



# “A Smarter Planet: The Next Leadership Agenda”

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We find ourselves together here in Istanbul at an extraordinary moment. The world has certainly changed since our last Business Leadership Forum—in June 2007 in St. Petersburg, Russia: a major political transition in the U.S.; the global economy in flux; our financial markets restructuring themselves; and everywhere in the world, an acutely felt need for leadership.

In every part of our planet... from the board room to the cabinet room... from the university campus to the kitchen table... people are thinking hard about what is happening, and what to do about it. Most importantly, they are ready, eager and anxious for real change. Which means that leaders of businesses and institutions everywhere confront a unique opportunity to transform the way the world works.

We have this chance for reasons no one sought. The meltdown of our financial markets has jolted us awake to the realities and dangers of highly complex global systems. But in truth, the first decade of the 21st century has been a series of wake-up calls, with a single subject: the reality of global integration.

## THE REALITY OF GLOBAL INTEGRATION

Those at this forum have long understood that global integration is changing the corporate model and the nature of work itself. But we now see that the movement of information, work and capital across developed and developing nations—as profound as those are—constitute just one aspect of global integration.

In the last few years, our eyes have been opened to global climate change, and to the environmental and geopolitical issues surrounding energy. We have been made aware of the vulnerabilities of global supply chains for food and medicine. And, of course, we entered the new century with the shock to our sense of security delivered by the attacks on 9/11.

These collective realizations have reminded us that we are all now connected—economically, technically and socially. But we’re also learning that being connected is not enough.

Yes, the world continues to get “flatter.” And yes, it continues to get smaller and more interconnected. But something is happening that holds even greater potential.

*In a word, our planet is becoming smarter.*

This isn’t just a metaphor. And I’m not talking about the Knowledge Economy—or even the fact that hundreds of millions of people from developing nations are gaining the education and skills to enter the global workforce.

I mean the infusion of intelligence into the way the world literally works—the systems and processes that enable physical goods to be developed, manufactured, bought and sold... services to be delivered... everything from people and money to oil, water and electrons to move... and billions of people to work and live.

- > **First, our world is becoming *instrumented*:** The transistor, invented 60 years ago, is the basic building block of the digital age. Now, consider a world in which there are a billion transistors per human, each one costing one ten-millionth of a cent. We’ll have that by 2010. There will likely be 4 billion mobile phone subscribers by the end of this year... and 30 billion Radio Frequency Identification tags produced globally within two years. Sensors are being embedded across entire ecosystems—supply-chains, healthcare networks, cities... even natural systems like rivers.
- > **Second, our world is becoming *interconnected*:** Very soon there will be 2 billion people on the Internet. But that’s just the beginning. In an instrumented world, systems and objects can now “speak” to one another, too. Think about the prospect of a trillion connected and instrumented things—cars, appliances, cameras, roadways, pipelines... even pharmaceuticals and livestock. And then think about the amount of information produced by the interaction of all those things. It will be unprecedented.
- > **Third, all things are becoming *intelligent*:** New computing models can handle the proliferation of end-user devices, sensors and actuators and connect them with powerful back-end systems. How powerful? This year IBM’s Roadrunner supercomputer broke the “petaflop” barrier—one thousand trillion calculations per second. Roadrunner is made from the same chips that go into consumer game consoles and the no-cost operating system Linux. Combined with advanced analytics, such supercomputers—

and new computing models like “clouds”—can turn mountains of data into intelligence. And that intelligence can be translated into action, making our systems, processes and infrastructures more efficient, more productive and responsive—in a word, smarter.

What all of this means is that the digital and physical infrastructures of the world 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.

And let's not forget that each of these areas of technology I've just described continues to make rapid progress. For instance, consider that petaflop computer. It's a huge advance for humanity—but IBM Researchers are already hard at work on achieving the next major milestone in computing speed—the exaflop computer—1 quintillion calculations per second. That's a 1 with 18 zeros after it—or 1000 times faster than Roadrunner. This level of computing is still a few years away, but the pace of technological progress remains pretty breathtaking.

With so much technology and networking abundantly available at such low cost, what wouldn't you put smart technology into? What service wouldn't you provide a customer, citizen, student or patient? What wouldn't you connect? What information wouldn't you mine for insight?

## THE WORLD IS GETTING SMARTER

The answer is, you—or your competitor—will do all of that. Because you can—because the technology is both available and affordable.

But there is another reason we will make our companies, institutions and industries smarter... because we must. Not just at moments of widespread shock and global crisis, but integrated into our day-to-day operations. These mundane processes of business, government and life—which are ultimately the source of those “surprising” events—are not smart enough to be sustainable.

- > **Consider how much energy we waste:** According to published reports, the losses of electrical energy due to inefficient grid systems range from 40 to 70 percent around the world. That's an overall average of 381 kilowatt hours lost per person per year.
- > **Consider how gridlocked and polluted our cities are:** A recent study by a public transit advocacy group reported that up to 45 percent of traffic on some streets in New York City is generated by people circling the block. Another study found that over the course of a year in just one small business district of Los Angeles, cars cruising for parking created the equivalent of 38 trips around the world, burning 47,000 gallons of gasoline and producing 730 tons of carbon dioxide.
- > **Consider how inefficient our supply chains are:** Consumer products and retail industries lose about \$40 billion annually, or 3.5 percent of their sales, due to supply chain inefficiencies. Indeed, guesswork, excess inventory and markdowns are endemic across global retail. Just look at the world's ports, which are cluttered by empty containers. In North America, it is estimated that between 20 and 22 percent of the total port volume is containers with nothing in them.

- > **Think about our wasteful food chains:** In a world where 820 million people are undernourished, it is a tragedy that grocers and consumers throw away \$48 billion worth of food each year in the U.S. alone, according to the United Nations. And then there's the inefficiency of what environmentalists call "food miles." In Iowa, the typical carrot has traveled 1,600 miles from California, a potato 1,200 miles from Idaho and a chuck roast 600 miles from Colorado. Plus, we don't just need to supply food; we need to protect its purity. The Centers for Disease Control estimates that there are 76 million cases of food-borne diseases each year, resulting in 325,000 hospitalizations and 5,000 deaths.
- > **We're all aware of how antiquated our healthcare system is:** In truth, it isn't a "system" at all. It doesn't link from diagnosis, to drug discovery, to healthcare providers, to insurers, to employers, to patients, to communities. Meanwhile, the volume and speed with which data proliferates is inundating practitioners. For example, Canada's 60,000 doctors face 1.8 million new medical papers in 20,000 journals and 300,000 clinical trials worldwide each year—not to mention the need to store, organize and access large amounts of patient data. And for patients, the consequences are real. Personal expenditures on health now push more than 100 million people worldwide below the poverty line each year.
- > **Consider our unmanaged climate systems:** According to a 2004 report from Lawrence Berkeley National Laboratory, the economic costs of weather-related events totaled \$1 trillion worldwide from 1980 through 2003. During this period, insurance covered 4 percent of total costs of weather-related disasters in emerging markets. It was better in high-income countries—40 percent. But that still leaves more than half a trillion dollars of uncovered losses.
- > **Think about the planet's eroding supply of potable water:** Global water usage has increased six-fold since the 1900s, twice the rate of human population growth. According to the Asian Development Bank, one in five people living today lacks access to safe drinking water, and half the world's population does not have adequate sanitation.
- > **Finally, of course, there is the recent crisis in our financial markets:** This will be analyzed for decades, but one thing is already clear. Financial institutions spread risk, but weren't able to track risk. And that uncertainty, that lack of knowing with precision, undermined confidence.

If you think I'm exempting my own industry—or technology in general—from this kind of dumbness, I'm not. Even today, the equipment in data centers is only utilized an average of between 10 and 20 percent. And PCs are worse. The client/server model from the 1980s is inherently inefficient.

The fact is, with the IT from 15 years ago you couldn't even have begun to attack the problems I've described here. You couldn't have done it with IT circa 2005. It has been too expensive, too hardwired and too underutilized, with too many distributed parts, too little datacenter floor space and too little energy and management expertise.

CEOs and other leaders know that their companies are not prepared for what the future has in store. Earlier this year, IBM reported the results of our bi-annual survey of CEOs: more than 1100 of them, from every region and industry around the world. We found that

eight in ten expect significant changes to their industries, their economics and their basic business models in the near term.

And yet they told us that their organizations simply aren't ready to carry out that change. In fact, in the two years since our last survey, this gap—between the need for and the ability to manage change—has tripled.

Ask yourself: As the planet becomes smarter, is my company—or my country—becoming smart enough to keep up, and to win?

Stepping back... Modernizing the world's water, electricity and transportation systems over the next 25 years, in urban areas alone, would require \$41 trillion, by one estimate. I don't know if that's right, but it's clear, given the trajectories of development driving the planet today, that we're going to have to run a lot faster, and a lot smarter, just to keep up—especially as we seek the next areas of investment to drive economic growth and to move large parts of the global economy out of recession.

Fortunately, we now can. We see this in how companies and institutions are rethinking their systems and applying technology in new ways.

- > **Stockholm's intelligent traffic system** has resulted in 20 percent less traffic, a 12 percent drop in emissions and a reported 40,000 additional daily users of public transport. And remember those people circling the block looking for parking in New York and LA? Well, San Francisco recently announced plans for an embedded and networked system that will alert drivers to empty parking spaces. They'll be able to see maps on their cellphones—which they can even use to pay the fee or to feed the meter remotely. *That's smart.*

IBM is building smart traffic systems in cities from London to Brisbane to Singapore—with many more being planned.

- > **Smart power grids**—such as IBM's partnership with Centerpoint Energy in the U.S.—allow remote sensing and operation of the grid, including connection and disconnection of service and automated meter reads. This means fewer and shorter outages, improved customer service and more efficient and reliable delivery. Smart meters also give customers better information, so they can use energy more efficiently. In addition, at Pacific Northwest National Laboratory, a virtual energy marketplace is allowing consumers to trade flexibility in usage for lower costs—and helping deliver a 50 percent reduction in short-term peak electricity distribution loads.

And that's just for today's power systems. The infusion of digital intelligence will help enable lower-cost integration of new sources of power—including renewables such as wind and solar, not to mention the smart charging of plug-in electric vehicles—and also provide end-to-end insight across the entire energy grid. *That's smart.*

- > **Smart food systems**—such as one that IBM has built with Norway's largest food supplier—can use RFID technology to trace meat and poultry from the farm, through the supply chain, all the way to supermarket shelves. And our Nutritious Rice for the World project will apply IBM's World Community Grid to harness the unused and donated power from nearly one million individual PCs to develop stronger strains

of rice... strains that could produce larger and more nutritious yields. The project can be completed in less than two years, compared to the 200 years it would have taken using more conventional computer systems. *That's smart.*

- > **Smart weather:** IBM Research's Deep Thunder project leverages dramatic increases in computing power, visualization and data analytics to generate local, high-resolution weather forecasts for areas as fine as 1 to 2 square km. Customized for business applications, IBM smart weather systems are being used in metropolitan areas from New York City, Chicago and Kansas City, to Atlanta and Miami. *That's smart.*
- > **Smart water management:** We can even use computer modeling to simulate the behavior of river basins around the world. That's what the Great Rivers Project, a partnership between IBM and The Nature Conservancy, is now doing in Brazil, China and the U.S.—helping to conserve the environment and benefit the communities that depend on our rivers. And a project with the Beacon Institute is generating minute-to-minute monitoring of the Hudson River in New York State, via a network of sensors, robotics and computational technology distributed throughout the 315-mile waterway. *That's smart.*

And, finally...

- > **Smart financial systems:** Consider global currency markets, which combined form the world's largest market at \$4 trillion average daily volume. Before it was re-engineered, the systemic risk of clearing these types of trades was enormous. Now, with the smart system known as "Continuous Link Settlement," the majority of settlement risk in foreign exchange has been reduced to zero.

This list could go on.

- > **Smart oil fields**—to increase pump performance and well productivity, in a business where a single oil or gas field can generate a terabyte of data a day, and only 22 percent of available reserves are currently extracted...
- > **Smart telecommunications networks**—from traditional telcos, to mobile networks, to media, broadband and broadcast, which are using IBM's Service Provider Delivery Environment as a common platform to offer new service combinations more frequently and at lower cost...
- > **Smart healthcare**—lowering the cost of therapy by as much as 90 percent, as ActiveCare Network is doing for more than 2 million patients in 38 states, whom it monitors for the proper delivery of their injections and vaccines... or using a new electronic communication system like AmerisourceBergen's to comply with regulations for pharmaceutical pedigrees.

Smarter systems, in other words, can make a material difference to the health of the global economy, the health of our planet, and the health and prosperity of global society.

And remember, the opportunity to become smarter applies not just to large enterprises, but to smaller and mid-sized companies—which are the engines of economic growth everywhere. When we think about systems like supply chains, healthcare delivery and food systems, we're really talking about the interactions of hundreds, even thousands of companies, most of them small.

This opportunity also applies far beyond business in general—to countries, regions and cities, which are increasingly competing on the basis of smarter physical and social infrastructure: from efficient transportation, modern airports, secure trade lanes and reliable energy grids, to transparent and trusted markets and the quality of life.

## THE LEADERSHIP CHALLENGE

Going forward, all leaders will need to ask themselves: Do we want an airport or a smart airport? A bank or a smart bank? A highway or a smart highway? A supply chain or a smart supply chain? A business model or a smart business model? A city or a smart city?

Certainly, as you travel the world, you see countries everywhere leapfrogging—not only to the latest technology and to digital infrastructures, but to the most modern business designs and models. This will be a significant competitive advantage for them.

***The importance of this moment, I believe, is that the key precondition for real change now exists: People want it.***

But this moment will not last forever. And in hindsight, when the circumstances that cry out for change are gone, when things have returned to “normal”—don’t we always wish we had been bolder, more ambitious, gone faster, gone further?

That’s why a period of discontinuity is, for those with courage and vision, a period of opportunity. Over the next couple of years, there will be winners, and there will be losers. And though it may not be easy to see now, I believe we will see new leaders emerge who win not by surviving the storm, but by changing the game.

To do that—and here’s where I will conclude my remarks—they will need to practice new forms of leadership... approaches that are very different from the models of the past.

Think about the way the world today actually works: Very few of our systems are the responsibility of a single entity or decision-maker. So leaders will need to hone their collaboration skills, because we will need leadership that pulls across systems. We will need to bring together stakeholders and experts from across business, government and academia, and all of them will need to move outside their traditional comfort zones.

For instance, governments know how to wield power—how to regulate, how to provide stimulus and incentives. But now, they will increasingly have to perform a more catalytic or convening role—bringing together expertise from many different spheres, and pushing for new thinking.

The hardest part of all this, I think, will be actually making our enterprises, institutions, diplomacy and society more transparent, more authentic, more accountable and smarter—at both an operational and management level.

In fact, I believe we will wind up seeing that we have to consciously infuse intelligence into our decision-making systems... not just infuse our processes with more speed and capacity. We saw this with the financial meltdown. There was lots of speed and capacity, but without more ability to track risk and recognize patterns—that is, without more intelligence—all that speed may actually have exacerbated the collapse.

## BUILDING A SMARTER PLANET

So I come back to this moment.

We all know that the hardest thing about driving any kind of change—whether for a corporation or an individual or a society—is to get people to internalize the need, at a personal level. Sometimes, though, the conditions demanding change are undeniable.

That's where we are today. This isn't just a period of turmoil... it's a period of discontinuity. On the other side of this crisis, I believe, there lies enormous promise—for both economic growth and societal progress, on a truly global scale. But we won't realize that promise if we don't seize this moment to change hearts and minds.

In truth, the most profound impact of a smart planet may be on individual human behavior. Today, people have a vague, anecdotal sense of how their behavior affects their lives. We make a significant number of decisions, large and small, in the dark. But new systems and capabilities are helping individuals navigate life in a smarter way.

Social networks enable people to manage far-flung relationships. Cars show you how quick acceleration reduces gas mileage. Medical data help you see how nutrition, exercise and habits like smoking and drinking impact specific health issues. We are getting access to information at every turn, information that enables us to make better (mostly very small) decisions that improve our lives and add up to dramatically better use of our resources: money, energy, expertise and time.

To make those small changes possible, leaders will need to do something big. And we won't have this opportunity forever.

I think one thing is clear: The world will continue to become smaller, flatter and smarter. We are moving into the age of the globally integrated and intelligent economy, society and planet. The question is, what will we do with that?

The world now beckoning us is one of enormous promise. And I believe it is one that we can build—if we open our minds and let ourselves think about all that a smarter planet could be.

Thank you.