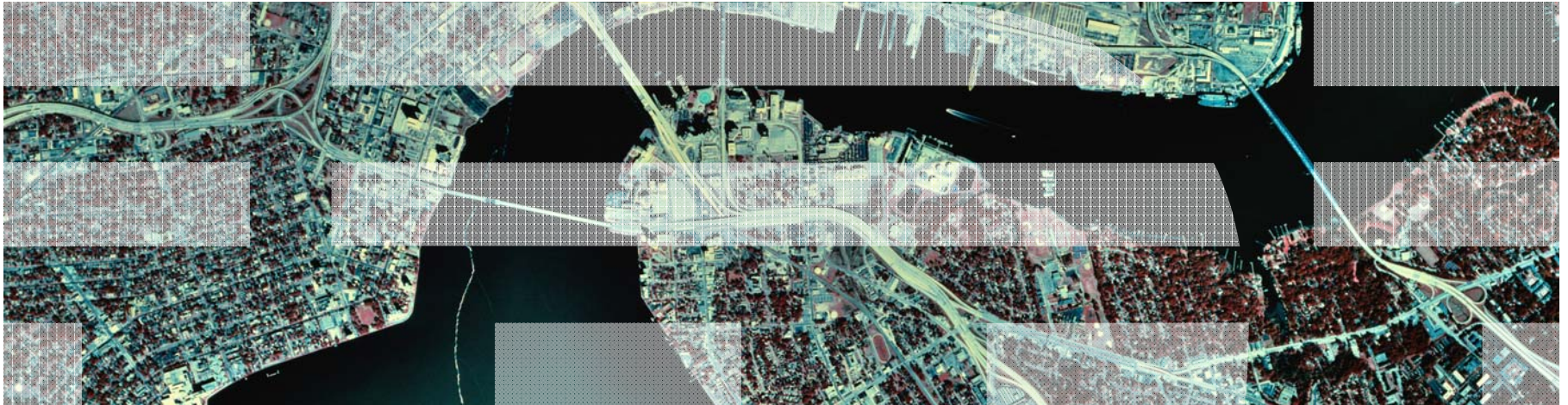


Building a Smarter Planet -- a more intelligent, interconnected, instrumented world:

University – Industry – Government – Non-profits

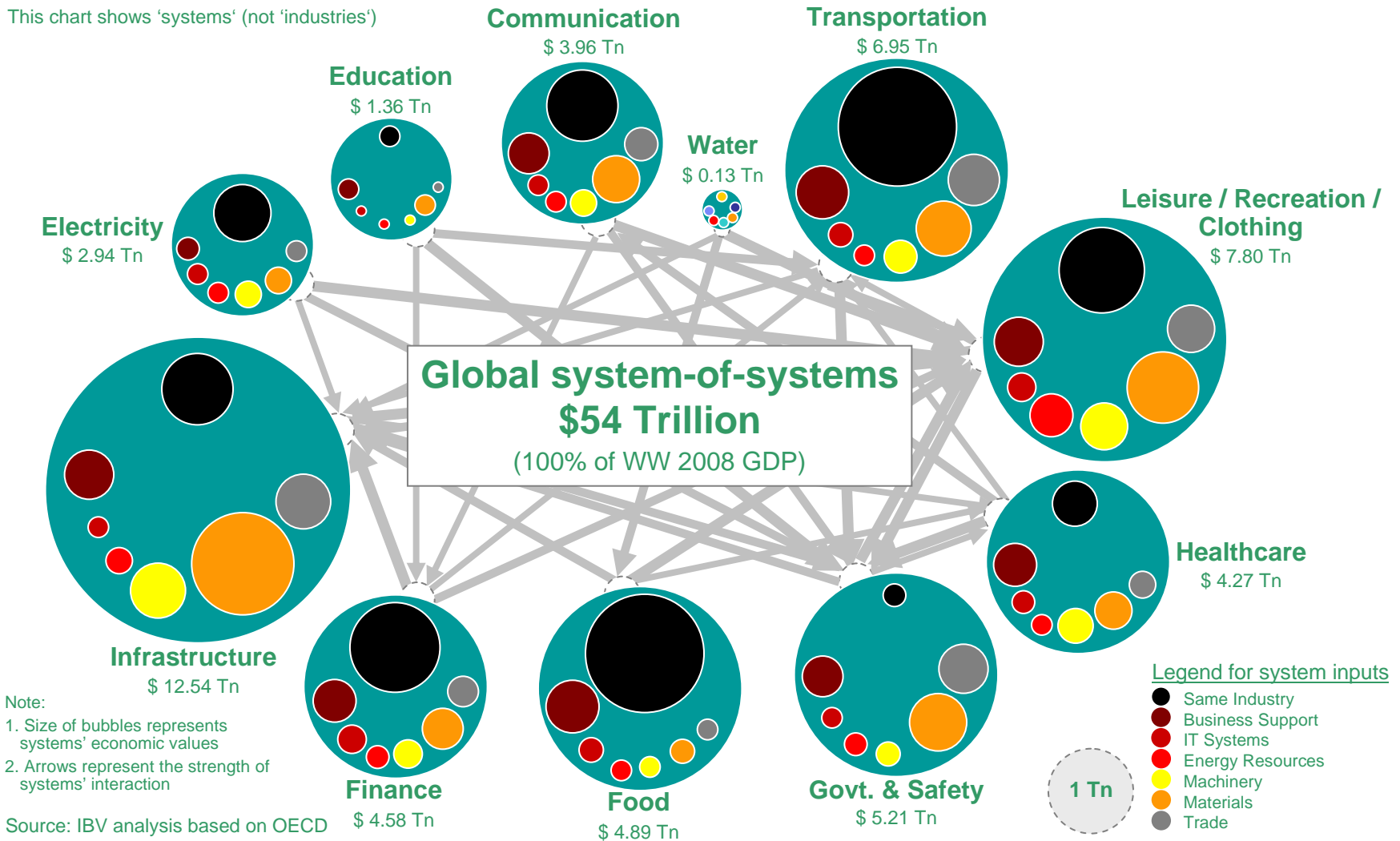


Lilian Wu

CGS/NSF workshop, May 18, 2010

Our planet is a complex, dynamic, highly interconnected \$54 Trillion system-of-systems (OECD-based analysis)

This chart shows 'systems' (not 'industries')



Note:

1. Size of bubbles represents systems' economic values
2. Arrows represent the strength of systems' interaction

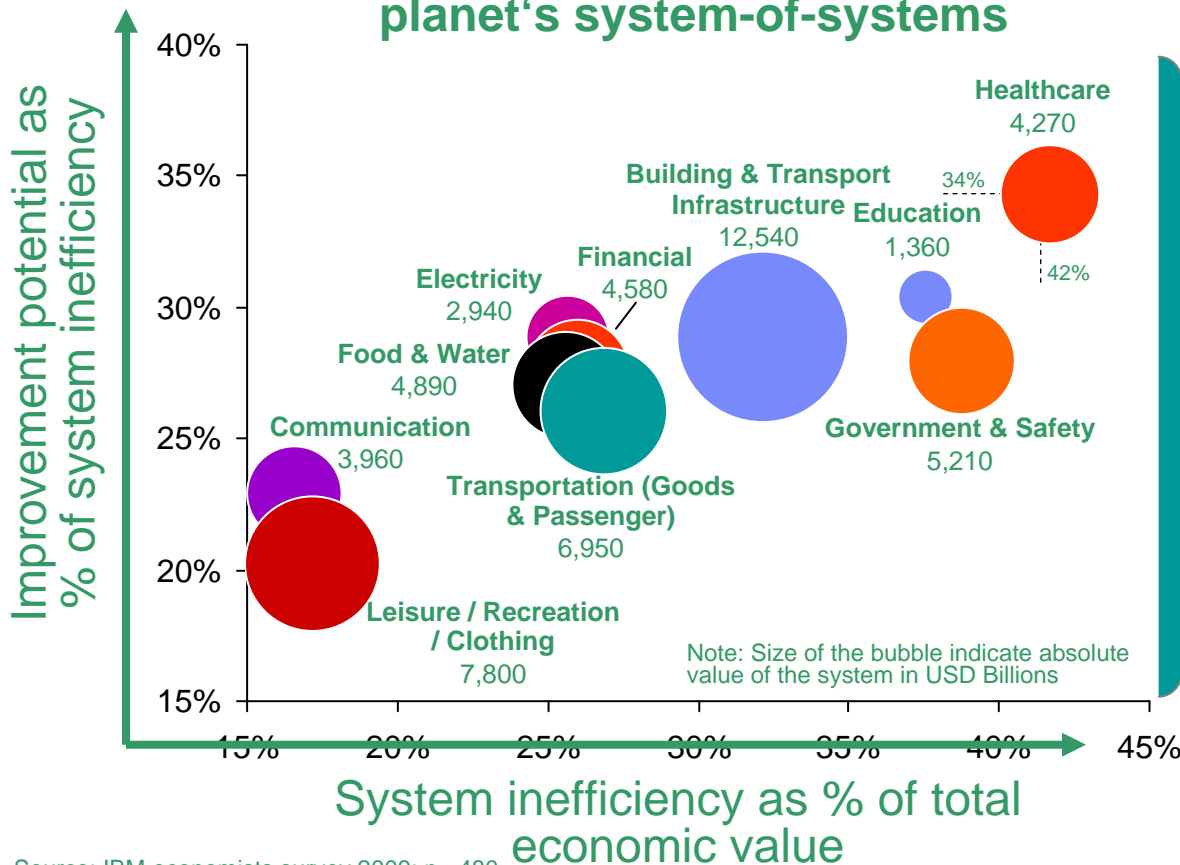
Source: IBV analysis based on OECD

→ We now have the capabilities to manage a system-of-systems planet

Economists estimate, that all systems carry inefficiencies of up to \$15 Tn, of which \$4 Tn could be eliminated

This chart shows 'systems' (not 'industries')

Analysis of inefficiencies in the planet's system-of-systems



Global economic value of

System-of-systems	\$54 Trillion 100% of WW 2008 GDP
Inefficiencies	\$15 Trillion 28% of WW 2008 GDP
Improvement potential	\$4 Trillion 7% of WW 2008 GDP

How to read the chart:

For example, the Healthcare system's value is \$4,270B. It carries an estimated inefficiency of 42%. From that level of 42% inefficiency, economists estimate that ~34% can be eliminated (= 34% x 42%).

Source: IBM economists survey 2009; n= 480

How do we involve universities?

How do we weave a "total solution" that includes universities?



A DECADE OF GENERATING HIGHER VALUE AT IBM

7 ... and our investments position us for growth in the next decade—the Decade of Smart.

We are focusing on four major growth opportunities in 2010:

Growth markets: IBM serve clients in more than 170 countries around the world. In both mature and growth economies, infrastructure represents a major technology and business opportunity, with more than \$2 trillion in fiscal stimulus earmarked by governments.

Analytics: Enabling clients to get far more value from their information, IBM's new analytics service line draws on 4,000 dedicated consultants, plus 200 mathematicians and advanced analytics experts in IBM Research. We have invested \$10 billion in 14 acquisitions since 2005, creating seven analytics solution centers around the world.

Cloud and next-generation data center: These new models are enabling efficient consumption and delivery of IT-based services. More than 18 million people use LotusLive, IBM's cloud-based collaboration suite. More than 200 IBM researchers are working on breakthroughs in areas like cloud security and privacy.

Smarter planet: We estimate that smarter planet increases IBM's addressable opportunity by 40 percent over the decade ahead. The sampling on this map of recent partnerships with more than 300 clients illustrates the reach of smarter solutions across industries and markets.

Smarter luggage

Industry: Transportation (Netherlands)

An integrated baggage-control and passenger-check-in system at Amsterdam's airport streamlines luggage tracking, offloading and redirection of bags on alternative flights, and fully automated security screening for all transfer baggage traveling through the airport.

Smarter medical research

Industry: Healthcare (United States)

The University of North Carolina's smart healthcare system allows researchers, clinicians and administrators to analyze and correlate data in new ways, leading to improved patient outcomes and compliance, and advances in research on diseases such as diabetes and cancer—shortening query times from weeks to seconds.

Smarter oil and gas imaging

Industry: Chemicals & Petroleum (Venezuela)

3-D seismic imaging technology helped Tricon Geophysics cut processing time by 50 percent and realize a 40-percent savings in power and cooling infrastructure, and operational costs.

Smarter microfinance

Industry: Banking & Financial Markets (India)

Microfinance bank Grameen Koota uses an open-source banking platform for accurate, near-real-time information, enabling them to predict capital requirements; to expand their microloans, insurance accounts and other banking functions; and to grow from 70,000 to 350,000 low-income clients.

Smarter patient care

Industry: Healthcare (People's Republic of China)

An intelligent medical records system at the Guang Dong Hospital of Traditional Chinese Medicine enables sharing between local facilities and large hospitals and across multiple departments. The result? Better patient care, improved diagnosis and treatment—with the promise of using deep analytics to drive cutting-edge research in global healthcare.

Smarter mobile phone promotions

Industry: Telecommunications (Philippines)

To hold onto existing mobile phone customers and win new ones, Philippine telcos must micro-target promotions for new services, in real time. Globe Telecom's smart Toolbox has cut the preparation time for launching service promotions from 40 weeks to three weeks, increasing Globe's sales by 600 percent.

Smarter global financial systems

Industry: Electronics (Japan)

Panasonic's Global Treasury System integrates financial management for 600+ subsidiaries around the world. By managing cash flow, currency exchange and settlements as a global, in-house bank, the company has significantly reduced financial costs, while giving it daily financial visibility.

Smarter Planet Engagements By Industry

- Aerospace & Defense
- Automotive
- Banking & Financial Markets
- Chemicals & Petroleum
- Consumer Products
- Education
- Electronics
- Energy & Utilities
- Government
- Healthcare
- Industrial Products
- Insurance
- Life Sciences
- Media & Entertainment
- Retail
- Telecommunications
- Transportation

Holistic Modeling & Analytics

Example: FIU's TerraFly



Naphtali David Rische
 Director, High Performance Database Research Center
 Director, NSF Industry-University Cooperative Research Center
<http://HPDRC.FIU.edu> <http://TerraFly.FIU.edu>



Indexing Geospatial Data with MapReduce

Naphtali Rische⁺, Vagelis Hristidis⁺, Raju Rangaswami⁺,
 Ouri Wolfson^{*}, Howard Ho^{**}, Ariel Cary⁺, Zhengguo Sun⁺, Lester Melendes⁺

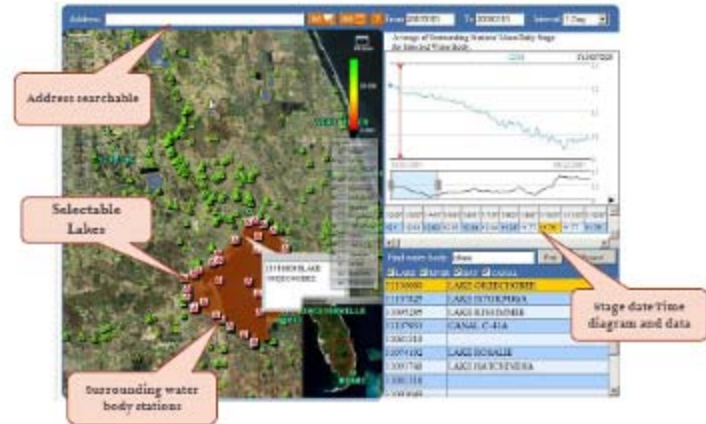
⁺School of Computing and Information Sciences, Florida International University

^{*}University of Illinois at Chicago ^{**}IBM Almaden Research Center

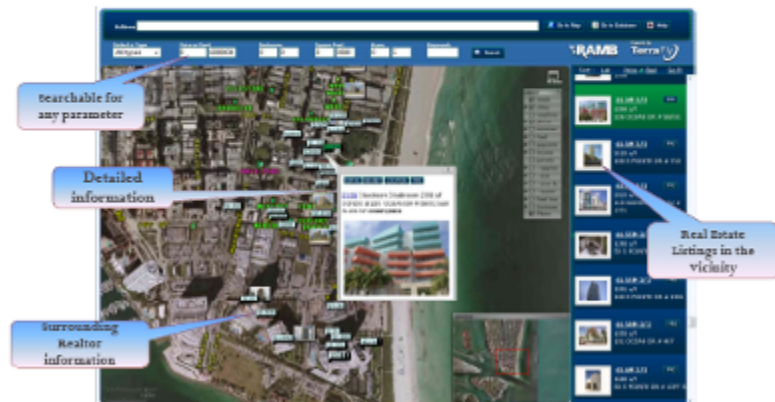
Sponsored by: NSF Cluster Exploratory (CluE)

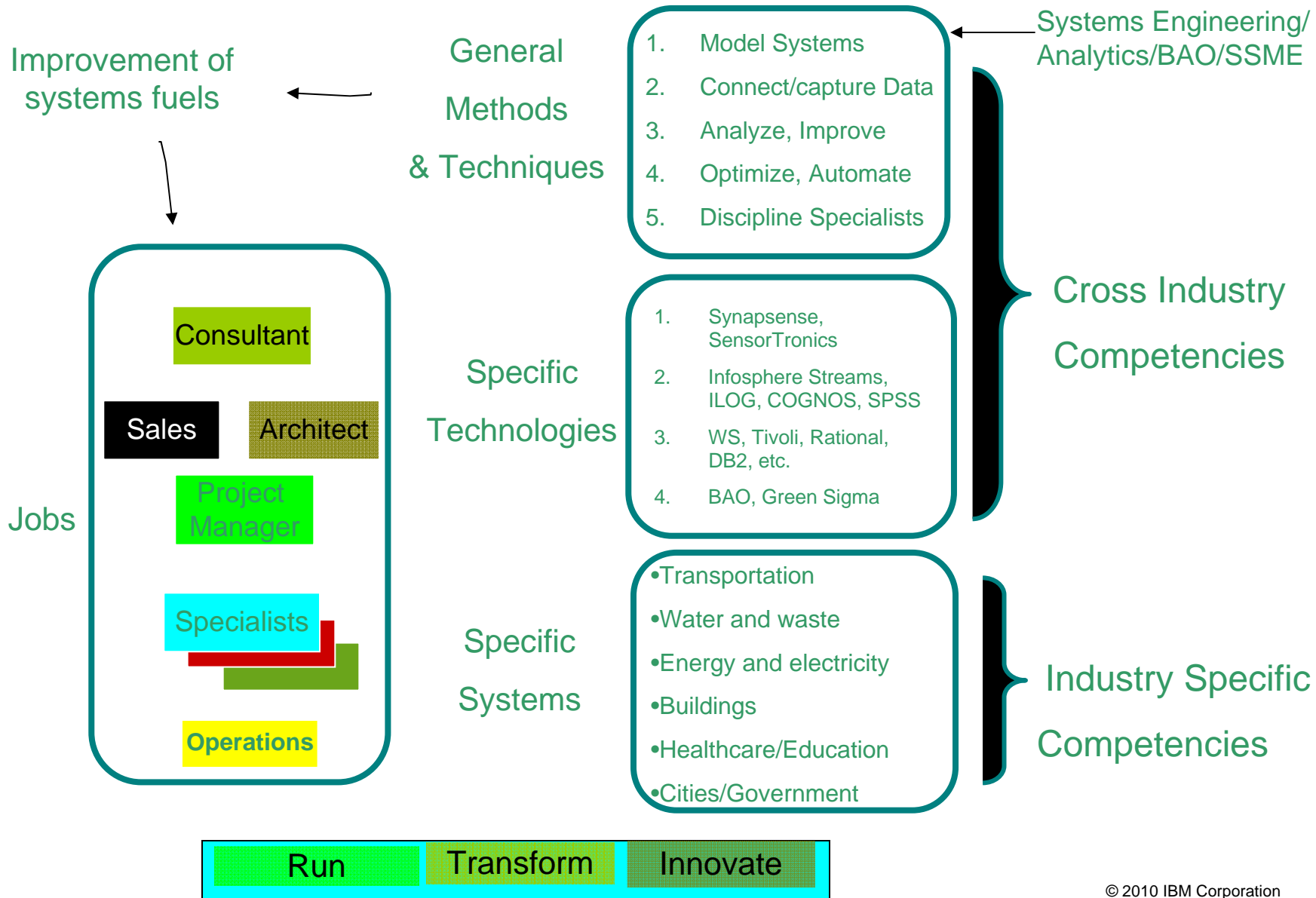
Hydrology Application

Average of Surrounding Stations' Mean Daily Stage for Selected Water Body.



Real Estate



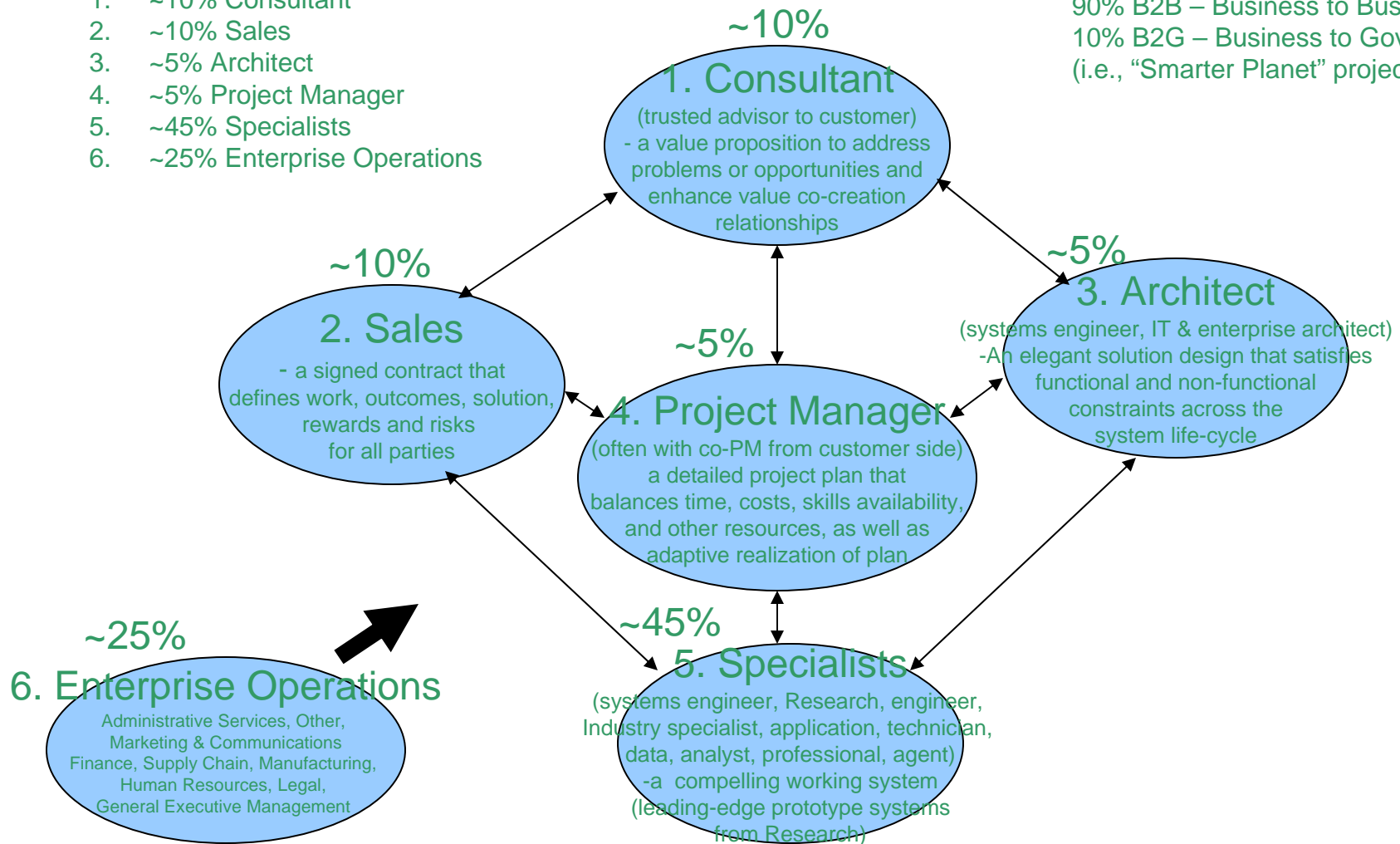


IBM Employees

1. ~10% Consultant
2. ~10% Sales
3. ~5% Architect
4. ~5% Project Manager
5. ~45% Specialists
6. ~25% Enterprise Operations

Project Work:

90% B2B – Business to Business
 10% B2G – Business to Government
 (i.e., “Smarter Planet” projects)



Improve Quality of Life = Quality of Service from systems + Quality of Opportunities in systems

Systems that focus on basic things people need

1. Transportation & supply chain
2. Water & waste recycling
3. Food & products manufacturing
4. Energy & electricity grid
5. Buildings & construction (Smarter Buildings)
6. Information and Communication Technologies

Systems
that move, store,
harvest, process

Systems that focus on people's activities and development

7. Retail & hospitality/Media & entertainment
8. Banking & finance (wealthy)
9. Healthcare & family (healthy)
10. Education & professions (wise)

Systems
that enable
healthy, wealthy,
and wise people



let's build a smarter planet

Systems that focus on governing security, opportunities, and rights

11. Cities & family and professional life/security (property tax)
12. States/regions & development opportunities & investments (sales tax)
13. Nations/NGOs & rights/rules/incentives/policies/laws (income tax)

Systems
that govern

“Imagine a better system, and use STEM language to explain why it is better”

STEM = Science, Technology, Engineering, and Mathematics

See Challenge-Based Learning: <http://www.nmc.org/news/nmc/nmc-study-confirms-effectiveness-challenge-based-learning>

T-shaped = deep and broad multi-disciplinary, multi-cultural, multi-functional/systems experiences



Economics and Social Sciences

Business Anthropology and Design

Organizational Change & Learning

Business and Management



Science and Engineering

Industrial and Systems Engineering

Computer Science & Info. Systems

Math and Operations Research

Universities are mini-Cities: System of Systems

