ENABLING A SMARTER PLANET IN CHINA
D.C Chien,
Chief Executive Officer of IBM Greater China Group
LET US WORK TOGETHER TO ENABLE A SMARTER PLANET

I am delighted to present to you this brilliant piece of thought leadership from the IBM Institute for Business Value (IBV) China. Smarter planet is not only a self-reflection of IBM’s innovation and profound insight but also our sincere gift to all the people of China. I ardently hope that it will win your praise and active response.

As a century-old enterprise dedicated to “innovation that matters for the world”, IBM has formed its own unique perspective on technology, social progress and the overall development of the world. Even before this economic crisis, IBM noticed a fundamental contradiction in the current world system; that is, the contradiction between a smaller and flatter world and our underdeveloped management model. The end of the Cold War marked the beginning of unprecedented market expansion and globalization. However, we are still, to a great extent, managing the world with an out-dated model. The current global economic crisis is making it increasingly clear that a new operational model is needed to unlock the potential of the 21st century.

Here at IBM, we believe a smarter planet, one that leverages advanced information technology to build the required new operational model, is the answer. Using advanced IT to improve business operation or public service is not a new idea but something which have long been promoted by many visionary leaders in China and worldwide. Yet such piecemeal, standalone actions will only bring limited impacts. On the other hand, our smarter planet vision attempts to drive transformation of the entire ecosystem of individual industry or public service areas through new, truly collaborative interactions which are made possible through advances in IT. This will result in a smarter operational model which will re-define the relationship among the government, enterprise and individual, from the previous unidirectional and single dimensional relationships such as “producer-
consumer”, “manager-managed” and “planner-executor”, to multi-directional and multi-dimensional collaborative relationships. These new relationships not only allow, but also encourage individuals and organizations to contribute and obtain intelligence, insights and expertise freely, accurately and timely. As a result, different parties in the ecosystem can influence each other’s behavior in a positive way, and allow better decisions to be made across the ecosystem.

Smarter planet applications must be customized for China’s specific challenges. Whether smarter planet can satisfy China’s developmental needs, what smarter planet can achieve for China, how smarter planet can be implemented in China—all these are our key concerns as well as the theme of this report. Our research and analysis has led us to believe that China can emerge as a leader in implementing smarter planet. For China, smarter planet means not only overcoming short-term threats but also creating a condition for sound, harmonious and sustainable long-term development. These conclusions by IBV are the results of fact-based, vigorous and scientific analyses which are defensible. I am sure you will share my view after reading this report.

I would like to take this opportunity to invite you to join IBM in enabling a smarter planet. Together we can innovate and reshape China as well as contribute to global development. This is a once in a lifetime opportunity. It is our responsibility to make the world a better, smarter place for future generations.

D.C Chien,  
Chief Executive Officer of IBM Greater China Group
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EXECUTIVE SUMMARY

China has been impacted by a number of global trends, including the current global financial crisis, globalization, energy geopolitics and global warming. A top priority for China’s leadership is to keep economic growth at around 8% in order to keep unemployment rates low. At the same time, China needs to fix certain fundamental problems in the economy which have been exemplified under the financial crisis, as these will be critical to the survival of Chinese companies. Meanwhile, the financial crisis also presents Chinese companies with new opportunities to expand or invest overseas and to become global leaders in their industries.

China’s short term priorities and long term development goals will be centered around five themes, namely, sustainable economic development, competitive enterprises, harmonious society, energy efficiency and environmental protection. These themes are reflected in the Chinese Government’s RMB 4 trillion economic stimulus package, the 2005-2010 11th Five Year Plan as well as a number of policy goals around job creation, healthcare reform, food, product and drinking water safety.

Success depends on how China responds. Traditional piecemeal economic stimulus measures will revive the economy but can neither resolve the underlying inefficiencies in the economy nor capture the broader transformational opportunity. Instead, China needs a new, smarter approach that not only “repairs” problems but also “prepares” China to become a global leader in the
post recession world. The smarter approach involves investment not only in physical infrastructure but also technologically advanced infrastructure and talent, to create higher skill, higher value impact jobs and new, highly competitive industries to achieve sustainability in the economy as well as the environment.

A smarter approach involves leveraging a new generation of information technologies which are instrumented, interconnected and intelligent. Through this, we can achieve the smarter planet vision of transforming the way every person, business, organization, government, natural system, and man-made system interacts to become much smarter, i.e., better clarity, efficiency, flexibility and responsiveness, which will open up meaningful new possibilities for progress.

Our vision in the transformation in six areas of the Chinese economy – power grid, healthcare, city governance and administration, traffic, supply chain and banking – illustrates how the smarter planet concept benefits government, enterprises and citizens.

China should capture this historical milestone and leverage the smarter planet model immediately to make real change in order to leapfrog to the next level of development and become global leaders. The road to a smarter planet requires the participation and collaboration of every government, company and individual to build the vision, contribute their industry/domain specific knowledge and develop the relevant technology applications. Above all, it requires all the participating parties to execute with commitment, courage and innovation.
CHINA NEEDS A SMARTER GROWTH PATH
GLOBAL CHALLENGES BRING NEW OPPORTUNITIES FOR CHINA

A combination of global trends, such as the current global financial crisis, globalization, energy geopolitics and global warming, are reshaping the world we live in. China, having been increasingly integrated into the global economy, has inevitably been impacted.

The global financial crisis has triggered a worldwide credit crunch and weakened demand across markets. Export oriented manufacturing, a stable pillar to the Chinese economy, has been severely impacted. As a result, we are witnessing the acceleration in the restructuring of industries across China’s domestic market.

Regardless of the outcome of the financial crisis, one thing is clear; globalization will continue to be a driving force in the restructuring of the world. Chinese companies will continue to face increasing competition in the domestic as well as global marketplace. At the same time, globalization provides Chinese companies with the opportunity to leverage global resources, talent and assets, establish global strategic partnerships, and invest overseas. Economic integration and information exchange will continue to drive Chinese people’s expectations related to living standards, work environment and business practice.

Volatility in energy pricing continues to be a major concern for the Government, enterprises and citizens. Though oil prices have come down significantly from the peak levels prior to the financial crisis, solving energy security (i.e., securing stable, reliable and sustainable energy sources) and energy efficiency still remain a high priority. China is also under increasing international pressure to uphold its
environmental responsibility and reduce greenhouse gas emissions so as to contribute to minimizing the consequences of global warming.

OVERCOMING CHINA’S SPECIFIC IMMEDIATE AND LONGER TERM CHALLENGES

Minimizing the impact of the global financial crisis is a top priority for China's leadership because economic growth around 8% is critical for creating new jobs and keeping unemployment rates low.

Weakening global demand has exposed and exemplified fundamental problems in China’s economy. First of all, during the high growth years manufacturing companies survived under a low profit, high volume strategy. Second, infrastructure and transportation development has not been able to meet the accelerated pace of activity, leading to extremely high logistics cost.

The pace of growth and demand of the past meant that these issues, and others, did not constitute significant competitive disadvantage to Chinese companies. However, with the new global market conditions these very well may be the critical factors affecting the survival of companies.

The global financial crisis has already exposed weaknesses in a number of what used to be considered global leading firms across various industries. This is an enormous opportunity for leading competitive Chinese companies to fill the market void. Already many leading Chinese companies are stepping up efforts to explore overseas expansion opportunities. Success will depend on Chinese firms’ ability to be competitive on a global scale, which requires advanced product and service offerings as well as increased maturity across business and operational areas.
In order to repair less competitive elements of the economy as well as trigger growth across the more competitive ones, the Chinese Government announced a RMB 4 trillion economic stimulus package. The stimulus package will focus on key areas such as: transportation and power grid infrastructure, improving healthcare & education, environmental protection & energy-saving, building affordable-housing and improving rural living standards, technological advancement, and earthquake reconstruction. Combined, these investment targets aim to achieve the government’s long term priority policy agenda of ensuring sustainable economic development, and improving people’s living standards.  

China achieved exponential economic growth in the past decades but is still behind OECD countries in terms of technological development, industry structure, basic infrastructure and living standards. Building a competitive and sustainable economy is China’s long term goal. The 2005-2010 11th Five Year Plan, set forth in detail the development agenda and priorities, sustaining a high-quality growth, becoming a resource-efficient, environment-friendly society, moving toward an innovation-oriented country with sound talent development, empowering development of inland and rural areas, and reforming the healthcare system to provide all Chinese citizens with accessible basic medical services.

Building a sustainable 21st century economy means achieving economic growth without scarifying the environment or the well being of the citizenry. To achieve this, there are many social and environment issues China must fix in the short and medium term, including: healthcare reform, social security reform, food and product safety, and drinking water safety.
On the whole, China’s actions to address short term challenges as well as long term development goals can be summarized into five themes (Chart 1):

- Sustainable economic development
- Competitive enterprises
- Harmonious society
- Energy efficiency
- Environmental protection

CHART 1: CHINA’S SHORT AND LONG-TERM DEVELOPMENT AGENDA CAN BE SUMMARIZED INTO 5 THEMES
PREPARE NOT REPAIR: BUILDING A 21\textsuperscript{ST} CENTURY ECONOMY

In this critical moment, China must seize the opportunity.

Success depends on how China responds. China could stimulate the economy through manipulating fiscal and monetary policies, accelerating the construction of physical infrastructure, subsidizing certain industries and enterprises at risk. This piecemeal, standalone approach will revive the economy, but can neither resolve the underlying inefficiencies in the economy nor capture the broader transformational opportunity.

In order to propel China’s economy into the 21\textsuperscript{st} century, China needs a new, smarter approach that not only “repairs” problems but also “prepares” China to become a global leader in the post recession world. A smarter approach is to drive investment that:

• not only immediately creates jobs, but also shifts away from labor-oriented jobs toward higher skill, higher value impact jobs;
• not only aims at short term economic recovery, but also establishes the course for a long term competitive economy;
• not only seeks economics progress, but also aims to achieve real sustainability in the environment so that people are able to enjoy the economic and environmental benefits;
• not only builds physical infrastructure, but also invests in technologically advanced infrastructure and talent;
• not only builds a safety net around the survival of the existing industries, but also creates new, highly competitive industries, employed by a 21\textsuperscript{st} century workforce.
SMARTER ACTION: IMPLICATIONS FROM A SMARTER PLANET

A smarter approach involves leveraging a new generation of information technologies to change the way government, enterprises and citizens interact. We are now at a unique moment where advanced information infrastructures can be coupled with highly integrated physical infrastructures, allowing governments, enterprise and citizens to make smarter decisions. The smarter approach is characterized by being instrumented, interconnected and intelligent. (Chart 2)

CHART 2: SMARTER MEANS OUR PLANET IS BECOMING MORE INSTRUMENTED, AND MORE INTERCONNECTED, AND MORE INTELLIGENT DAY BY DAY

<table>
<thead>
<tr>
<th>INSTRUMENTED</th>
</tr>
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<tbody>
<tr>
<td>• Any system and process can be measured, sensed and seen</td>
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</table>

<table>
<thead>
<tr>
<th>INTERCONNECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Instrumented systems can work together in new ways</td>
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</table>

<table>
<thead>
<tr>
<th>INTELLIGENT</th>
</tr>
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<tbody>
<tr>
<td>• Every insight results in action that creates new value</td>
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</table>

Our vision is to bring a new level of “smartness” to the way the world works — the way every person, business, organization, government, natural system, and man-made system interacts. Each interaction represents a chance to do something better, more efficiently and more productively. But more than that, as systems of the planet become smarter we can open up meaningful new possibilities for progress.
INSTRUMENTED

Being instrumented is a much broader concept beyond traditional sensors, digital cameras and RFID. It is about making use of any device, system or process that can sense, measure, capture, and transfer information anytime and anywhere. With these new instruments, any kind of information - ranging from a person’s blood pressure, company financial data, or a city’s traffic conditions - can be quickly acquired and analyzed, allowing for immediate action and longer term planning.

INTERCONNECTED

Interconnection means connecting data or information collected or stored in different devices and information systems resided with individuals, organizations and governments through high speed, high bandwidth communications networks, allowing sharing of information and interaction among different parties. This allows monitoring of environments and business conditions in real time, situations to be analyzed and problems solved in more holistic view and more responsively, and work and tasks to be remotely completed through a network of collaborating parties, bringing about fundamental changes to the way the world works.

INTELLIGENT

Being intelligent is about making sense of all the data collected and getting innovative, systematic and comprehensive insight to solve specific problems. This requires consolidating and analyzing enormous data and information across geographies, industries and functional areas, using advanced technologies such as data mining and analytic tools, scientific models and powerful computing systems to handle the complicated data analysis, aggregation and calculations, and applying specific knowledge in the specific industry, generating scenarios and solutions to support decisions and actions.
TECHNOLOGIES BEHIND THE 3IS

INSTRUMENTED

• By 2010, there will be a billion transistors per human, each costing one ten-millionth of a cent. The technology is being embedded into billions of devices – cars, appliances, roadways, etc.

• 30 billion Radio Frequency Identification tags are produced globally within two years.

• The number of mobile subscribers is expected to reach 5 billion over the next few years.

• Sensors are being embedded across entire ecosystems — supply-chains, healthcare networks, cities, and even natural systems like rivers.

INTERCONNECTED

• By 2011, an estimated 2 billion people will be on the Web, with High Speed Packed Access (HSPA) technology leading to ‘3 screen’ (TV, PC and mobile handset) convergence and opportunities for always-on networking.

• An estimated trillion connected and instrumented things - cars, appliances, cameras, roadways, pipelines and even pharmaceuticals and livestock.

INTELLIGENT

• IBM’s Roadrunner supercomputer broke the “petaflop” barrier — one thousand trillion calculations per second, and the next major milestone in computing speed — the exaflop computer — 1 quintillion calculations per second, 1000 times faster than Roadrunner.

• Massively powerful computers and computing “clouds” can be affordably applied to processing, modeling, forecasting and analyzing the mountains of data all this will generate.
THE SOLUTIONS: RESULTS CAN BE ACHIEVED

For China, the smarter planet concept should be seen as an enabler for achieving the transformation into a leading 21st century economy. Now is the time for the government, enterprise and citizen stakeholders to act together on a unified vision, collaborating and contributing to the creation of an ecosystem enabled by instrumented, interconnected, and intelligent technologies. (Chart 3)

<table>
<thead>
<tr>
<th>Sustainable economic development</th>
<th>Harmonious society</th>
<th>Environmental protection</th>
<th>Energy efficiency</th>
<th>More Competitive Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-direct the employment and investment move from labor centric industries to “smarter” initiatives and relevant industries, which will “prepare” China for a new and long-term growth</td>
<td>Build up a smarter public physical and service infrastructure where people could live a convenient, safe and high living standard life and are provided with high-quality, affordable and accessible public service/ healthcare and education</td>
<td>Reduce waste and carbon emission, less pollution by a more environmental friendly way manufacturers producing, people living, transporting and a smarter tool to manage environment</td>
<td>Create a smart energy infrastructure to drive more efficient consumption and more choice, resulting in more cost effective reliable power</td>
<td>Create a smarter business dynamic that drives cost &amp; risk reduction, information and system simplification and integration, responsive &amp; efficient operation and better customer insights and more competitive products/services</td>
</tr>
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The transformation in six areas of the Chinese economy - power grid, healthcare, city governance and administration, traffic, supply chain and banking - clearly illustrates how the smarter planet concept benefits everyone.
**SMARTER GRID**

Overcomes the challenge of energy efficiency by creating an infrastructure that provides consumers choice, establishes a transparent market and efficient utilities. Provide cost effective power at higher reliability levels generated through environmentally friendly sources.

**SMARTER HEALTHCARE**

Addresses key challenges in the healthcare system including lack of access to affordable healthcare especially in rural areas, inefficiency of the healthcare structure and lack of high quality patient care. Resolving these challenges contributes to building up of a harmonious society, as a health citizenry is a productive citizenry.

**SMARTER CITY**

Addresses issues related to China’s immature city infrastructures for business and citizens, inefficient city government and management systems as well as emergency response. Cities are the heart to economic activity, so smarter cities means higher living standards, more competitive business environment and investment attractiveness.
SMARTER TRAFFIC

Addresses how to relieve the over-strained transport infrastructure. Less congestion means, faster product movement, increased worker productivity and environmental protection via reduced pollution emissions.

SMARTER SUPPLY CHAIN

Address the systemic issue of high logistics costs and long lead time, which result from an inefficient transportation, storage and distribution system. Resolving these issues will stimulate domestic trade, make enterprises more competitive, and generate additional impetus to sustainable economic development.

SMARTER BANKING

Enhances the competitiveness of Chinese banks in both the domestic and overseas market, mitigates risk, provides more market stability and thus is able to support the development of small businesses, large enterprises, and individual portfolios.
SMARTER ACTIONS IN SIX SELECTED AREAS
SMARTER GRID

A Smarter Grid is:

RESPONSIVE
Knows exactly where a power outage occurs and instantly dispatching a crew to fix the problem

RELIABLE
Prevents outages before they occur by sensing potential equipment failures

ENERGY SAVING
Instantly detects changes in demand, leading to reduced power generation during times of low demand

BETTER ASSET UTILIZATION
Extends asset life by sensing and managing the stress placed on aging equipment

SUSTAINABLE ENERGY
Maximizes renewable energy supply through enhanced understanding of grid demand
In the past, electrical grids were a symbol of progress; providing affordable and abundant light to homes, streets, businesses, towns and cities, which sparked an era of economic and social development. But today's electrical grids reflect a time when energy was cheap, their impact on the natural environment wasn't a priority and consumers weren't even part of the equation. The old model was designed to distribute power in one direction only—not to manage a dynamic network of energy supply and demand.

The current trend of energy consumption is not only unsustainable, but is also unhealthy for economic development and society. Take the fact that between 2005 and 2020, China’s total energy consumption is predicted to double. If this occurs China will be the world’s largest energy consumer. China’s annual energy consumption has grown by an average of 12% since 2001, which means growth rates have led to a disproportionate rise against GDP. For example, in 2007 GDP grew by 11.3% but energy demand growth was 14.4%. ²

Now we can instrument everything from the meter in the home to the turbines in the plants to the network itself. All of this instrumentation is marrying supply and demand smarter transmissions allow providers to meet accelerated growth and intelligent meters help end consumers choose how and when to consume. A truly intelligent market design that provides visibility, the right price points and turns data into deep insight means better decision making across the value chain.
For utility providers, smarter grids mean improved grid reliability and power quality leading to increased productivity, predictive maintenance, and quicker outage restoration time leading to improved forecasting of capital equipment expenditures. Smarter grids also reduce greenhouse gas emissions by meeting stringent greenhouse gas emissions targets while maintaining sufficient, cost-effective power supply.
Case Study

**TO RESPOND TO INCREASING GRID PRESSURES DONG ENERGY BUILDS AN INTELLIGENT UTILITY NETWORK**

DONG Energy is Denmark’s largest energy company. The company needed to enhance management and utilization of its electrical distribution network in order to respond to power outages faster and more efficiently. The solution was to install remote monitoring and control devices that give the company an unprecedented amount of information about the current state of the grid. The new solution also involves extensive analysis of the data provided by the remote devices, as well as reengineering of DONG Energy’s business processes.

As a result, DONG Energy can reduce outage time by 25–30% and reduce fault search time by 1/3. Even more valuable is the fact that by improving the quality of electrical service through faster, more efficient response to outages DONG Energy now has a clear competitive advantage. Also, fully utilizing existing assets to respond to surges in demand helps the company avoid capital expenditures for additional capacity.3
SPECIFIC SMARTER GRID APPLICATIONS

Reducing Power Outages

Power outages are widespread and detrimental; leading to reduced reliability and customer satisfaction, energy wastage, reduced network efficiency, and have a negative affect on company revenue (on both the supply and demand side).

Through installing an advanced analytical & optimization engine in a smarter power grid, utility providers can move beyond the bottlenecks of a ‘traditional’ network and move toward an ‘intelligent’ network which can proactively manage power outages. The outage plan takes into account the complex topology and resource constraints as well as identifies parallelized assets so that utility providers can efficiently prioritizing the outage tasks. As a result, outage time and frequency is reduced (roughly 30%), revenue loss due to power outage declines, and grid reliability is enhanced, which leads to improved customer satisfaction.
Intelligent Meters

Intelligent meters, supported by the infrastructure of smarter grids, are re-defining the utility-customer relationship.

By installing a compact and easily readable device capable of displaying the cost of power at any given point in time, as well as the 24 hourly cost points (looking both backward and forward) over the course of a day, utility providers can enable flexibility on the demand side by giving customers the information they need to alter their energy consumption patterns. The meter is not just a means for measuring consumption; it becomes a sensor on the grid capable of assisting in the detection of fluctuations and outages, provides the ability to store and correlate information, enables the utility to remotely turn on or shut off service, and can enable the utility to remotely switch between credit or prepayment options. Intelligent meters contribute to reducing peak loads, enable utility providers to transform their operating model, and redefine customer experience.
Case Study

WITH SMART METERS, ENERGIE BADEN-WÜRTTEMBERG (ENBW) PUTS THE CONSUMER IN CONTROL

EnBW, a leader in Germany’s utility industry, has over 6 million energy customers and about 15,000 megawatts of electric generating capacity. Nearly all Germans are ‘plugged-in’, making growth via new customers very difficult; therefore, EnBW needed to add flexibility on the demand side by empowering customers to make “smart” power consumption decisions.

The first-of-a-kind solution uses smarter meters to generate and display the underlying price of electricity as it changes throughout the day to the consumer. The pricing transparency gives customers knowledge of when peak electricity prices apply, so that they can make informed judgments about when to use electricity. Furthermore, the solution is decreasing energy demand at peak time, reducing cost across the entire system, allowing for maximized renewable energy supply, and is empowering the customers to manage their power consumption.
SMARTER HEALTHCARE

Smarter healthcare is:

INTERLINKED
Authorized doctors are able to access a patients’ medical records, past treatments, and insurance details, empowering patients to select and change medical service providers

COLLABORATIVE
Breaks down information silos to record, consolidate and share medical information & resources to build a complex, specialized healthcare network

PREVENTIVE
Senses, processes and analyzes major health events in real-time to implement fast, effective responses

ACCESSIBLE
Enables rural and local community hospitals to link seamlessly into central hospitals for real-time expert advice, referrals and training

INNOVATIVE
Fuels clinical innovation and research with enhanced knowledge and processing power

RELIABLE
Allows medical practitioners to search, analyze and reference a huge body of scientific evidence to support their diagnosis
Even though China was praised by the WHO half a century ago for its three-tiered hospital system and peasant-centric healthcare, China’s healthcare system has not kept pace with the rapid economic and societal development. Inadequate funding and inappropriate management has kept healthcare coverage low (39% for rural residents and 36% for urban residents are unable to afford professional medical treatment). Government funding has been focusing on larger, urban hospitals, thereby keeping the number of hospital beds available in rural areas below demand and making hospitals more inclined toward revenue-generating activities, not the core competency of clinical care.

A vital piece of the Chinese government agenda is the development of a modern healthcare system. In January 2009, China's State Council passed the long awaited New Medical Reform Bill, which promises universal medical coverage to the country’s 1.3 billion citizens in 3 years time. Central to the new policy is: increasing the coverage to 90% in urban and rural areas by 2011, optimizing the medical supply chain so costs of medicine declines, improve funding to smaller country and township level clinics, and reduce the workload of big hospital by shifting patients to community clinics by introducing differential pricing and implementing universal health records.

Here is a scenario in the future world of smarter healthcare. Mr. Sean, an retired engineer, feels pain in his back one day. He picks up the phone and calls the community clinic. Dr. Dick in the clinic will see Sean’s healthcare record at the moment he answers Sean’s phone. After asking Sean’s situation, Dick feels it is
necessary to consult a senior doctor in a territory hospital and so he initiates a video conference with a senior doctor in the No.1 City hospital. After real time diagnosis, the senior doctor suggests an X-ray check for Mr. Sean. Dick books an X-ray check at 10am on second day in No.1 City hospital. Mr. Sean goes to No.1 City hospital at 10am the second day and takes the X-ray check and diagnosis without queuing at the counter, with the result and prescription recorded in his healthcare record automatically. When Mr. Sean arrives home in the afternoon he receives the medicine in the prescription by medical logistics and the expense of the medicine is paid by the medical insurance at the same time without Sean's personal application.

**CHART 5: HEALTHCARE IN A SMARTER PLANET IS**

- **Instrumented**: Mobile devices enable data sharing and synchronization to improve speed and quality of care. With the support of telemetry technology, remote diagnosis and treatment can be realize.
- **Interconnected**: Integrated healthcare information cross the hospital and virtual team improves resource efficiency and allows better informed choice.
- **Intelligent**: High performance computing increases speed and effectiveness of medical research and help knowledge discovery.
Developing and providing 21st century healthcare requires a smarter approach to information sharing and management capacity. Real time information sharing helps hospitals maintain low inventory levels of drugs, reducing cost and increasing efficiency. Comprehensive and accurate information means doctors can receive patient records and treatment history, increased visibility into patient health conditions means better service and quality. Smarter healthcare paves the way for a new service model which involves sharing of resources, services and expertise; an integrated transaction platform across hospitals; and, for a more effective governance system as costs and processes will be much more transparent.

**SPECIFIC SMARTER HEALTHCARE APPLICATIONS**

**Integrated Healthcare Platform**

China’s healthcare system suffers from an inability to leverage resources and share information across the entire hospital network. Dirty data caused by repeated registration and inconsistent records in different departments means increased likelihood of misdiagnosis, increased cost and makes patient referral difficult and inefficient.

An integrated healthcare platform collects and stores patient information, as needed, adding the data to the patient’s electronic health record, which is now accessible to all authorized and integrated hospitals. The platform allows

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**Job Creation**

A RMB 25 billion investment in smarter healthcare can create 354,300 jobs.
resources and patients to be effectively distributed across hospitals, including appropriate administration systems, policies and referral systems between hospitals. The platform supports the information sharing needs for an effective multi-tier distributed healthcare network.

**Case Study**

**A TRADITIONAL CHINESE MEDICINE HOSPITAL’S IMPLEMENTATION OF AN INFORMATION INTEGRATION SYSTEM**

The largest modern hospital organization in south China, with four branches and more than 10,000 patient visits everyday, faced the challenge of information fragmentation among different departments, lack of visibility to branch hospitals and difficulties integrating information due to different formats and systems.

With the implementation of a comprehensive hospital integration platform which is customized to Chinese medical regulations and traditional Chinese medicine requirements, the hospital standardized clinical services and information is now shared between headquarters and branches. The changes have enabled integration and re-use of clinical data, improved quality of service from access to new healthcare information applications and enhance hospital management and administration.
Electronic Health Record System

One of the biggest bottlenecks in China’s healthcare system today is the lack of information exchange across the network. Any information integration is largely limited to the hospital level, and is often time-consuming to access (either paper-based, or distributed across incompatible systems).

The electronic health record system centralizes the integration and sharing of patient records by suitable trustworthy portal technologies so that treatment activities can be related in a consolidated view not limited by administrative boundaries. An electronic healthcare record enables correctly and smoothly transfers patients from one department to another, from one hospital to another, and helps the patient to be aware of his/her health condition at any time and doctor also can easily and correctly diagnose the patient based on his/her complete historical healthcare record.
Case Study

A CANADA HEALTHCARE ORGANIZATION TO REALIZE THE VISION OF UBQUITOUS AVAILABILITY AND EXCHANGE OF PATIENT DATA

A government-funded, non-profit organization driving Electronic Health Records (EHR) in Canada has a target to setup EHR for 50% of Canadians by 2010.

The idea is to develop blueprint EHR architecture with 276 EHR projects. The result is very promising. It enhances availability of care through distributed access, improves the inter-hospital referral system through accurate, fast, reliable integration of information, applies validated scientific and business oriented rules to analyze patient information and patient history, and provides vast amounts of normalized data to facilitate the medical research.
A Smarter City is:

**FLEXIBLE**
Knowing in real-time when and where emergencies happen in the city, and deploying resources to respond timely and appropriately

**CONVENIENT**
Accessing “one stop” government services remotely, paying bills, learning, shopping, making reservations and doing transactions online or on mobile phones

**SECURE**
Better surveillance and more effective crime prevention and investigation

**ATTRACTION**
Better planning of business infrastructure and public service through collecting and analyzing data, making a city more attractive to investors

**COLLABORATIVE**
Integration among government agencies and collaboration with the private sector to increase government transparency and efficiency

**HIGHER LIVING STANDARDS**
Less traffic congestion means less pollution; less time wasted in traffic jams and queuing for services means better work life balance; less pollution and better social services means living a healthier and happier life
Currently, most cities in China are behind OECD countries in basic IT infrastructure. Broadband coverage in Beijing is 55% whilst in London, New York and Tokyo the average is around 80%. Immature city infrastructure can not meet citizens’ increasing expectation for higher living standards and is not conducive to attracting foreign investment.

Inefficient city governance and inconvenient public services is another systematic challenge hindering city development in China. Different government agencies and functions are duplicated and isolated in process and data management. The lack of internal integration and collaboration results in slower response time and cost inefficiency in handling public administration and public services. Enterprises in Shanghai have to take an average 8.7 days for custom clearance; comparatively in Korea, the average release time is 5.3 days.

The changing global environmental and political dynamics have increased the concern over safety and security. Recently, citizens have been displaced by natural disasters, become ill from epidemics, been affected by rapid urbanization, witnessed food supply become increasingly contaminated, and now being hit by the global financial crisis.

Meeting citizens’ heightening expectation requires a new city ecosystem where government, citizens and business are supported by new, smarter instruments.
Intelligent and interconnected instruments allow governments to collect and analyse, in real time, data from across the city. This new visibility eliminates redundant processes and enhances decision making. Citizens can remotely work, shop, learn and conduct transactions, making life more convenient, flexible and mobile. Businesses can quickly go through a “one stop service” for all the government processes, as well as manage their product development, manufacturing, logistics and distribution more effectively. A smarter city, designed for the needs of the 21st century, is a harmonious city.
SPECIFIC SMARTER CITY APPLICATIONS

Emergency Management

Different from the traditional way of handling emergencies, which only focuses on response and rescue, emergency management has four layers: mitigation, preparedness, response and recovery. It is also a systematic, cross-functional and cross-organizational activity covering medical actions, relief logistics, rescue activities, financial support and data infrastructure.

Real Time City Management

Managing a city with a large population is a difficult task, especially when numerous harmful incidents occur at once. A ‘city monitoring centre’ that has divided the city into grids, can leverage real time surveillance technologies and data capturing tools so that city managers and response units (i.e., fire, police, ambulance) to have an enhanced ability to respond to incidents.

Case Study

BEIJING CHAOYANG DISTRICT ACHIEVES REAL TIME RESPONSES TO CITY EVENTS THROUGH ITS CITY MANAGEMENT PLATFORM

Beijing Chaoyang Government is burdened with road cleaning, garbage exposure and theft of city assets; leading to pedestrian accidents, disruption to power distribution and communications systems.

To solve these problems, Chaoyang Government firstly adopted SOA-based urban grid management information platform in China. City Management Platform divided
Chaoyang into 10,000 distinct grid sectors, marking every city assets within the grid. Community areas are assigned supervisors who collect information using a mobile terminal. The information is reported to the monitoring centre, which identifies the degree of seriousness and implements an appropriate response. The new City Management System achieves each set of monitoring data and the assigned response to accidents and crimes.

This new platform reduced annual city administration cost and improved operational efficiency. The response and management of traffic accidents become more efficient and the losses of city physical assets dramatically reduced.

**Integrated Public Services**

Limited by isolated data and different process requirements in government functions, citizens have to rush to different government agencies and wait for hours for tax clarification, social welfare application, etc. The new public services system consolidates originally isolated data and processes in different functions such as civil affairs, social insurance, police station, and tax into one integrated platform. It consolidates process as well as integrates system and data management; therefore by providing a one-stop, more convenient, effective services to citizens.

**Case Study**

**NANJING XUANWU GOVERNMENT PROVIDE A ONE-STOP PUBLIC SERVICE TO CITIZENS THROUGH INTEGRATED PUBLIC SERVICES PLATFORM**

Nanjing Xuanwu government consolidated public services such as, tax, health and industry and commerce administration into a new integrated management platform. Citizens now have a one-stop service to public services, with process time dramatically shortened from 10 to 4 days.
SMARTER TRAFFIC

Smarter Traffic is:

**ENVIRONMENTAL**
Substantial reduction in carbon emissions, energy consumption, and various pollutions ensure a better way of living

**CONVENIENT**
Traveler experience is enhanced via mobile communication of optimal route and single payment for all modes of transportation

**SAFE**
Detects hazards and informs relevant parties in time

**EFFICIENT**
Real time data analysis and prediction of movement across the network prevents unnecessary wastage as well as maximize traffic flow

**VISIBLE**
Integration of all public transport fleets and private vehicles into a single database that delivers a single view of network status

**FORECASTS**
Continuous data analysis and modeling to improve traffic flow and infrastructure planning
It has never been easier to get from one place to another. Yet, it’s also never been harder. Our fast cars, trucks and buses get stuck in traffic. And that’s not all; advances in transportation have also advanced some of the world’s biggest problems – such as pollution.

Simply, clogged roadways need new approaches. Cities everywhere are battling an increase in demand and an inability to build sufficient infrastructure to cope. Take for example, the fact that congestion costs as a percentage of GDP range from 1.5% to over 4%. These costs manifest themselves in many ways: lost worker productivity, unpredictable/increased travel time, environmental damage and property damage, etc.

The traditional way to address congestion has been to increase capacity (e.g. add new highways and lanes). In today’s environment we need other solutions. Building intelligence into the roads and the cars—with roadside sensors, radio frequency tags, and global positioning systems—certainly is. Rethinking how we get from point A to point B means applying new technology and new policies to old assumptions and habits. It means improving drivers’ experience, not just where and when they drive. And it could lead to advances in the cars we drive, the roads we drive them on, and the public transit we might take instead.

Imagine a transit system that lets a commuter use his cell phone to check how many seats are available on the next commuter train or subway. Integration of services and information is crucial to the future of public transit. For example, to
match supply and demand, future transit systems will know where the riders are, and get vehicles to them. Many transit planners are also pushing integration beyond the bounds of a single system and integrating fares and services across transit types, cities, and even countries.

A smarter traffic system delivers improved accessibility (e.g., improved productivity, reduced journey time, and faster emergency vehicle response time) and protects the environment (e.g., air quality improvements, reduced noise pollution, longer asset lifecycle, preserved historic landmarks/sights/neighbourhoods).
SPECIFIC SMARTER TRAFFIC APPLICATIONS

Intelligent Transportation

Combining a broad range of wireless and wire line communications-based information and electronics technologies allows cities to implement a 21st century traffic system.

Real-Time Traffic Information

Smarter roads may hold the key to reducing traffic congestion, but we do not yet understand the many ways that people, vehicles, freight and goods actually move through the urban landscape. Getting the data is a vital first step.

By putting sensors almost anywhere we can obtain real-time road information that helps monitor and control traffic flows. People can get real-time information about traffic and adjust their routes, avoiding congestion. In the future, we’ll see automated highways, where cars are connected to a grid that dynamically redirects them and optimizes traffic flow.

One Card Fits All: Integrated Transit

A single back-end and front-end integrated user account for all parts of the transportation infrastructure, providing transit users with a single card for buses, trains and ferries, taxis and even parking lots; providing a user friendly transit experience and improved convenience.
Road Charging

Uses RFID technology and advanced free-flow roadside system using laser, camera and systems technology to seamlessly detect, identify and charge vehicles.

Case Study

STOCKHOLM REDUCES TRAFFIC WITH CONGESTION CHARGING

The city of Stockholm (Sweden) was increasingly being burdened by congestion, so the road and transport authorities set out to reduce congestion by 10% and 15%. The city needed to build a system that would automatically tax Swedish registered vehicles entering and leaving the city centre between 6.30 and 18.30, Monday to Friday (excluding national holidays). An on demand solution for full-scale congestion charging, using RFID technology and advanced free-flow roadside system using lasers, cameras and systems technology to seamlessly detect, identify and charge vehicles was designed and implemented.

The results were staggering: traffic congestion was reduced by 25% (far above the original target), traffic queuing times fell by up to 50%, taxi revenue was up over 10%, pollution levels in the city fell by 10% and 15%, and there were 40,000 new daily public transport passengers.
SMARTER SUPPLY CHAIN

A Smarter Supply Chain is:

FLEXIBLE
Fully leverages resources and is environmentally sustainable, but also manages the trade-offs of cost, quality, service and time

VISIBLE
A pervasive visibility capability, provides connectivity across the value chain, supports collaboration (shared network decision making), and is intelligent (optimized analytics)

IN-SYNCH
Gauges and dashboards provide past, current and future trend analysis that is communicated across the supply chain in real-time

BETTER RISK MITIGATION
Risk along the supply chain can be identified, mitigated and rectified effectively and responsively

CUSTOMER ORIENTED
Able to satisfy the increased demand from customers for more precise synchronization of supply and demand as well as traceability information
Logistics costs, as a percentage of GDP, are consistently higher in China than in developed markets, an indicator of systemic operational inefficiency. In 2006 alone, logistics cost in China amounted to 18% of GDP, compared to 11% in Japan, 8% in the United States, and 7% in the European Union. Of that 18%, transportation costs amounted to over 55%, while storage costs reached 30%.  

Regulatory, infrastructure and operational bottlenecks are the underlying causes of the inefficient supply chain in China. These bottlenecks reduce the competitiveness of Chinese manufacturers and hinder internal trade flows and further expansion of domestic demand.

- **Regulatory Bottlenecks**
  - Regulatory constraints hindered foreign investment and operational control
  - Local entry barriers have been a large contributor to industry fragmentation
- **Infrastructure Bottlenecks**
  - Quality remains low outside major cities and the network’s insufficient coverage prevents companies from meeting changing consumer demands
  - National rail and aviation is underdeveloped and under utilized for freight
- **Operational Bottlenecks**
  - Logistics (trucking specifically) remains highly fragmented, resulting in a highly competitive market where pricing pressures are intense and maintaining low throughput time is critical
Rapid and unplanned network expansion has led to repetitive and under utilized logistics facilities, while inadequate collaboration among supply chain partners has led to reduced efficiency, higher costs and an inability to meet end-consumer demand.

Solving these problems requires new capabilities and approaches that address the challenges of this environment. Supply chains already weave together suppliers, business partners and customers into intricate, dynamic relationships. They are functioning not just as the physical plumbing of economic activity, the literal meaning of production, distribution, and consumption of goods and services, but also operate as complex information networks. A smarter supply chain will allow the physical and digital networks to converge, bringing advanced sensors, software and self-awareness to the system.

**CHART 8: SUPPLY CHAINS OF A SMARTER PLANET ARE**

- **Instrumented**
  - Dashboards on devices display the current status of plans, commitments, sources of supply, pipeline inventories, conditions of goods, and consumer requirements in real-time.

- **Interconnected**
  - Collaborative networks of world-wide partners sharing in decision making, risks and rewards. Begin and end with the final consumer in the forefront and maintain balance in the consumption of global resources.

- **Intelligent**
  - Supply Chains are monitored automatically and self-learning to make corrections during disruptions to the flow of goods and services world-wide.
“New intelligence” will flow from advanced computing technologies and expertise that can reveal insight from mountains of real-time information. The value of a smarter supply chain is in how we can now extract value from a variety of data – including geospatial or location-based information, information regarding product attributes or processes/conditions the product has gone through, supply chain key performance measures, etc – and the velocity with which data flows. Smarter supply chains, fit for the 21st century, enhance efficiency (e.g., dynamic supply and demand balancing, predictive event detection & resolution, high visibility of inventory levels and product location driving reductions in stock levels), mitigate risk (e.g., decreased likelihood and mitigate impact of contaminations and recalls, reduced product liability insurance premiums, protection against growing problem of consumer product counterfeiting) and reduce the environmental impact of our supply chains (e.g., reduced energy & resource consumption and reduced pollutant emissions).

SPECIFIC SMARTER SUPPLY CHAIN APPLICATIONS

Optimal Supply Chain Network Design

A supply chain logistics network sounds like a simple thing – a system developed to move goods from supplier to customer. Yet, dig deeper and you discover that networks are currently hampered with redundant and inefficient facilities, high inventory storage costs and low truck load rates. An ever-changing marketplace – one frequented by mergers, acquisitions, expansion into new territory, new product introductions – further complicates the delivery of goods.
A smarter supply chain is one which optimizes the supply chain network, from raw materials to finished goods, through a powerful analytic and simulation engine. This assists in determining facility locations and ways to optimize the supply portfolio, and helps with strategic inventory allocation. As a result, companies can realize a virtually seamless end-to-end supply chain with an optimized network design, which leads to more control and less assets, reduced costs (transportation, storage, inventory), reduced carbon emissions, as well as improved customer service (lead time, on-time delivery, speed to market).

Case Study

COSCO LOGISTICS TRANSFORM INTO A ‘GREENER’ SUPPLY CHAIN

One of the leading logistics providers in China, with a growing global presence, needed to reduce distribution and line-haul transportation costs as well as inventory levels.

The company implemented a project to optimize logistics planning from manufacturing sites to customer delivery, so as to streamline the supply chain network. Adding further value, the project analyzed the current carbon footprint and developed alternative logistics strategies to reduce carbon emissions (e.g., tradeoff analysis between carbon, logistics cost and customer service, and alternative mode and freight consolidation strategies). As a result the company was able to reduced their number of distribution centers from 100 to 40, reduce distribution cost by 23%, reduce fuel consumption by 25%, and achieve a carbon reduction of 10-15% (equivalent to a reduction of 100,000 tons of greenhouse gas emissions annually).
Full Value Traceability – Bringing Visibility To The Supply Chain

The ability for each member of a supply chain to trace the ownership and characteristics of ingredients, packaging and products backwards as well as the ability for each member of a supply chain to track the movement of ingredients, packaging, and products forward through the supply chain is becoming critical.

Designing a supply chain with full value traceability requires companies to set up processes that allow for and an infrastructure that can collect, integrate, analyze and communicate credible information about the ownership and characteristics of a product through all stages of the supply chain (from farm-to-fork). It combines different technology solutions so that the physical supply chain (movement of actual goods) and information supply chain (collection, storage, organisation, analysis and access control of data) become integrated. The resulting supply chain visibility allows companies to protect and empower the brand, proactively engage different stakeholders, and reduce the impact of safety-related incidents.
Case Study

**MATIQ IS LEADING THE WAY WITH A FIRST-OF-ITS-KIND TRACEABILITY SOLUTION**

Matiq is the IT subsidiary of one of Norway’s largest meat and poultry manufacturers and suppliers. The company sought to expand its capabilities and footprint into new marketplaces to generate new revenue streams.

The solution was to implement traceability technology to track and trace poultry and meat products from farm through the supply chain, to supermarket shelves. Each product package is now tagged with a RFID chip to help ensure products are kept at optimal conditions throughout the supply chain, improve quality control and food safety, take advantage of a standardized way in which to obtain information, and comply with upcoming government food industry mandates.

Now data is captured and analyzed across the entire value chain, which means increased efficiency and reduced cost as well as supply chain optimization in the form of enhanced stock management and improved responsiveness of the supply chain to changing customer buying patterns.
SMARTER BANKING

Smarter banking is:

**OPTIMIZED**
Non-customer interactive back office process is centralized and handled remotely to ensure better process compliance and allow branch employees to focus on value added services

**INNOVATIVE**
Continuously develops new products and new process to sharpen competitive edge and penetrate into new market

**CUSTOMER INSIGHT**
Utilizes and analyses personal consumption data as well as relationships across people, groups and organizations to provide customers with customized banking services

**BETTER RISK MANAGEMENT**
Implements BASEL II projects from data architecture to credit management and currency trade to realize risk-proof operation

**CONNECTED**
Digitalizes the transaction and customer interaction process to allow real time connectivity with customer and realize customer self-service to empower customer in service selection and control.

**INTEGRATED**
Combines cross-region, cross-function, cross-service businesses and cross channels into one platform to form a shared view of the customer and provide “one stop shop” for customers
The current global financial crisis has increased pressures on China’s banks; even though China’s banking industry is less sensitive to the financial crisis, economic fundamentals are weakening. The result is lower demand for credit, increased default loans, decreased interest margins, all of which jeopardize a banks’ earning capability and shrinks a banks’ earning assets. In the long term, tighter financial supervision, growing market competition, requirements of BASEL II compliance and complicated and widening business portfolios will require Chinese banks to focus on customer care and insight.

Smarter banking is the use of more powerful and efficient information and pervasive connection and interaction with customers.

Take for example the fact that now customers can enter the virtual world to demo and become familiar with different banking solutions and services. After the virtual visit, customers can access the bank’s website and tailor their accounts; applications for new services, such as affiliate credit card holders or opening additional accounts, can be submitted online, removing the hassle of waiting in line at the bank. All account actions are then confirmed via text message and/or email.

Smarter banking, and its reliance on self-service counters or portals, leverages back office centers to reduce the workload of branch staff and improves overall customer experience. Banks can focus more on value added services, such as
E-teller or e-counter allows customer to experience the banking products, conduct transactions and enjoy multi-channel service without queuing up at the branch.

Virtual bank extends banking service from branches to home, office or anywhere an internet access exists. Centralized back office connects branches and virtual bank and enables low cost and high efficient operation.

The risk management infrastructure with Chinese character auto-matching system and domain knowledge guiding mechanism can make the risk management of the banking an high intelligent process.

stocks, funds, and portfolio management. Smarter banking also eases pressure on management, as now banks are equipped with intelligent risk management.

For instance, credit card managers will receive a daily “unusual application report” which shows suspicious applicants whose name or address are similar to someone blacklisted for default payment. The credit card manager can quickly and efficiently filter applicants and avoid possible risk.
SPECIFIC SMARTER BANKING APPLICATIONS

Enterprise Risk Management

According to China Banking Regulatory Commission (CBRC), all banks in China should meet Basel II compliance requirement by the end of 2010. This means more than 8,000 legal entities of the banking institutions and 124 city commercial banks in China need to invest significantly in their risk management system. However, due to missing and incomplete data, Chinese banks cannot easily adopt existing worldwide solutions directly into their systems. Further complicating the task is China’s historical bank risk assessment which is based on domain knowledge and lack the historical transaction data as foreign banks do, making it necessary for local customization and development of solutions.

Implementing an Enterprise Risk Management system, which can extract information from different systems across the bank, analyze the information based on certain risk assessment processes, and optimize the information for management decision making, is critical to addressing the aforementioned challenges. The system covers three key risk management areas – credit, operation and market – and applies data cleansing techniques to improve data quality. The system also integrates the banks’ domain knowledge and China’s specific financial market features into the application level of risk management.
Back Office Centralization

Customers in China are very familiar with the long queues at banks. In Beijing, the average customer has to wait about 85 minutes to have his/her transaction completed. One factor contributing to long waits is the fact that complicated and uncommon business procedures are handled at the counter.

By centralizing and automating certain approval or auditing procedures or non customer interactive back office activities at shared service centers at the provincial or national level, banks can free employees in the branches to focus on sales and marketing activities. Functions that are traditionally offered in separate channels like ATM, telephone banking, internet banking can be integrated into a single self service counter located in the branch, which allows customers to serve themselves without queuing up for counter service.

Data in different repositories can be integrated and consolidated to offer a single view of the customer, which in turn supports different applications that requires access to customer information in different areas of the bank. The different back end processes and IT applications supporting various customer-facing channels will also be integrated. From a risk management point of view, back office centralization ensures implementation of standardized approval mechanisms across all the branches, and the single customer view allows bank to discover abnormal transactions for a particular customer. These all helps reduce the chance of bad debts or other risks.
Case Study

A LEADING INTERNATIONAL BANK’S BACK OFFICE CENTRALIZATION

Within a couple of years, this bank expanded quickly from a regional bank to an international bank through aggressive mergers and acquisitions. However, M&A also meant new challenges, such as an expanded and more complicated customer base, product portfolio and branch management. As a result, the bank faced profitability, efficiency and cost control pressures.

The bank centralized selected middle office and back office processes from IT infrastructure, operation and service to form a “back office operations center” and set up a single platform to support multiple services and channels. As a result, it significantly reduced the workload of the branches to enable the branch to dedicate more time and efforts to marketing and sales. With the transformation, the bank also streamlined the payment process and reduced transaction time and work load in the front counter. From 1999-2003, due to the implementation of “back office operation center”, the bank’s cost income ratio decreased from 58% to 43%.
Smarter Water Management
Smarter Grid
Smarter City
Smarter Traffic
Smarter Healthcare
Smarter Oil
Smarter Food Systems
Smarter Communications
Smarter Banking
Smarter Retail
LET’S BUILD A SMARTER CHINA TOGETHER
Up to now, we’ve thought of physical infrastructure and IT infrastructure as separate: airports, roadways, buildings, power plants, oil wells, on the one hand; and datacenters, PCs, cell phones, routers, broadband, etc., on the other. The first was the stuff of concrete, wires and steel; the second of bits, chips and bandwidth. We have now arrived at a historical crossroad, where the infrastructure of atoms and the infrastructure of bits are merging.

This is a once in a lifetime opportunity that China must capture. China should leverage this new smarter model immediately to make real change in order to leapfrog to the next level of development. The transformation into a smarter China means sustainable economic development, prosperity and a leading role in the 21st century. Pursuing a smarter growth path requires investment in an instrumented, interconnected, and intelligent physical, technological, and human infrastructure.

Thus, smarter planet is a revolutionary trend that we cannot ignore nor resist. It is a journey that requires the participation and collaboration of every government, company and individual. Together we build our vision, contribute our expertise, innovate and develop.

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 it?

The technologies are ready. The only limitation is imagination.
APPENDIX

Job Creation Model Methodology

To measure how investment in smarter power grid, smarter healthcare and smarter city would result in job creation, IBM IBV collaborated with Department of Informatization Research, State Information Center and created a “Job Creation Model”, which is based on Wassily Leontief’s "Input-output method ".

Department of Informatization Research, State Information Center determined the number of direct jobs created in each industry using industry-specific data on employee work efficiency (GDP created by each employee) provided by the National Bureau of Statistics of China. They then calculated the number of indirect and induced jobs created using industry-level employment multipliers from National Bureau of Statistics of China.

Job creation parameters & multipliers

<table>
<thead>
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<th>Direct Jobs Parameters</th>
<th>Indirect Jobs Multiplier</th>
<th>Induced Job Multiplier</th>
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<tbody>
<tr>
<td>Software and Services</td>
<td>0.02504</td>
<td>0.01496</td>
<td>0.08680</td>
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<tr>
<td>Hardware</td>
<td>0.07419</td>
<td>0.05081</td>
<td>0.06550</td>
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<tr>
<td>Construction</td>
<td>0.01996</td>
<td>0.04356</td>
<td>0.07557</td>
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</tbody>
</table>

Notes: *Direct jobs are those created specifically by new spending (e.g. installation and equipment); **Indirect jobs are those created to supply the materials and other inputs to production; ***Induced jobs are those created by newly employed workers spending their paychecks (e.g. restaurant and retail jobs);
Job Creation in Smarter Healthcare/Broadband/Smarter Grid

<table>
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<tr>
<th>Industries</th>
<th>Investment (RMB bn)</th>
<th>Direct Jobs (Thousand)</th>
<th>Indirect Jobs (Thousand)</th>
<th>Induced Jobs (Thousand)</th>
<th>Total Jobs (Thousand)</th>
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<tbody>
<tr>
<td>Smarter Grid</td>
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<td>79.1</td>
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<tr>
<td>Smarter Healthcare</td>
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<td>Broadband</td>
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<td>256.0</td>
<td>232.9</td>
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</table>

Detailed data source include:
- China Statistical Year Book of Tertiary Industry 2007
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- China Statistical Year Book 2003
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