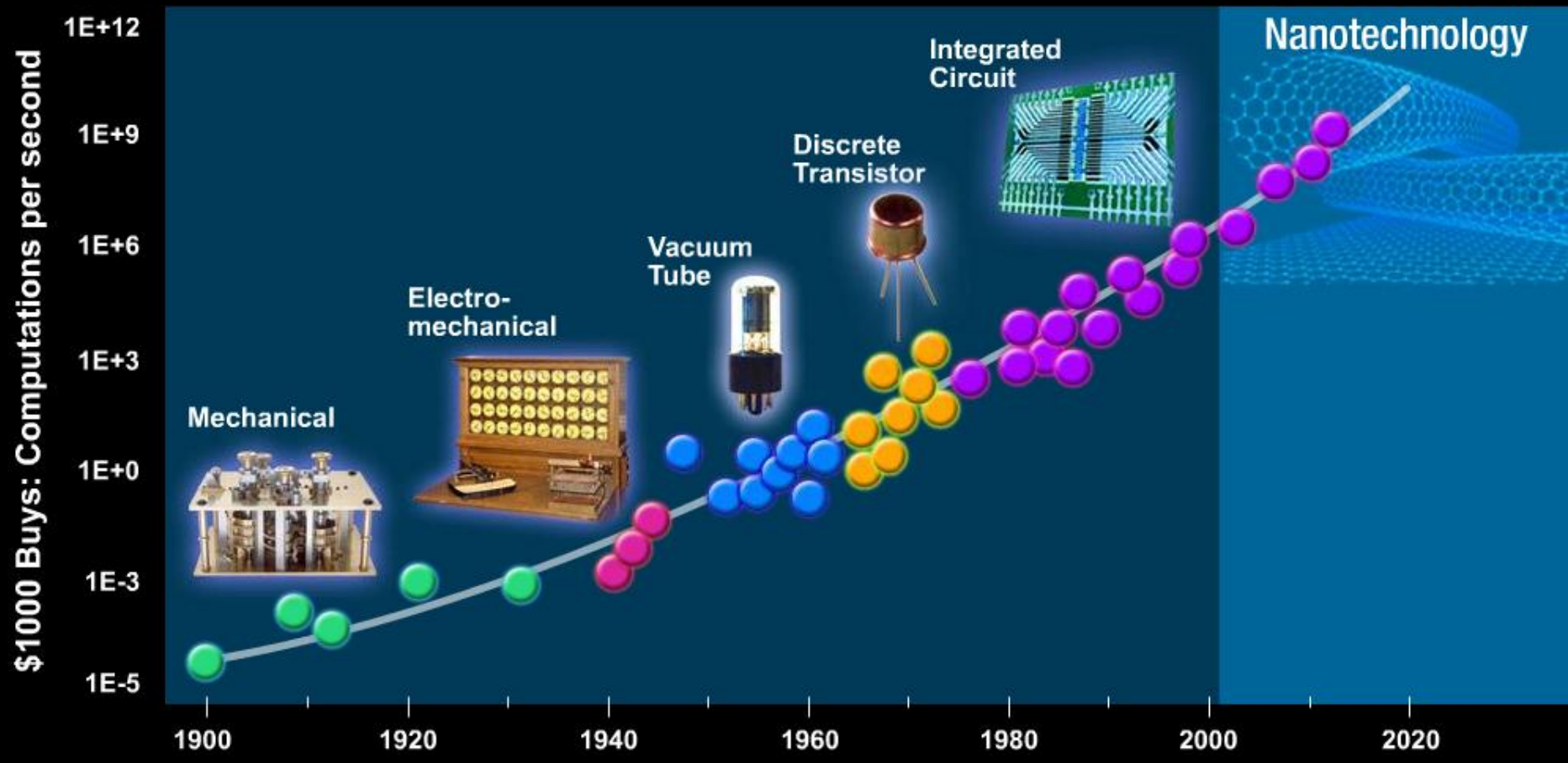
Nicholas M. Donofrio
IBM Fellow Emeritus
(Ret.) IBM Executive VP, Innovation & Technology

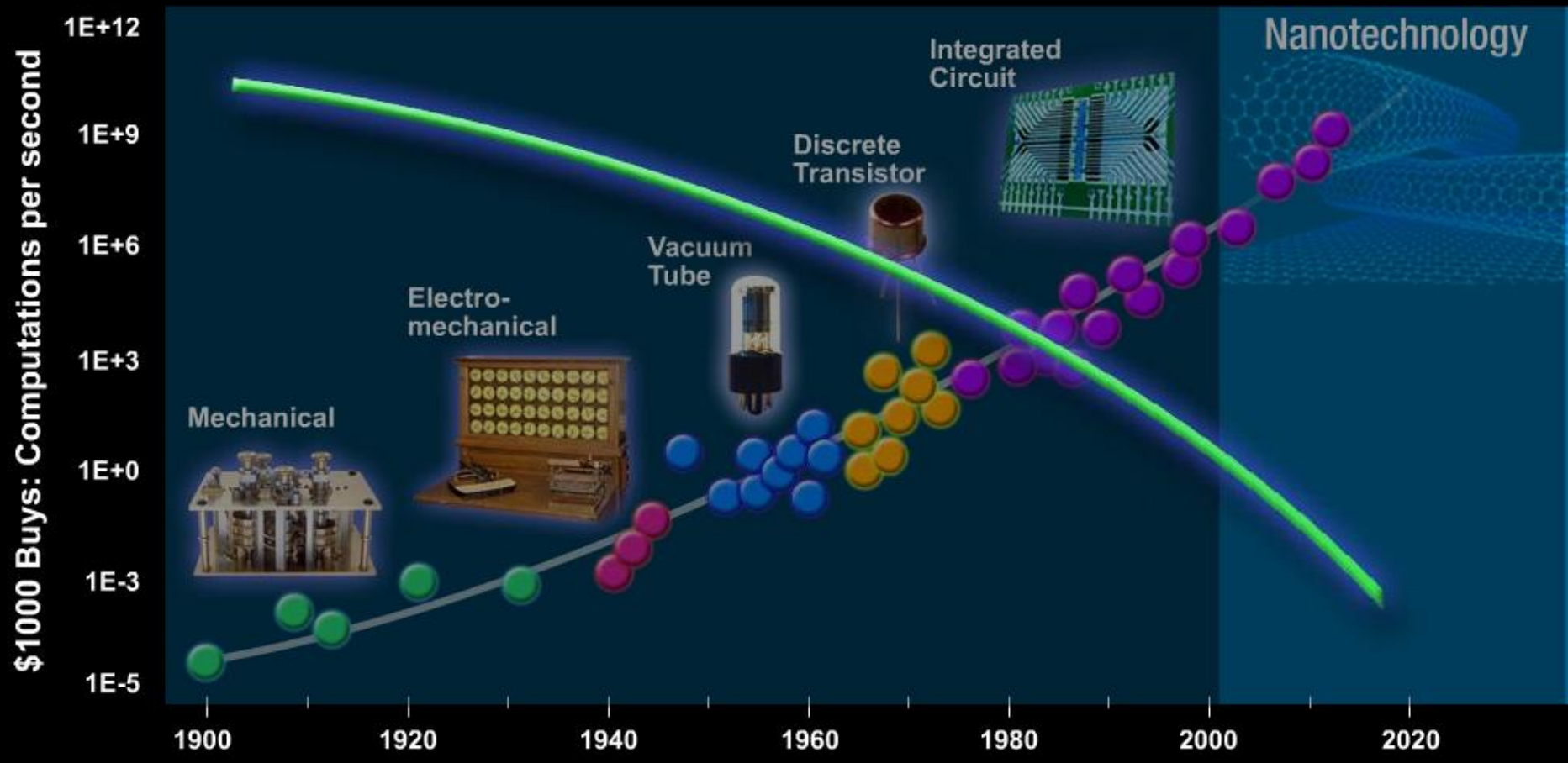
Innovation for the 21st Century

Accelerating Advances in Technology



Source: Kurzweil 1999 – Moravec 1998

Accelerating Advances in Technology



World Economy in a New Era

21st-Century IC Technology Drivers

Network Ubiquity

- More than a billion Internet users and three billion wireless subscribers worldwide

Open Standards

- Widely-adopted technical and transaction specifications

New Business Designs

- Horizontally-integrated operations

The National Innovation Initiative

Goals

- Bring together top minds on innovation
- Sharpen understanding of how the innovation process is changing and can be harnessed for economic growth
- Look beyond the traditional tools for economic stimulus
- Advocate a strategic agenda to create a fertile environment for innovation; one that values the participation of other nations

Innovation Defined

Innovation resides at the intersection of invention and insight, leading to the creation of social and economic value.

National Innovation Initiative

National Innovation Initiative

Talent	*Investment*	*Infrastructure*
▪ Develop a diverse, world class, next-generation of innovators	▪ Help markets place top value on long-term innovation strategies	▪ Create world-class infrastructures, including transportation, information, healthcare and energy
▪ Establish a National Innovation Prize	▪ Establish incentives to increase early-stage investment in small-business innovation	▪ Drive regulatory and legal systems to better support innovation and entrepreneurship
▪ Make the US a magnet for the best global talent	▪ Invest to accelerate innovation in the services economy	▪ Build a system that protects the rewards of IP, but that also encourages open collaboration

Establish innovation metrics for the knowledge economy, not the industrial economy

The Changing Nature and Scope of Innovation

Open

Collaborative

Product and Services Innovation

Process Innovation

Business Model Innovation

Management System Innovation

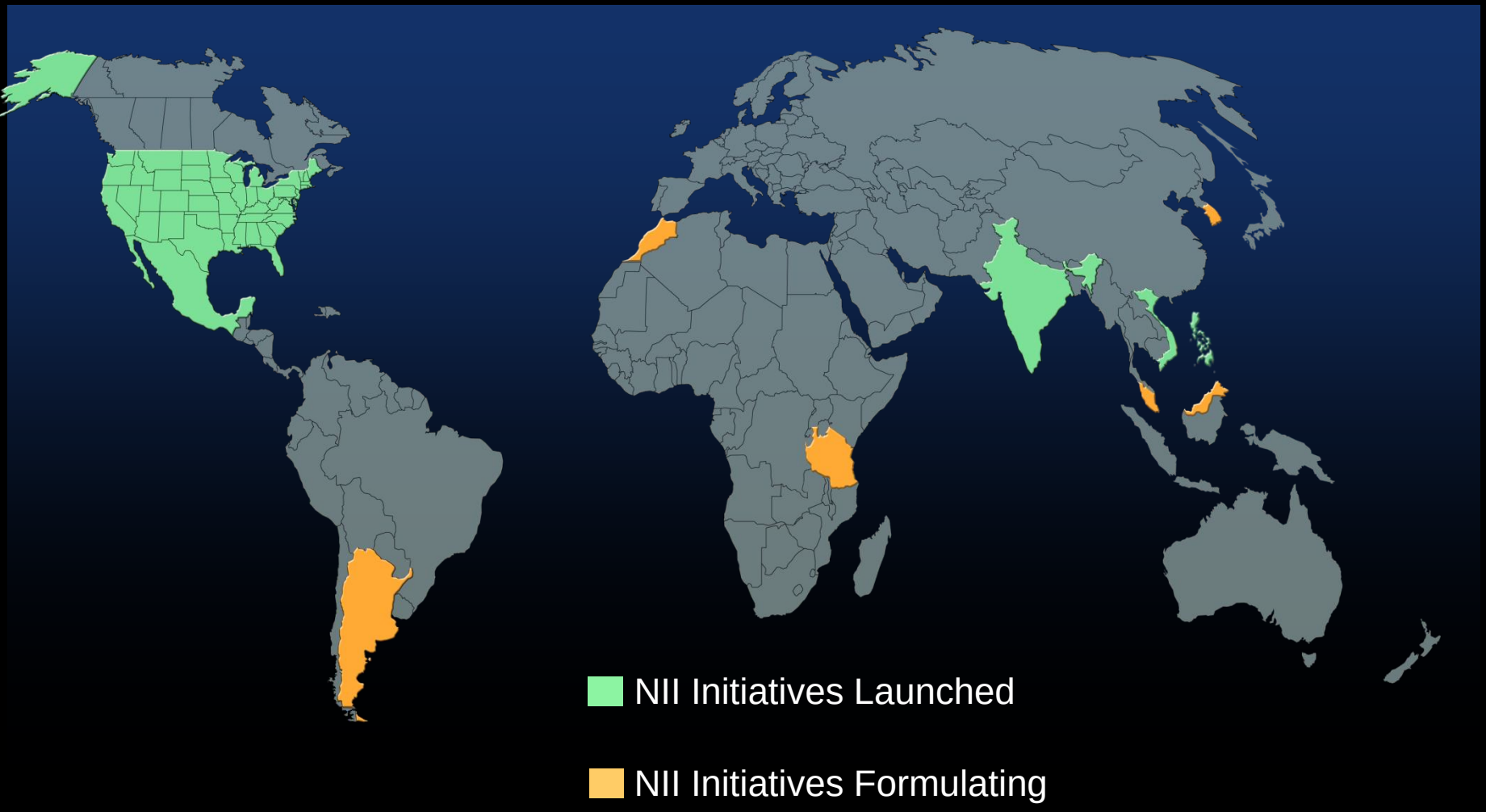
Societal Innovation

Multi-disciplinary

Global

Established Innovation Ecosystems

Positioning to Compete in the Global Economy



The Realities of a Globally Integrated World

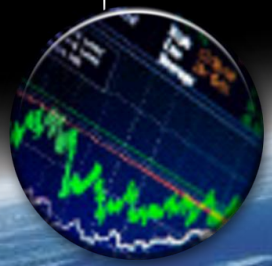
Interwoven Issues

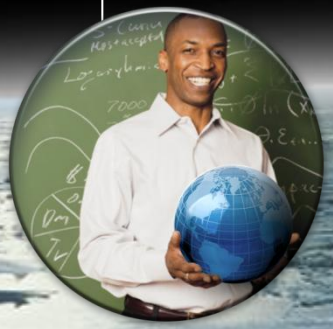
Economic downturn and uncertainty about the future

Energy shortfalls combined with volatility in price and demand for energy worldwide

Transience in price and availability of shrinking natural resources, worldwide

Increasingly empowered and interconnected customers demand more responsible business practices





The Need is Clear

170 billion

kWh wasted annually due to insufficient power usage information

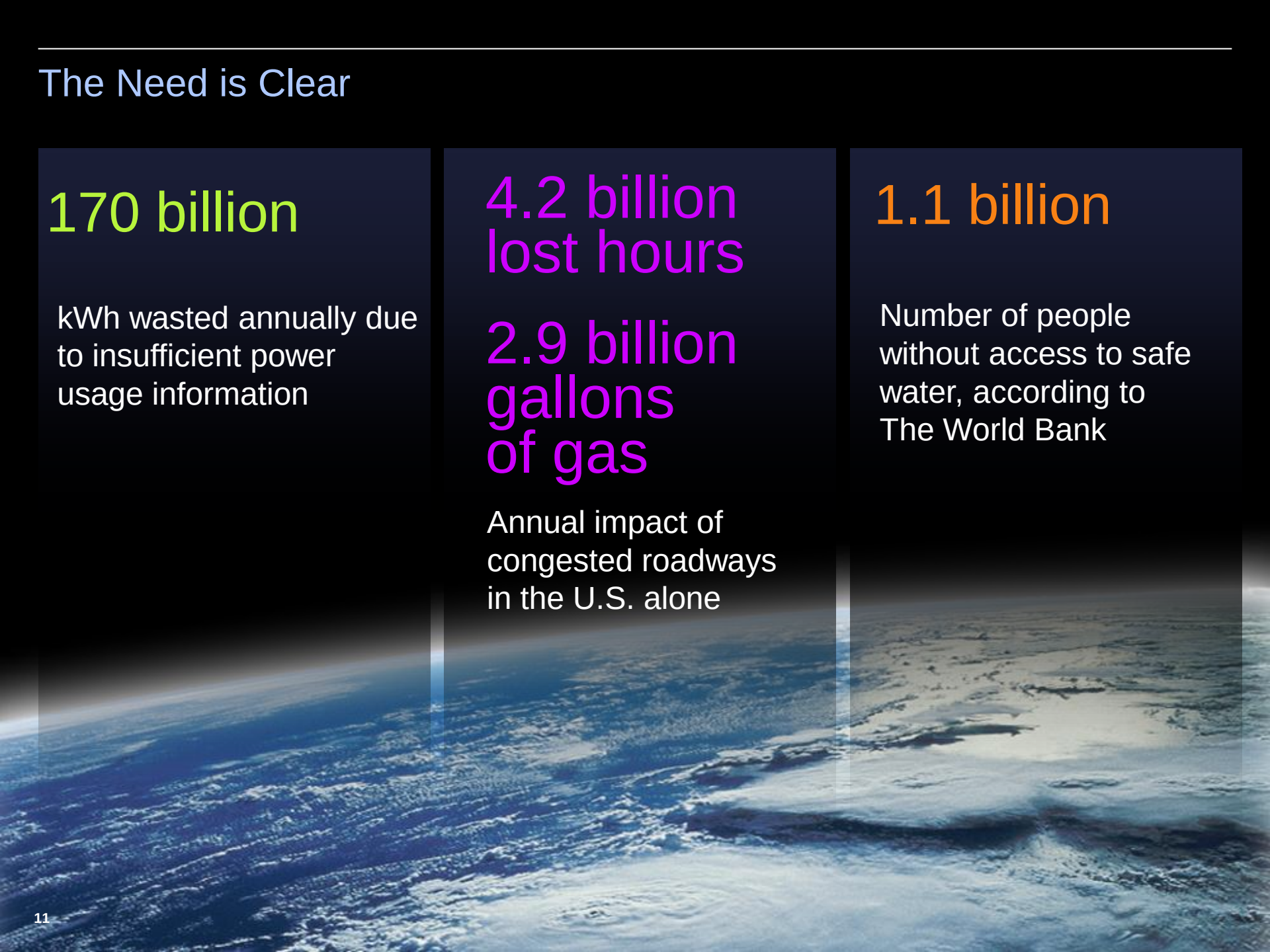
4.2 billion lost hours

2.9 billion gallons of gas

Annual impact of congested roadways in the U.S. alone

1.1 billion

Number of people without access to safe water, according to The World Bank



The Benefits are Real

15%
reduction in peak loads

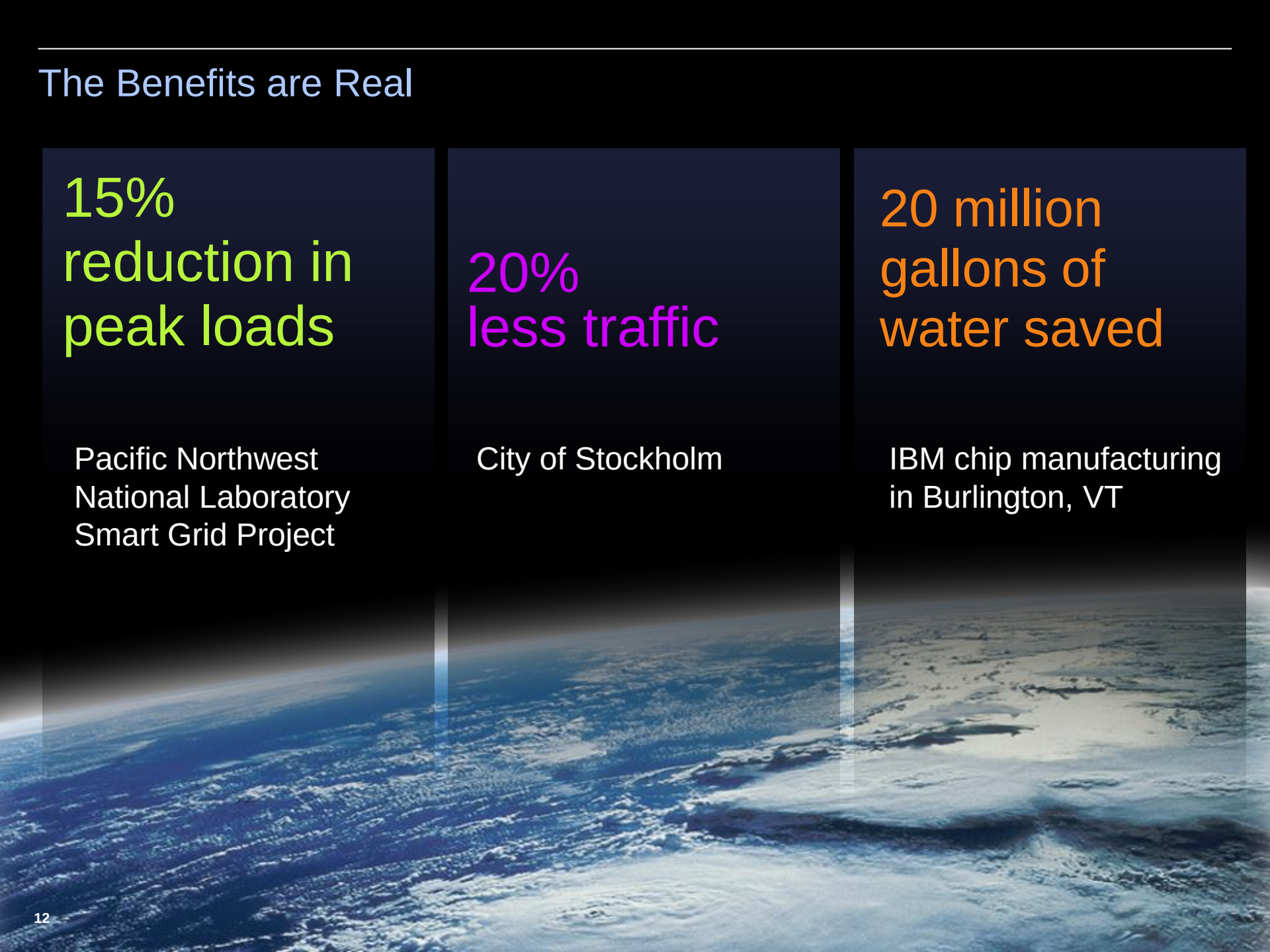
Pacific Northwest National Laboratory Smart Grid Project

20%
less traffic

City of Stockholm

20 million gallons of water saved

IBM chip manufacturing in Burlington, VT



The New Environment

Our world is becoming
INSTRUMENTED

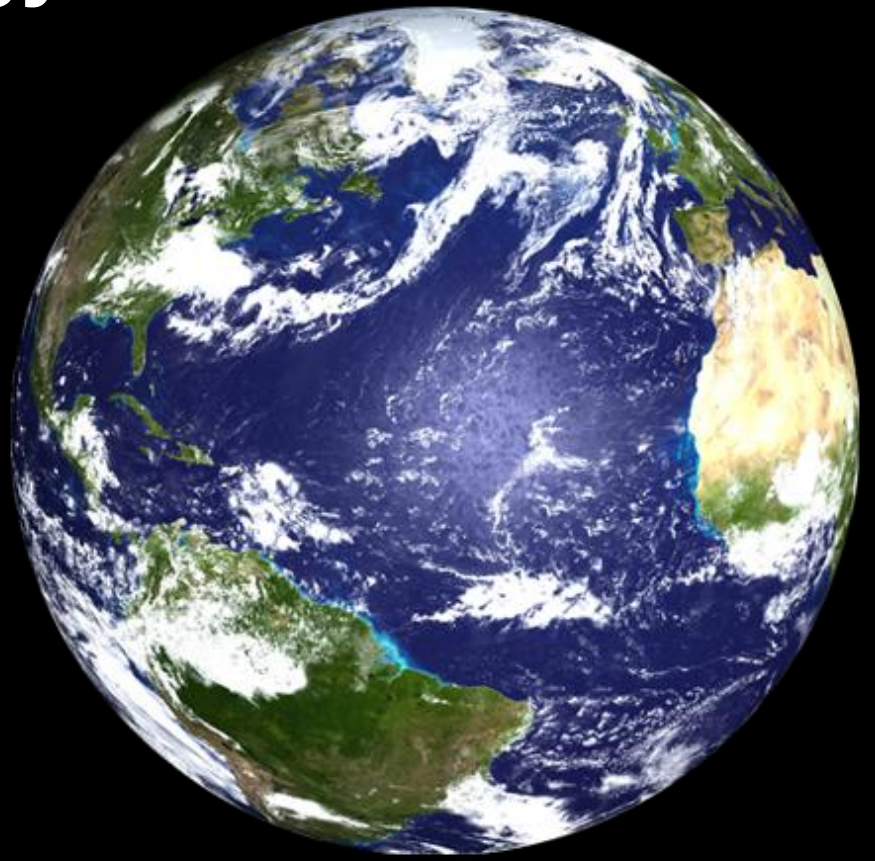
Our world is becoming
INTERCONNECTED

Virtually all things, processes and ways of working are becoming
INTELLIGENT

Information Technology
is making things

Faster, less
expensive,
and …

smarter



New sources of data, new insights, new capabilities

To Realize the Potential of a Smarter Planet
Organizations Need to Do Three Things

1

Focus On Value

Do more with less

Focus on the core

Re-align relationships

2

Leverage Opportunities

Capture share

Build future capabilities

Change your industry

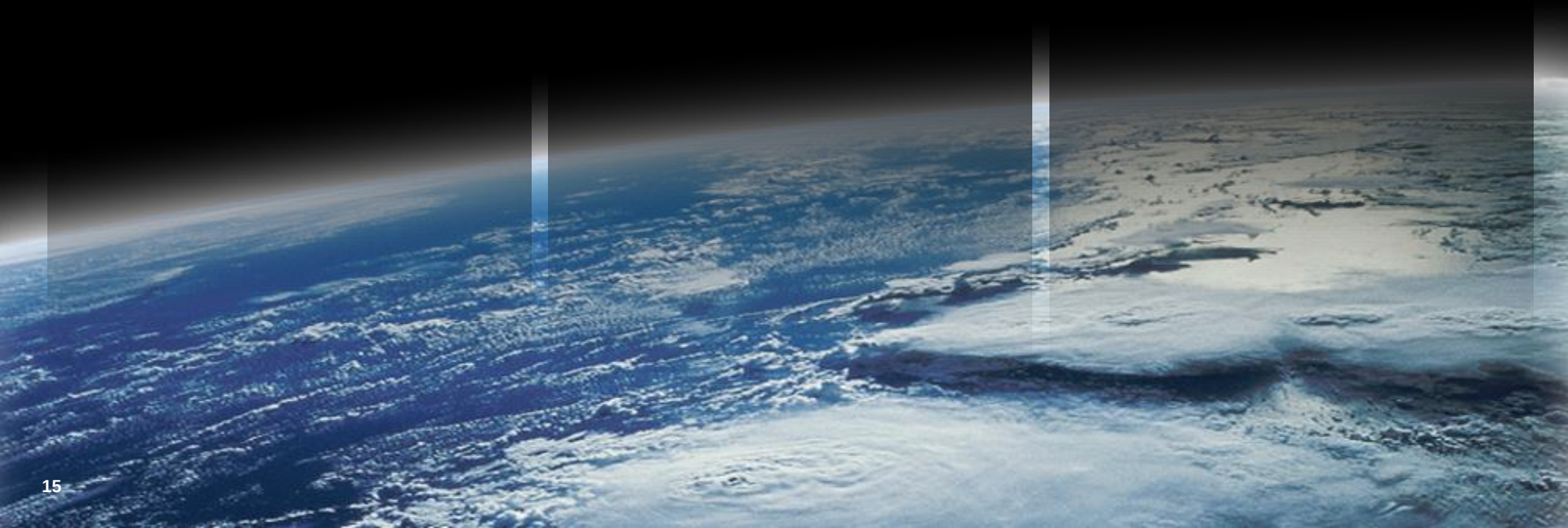
3

Act with Speed

Manage change

Leadership

Risk and transparency



Smarter Transportation
Transformation Examples

City of Stockholm

Intelligent toll system in the city center

- 20% less traffic
- 40% lower emissions
- 40,000 additional users of public transportation system

Singapore Land Transport Authority

Deep insight into rider travel patterns

- Enables fare and schedule adjustments
- Increases ridership
- Reduces traffic congestion

Smarter Water
Transformation Examples

River Estuary Observatory Network

Minute-to-Minute monitoring of the Hudson River

- Self-managing network of sensors, robotics and computational technology
- Real-time analytics; advanced visualization

Galway Bay

Real-time advanced analytics platform

- Forecasts wave patterns
- Monitors marine life
- Water contamination warning and response

Smarter Energy and Utilities
Transformations

ONCOR Electric Delivery, Texas

Leading one of America's largest deployments of smart grid technologies; replacing 3.4 million standard meters with smart meter systems by 2012.

IBM providing expertise in smart metering, systems integration, business analytics and security solutions.

Malta Smart Grid

IBM building world's first smart grid country. Network of 250,000 smart meters will enable Malta's national utilities to conduct remote monitoring, meter reading and real-time management by 2012.

Pricing based on time of day; Malta residents track their energy use on-line.

Ministry of Finance, Taiwan, Building a Smarter Taxation System

Business challenge

Taiwanese Financial Data Center (FDC) wanted to become a more customer-oriented and efficient organization by enhancing tax services, optimizing public finance resource utilization, and creating value to information.

Solution

Working with IBM Global Business Services, FDC is conducting a comprehensive analysis to streamline and automate taxation processes and design a dynamic, cost- and power-efficient infrastructure that integrates inter-agency and inter-region taxation data.

Benefits

Detailed study is driving comprehensive reform for service innovation, business model optimization, technology renovation to improve service quality, reduce electricity consumption by 40% and enable more than NT$3 billion in savings.

Greater collaboration will enable the expansion of online tax filing services beyond general income tax to other types of taxes for a savings of NT$213 million Deployment of event-based risk management mechanisms will enable auditors to more quickly identify tax return issues, helping reduce tax evasions and driving NT$3.6 billion in savings

"By leveraging IBM's expertise, we are revamping our taxation information system to support the rollout of Smart Taxation System to our customers."

—Su, Chun-Jung
Deputy Director-General, Financial Data Center, Ministry of Finance, Taiwan

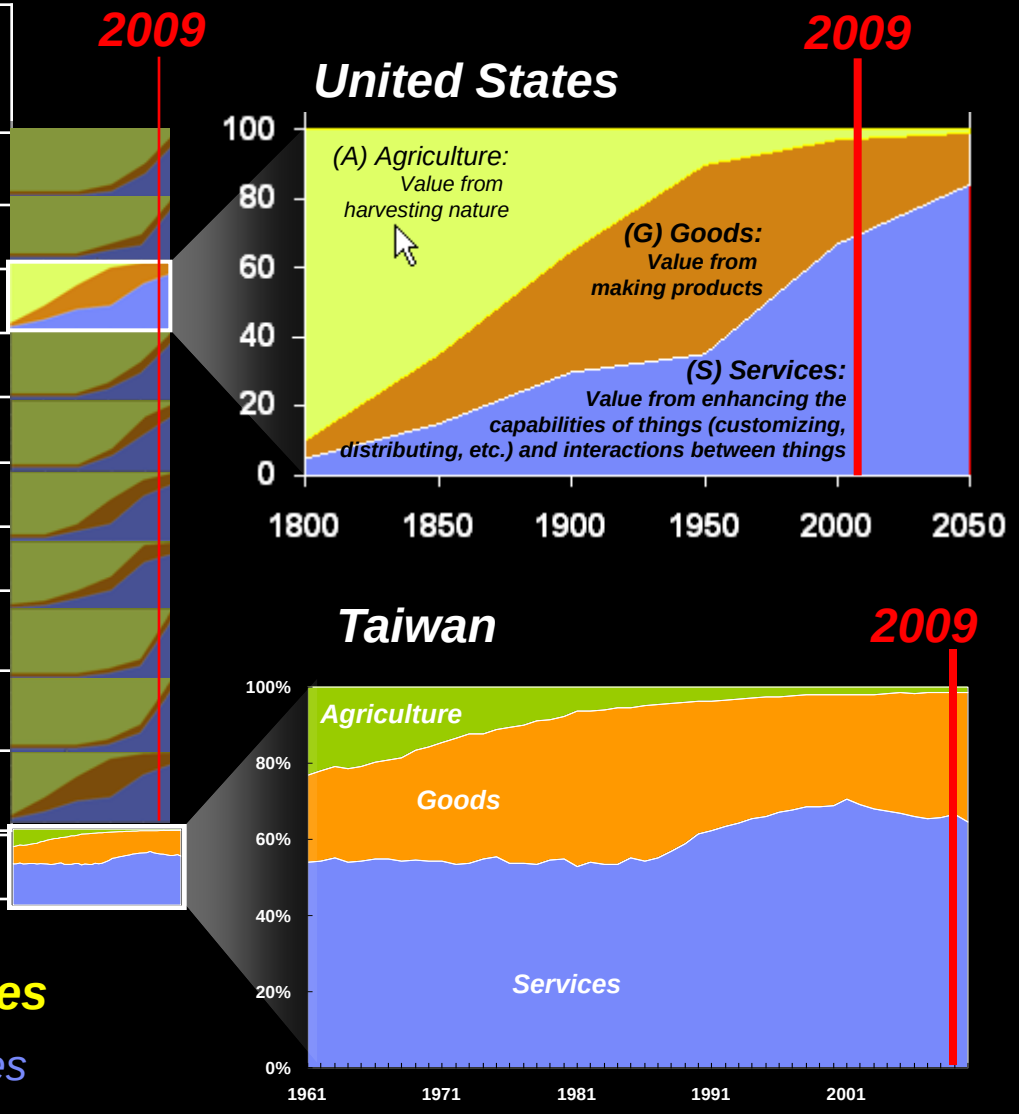
財政部財稅資料中心
Financial Data Center, Ministry of Finance

The 21st Century Demands Uniquely-Skilled People

- Cross-disciplinary programs and degrees
- Fusing technical competency with industry-specific knowledge and business-process expertise
- Talent & skills to innovate and deliver on the promise of a Smarter Planet

The World Needs Services Innovations

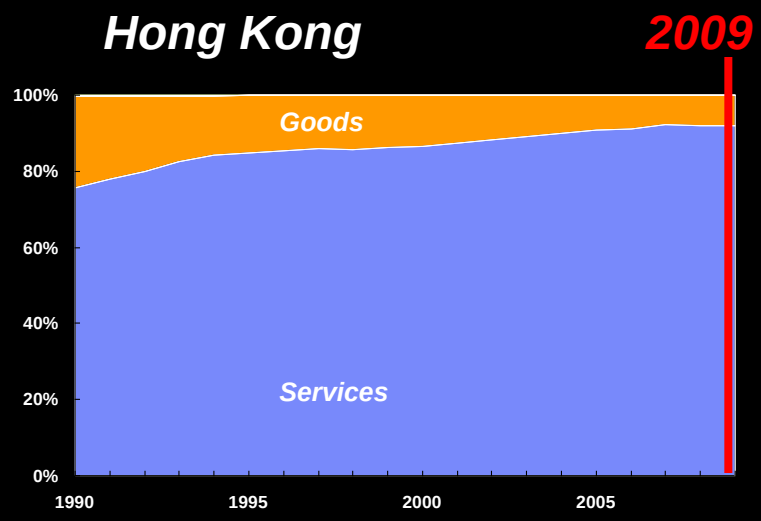
Nation	% ww Labor	% A	% G	% S
China	25.7	49	22	29
India	14.4	60	17	23
U.S.	5.1	1	23	76
Indonesia	3.5	45	16	39
Brazil	3.0	20	14	66
Russia	2.4	10	21	69
Japan	2.2	5	28	67
Nigeria	1.6	70	10	20
Bangladesh	2.1	63	11	26
Germany	1.4	3	33	64
Taiwan	0.34	1.5	31.9	66.6

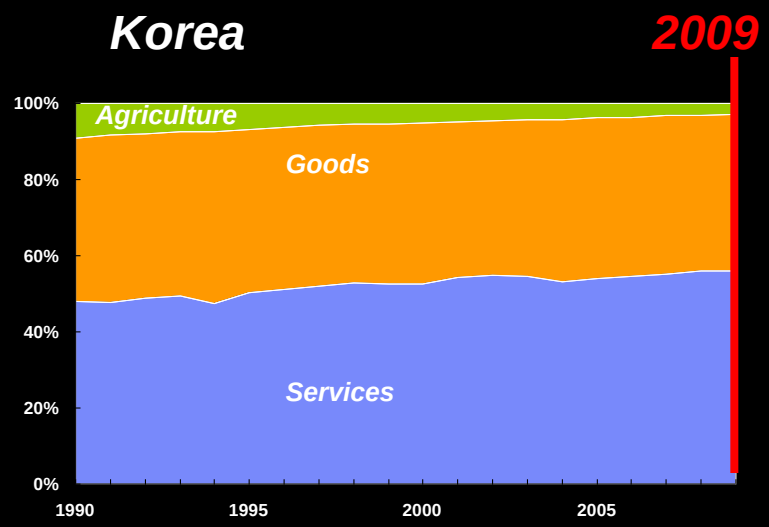


> 50% (S) Services

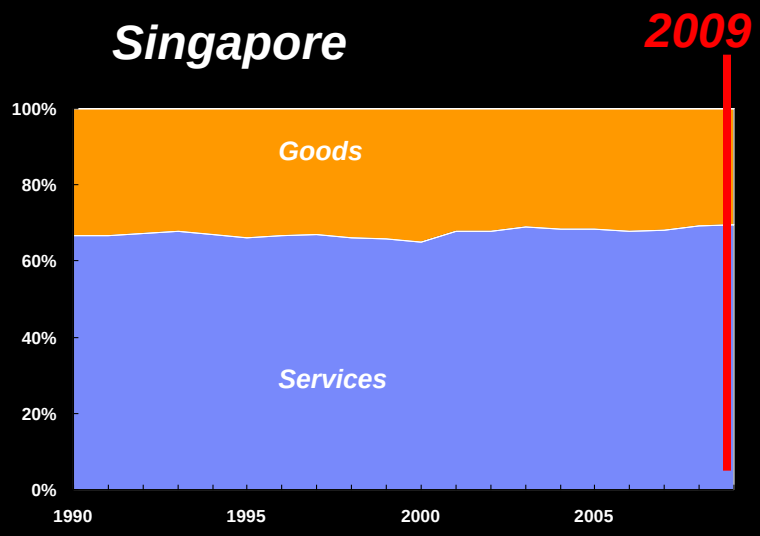
A = Agriculture G = Goods S = Services

GDP by Industry



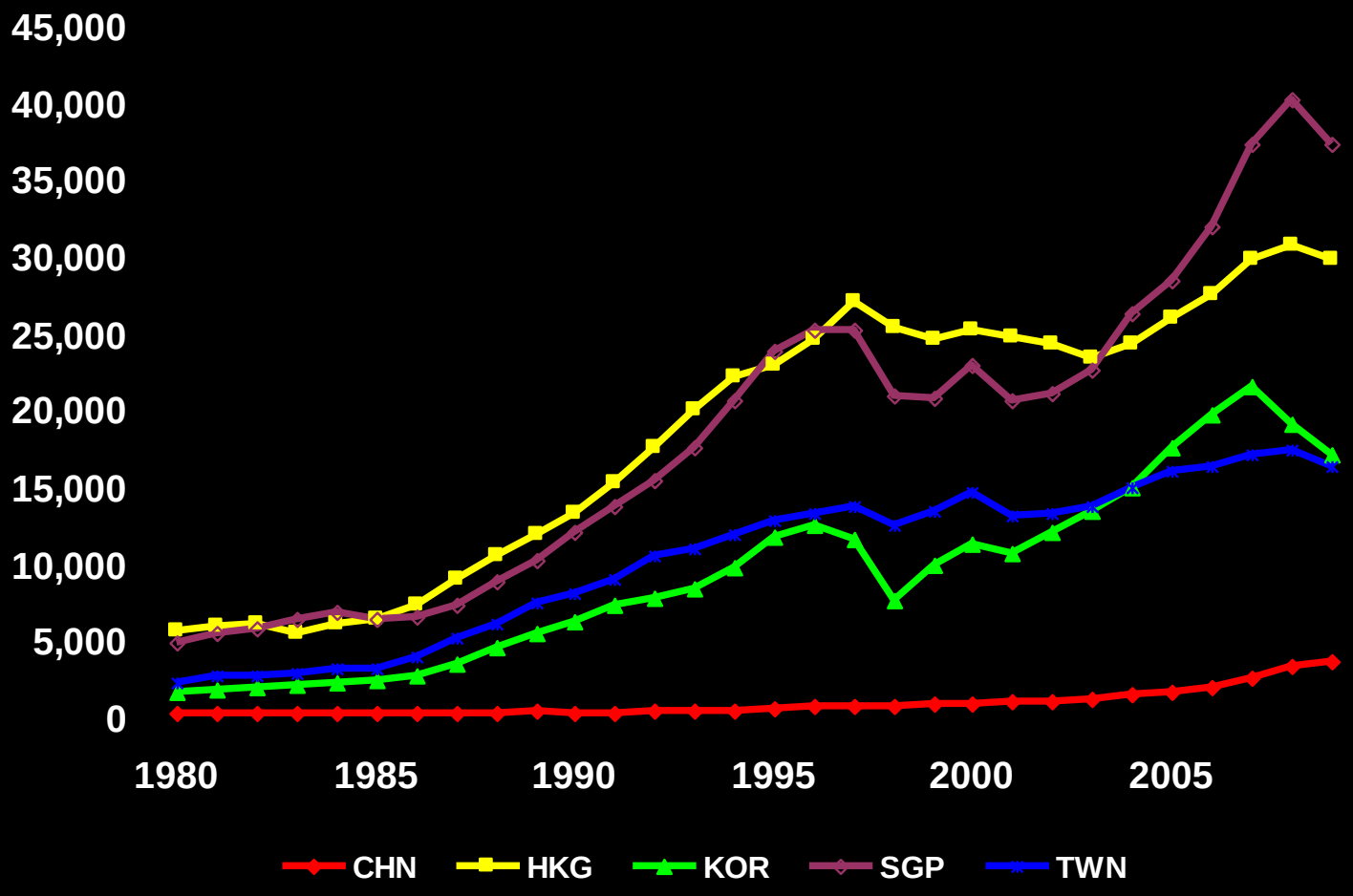


	HK	Korea	Singapore
Services	91.9%	49.9%	69.4%
Goods	8.0%	36.7%	30.6%
Agriculture	0.1%	2.6%	0.0%

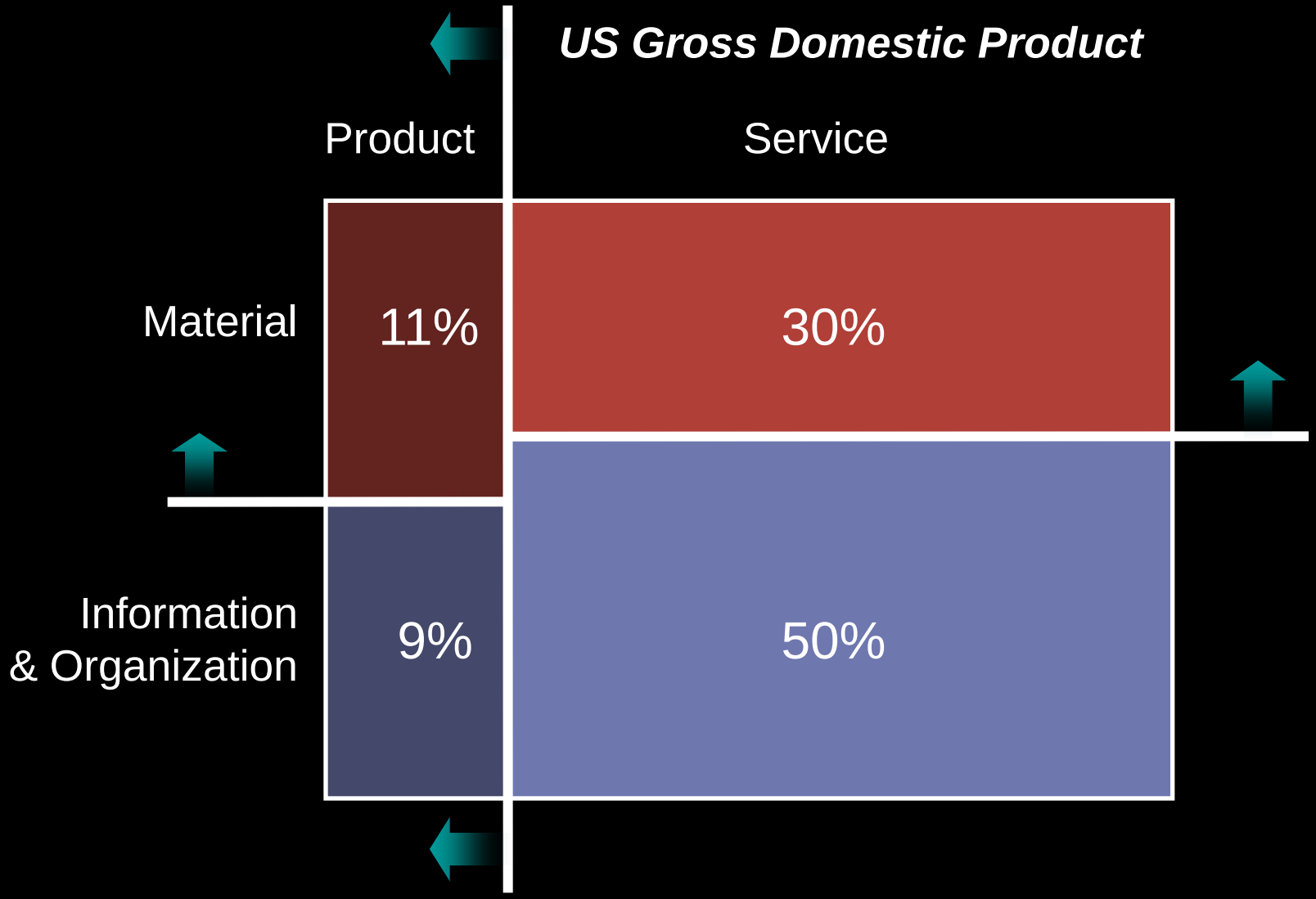


Source: EIU

GDP Per Capita, Current Prices



US GDP Shift to Service Innovation



Based on Uday Karmarkar, UCLA
(Apte & Karmarkar, 2006)

T-Shaped People Drive Services Innovation

Economics and Social Sciences

Business Anthropology

Organizational Change & Learning

Business and Management

Science and Engineering

Industrial and Systems Engineering

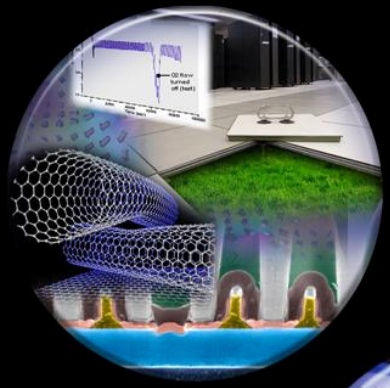
Computer Science & Info. Systems

Math and Operations Research

Accelerating Change

Building a Smarter Planet,Together

Technology & Innovation



Analytics & Optimization

Collaboration & Insight

Moving Forward

- Work together aggressively in new and varied ways
- Real innovation comes when business, government and academia collaborate
- A true genius is a person capable of freeing their mind from the worn channels of tradition and time

“If nothing changes, nothing changes.”