CREDIT SUISSE

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Expertenwissen für Anlagekunden der Credit Suisse

Global Investor **Focus**

Innovation

Bye-bye Blockbuster > Nischenprodukte statt Massenmarkt
Macht der Konsumenten > Mehr Einfluss dank digitaler Vernetzung
Umdenken > In den Emerging Markets zählt nicht nur Profit

Photos Cover: Stefano Bianchetti, Ole Graf/zefa/Corbis

Innovation

The word *“innovation”* derives from the Latin *“novare”*, which means “to renew” or “to change.” So innovation does not just refer to a pioneering invention. It can also imply a promising further development or improvement of something which exists already. Some definitions emphasize the difference between “invention”, as conceiving an idea, and innovation as its embodiment. In the first half of the 20th century, the economist J. A. Schumpeter first used the word “innovation” to refer to the process of creative destruction. Indeed, to achieve economic success, companies must not only keep developing new products, but also constantly rethink their business models and adapt their processes to current conditions. This is absolutely decisive in today’s interconnected world. While innovative products are important, they can only offer profit for a limited time, notwithstanding patent protection. It is only a matter of time before they will be copied, developed and, quite possibly, improved further.

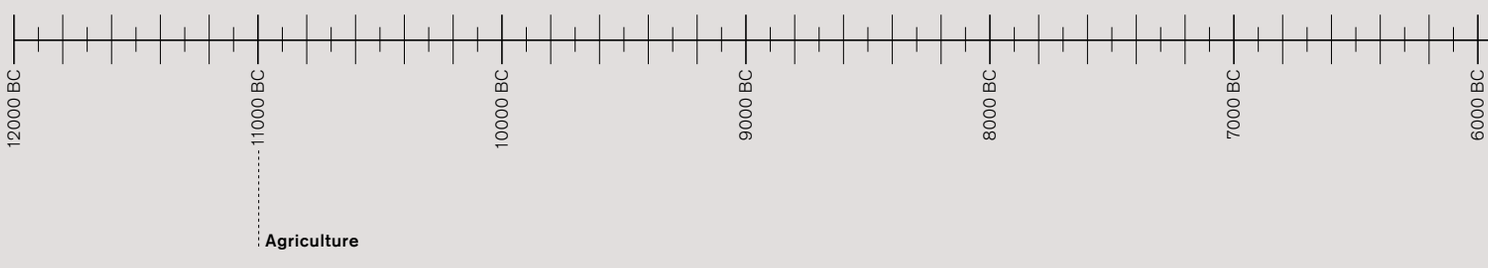
Why now?

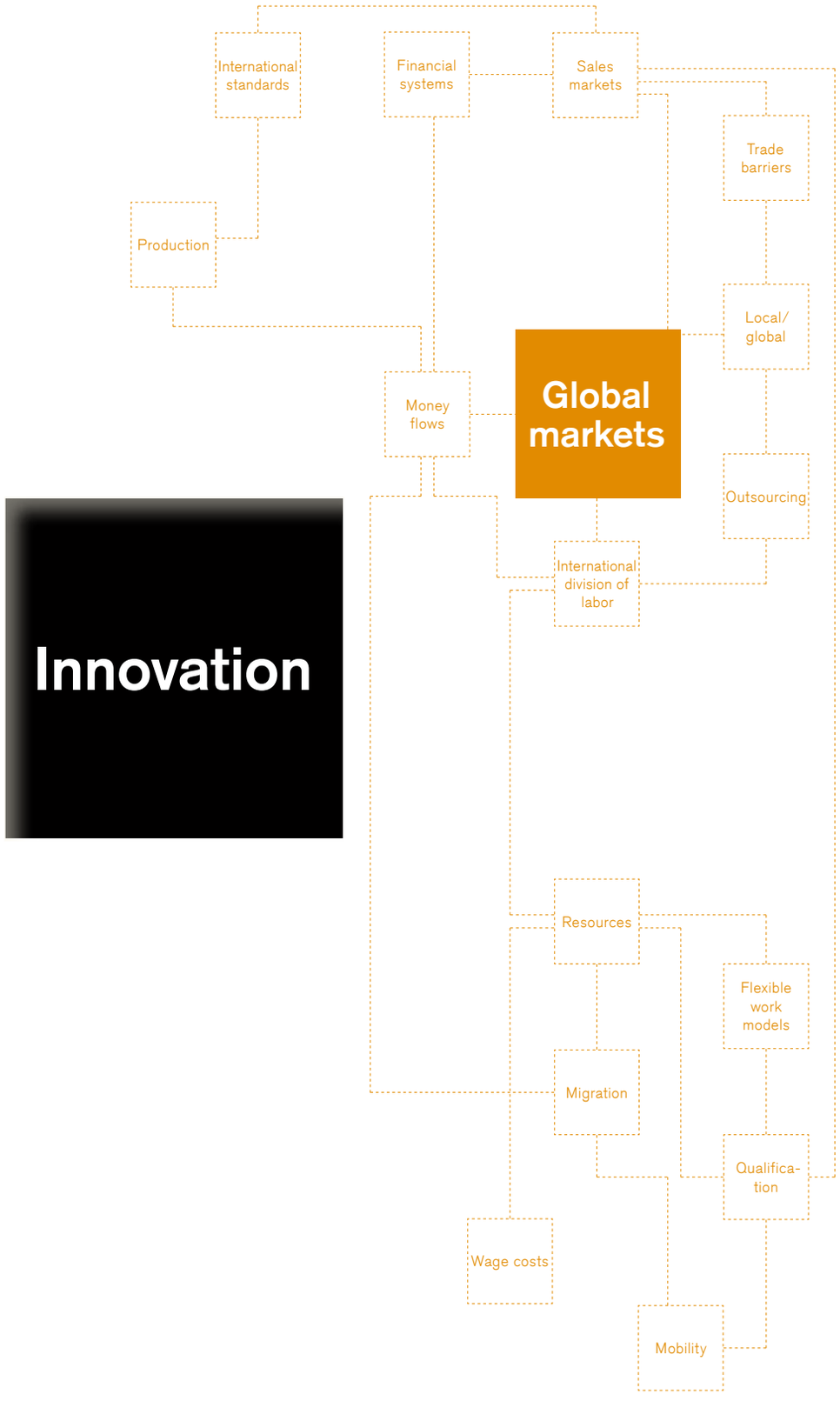
Innovation

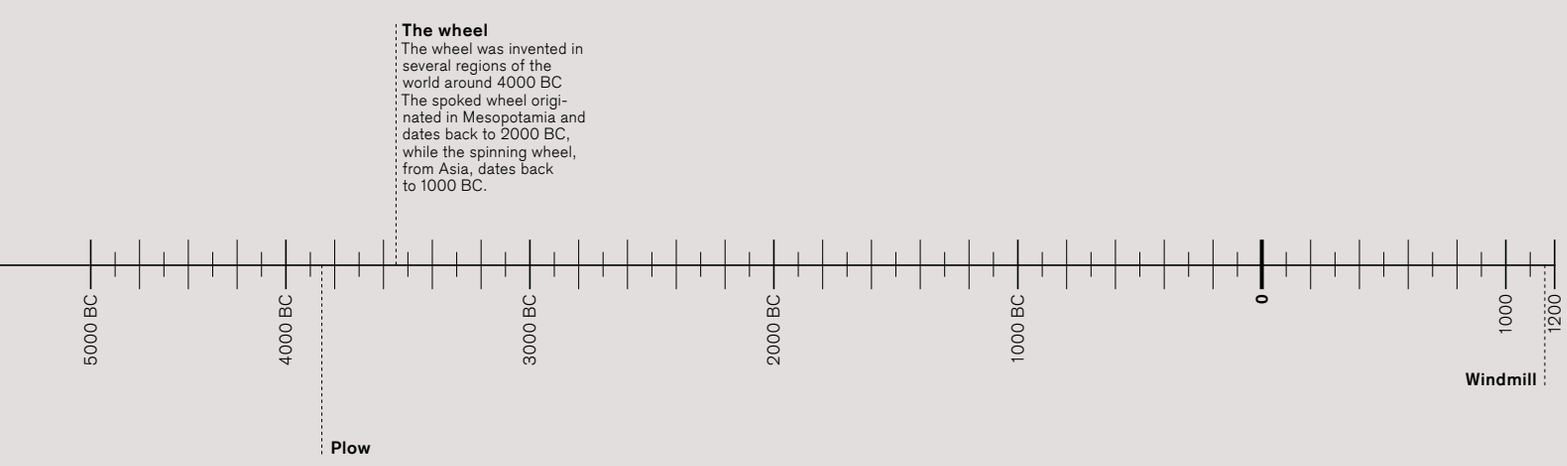
Global markets T-shirts from China, roses from Ecuador, wine from South Africa: faster communications and transport, simpler financial systems and the political will to remove trade barriers are making international commercial relations more interdependent. Production takes place where costs are lowest or know-how is greatest. The worldwide market offers opportunities: wider prosperity, bigger sales and more resources. But international competition also creates insecurity and fear. In Western countries, jobs for low-skilled employees are scarce. Migration has brought additional labor on to the market, and different cultures clash. The search is on for improved working patterns and fair and even-handed terms of trade.

Why now?

Photo: NASA/Roger Ressmeyer/Corbis




International standards
Financial systems
Sales markets
Trade barriers
Production
Local/ global
Money flows
Global markets
Outsourcing
International division of labor
Innovation
Resources
Flexible work models
Migration
Qualifica-tion
Wage costs
Mobility


The wheel
The wheel was invented in several regions of the world around 4000 BC The spoked wheel originated in Mesopotamia and dates back to 2000 BC, while the spinning wheel, from Asia, dates back to 1000 BC.
5000 BC
4000 BC
3000 BC
2000 BC
1000 BC
0
1000
1200
Plow
Windmill

Why now?

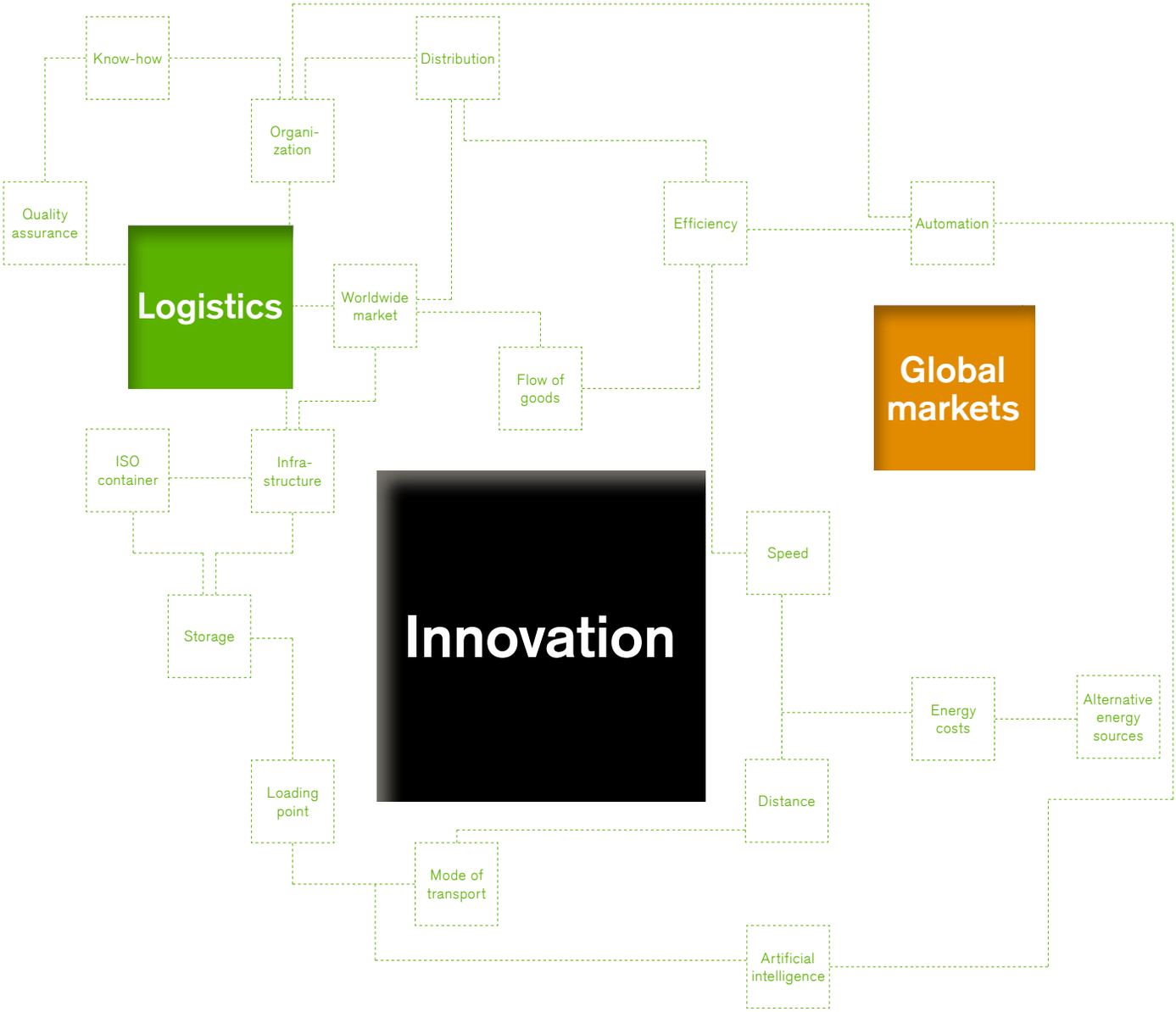
Logistics In the past, trade routes lay along difficult and dangerous tracks. This meant that goods manufactured at a distance were rare and precious. Nowadays a gigantic transport network spans the globe. Every day, tonnes of goods are conveyed in modular containers by air, truck, rail and on container ships. Technical progress makes it possible to increase the speed and efficiency of the flow of goods. In particular, automation allows better synchronization of processes at docks and depots. This not only saves time, but also expensive storage. On the other hand, climate taxes and increasingly scarce fossil fuel resources may well increase transport costs again. Renewable energy sources are therefore vital to the logistics sector.

Photo: image100/Corbis

The printing press
Between 1450 and 1455, Johannes Gutenberg of Mainz, Germany, developed the printing press, with moveable type made of metal. Type for printing using woodblocks had already existed in China since 600 AD.

1200 1250 1300 1350 1400 1450 1490

Spectacles



The share
On 27 September 1606, the Vereinigte Ostindische Compagnie (VOC) in Amsterdam issued the first "andeel" – a share of stock.

The steam engine
In 1769, the Scotsman James Watt registered a patent for his steam engine, which was actually an improved version of the machine that the Englishman Thomas Newcomen had constructed in 1712.

1500 1550 1600 1650 1700 1750 1790

Pocket watch

Treadle spinning machine

Microscope

Telescope (astronomical)

Telescope

Pendulum clock

Steam boiler

Blast furnace

Cast steel

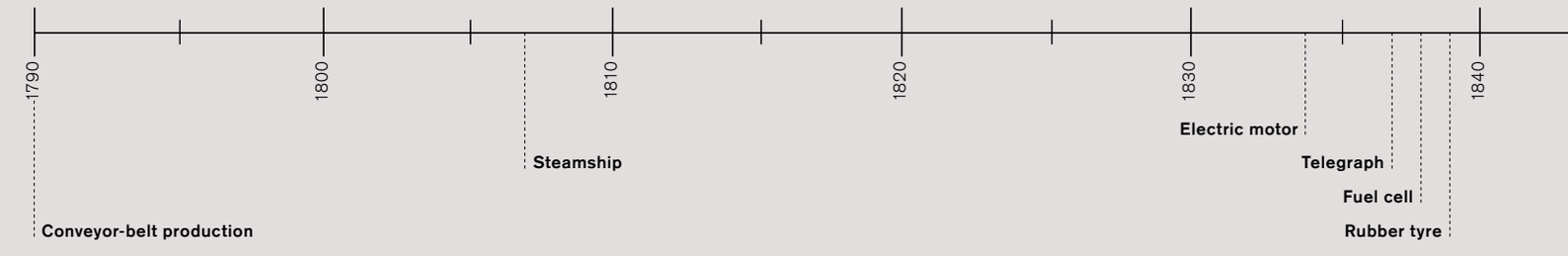
Spinning machine

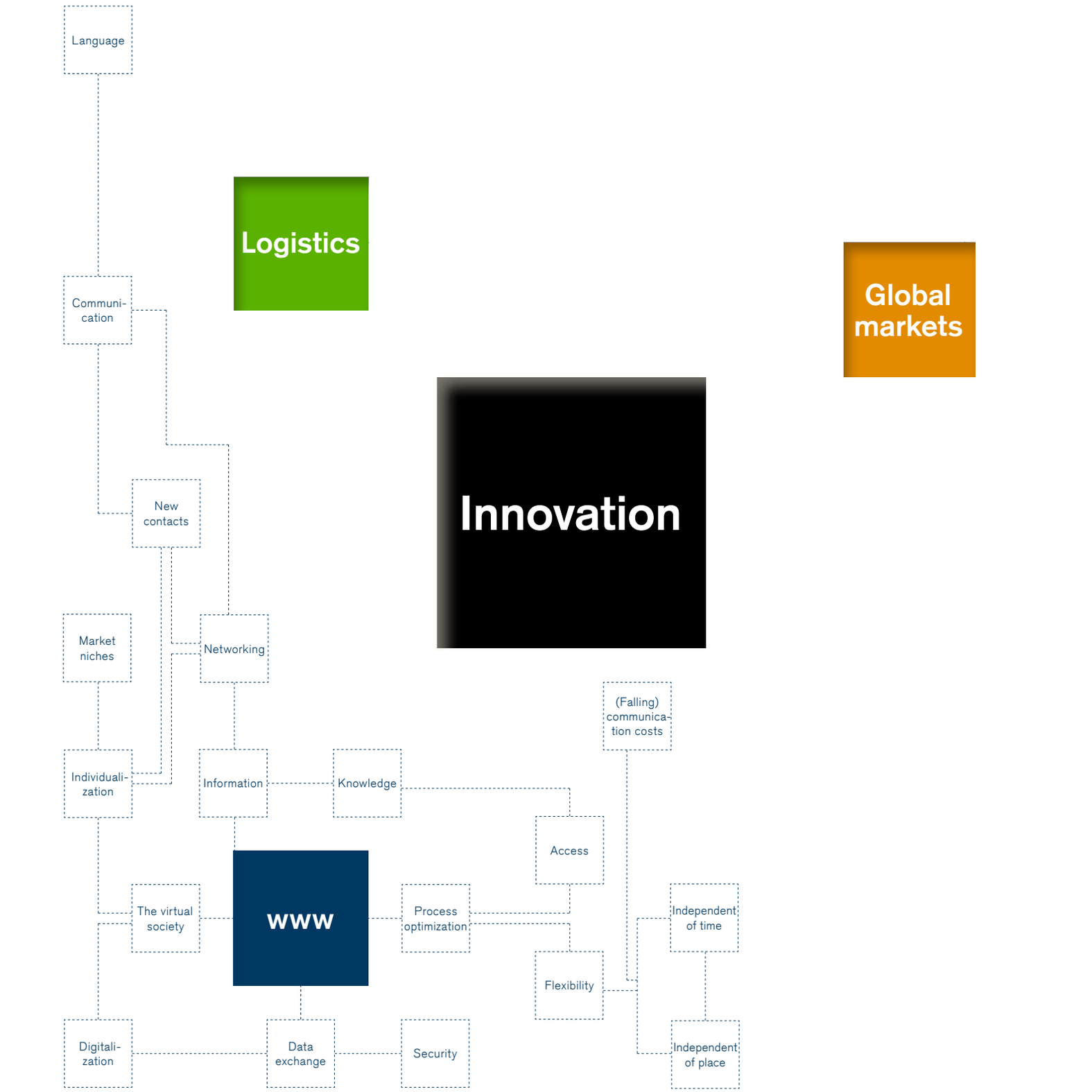
Steam-powered car

Why now?

The World Wide Web The Internet is a means of communication, a knowledge platform, a trading exchange and a network all in one. Regardless of place and time, people meet and swap wishes and ideas almost instantaneously. One person may be looking for a solution to a specific problem. Someone else may have an idea, but not know a suitable application for it. Perhaps their virtual paths will cross. The result is a fresh product and, in some cases, an innovation. Many websites serve as platforms for ideas and then facilitate the process of innovation. Realizing the new used to be lonely, backroom work. Later, it became a more-or-less linear process in institutionalized research and development departments. Now, in the Internet age, it is often a chaotic interplay of disciplines.

Photo: Ausloeser/zefa/Corbis





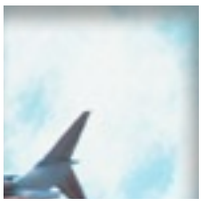
The telephone
Alexander Graham Bell registered a patent for the telephone in 1876. His invention was based primarily on the work of Antonio Meucci, who had publicly unveiled his telephone system in 1860, but without securing a patent for it.

The light bulb
In 1880, Thomas Alva Edison was awarded a basic patent in the USA for his improved incandescent light bulb based on the use of a carbon filament.

The automobile
In 1886, Karl Benz of Mannheim, Germany, built the first gasoline-powered automobile. Shortly thereafter, Gottlieb Daimler and August Wilhelm Maybach from Stuttgart followed suit with their automobile. Berta Benz went for the first successful long-distance drive in 1888.

1850 1860 1870 1880 1890 1900

Steam locomotive
Airship
Dynamo
Dynamite
Punched card tabulating
Electric railway
Motorcycle
The film camera
Telephone
(automated exchange)
Radio engineering
Diesel engine



Why now?

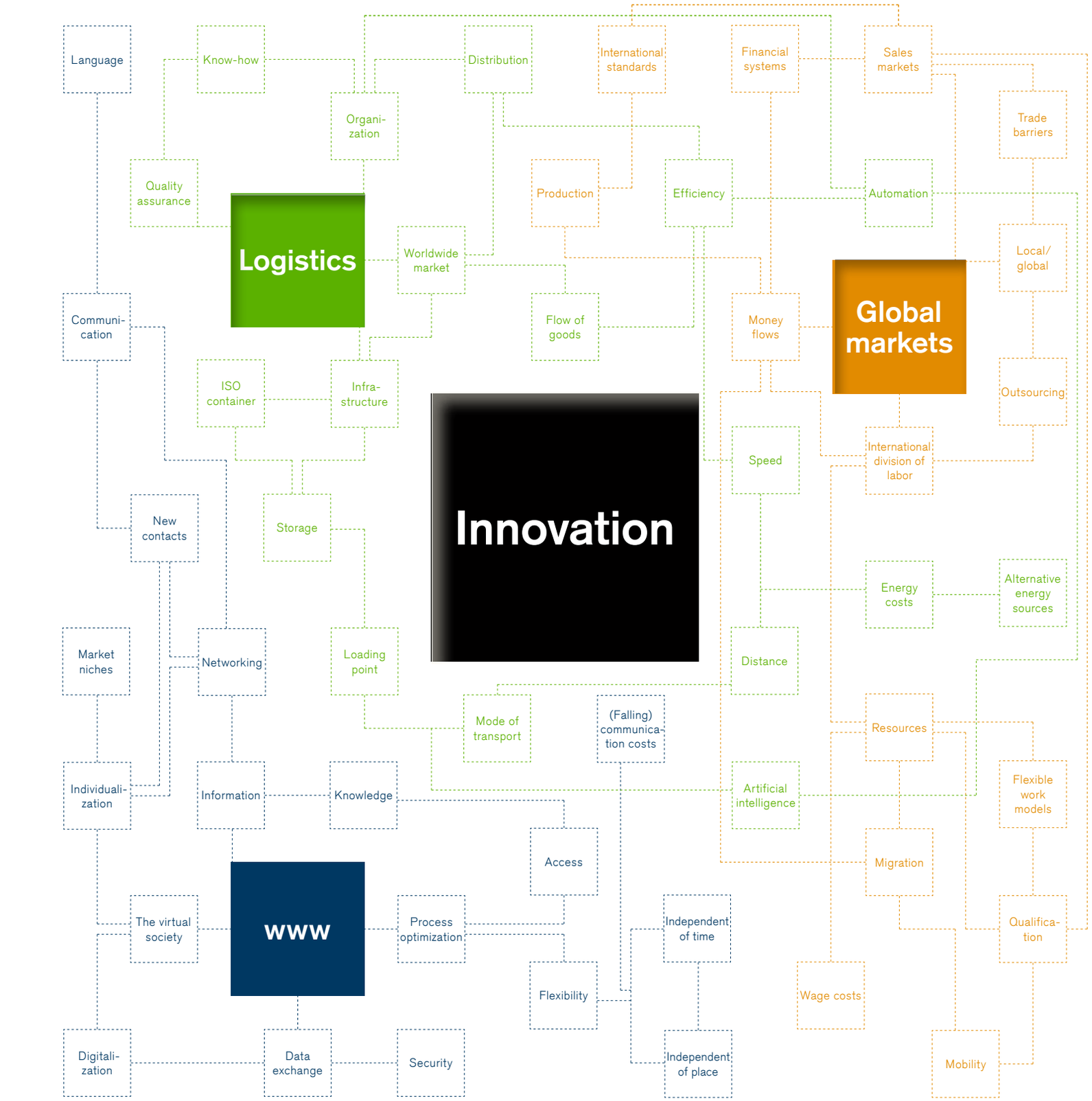
The radio
In 1896, Russian Alexander Popov transmitted the words “Heinrich Hertz” to a receiving station 250 meters away. But Guglielmo Marconi is generally credited with inventing radio at round the same time, while the ground-breaking work of Nikola Tesla also played a vital part in this innovation.

The airplane
On 17 December 1903, two American brothers, Orville and Wilbur Wright, made their first successful machine-powered flight over a distance of 260 meters at Kitty Hawk, North Carolina.

The computer
1946 was the year ENIAC was created — the first Electronic Numerical Integrator and Calculator. In 1947, IBM built the SSEC (Selective Sequence Electronic Calculator), a hybrid computer featuring vacuum tubes and electromechanical relays.

1900
1910
1920
1930
1940
1950

Fluorescent tube
Superconductor
Tank
Zip fastener
Supermarket
Traffic light
Television
Helicopter
Photocopier
Teflon
Atomic bomb
Transistor
Bar code
Scanner



The microchip
Jack Kilby, American engineer and recipient of the Nobel Prize for Physics, submitted a patent for the first integrated circuit on 6 February 1959 — and so the microchip was born.

The Internet
In 1989, British computer scientist Tim Berners-Lee, who worked at the CERN nuclear research organization in Geneva, proposed a project to his employer based on hypertext (HTML), simplifying the global exchange of information among scientists. The World Wide Web emerged.

Decoding the human genome
In April 2003, the international Human Genome Project (HGP) announced that it had succeeded in decoding 99% of the complete DNA inheritance, or genome, of human beings. The project had kicked off in 1990 in the USA, Germany, the UK, France, Japan and China.

1960 — 1970 — 1980 — 1990 — 2000 — **2007** — 2010

Computer mouse
Floppy disc
Chip card
Video game
CD
Wind farm
MP3
Solar energy
Cloning of animals
Programmable materials
Mobile telephone
First solar cell
Nuclear power plant

1. Shopping carts that you can't steer properly **2.** Bad cell phone connections. **3.** Garbage cans with revolving lids. **4.** Umbrellas that collapse in the slightest gust of wind. **5.** Dishwashers that fail to clean the dishes. **6.** Incomprehensible directions for programming video recorders and microwaves. **7.** The settings on ovens. **8.** Irons that leak water. **9.** Computers that crash.

Source: www.tiscali.de, Photo: Josh Westrich/zefa/Corbis, Marco Cristofori/Corbis, Lili K./zefa/Corbis, Digital Vision, The Image Bank, Serge Kozak/zefa/Corbis, Photonica, Photodisc

Be innovative!

The last time you went shopping, were you faced once again with a shopping cart that had a mind of its own? Did you wonder how just four wheels could all roll in different directions? Perhaps you got to grips with it in the end, but then you were unable to make that important call because of poor cell phone reception. You might have tried to ditch the telephone in the next garbage can, but it had one of those revolving lids, requiring either an excellent throwing technique or the use of both hands. And you only had one free hand, because in the other you were still holding that broken umbrella you had just bought — the one whose spokes snapped the first time it was opened. Isn't it time to finally improve these bothersome things we encounter in our day-to-day lives?

Photo: Hans Schürmann

One nanometer measures 0.000000001 meters. The relation between 1 meter and 1 nanometer corresponds to that between the diameter of the earth and that of a hazelnut. The fact that we have been able to penetrate this world of ultrasmall particles in the first place is down to a groundbreaking innovation: the development of the scanning tunneling microscope. Thanks to this, it is now possible to make these microelements usable. They could lead to revolutionary advances in medicine, with nanoparticles being used as tiny markers to make individual genes, proteins or even small molecules visible and to track them in cells. Credit Suisse recognized the potential of this key technology at a very early stage and is now making connections between investors and scientists.

For innovation to occur in the first place, the right basic conditions are of vital importance. These conditions also include the interplay between science and economics. Only those who succeed in getting knowledge out of the laboratories and into the market quickly are able to survive in the long term in the face of intense competition. Investors in particular play an important part when it comes to providing access to the market for promising developments in research.

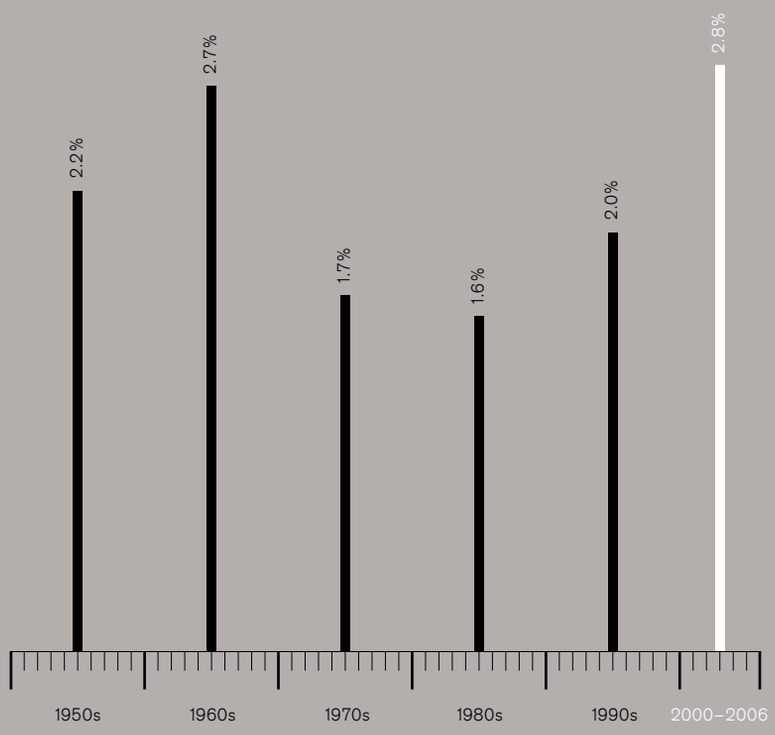
History shows that innovation has always been an important driver of economic growth and continues to be so. The Asian countries with their rapidly burgeoning economies provide a very good example of this from recent history. They show very clearly what a spirit of innovation can achieve, and that it pays to take entrepreneurial risks in order to foster progress and growth.

This is very much in the spirit of the “tradition to innovate” to which Credit Suisse feels it has been committed for over 150 years. For us, as a global financial services institution, the challenge is also to make these developments in research and industry useful to investors by looking ahead in order to identify future trends, asking critical questions and seeking dialog with our clients. Which is precisely what we also want to do with this current edition of Global Investor Focus.

Arthur Vayloyan
Head Private Banking Investment Services and Products

2.07

US non-farm productivity average annual growth rate



Source: Datastream, Credit Suisse

America's golden era returns thanks to innovation

US productivity growth in 2000–2006 reached record levels, as the technological innovations of the last 20 years fed through into the economy, bolstered by the effects of globalization and greater urbanization.

The new wave of innovation

The quantum leap forward in information technology over the last two decades has unleashed one of the most important waves of innovation since the advent of electricity. And as this issue of Global Investor Focus shows, the momentum is still building, opening up a whole new field of investment opportunities.

Giles Keating, Head of Global Research, Credit Suisse

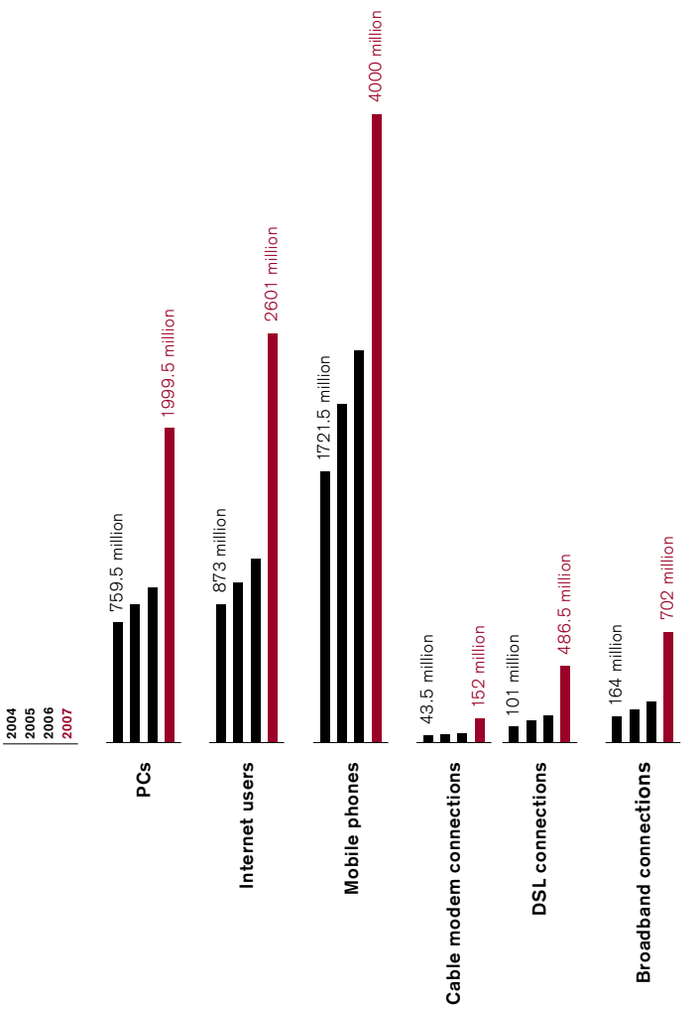
The most powerful innovations, driving leaps in economic growth and business opportunities, center on technologies that enable other technologies. A century ago the harnessing of electricity played this role, facilitating development in areas as diverse as automobiles and radio. Nowadays, information and communications technologies go even further. They drive innovation in sectors ranging from mass entertainment to air travel, but also support other enabling technologies such as financial engineering and nanotechnology, which in turn facilitate further innovation.

The recent acceleration of US productivity to record levels is evidence that the current technology cluster is much more powerful than its predecessors (see graph opposite). Moreover, its impact is magnified by interaction with other large-scale changes, such as urbanization and globalization. This Global Investor Focus aims to give investors road signs showing the direction innovation is taking the macroeconomy and financial markets, while also looking at some of the investment opportunities it is triggering.

A guiding theme from our eminent contributors is that we are still in the early stages of the information and communication technology (ICT) revolution, with far more impact still to come (see graph on page 8). If this is right, it bodes well for investors, since it suggests many future years of high-productivity growth. Professor Giovanni Dosi of the Sant'Anna School of Advanced Studies, Pisa, argues that the impact of the PC, the Internet and mobile phones, though substantial, does not yet represent as great a break with the past as, say, the move from horse-borne letters to the telegraph and the telephone. What might help unlock another leap forward? Chris Anderson of "Wired" magazine argues that the key is generational: "Technology does not really show what it is all about, until a generation has grown up with it." I think he is quite right. Why are our cities still full of buses that drive around with many empty seats on fixed routes, rather than responding to passenger requests keyed in by cell phone? The technology is there, but it will take a new younger generation of entrepreneurs and city leaders to see its application as natural.

A second crucial broad theme is that innovation is as much about process and organization as it is about physical science. Professor Niraj Dawar, University of Western Ontario, Canada, gives the fascinating example of Orica, which moved from the commodity business of selling explosives by the kilogram, to the value-added business of selling an outcome, measured in terms of the amount of rock moved and the error tolerance. The physical material being sold was the same, but the process behind the offering to the customer was utterly innovative. Professor Dosi takes the same idea but stresses it at the level of society as a whole, arguing that social organization is still stuck in the mass-production era that followed the Second World War. He believes institutions ranging from social welfare systems through to labor unions, and the relationship between government and consumers, need to be redesigned around technology now far more diffuse and responsive.

And this leads to a third key theme, which is the growing power of the consumer, including very poor ones, in a world where ICT makes it so much easier to tailor products to new customer segments, or individual needs. This is stressed by Professor C. K. Prahalad of the University of Michigan, author of "The Fortune at the Bottom of the Pyramid." He notes how firms like Motorola, Nokia



*DSL, cable modem and others. Source: Bitkom, Daten zur Informationsgesellschaft, 2006; Forecast 2015: Zukunftsinstitut

The rise of the PC/Internet generation

Growth in the global information infrastructure is only just getting under way. By 2015, usage will have multiplied many times in some cases.

and Samsung are adapting their business models, previously aimed at rich Western consumers, to provide low-cost handsets for the six million wireless subscribers added monthly in India.

A closely related phenomenon is the ability of microfinance to give tiny loans to multiple millions of low-income borrowers, as described by Richard Weingarten of the United Nations Capital Development Fund. Anderson addresses the same idea from a different standpoint, stressing how the new technologies allow a "long tail" of highly specialized or customized products, to satisfy tiny markets. In both cases, costs are being lowered to reach more people and create new sources of profit, but in the first case, mass markets are made even more "mass," while in the second, firms are finding millions of novel niche markets. Intriguingly, Prahalad argues that these two developments may merge, as the long tail of customized products spreads to low-income consumers.

But of course, investors must be alert to the way that old business models can be damaged by these changes. Anderson notes that the week of 20 March 2000, when the dotcom bubble burst, also saw the release by the band *NSYNC of an album that sold 2.41 million copies in the first week. No album has sold as well since, and he believes none ever will. The main reason is not piracy, but the way that music downloads allow consumers a vastly greater range of choice, and the ability to sample tracks easily. Music sales will no longer be dominated by a few blockbusters. Instead, there will be a long tail of tiny sales by a myriad of little-known artists. The same is starting to happen in video, as YouTube gives enormous scope to amateurs and small-scale production companies, at the expense of mass-market TV.

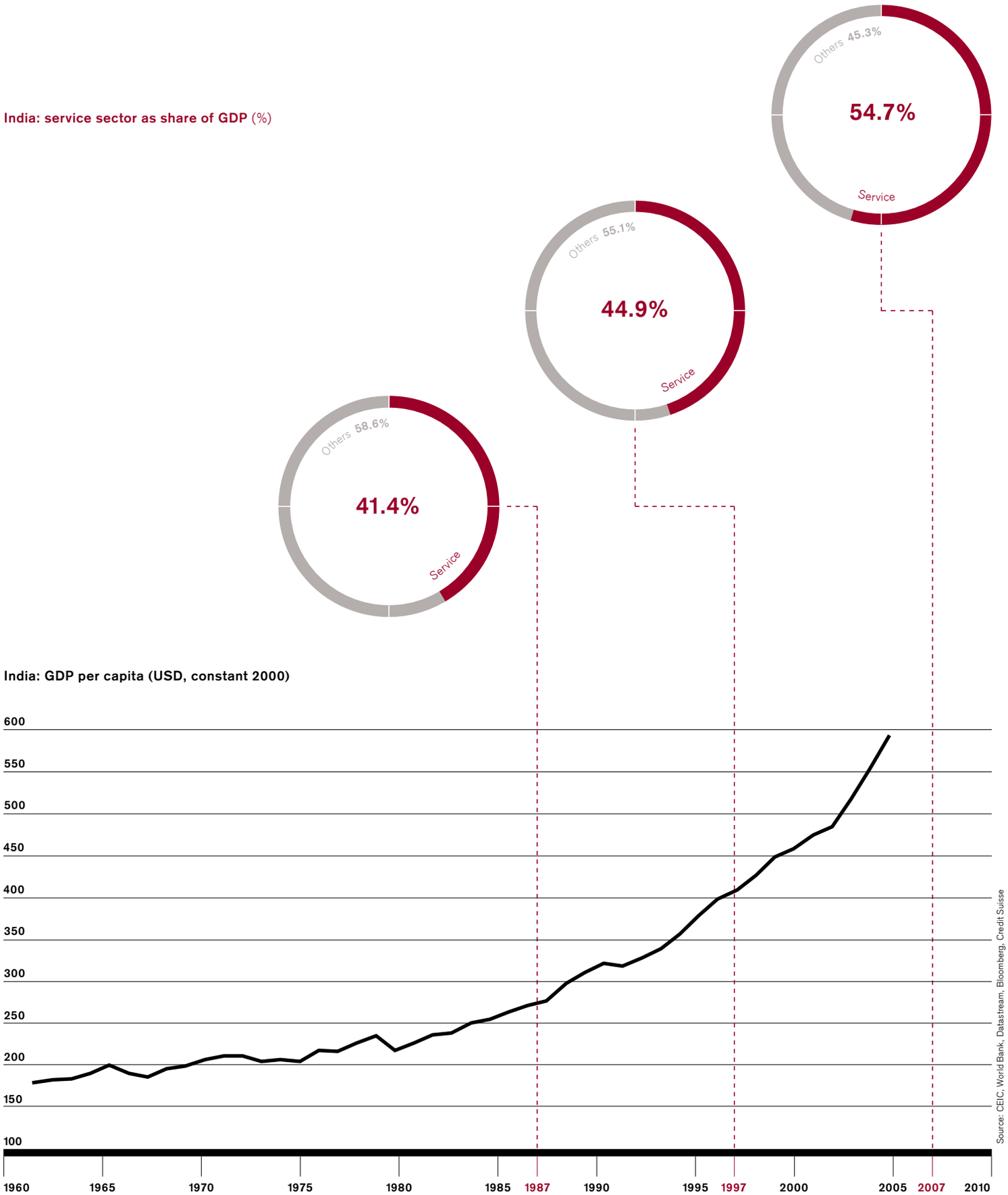
These three big themes lead toward a number of investment conclusions. The argument that we are still in the early stages of the information revolution would indicate a continuing bullish direction for equity markets, assuming valuations are at reasonable levels, and subject to the usual periodic corrections as risk appetite and liquidity ebb and flow. The application of ICT should also help sustain strong productivity growth and hence limit, though not prevent entirely, the upward pressure on inflation, and hence bond yields, that comes from rising energy and commodity prices.

The second big theme, focusing on improved process and organization, suggests investors should favor firms that embrace this type of change. And the third theme, looking at the new power of consumers at the bottom of the wealth pyramid and the long tail of customized markets, points to companies that pursue new business models and philosophies, as well as investments in microfinance and alternative energy. Within this framework, this publication identifies several complementary and concrete investment themes, such as connectivity, customization, financial innovation, and changing global imperatives toward education and logistics.

Moreover, to return to our starting point, the power of the digital revolution lies not only in the innovations it enables directly, but also in the technology it fosters indirectly. Possibly the most important of these is nanotechnology, which incorporates a vast range of scientific developments built on foundations laid by information technology. The potential of this pioneering field in areas such as printed electronics, lighting and health care is enormous.

Innovation has always been integral to capitalism and has always been one of the main sources of high returns for investors. The analysis presented in this issue of Global Investor Focus suggests the pool of innovation-driven investment opportunities may be greater now than ever before. ■

"Innovation is at the heart of value." C. K. Prahalad



India: An innovation hotspot

India has become one of the world hotspots for innovation over recent years, producing notable achievements in medicine, information technology and other sectors. The kindling of an innovative spirit has contributed to the country's economic success story, as highlighted by increasing GDP and the growing role of the service sector.

The revolution is just starting

Growing computer power, nanotechnology, gene science: it is easy to see the early 21st century as one of the globe's most innovative periods. But it can be argued that what we have seen so far of this information-based, technoeconomic revolution has yet to cause shifts as profound as those triggered by, say, the Industrial Revolution or the invention of the internal combustion engine. Changes in the way we foster innovation are needed if we are to gain full benefits of the new revolution.

Giovanni Dosi, Professor of Economics at the Sant'Anna School of Advanced Studies, Pisa

Is technological innovation the most important driving force behind economic growth, or do other factors have equal weight? Since the Industrial Revolution, innovation has been a fundamental engine of growth. History, however, is more complex than might appear at first sight. It is too simplistic to look solely at technological innovation. This must be accompanied by the evolution of organizational institutions if growth is to be sustained. From the invention of modern factories at the end of the 18th century right up to "Toyotism" — the market-driven production techniques developed by Toyota — in the late 20th century, one can see how organizational and technological innovation are essentially two sides of the same coin.

Technological innovation will not create sustainable growth without the evolution of formal organizational institutions. Paul David, Professor of Economics and Economic History at the University of Oxford, says the absence of such organizational development holds back change in major new technological paradigms.

Another factor at play is the rate at which innovation is modulated by the size and dynamic of the market. In the 1960s, a view developed that much innovation was driven by demand, so one would expect that high demand in one area of activity would focus innovation research in that area. But, while some examples back up this hypothesis, others indicate the activity of innovation is governed more by supply than demand. In other words, opportunities arising from developments in advanced applied sciences and engineering can also push innovation. So the idea that bigger markets trigger more innovation is sometimes true and sometimes not.

It is often said that the era of information and communication technology (ICT) is producing one of the greatest ever periods of innovation. Is this the case? Clearly, ICT encompasses a set of broadly applicable technologies that influence the rate of innovation in almost all industrial sectors – and increasingly in the service sector too. In that sense ICT, as a new technoeconomic paradigm, is comparable to electricity or the internal combustion engine, even if the effects are not necessarily as dramatic. For example, changes heralded by the introduction of electricity in terms of speeding up the transmission of information can be seen as much greater than those of the ICT era – the leap between the pre-electricity era of carrier pigeons and horse-back mail and the innovation of the telegraph and telephone was arguably much greater than that from phone to Internet.

Photo: Thomas Eugster

Giovanni Dosi is Professor of Economics at the Sant'Anna School of Advanced Studies, Pisa. He is author and editor of works on economic innovation, industrial economics, evolutionary theory and organizational studies. He is Codirector of task forces on industrial policy and intellectual property rights at Columbia University and is a consultant for the OECD, UNCTAD and other bodies.

So far ICT has made very little difference to consumption patterns. The invention of the cell phone and even the PC have not made as much impact so far as the introduction of the car, washing machine or television did in the past. This view may differ from that of some, but right through history, people have tended to praise the innovations of their time at the expense of those of preceding eras. This happened in the Industrial Revolution and again in the so-called second Industrial Revolution.

ICT may speed up and add value to industrial processes, but it doesn't completely replace them. So, while perhaps 95% of the development of a new aircraft may take place on a computer, it cannot be commercialized without intensive testing in practice – and it is these actual tests that will establish whether a project is feasible or not.

Also, the effects of ICT have not always been as spectacular as hoped for. The pharmaceutical industry, for example, has made huge progress in areas such as genetics, where ICT has played a pivotal role. But such advances have not necessarily paved the way for "silver bullet" cures for diseases in the way that was being predicted 20 years ago. Instead of simplifying the path to a cure, the greater knowledge brought via ICT can reveal a much more complex picture than foreseen. In some cases, we now know that perhaps as many as 1,000 genes may act on a disease, particularly generative and systemic diseases, and this unexpected complexity means the pace of advance in some areas of life sciences has been retarded, in spite of the ICT tools at scientists' disposal.

As more corporate resources go into patenting innovations, or fighting claims of patent infringement, is there a risk of creating a legal straightjacket restricting innovation? There has been a proliferation in the registration of patents, which is not necessarily helpful to innovators. A process similar to that at work in an arms race seems to be going on, with the attitude that if your rivals are patenting everything, then so must you. This is often done just to stake out territory in a technological field, or perhaps with a view to using the patent as a bargaining chip – even if nothing worthwhile is likely to come out of the patent long-term. It has been estimated that the cost of patent litigation in the US now accounts for up to one-third of the country's research and development budget.

The outcome of all this may be merely frivolous, such as the US patent which describes a method of exercising a cat. But it may also be harmful, as can be the case in developing countries. One has to ask whether the aggressiveness with which intellectual property rights (IPRs) are now being enforced has the effect of accelerating or obstructing the process of global innovation. The enforcement of IPRs is generally in the interest of countries and companies on the technological frontier. On the other side of the equation are the "catching-up" countries that tend to oppose sweeping enforcement of IPRs – often with good reason. In some areas, IPRs tend to restrict imitation and the diffusion of technological knowledge, which leads to major difficulties in catching-up countries as they race to improve their position. In the past, these countries used to imitate goods and processes from elsewhere and then go on to invent their own innovative products on the basis of what they had learned. International negotiations to bring about wide-scale symmetric waivers for IPRs in developing countries to try to ease the difficulties in catching up could prove highly beneficial in this regard.

In the case of developed countries, we can, at least, dispel some myths. For example, IPRs are not as important as some believe. Of more importance is the governance of the institutions that preside

over the generation of knowledge. It is fundamental to knowledge creation that a society has an open science framework with a broad base of knowledge available to everyone. The much-celebrated narrowing of ties between academic institutions and commercial application is a worrisome development. The ethos of information sharing in the scientific community has been eroded over the last two decades in the US and other countries.

If we want to keep the innovation engine running we need to preserve a healthy separation between broad-based scientific research and application in the marketplace, contrary to conventional wisdom. And we need to foster a culture of information sharing, if we are not to risk killing the goose that lays golden eggs.

How are problems in developing global trade agreements affecting technological development? Efforts to reach multilateral trade agreements under the World Trade Organization (WTO) and the growing number of bilateral trade agreements forged between developed and developing countries have brought their own problems for technological progress. With bilateral agreements, a beneficial clause in one sector may be dependent on accepting a less favorable clause in others. So, for example, a developing country might be allowed preferential access to a developed market for textiles, while having to accept a long list of provisions limiting imports from elsewhere for software and drug development. The country may not have any software or pharmaceuticals industry at the time the agreement is drawn up, so there may be no short-term disadvantage, but such restrictions may hold back future development and innovation in these sectors

How does the rise of China fit into the picture? China poses its own distinctive issues. Here, the catching-up process in technology, which is very advanced in some areas, has not been accompanied by a parallel rise in wages. This has created a country that is becoming economically powerful but which still remains underdeveloped in terms of salary.

What can be done to promote an environment within which innovation can flourish? Technological and organizational innovation is a long-term driver for growth in contemporary economies. However, the potential is fully realized only if such innovation is suited to existing organizational structures and the institutional and legal framework for governance of societies, as well as dynamic demand patterns.

A good example of the near-perfect match of variables is the Golden Age after the Second World War, with the global commercialization of the internal combustion engine, mass production of electricity, the rise in the buying power of the middle classes and changes in economic and social structures, such as the evolving role of unions and development of the welfare state. For the new ICT paradigm, we are still in the phase where we are searching for this kind of match and we do not have a clear idea what the modern-day equivalent might be at this stage. ■

Measuring innovation

Defining innovation in broad terms is relatively easy: it can be described as the change in a product, a process of production or an organizational mode. However, measuring its extent is much more difficult and may best be done on a sector-by-sector basis, where terms of reference will vary._A. In the pharmaceuticals industry, two measures could be considered. One is the level of patenting and the other is how many new chemical entities have been developed. Every year, thousands of new patents are registered, while perhaps a mere 15 – 25 new chemical entities are established globally, arguably a much better gauge of progress. In many other sectors, it may be more useful to look at the notion of technological trajectories as they are defined by the fundamental techno-economic characteristics of a product._B. The development of the chip, for instance, is defined by a number of dimensions, including the density of circuits on the chip – which affects the speed of calculations – and cost. Here, change can be measured by analyzing different generations of products along the dimension defined by the trajectory. This sort of trajectory analysis has also been applied, for example, to the development of planes, helicopters and tractors with success._C. Such measurement is labor-intensive if carried out sector-by-sector, but it is one of the few ways to measure innovation reliably. If you use productivity as a measure, then the process simply becomes tautological, because what you really want to do is independently measure the effect of innovation on productivity, rather than measure productivity itself._D. One drawback of this methodology is that the narrow focus on sectors risks missing technological leaps outside an established paradigm when new paradigms emerge. But for incremental innovation, detailed measurement of technological trajectories within single sectors works well.

Photo: Thomas Eugster

Niche products rather than the mass market: **Chris Anderson,** editor-in-chief of "Wired" magazine and best-selling author explains the business of the future. **Interview Steven Soranno, Credit Suisse Research Team**

"The YouTube effect is a wake-up call to the mass market."

Steven Soranno: Innovation is commonly believed to involve a high degree of creativity and thinking outside the box. In that sense, it can be thought of as more of an art than a science. What does innovation mean to you?

Chris Anderson: Innovation is advancing the ball. It is evolving or creating something that did not exist before. Innovation typically works through the process of cross-fertilization. Newton said: "If I have seen further, it is by standing on the shoulders of giants." It is now far easier to stand on the shoulders of other people's ideas, other people's work, other people's contributions, and advance the ball. I think there has never been a better laboratory for cross-fertilization than the Internet.

Is the impact of digitization on the global economic structure historically unique?

Chris Anderson: Digitization is a step-change in the economics of replication and distribution. We have seen other such changes in the past, such as Gutenberg's press, but there has never been anything that has dropped the cost of replication and distribution as rapidly and as low as digitization. And what that does is make information, broadly defined, a costless economy, which is to say that it has near zero marginal cost. When things have near zero marginal cost, it completely changes the game. As a result, we now have essentially unlimited access to information. Now obviously, without the likes of Google, it would not be as useful as it could be. So, making sense of information is still a scarcity in the marketplace, but the access to information itself is increasingly becoming ubiquitous and free. And that is the environment in which innovation and cross-fertilization can happen.

On the surface, your "Long Tail" thesis and C. K. Prahalad's "Bottom of the Pyramid" appear similar. Both stating, with a broad stroke, that new technologies are one factor helping unlock the innovative and entrepreneurial spirits of millions of economic value niches, generating new economic paradigms that have far greater productivity curves than would be achievable under the industrial revolution, mass-market paradigm. How would one compare both theories?

Chris Anderson: I went to India for a week to do just that. Basically, the difference between the two is that the Bottom of the Pyramid is about commodification – taking a small amount of products and making them very cheap – while the Long Tail is about "nicheification," which involves changing the economics of the marketplace so you can offer a large number of products to satisfy minority tastes. Both

Chris Anderson has been editor-in-chief of "Wired" magazine since 2001. A student of physics, he worked for the leading scientific journals "Science" and "Nature." Thereafter, he was an editor for business magazine "The Economist" for seven years, based in London, Hong Kong and New York, covering the US economy, technology and other topics.

theories are based on the notion that if you break the economic and physical bottlenecks of distribution, you can reach a huge, previously neglected market. They both recognize that millions of small sales can, in aggregate, add up to big profits. And they're both focused on ways to lower the cost of providing goods and services so that you can offer them at lower price point while still maintaining margins. But the Bottom of the Pyramid is focused on taking a single product or service and finding ways to make it cheap enough to offer to a larger, poorer market. This is why I think it's essentially about commodification. By contrast, the millions who find themselves in the tail are no poorer than those in the head. Indeed, they are often drawn down the tail by their refined tastes, in pursuit of qualities that are not delivered by one-size-fits-all. So the Long Tail is made up of millions of niches. The Bottom of the Pyramid is made up of mass markets made even greater. Both lower costs to reach more people, but they do so in different ways.

To what extent is digitization geographically long-tailing innovation, spreading the value chain from developed economic bastions into less developed markets?

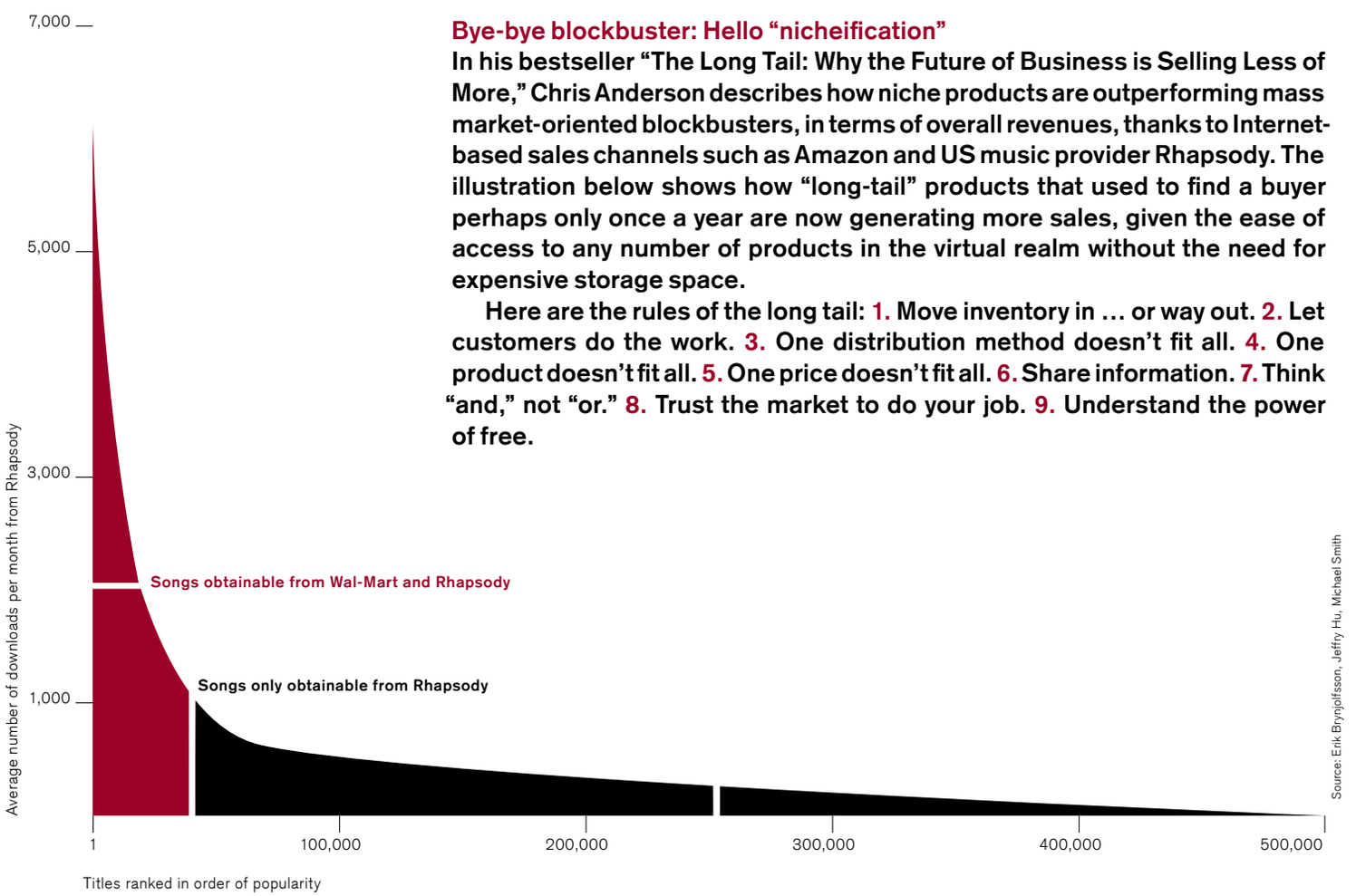
Chris Anderson: On my blog I have been debating with Richard Florida, who wrote a book titled "The Rise of the Creative Class." His idea is that there are spiky concentrations of innovation and creativity in places like Silicon Valley and elsewhere, and that creativity tends to be geographically concentrated. Which is true, but we must be careful not to miss the innovation and creativity that happens in non-spiky places, outside Silicon Valley and New York City. I largely look at the Internet as a way to tap the long-tail talent of all those smart, creative, innovative people who do not happen to live in New York or Silicon Valley. The winners of the Google programming contest, when you map them out, tend to come from all over the place, from Madagascar and Slovakia … rarely the kind of places one would expect.

Looking at innovation from a different angle, that of its impact on modern business structures, are mass-market models at serious risk of being crowded out of developed markets by long-tail effects?

Bye-bye blockbuster: Hello "nicheification"

In his bestseller "The Long Tail: Why the Future of Business is Selling Less of More," Chris Anderson describes how niche products are outperforming mass market-oriented blockbusters, in terms of overall revenues, thanks to Internet-based sales channels such as Amazon and US music provider Rhapsody. The illustration below shows how "long-tail" products that used to find a buyer perhaps only once a year are now generating more sales, given the ease of access to any number of products in the virtual realm without the need for expensive storage space.

Here are the rules of the long tail: 1. Move inventory in … or way out. 2. Let customers do the work. 3. One distribution method doesn't fit all. 4. One product doesn't fit all. 5. One price doesn't fit all. 6. Share information. 7. Think "and," not "or." 8. Trust the market to do your job. 9. Understand the power of free.



Chris Anderson: Absolutely. It is important to remember that though this is not the end of the "hit," neither is it the end of the mass market. It is the end of the monopoly of the hit. Traditional retailers now have to compete with long-tail marketplaces that offer a near-infinite number of products for a near-infinite number of tastes. Music is the classic example. We will see a very small number of dedicated music stores going forward, while we have already seen Tower Records disappear. The question is: "what can a Wal-Mart do to take advantage of minority tastes and niche products?" There are many possibilities, but the main answer is: "not much." Inadequate answers include things like using WalMart.com for the long tail (niche markets) and Wal-Mart the store for the short head (mass markets). Another is the attempt to bridge the long tail and the head with in-store kiosks so that the consumer can, for example, see product varieties on the flat screen at the end of the aisle. Those things are all a step in the direction of bringing the long tail into the shopping mall, but they will not transform the retail experience. They are really marginal steps in this direction.

Is there a "light" versus "heavy" issue in digital economics?

Chris Anderson: Pure long-tail markets are ones in which marginal costs are essentially zero, and that involves digital products. Then there are hybrid markets in which there are physical products but a digital catalogue – that would include the Amazons and eBays – in which the economics of the atom are not radically different from the paper catalogue era. But the search, discovery and opinion-shaping are transformed by Internet economics, where there is a digital catalogue of physical goods. Sometimes, those physical goods are not housed in any one place. eBay has no warehouses. It has distributive inventory, which tends to, at least from eBay's perspective, superimpose the economics of bits on to the world of atoms.

"We will see a very small number of dedicated music stores going forward. We have already seen Tower Records disappear."

So digital technologies bring efficiencies that generate higher systemic productivity and lower prices.

Chris Anderson: Exactly. Digital catalogues bring information efficiencies – "findability," recommendations, opinion-shaping and customer support – which encourage people to march down the tail in search of unique products.

Most investors would regard the week of 20 March 2000 as the one in which equity markets reached all-time highs. The S&P 500 declined 37% in the next 18 months, and the Nasdaq 100 dropped 75%. But something else happened that you believe could be just as important, but that most investors missed.

Chris Anderson: The poster child of long-tail marketing is the music industry. On 21 March 2000, the band *NSYNC released their second album, "No Strings Attached," which set a record as the best-selling album of all time, one million copies sold the first day, 2.41 million in the first week. That was the high-water mark of music's blockbuster era. No album has sold as well since. No album ever will sell as well. The number of gold, silver and platinum albums has fallen by more than 60% since then, even though music industry sales have been largely flat. That week really marked the end of the blockbuster culture in music, which is the leading proxy for other blockbuster cultures.

Might investors have misunderstood the secular narration of the late 1990s because they did not realize the encompassing and penetrating economic effects that digitization was beginning to have – long tail being one effect only more recently understood, thanks, in large measure, to your efforts?

↗

“Innovation is not just a developed market phenomenon.”

“The most important force is the power to connect.”

Chris Anderson: In that sense, I think you are absolutely right. Even as the Nasdaq was discounting the underlying economic changes wrought by the Internet, the best piece of evidence ever of what was actually going on was emerging. In a sense, the decline of the blockbuster, after the "No Strings Attached" album, was the evidence that we had been looking for in the bubble, but had come too late.

Which two things have you seen in the last year that may be high-water marks for innovation trends?

Chris Anderson: Number one was the mainstreaming of Wikipedia. I think Wikipedia is perhaps the most profound phenomenon of our time. If one were to figure out what is going to be different in the next century to the last, it would be the notion of peer production. And Wikipedia has really come of age in the last year. The second, of course, is YouTube, and the recognition that user-generated content – and I use that phrase loosely – could compete with television so successfully that the audiences are roughly equivalent. The YouTube effect was a wake-up call to mass-market television that said, "What television does is not so special, and its ability to interpret what society wants could equally be done by anyone with the basic, right technology."

Would you put the network effect of the online video gaming on a similar level as peer production or user-generated video in that sense?

Chris Anderson: I think online gaming is huge, and I am a big gamer. But I would not put it on a level with peer production. It really is largely the evolution of a medium. Whereas the whole notion of peer production, and the dawning recognition that amateurs can do things better than we thought – and sometimes even better than professionals can – is just huge. It goes from open source to YouTube doing it to the television industry, to Linux doing it to the software industry, to MySpace doing it to the music industry, and the blogs doing it to the mainstream media. I have never seen an economic force as powerful as that.

Let us consider three broad macro trends underlying the digital economy: the aging of Generation Y, the proliferation of broadband technologies, and the opening of global markets. Any one of these alone would not be considered unique historically, but is the confluence of all three at the same time proving to be a force that could enable or facilitate historically unprecedented change?

Chris Anderson: I think of it this way, and will take the demographic point first. All technology is generational. Technology does not really show what it is all about, until a generation has grown up with it. The generation that speaks the language of technology as its native tongue is the one that will realize the potential of what we are talking about. We, in the technology business, are always surprised by how slowly new technologies are adopted. We think in terms of Moore's Law, but the reality is that the world moves at a generational pace. That is the reality of human nature and learning curves. The other points, on globalization and the opening of markets; those are really network effects. It just shows that the most important force in the world is the power to connect. When things become connected, it enables growth not possible in other ways. The big trend of our era is that things work better when they are connected.

And therein, do we have a key to the revolution in the global innovation process, with connectivity enabling effective aggregation of ideas and work, including global niche contributions, while also facilitating the building of one idea on top of another?

Chris Anderson: Absolutely. Innovation is not just a developed market phenomenon, it is immensely global; it is not just the professionals, it is also amateurs; it is not just within companies, it is also outside of companies. Innovation works better when it is open and connected. The economist Ronald Coase observed that companies were the best place for innovation in the 1920s and 1930s, because communication within the company was more efficient than outside the company – much lower transaction and opportunity costs. Now, we have found a new platform of communication with the Internet that has much lower transaction costs than communication within the company. Not just because it is faster and easier now to communicate within the corporate structure, but it has also become vastly easier and simpler to include people who are not in the company. There is the famous quote: "most of the smart people in the world do not work for you." That is true for all industries everywhere. And the great thing about open innovation is that you can now tap those smart people who do not work for you. And we can do it because we now have a platform for collaboration and communication that is the best the world has ever seen. ■

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"Long Tail" or "Bottom of the Pyramid?": read more about Indian economist C. K. Prahalad's pyramid theory on page 24.

Photo: Thomas Eugster

Sometimes small amounts make a big difference. **Richard Weingarten,** Executive Secretary of the UN Capital Development Fund, explains why microfinance is a good tool for development. **Interview Tania Dimitrova, Credit Suisse Research Team**

"It does not take much – that's one of the beauties of microfinance."

Tania Dimitrova: The UN declared 2005 The Year of Microcredit, the 2006 Nobel Prize for Peace was awarded to Muhammad Yunus and Grameen Bank, and more private institutions are getting involved in this field. Is the importance of microfinance increasing?

Richard Weingarten: Definitely. Microfinance is becoming a very important tool for development. At the UN Capital Development Fund, we think microfinance is important as it encourages economic growth and employment, and reduces poverty. I expect that microfinance activities will increase over the next years and contribute to reducing poverty around the world.

Microfinance is a powerful tool in encouraging entrepreneurship. How can it unleash innovation in communities that have been previously untapped?

Richard Weingarten: Microfinance is most effective at reaching individuals, rather than small enterprises. In terms of unleashing individual and small group activity, microfinance can be very successful. In terms of actual enterprise creation, it is not quite clear yet what contribution microfinance can make. However, the microfinance community is focusing more and more on small and medium-sized enterprises (SMEs), particularly as more commercial banks get involved. I expect that over the next few years more attention will be paid to actually creating SMEs that could grow and employ more people. Microfinance institutions and commercial banks will focus more on enterprises; the impact of microfinance on entrepreneurship in the technical sense will increase over the next few years.

What role do financial institutions in this field play and how is it changing?

Richard Weingarten: There are many different roles that financial services companies in particular can play. I expect that more private banks will be involved in microfinance by creating microfinance subsidiaries, or other ways of investing for poor and lower-income people. On the other hand, I feel that other microfinance institutions will continue to thrive in their specialized niches. I think that cooperative groups will become more active; savings institutions that are not currently involved in microlending might expand into this area, and retailers who are not currently thought of as financial institutions might get involved in extending microcredit at the retail level, because they are very close to their customers at the local level. Technology companies and infrastructure providers in the private sector will become more involved, particularly on the telecommunications side, as microfinance seeks to reach out to more rural areas, where most poor people live. This is going to be a priority for governments all around the world, particularly in Africa, where the rural agricultural population is still not being reached by microfinance services.

In microfinance, the functions of the private and public sectors overlap. What are the challenges to the development of this field in the future?

Richard Weingarten: As a general principle we believe that the role of government and the public sector in microfinance is twofold. One is to create an appropriate

Richard Weingarten joined the United Nations Capital Development Fund in 2005 as Executive Secretary. As an investment banker he had previously worked with many not-for-profit organizations, particularly in the area of economic development. In various roles he traveled to Asia, Africa and Latin America. His experience includes working on microfinance and local development projects. Mr. Weingarten has held several board positions for a number of not-for-profit organizations.

Banking on the mobile

Klaus Tischhauser, Managing Director, responsAbility Social Investment Services AG

We have long grown accustomed to using automatic teller machines (ATMs), paying for purchases in non-cash form and hardly ever entering the lobby of a bank to carry out simple business transactions. With the help of the Internet, e-banking has now entered private households. Mobile telephone-based services – so-called m-banking – have spread at a somewhat slower pace. Nevertheless, thanks to technology, for years practically everyone in industrialized nations has had access to low-cost financial services, independent of time, place and the presence of a bank.

In developing countries, the modern banking industry is also being transformed by technology use, with the expansion of financial market structures for poorer segments of the population (so-called microfinance) just taking root. Here, the trend in m-banking services is moving even faster than in the industrialized world.

One reason lies in the spread of mobile telephony. Of the more than three billion mobile phone users worldwide today, a greater proportion live in developing nations than in developed ones. Another factor is that mobile-telephony network operators and the microfinance industry have something in common: they both deal with vast numbers of customers and transactions, but with minute amounts of money. Thanks to the user-friendly nature of the mobile telephone, m-banking services are playing an increasingly significant role, particularly in Africa – the fastest-growing communications market – but also in other developing countries with lowly populated rural areas, poor infrastructure and, in some cases, lower educational levels among customers.

Trend-setting cooperation

Technology companies, banks and microfinance institutions specializing in serving the poorer customer segments have been compelled to enter into cooperative agreements, primarily because the financial sector is strongly regulated in most countries, with access often limited just to banks. The following examples from Africa reveal how cooperation and innovative technology can pave the way for the development of financial services, such as m-banking, even to remote clientele.

The field of operations for mobile telephony within the scope of m-banking services is multifaceted. In Kenya, for instance, Vodafone has set up the M-PESA service in conjunction with local provider Safaricom, the Commercial Bank of Africa and the local microfinance institution Faulu. With M-PESA, customers are able to borrow money, call up their account balances and transfer funds, all via their mobile phones. Another example in Kenya is the cooperation between microfinance specialist Equity Bank and a network of traders aimed at providing mobile phone-based banking services to around 1.7 million Kenyans, most of whom live in rural areas far from bank branches. Meanwhile in South Africa, a consortium of companies is dispensing entirely with the traditional banking infrastructure, establishing a virtual, purely mobile phone-based facility, WIZZIT. Customers using WIZZIT appreciate this service since it is faster, safer and roughly one-third cheaper than making the journey to a bank branch or ATM.

In the Democratic Republic of Congo, the transportation routes are extremely long and difficult to maneuver through, infrastructure is patchy, and the financial sector is very underdeveloped, with only an estimated 30,000 bank accounts. In this environment, Celpay offers the possibility of making payment transactions via mobile telephone. For example, Celpay enables traders to execute money transfer in a split second, rather than having to pay their suppliers in cash, and allows suppliers to confirm the transaction locally on their mobile phones. The security advantages of non-cash payment transactions are obvious. In addition, traders can offer low-cost, long-distance payment services to customers who do not personally own a mobile telephone or receive payments on behalf of customers. Celpay already settles 500,000 of these types of transactions monthly.

Diverse uses of technology and innovation

Besides m-banking, technology is being applied in many other areas of microfinance: for example, ATMs, point-of-sale (POS) systems, devices for detecting biometric data for customer identification (e. g. fingerprints for those who cannot write), as well as handheld devices for loan officers visiting customers. These applications have a number of advantages: they reduce the use of cash and the involvement of bank employees, as well as, in some cases, dramatically lower costs and diminish risks. This, in turn, allows companies to offer a larger assortment of financial services through additional distribution channels at lower costs. These firms are able to reach more customers and new segments previously unserviceable due to cost. In light of the fact that an estimated two billion people living in developing countries still lack basic access to financial services, this is a very promising trend. ■

enabling environment so that financial institutions and technology providers can work. That generally involves legislation policy – the legal environment as well as the regulatory environment. Governments must create an environment where fair competition can take place on a level playing field and where there is accountability and transparency both on the public sector side and on the private sector side. In addition, governments can remove constraints, which the private sector players frequently see in terms of the regulatory environment or in the costs of doing business. On the other hand, governments should generally avoid extending credit directly to retail customers because that frequently becomes a political process and can also squeeze out the private sector if subsidies and other uneconomic activities are used for political purposes. That is not to say, however, that governments should never be involved in direct lending. Nor does it mean that governments cannot act ahead of the private sector, particularly where social problems need addressing and where purely commercial or purely private activities wouldn't be able to manage effectively. A good example is rural areas that are very difficult to get to, or encouraging agricultural activities that may not be economically viable for the private sector alone. These types of subsidies or interventions by governments should be few and far between, and generally governments should avoid participating directly, unless it is necessary to encourage or stimulate private sector activity.

The government plays a very important role in encouraging financial services infrastructure, payments systems, settlement systems, money transfer systems, and telecommunications systems. In these areas a variety of economic models may be necessary to establish the infrastructure to allow microfinance to function smoothly.

How can we as average citizens and investors get involved? And what do you think about large institutions involved in microfinance on behalf of their clients?

Richard Weingarten: There are large institutions, including Credit Suisse, who are providing vehicles for private individuals to put money into professionally managed funds, that will then lend those funds to microfinance institutions. This is probably the best way for individual people to get involved. I would caution individuals not to try to get involved in making microfinance loans directly or finding microfinance institutions on their own to support. It is a very difficult area, in which it is useful to have professional help. Diversification of microfinance institutions is a very important principle, so individual investors working through private money managers have an extremely good way of developing a diversified investment portfolio.

How has microfinance changed the communities in the areas where you have worked?

Richard Weingarten: Historically, microfinance lending has been geared towards women. And when women are the recipients of loans they frequently utilize the funds that they receive for their families. Extra income that comes in usually goes on food and improving the nutritional condition of young children and also towards allowing children to attend schools. Consequently, those two benefits are also very important social benefits. Microfinance has managed to even out families' cash flow so that economic shocks or unexpected interruptions in cash flow are much more easily overcome. This has a very beneficial social and economic purpose: it makes life more balanced and it becomes easier to plan for the future.

Generally, in the countries where we work, people are living on a dollar a day. If they get to two dollars a day as a result of microfinance, that is a very big improvement in their lives. And if people can get to three or four dollars, they have major improvements in their social conditions and the way in which they live with their families. So, it does not take much – that's one of the beauties of microfinance. A small amount of money can go a long way in making a great improvement.

What is the most interesting development in microfinance that you see today?

Richard Weingarten: The most important innovation in microfinance is technology. It will reduce transaction costs and help to reach rural areas where there is none of the roads and other infrastructure necessary to tie people to the markets. There is excellent work being done in Latin America, as well as in Southeast Asia: technology facilitates access to a broader range of financial services and it also helps to reach illiterate people, because they can utilize those technologies to do financial services transactions even if they can't read or write. The most important innovations will take place in mobile telephony, providing cheap access for people in rural areas that otherwise would not have access to financial services. There is also a lot of room for innovation in the development of new products and services. A lot of interesting work is under way in microinsurance where new credit and savings products are being developed. Here, the private sector can play an important role.

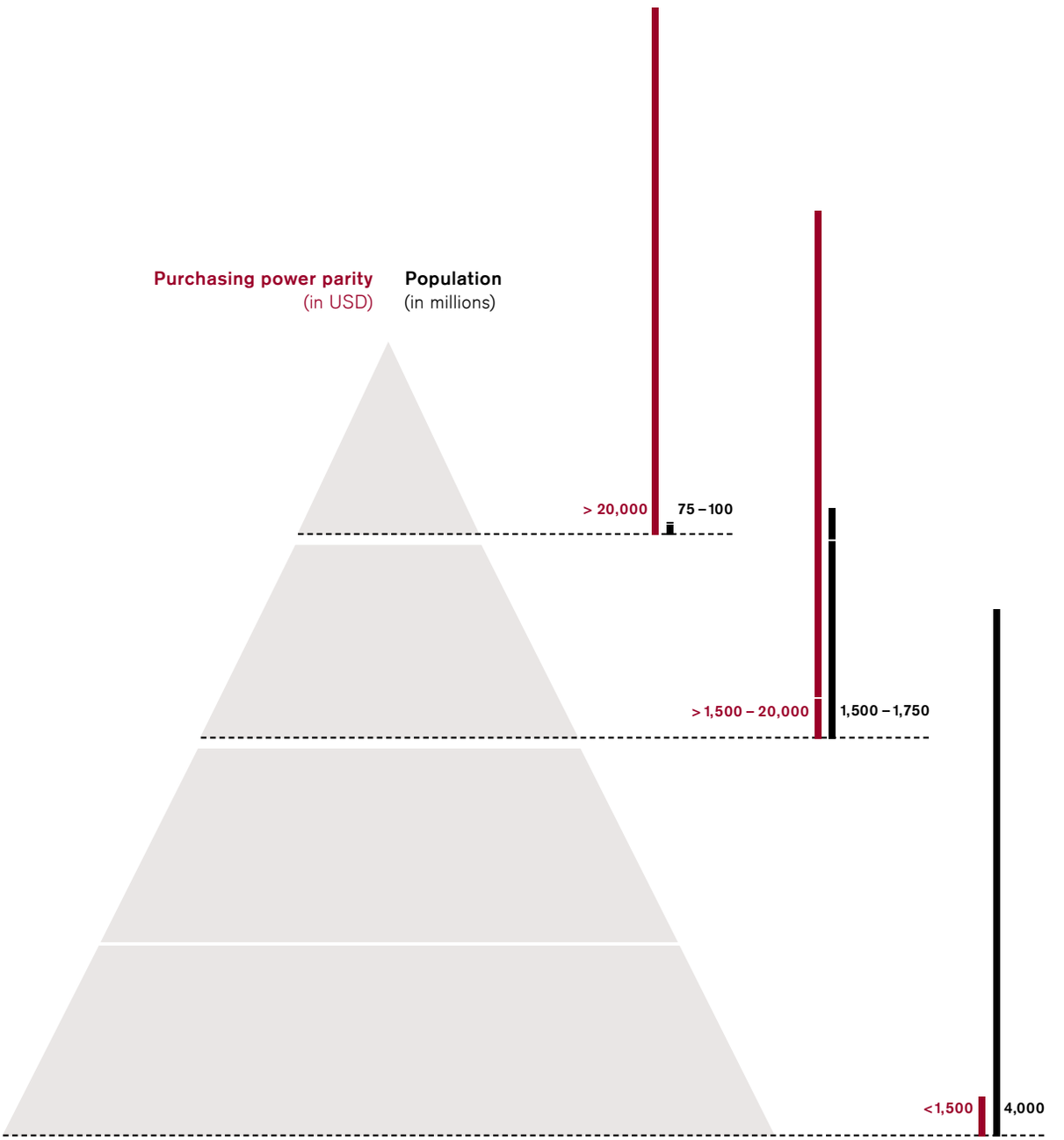
Another field of innovation lies in the area of remittances, in turning remittance flows into development products. Here again, the private sector might think of ways to take large flows of money moving between developed and developing countries and turn them into development tools, so that they can help with societal development, rather than simply being of benefit to individuals. ■

Credit Suisse and microfinance

In microfinance, loans that are often as small as USD 50 are granted to very small businesses in developing and newly industrialized countries. This enables these businesses, which are frequently run by women, to become firmly established or to significantly increase their profitability. In 2003, Credit Suisse and other financial services providers launched responsAbility Social Investment Services AG, which bridges the gap between the financial market and development cooperation. The company manages two investment funds; the Microfinance Leaders Fund, just launched in the end of 2006, and the Global Microfinance Fund. Microfinance institutions in the responsAbility portfolio generated funding for nearly 200,000 micro-business ventures.

The Social Performance Report, published by responsAbility, shows that the clients supported by microfinance are able to significantly improve their personal circumstances and standard of living.

www.credit-suisse.com/microfinance, www.responsAbility.com



Source: C. K. Prahalad/Stuart Hart, 2002

At the foot of the wealth pyramid

The pyramid graphically illustrates the gap in wealth and income generation opportunities. The richest sit at the top of the pyramid, with numerous income generation opportunities at their disposal. More than four billion people occupy the foot of the pyramid – people who have to survive on less than USD 2 a day.

A new way of thinking

Innovation passes not only from rich societies and their multinationals to emerging economies. Ingenious ways of thinking and doing business are increasingly flowing the other way too. This reflects a wider, global trend of greater customer influence on corporate behavior. The mass-market model that fails to differentiate between individuals is past. In developing economies, this means understanding awareness, access, affordability and availability from the perspective of the poor.

C. K. Prahalad, Professor of Corporate Strategy, University of Michigan

Innovation lies at the heart of value creation. The process, focus and sources of innovation and value creation are changing. We need to focus on the key drivers of innovation. I think of the emergence of a new innovation and value creation model based upon three fundamental drivers:

1. The role of the firm and the consumer is changing dramatically. This is the substance of my co-authored book "The Future of Competition: Co-Creating Unique Value with Customers." We have long assumed the firm will always dominate the consumer because it has more information and more resources. But what we are beginning to see is that the consumer has as much access to information as the firm. Moreover, consumers are connected. Over three billion people will be connected by cell phones and PCs. They form communities based on specific interests. We must therefore make a transition to a competitive landscape where the firm no longer necessarily dominates the consumer, and where the consumer can actually affect the firm. That is true whether we look at Google or eBay or Starbucks – we can see a wide variety of businesses in which the influence of consumer communities is quite significant in terms of product development, pricing, distribution, and a host of other key aspects impacting the economics of the business.

2. The interplay between the world's rich and poor is fundamentally changing. We have always assumed the rich will dominate the poor. But what if the poor – five billion of them – started having influence on the rich? This is the thesis of my book, "Fortune at the Bottom of the Pyramid." The evidence is now overwhelming. India alone is adding six million new wireless subscribers per month. Can Motorola, Nokia or Samsung really afford not to be there? And do they have to build new business models to serve those markets? For some of the world's biggest firms, this has become a key issue. If India and China together have 500–700 million subscribers, they will have considerable influence, even in setting standards and developing next-generation applications.

3. Innovations from the developing world are becoming critical to the developed world. We have always assumed that richer nations would dictate policies and conditions to emerging ones, but that is changing. For example, several years ago, no one would have predicted that the outsourcing of technology services to the developing world would influence how large companies are run. Today, IT and IT-enabled services are provided by outsourced operations in India and the Philippines, or increasingly in China and Poland. The question poses itself: is outsourcing just cost arbitrage, or is it increasingly innovation arbitrage? Outsourcing is increasingly cost-plus-innovation arbitrage. This trend is not confined to the IT industry. The same trend is visible in the pharmaceutical industry, where generics were seen as lowly imitators, and not a strategic concern for the large pharma companies like Pfizer, Novartis, Merck and GlaxoSmithKline. But because of the level of sophistication reached in reverse engineering and doing things at such low cost, Indian pharma efforts are becoming critical for established Western pharma firms. Is this trend just confined to the outsourcing of manufacturing? Or just to those drugs that are coming off patent? Or is this a precursor to a revolution – a new way

Photo: Thomas Eugster

C. K. Prahalad is Professor of Corporate Strategy at the University of Michigan and is engaged in developing innovative business models aimed at alleviating global poverty. The Indian economist and author has been described by "Business Week" as probably the most influential thinker in the field of corporate strategy.

of producing high-quality drugs at low cost? Those are the three elements – the changing nature of consumer-firm relationships, the nature of rich-poor relationships and the role of developing countries in innovation – that I think are going to influence the innovation space, and therefore the value creation space. The transitions that I am discussing can best be captured as follows:

	Traditional thinking		New thinking	
Consumer and the firm	Firm	> Consumer	Consumer	≥ Firm
Rich and poor	Rich	> Poor	Poor	≥ Rich
Developed and developing	Developed	> Developing	Developing	≥ Developed

These are critical transitions that are already taking place.

A new economic paradigm

I think the paradigm of the last industrial revolution is over. We are starting a new economic order where economic development and social equity are both equally important. The definition of a society is no longer bound by country, but spans the globe. That is going to force a lot of rethinking about the social legitimacy of the large corporation, and how that legitimacy can become re-established. I believe a new social compact will emerge, which involves large companies partnering civil society organizations (NGOs) and national governments and international institutions, such as the United Nations Development Program and the World Bank. Instead of governments and NGOs viewing corporations as adversaries to be taxed and regulated, the relationship will increasingly be one of a partnership that can help create checks and balances.

Very importantly, these public-private partnerships can share the deep knowledge they have built over time about scale and scope as well as the uniqueness of local communities. The critical questions are: how can corporations leverage this new opportunity? How can firms innovate not just in products and services but in ways that they access resources and build new business models? How can they create products that are both affordable to the majority of the poor, and at the same time maintain high quality? The answers to these questions will help define the next generation of successful multinational business models.

Rethinking the successful business model

In order to participate in these markets, companies have to innovate in products and services, as well as new delivery systems, to create new business models. Organizations often find it very hard to experiment from within because internal politics tend to protect the status quo rather than promote breakthrough innovations. It is easy to talk about making something new, but innovation in the space that sits alongside the daily routine is a lot different from innovation inside the box of daily routine itself.

One implicit obligation in most conventional commercial thinking about innovation is the acceptance that Cost + Profit = Price. But to build a market among the world's poor, the critical issues are: awareness, access, affordability, and then availability. It is not enough to be affordable; products must be easily accessible too. This means we must create innovative distribution and logistics chains, so that people do not try an item once, like it, but then fail to have access to it again. Before anything else, people must become knowledgeable that this product or service makes sense for them. The mechanisms for awareness, affordability, access and availability are very different to that in developed markets. That is

why we must start thinking in terms of Price – Profit = Cost. It looks like a simple re-juggling of the three variables, but going from Cost + Profit = Price thinking to Price – Profit = Cost thinking requires a fundamentally different approach. How does a company achieve affordable selling prices, which often are 1/20th or 1/50th of the price at which things are sold in the West, and at the same time make the business profitable? And this assumes that the products conform to world-class quality standards. There may be a wide variety of solutions. One is pay-per-use, which essentially says the consumer does not have to own the product or service, just have access.

A perfectly good example is USD 0.10/hour Internet access. That is a very different way of thinking than having to buy a PC to get access to the Internet. Or, alternatively, we may think in terms of pay-per-use telephones. One cannot arrive at Price – Profit = Cost by using old methods. One must fundamentally innovate. The innovation is both in technology and the use of technology, as well as in the business models.

Built for the poor, available to the rich

The bottom-of-the-pyramid approach challenges many conventional business assumptions that developed with the industrial revolution. If a company builds its model the other way, the poor cannot participate. The world's greatest companies were built for ordinary people. Take for example the Ford Motor Company. The first mass-production car, the Model T, was built so that for USD 300 anybody could buy one. It freed the farmer from the village. Singer innovated the monthly payment system with its first sewing machines, so poor housewives could paying USD 5 per month and afford a USD 100 product. Singer became a global company, so did Ford, and more recently, Wal-Mart started not with the rich but with ordinary folks in the United States. There are a lot more examples. But now that multinationals have established themselves in the rich part of the world, they will need to make fundamental changes in terms of a bloated cost structure, the supply chain, product design, distribution and awareness mechanisms.

Those are very difficult alterations for established firms to make. Many of them think along the following lines: "I want to protect my cost structure, and therefore I am willing to give up this market." Another fundamental mistake is that we have been socialized to think that the poor cannot afford advanced technology, will not pay for it, and do not appreciate it. Cell phones have proven that belief wrong. Market development among the world's poor does not involve less technology, it requires more.

In terms of sustainable development, a billion Chinese and a billion Indians using resources the way the West does is going to create enormous pressures, not just on financial resources, but also on the use of water and land. This is going to present another challenge for innovators. I expect to see companies discovering ways to reduce significantly the use of resources and to change the way we do things.

Where demand far exceeds supply

Let us look at the things that will be needed as this new economic order develops. I think we should approach this aspect in terms of connectivity, microfinance, energy, education, health and nutrition. On connectivity, for example, India has roughly 200 million people who can communicate via telephones, but India has one billion people. Connecting a billion is going to be a big opportunity, although it will require rethinking business models. I believe microfinance is a key enabler. Microfinance involves much more than access to credit. We should think in terms of both the income statement and balance sheet of the poor. Access to insurance, for example. Energy is something people do not commonly think of on a micro level, but it is vital. Just look at simple things like cooking. Why should people use a very inefficient biomass stove, which creates respiratory disease that is very hard to deal with? In terms of food, which I think will be a major issue, the key is more malnourishment than maldistribution. Food oriented towards health and vitality is going to be a big thing. And obviously health, which really links with much of the forces described above. Affordable health includes more than medicines. It involves hygienic structures, so people can avoid germs before they become infected.

From one-size-fits-all markets to markets the size of one?

The new paradigm is largely about the economic value of unleashing the human spirit and creative force. This is perhaps the strongest economic wave we have ever seen. When we consider the connectivity segment of the revolution, and combine it with the other forces I have mentioned, it brings to the forefront what I call N=1; that is a consumer of one. Google can serve people one at a time via the company's homepage and at the same time cater to a hundred million consumers. One consumer at a time is now compatible with mass markets. That is what eBay, Lego Mindstorms and Starbucks do – one consumer at a time. But to serve that N=1 requires resources from multiple vendors. Therefore, resources can be multivendor and global.

This world is, in many ways, the exact opposite of the Model T mass-production paradigm. Under Model T, N was a totally undifferentiated consumer. All resources required were within the firm. Ford was vertically integrated. From this past, we are moving to N=1 (one consumer at a time) and R=G (resources from multiple vendors to support that N=1). This trend is global, and whether a country is rich or poor does not make a difference. In fact, most non-wealthy consumers are used to customized solutions in the village. They have not gone through the socialization of mass production. They can go directly from a personalized, service-oriented village shop, to a personalized service in the new paradigm. ■

Photo: Thomas Eugster

Innovation is not just about producing better widgets. Companies need to understand how much value they could capture by providing products how the customer wants them, explains **Niraj Dawar,** Barford Professor of Marketing at the University of Western Ontario, Canada. **Interview Steven Soranno, Credit Suisse Research Team**

"We must look at the entire value that the customer is buying."

Steven Soranno: Could you define the meaning of the concept "innovation"? How has it changed?

Niraj Dawar: Innovation is a much broader concept than we commonly think, and goes beyond creating better products. We need to focus on customer value, which is a function of "what" the customer buys plus "how" the customer buys.

To take a simple example, when the customer buys a can of coke in a supermarket as part of six-pack – they buy it, take it home, refrigerate the product, carry it with them to the point of thirst and then they drink it. For that can they are paying USD 0.30–0.50 and they are getting value for that money, otherwise the transaction wouldn't take place. But on other occasions at the point of thirst they will find a vending machine and be willing to pay four times as much for a single-serve chilled can of coke. That 300% premium is a reflection of the value that they see in the product when they see it delivered to them, when they want it, how they want it and in the context that they want it – the benefit is entirely different.

So taking that as a starting point, companies need to ask themselves how much value they are leaving on the table by not providing products in the way the customer wants them. If they can then start to systematically examine ways in which they can create value for the customer in the "how," we can then begin to innovate in the "how" and develop new ways of delivering products and benefits to the customer.

Are you alluding to customer focus with the "how"? Hasn't this always played a significant role?

Niraj Dawar: Customer focus applied to the notion of innovation has often been about understanding customer needs and then developing better products to serve those needs. What we're saying is that you need to go beyond the notion of products and look at the entire value that the customer is buying. Then we need to systemically break that down into the "what" and the "how" and once we've decomposed the value that the customer is buying, let's then systemically examine ways of innovating in the "how." So we're saying we can actually understand the entire value that the customer is buying and that goes well beyond the product. There are opportunities to create value in how the customer purchases what we're selling.

There's another reason why this is different from previous notions of customer focus. Companies often say, "We have a product and we'll slap some service on to the product – whether it be after sales or product education." That's not what we're talking about. What we're saying is, look at the transactions, look at the value that the customer is buying. That value is not just the product plus the service, it is the context, it is when the product is delivered, and that's much more than just a service.

What are the first steps companies should take to understand the "how"?

Niraj Dawar is Barford Professor of Marketing at the Richard Ivey School of Business, University of Western Ontario, Canada. Prior to this, he was Associate Professor of Marketing at INSEAD, France. His current research focuses on the impact of corporate and managerial actions on brand equity and marketing strategies in international contexts.

"The relationship between buyers and sellers is changing, because buyers are talking to each other in ever larger communities."

Niraj Dawar: A company must ask itself two questions: firstly, it needs to look at the interaction costs – what are the costs that customers need to incur to get value from us in order to derive the value of the product or services that they are purchasing from us? They are paying for the product, of course, however they are also incurring a large number of other costs.

Going back to the Coca Cola can example, the customer has to carry the multipack home, break the bulk pack, refrigerate the product – all those are additional costs that well exceed the price the customer has paid for the product itself. But we can systemically reduce those interaction costs and thereby create value for the customer.

There's a second element to the "how." Companies have to ask the question: what are the risks that the customer incurs in purchasing from us, rather than from our competitors? We can then systemically find the risks, make an inventory of the risks and eliminate them, so creating value for the customer.

Is "how"-based innovation now a fundamental requirement?

Niraj Dawar: Companies have access to the same outsourced R&D labs, outsourced designers and product developers, so product parity is increasingly a given. We've seen that with shortening product life cycles, intensified competitive activity in most industries, rapid imitation and innovation by competitors on the product side, companies are recognizing that competitive advantage may lie in the "how" rather than the "what."

How is the relationship between sellers and buyers changing?

Niraj Dawar: It's changing in many ways, but it's changing not necessarily because of the "what" and "how." It's changing because buyers are more-than-ever talking to each other in larger communities. They know what's happening in other parts of the marketplace. Buyers are creating a large part of the information around products. By interacting on the Internet they can share that information. They are forming into communities. So where earlier the manufacturer or seller could speak to millions of consumers from on high, today the seller has to see itself not as a broadcaster of messages to millions of consumers, but rather as a member of a community in which they have a voice – though no more of a voice than others in that community. As members of that community they have to abide by the rules and the results tend to be increasingly monitored by consumers rather than firms. So yes, the relationship is changing, but because of larger changes occurring in the marketplace.

Why do product innovations provide firms with little sustained advantage?

Niraj Dawar: Technology is moving very fast. Somebody who develops the technology wants markets for it as quickly as possible and the reason they want to reach the market is that they know there are competitors ready to put similar products on the market as soon as they see that the product is successful. So the rate at which competitive products appear on the market and slice away market share is increasing. The result is that we have shorter periods of exclusivity. In other words, competitive advantage is more difficult to sustain than 15 years ago.

An explosive impact

Companies need to understand that the focus of their activities should not be what they sell, but rather what the customer buys, says Niraj Dawar. This subtle shift in perspective can yield tremendous insight into customer value.

"Orica, an Australian explosives company, is a prime example. It completely changed the nature of what it sells by re-pricing a commodity product. It changed from selling explosives by the kilogram to selling a certain outcome – saying that, for example, 80% of the output of this explosion will be within the tolerances the customers specified in terms of rock size. That changed the rules of the game, and competitors now have to figure out what leads to certain outcomes of explosions."

Says Dawar: "Orica generated this innovation by collecting data from customers, collating that information and determining the conditions that produced desired outcomes. This put it in a position to take charge of the entire blast – not just sell commodity plastic – and offer customers contracts for broken rock. That is an innovation where management changed the pricing, but it also changed just about everything else except the product. That remained the same."

But can't "how"-based innovations also be copied or become out of date?

Niraj Dawar: It's a concern to the extent that firms need to find other areas in which they can build a competitive advantage that is sustainable. Firms make a lot of investment in new product development, in creating value for customers, and they want to be able to achieve returns on that investment – returns that will impress their shareholders more than the shareholders of other companies. To do that, they have to have some degree of exclusivity around what they are offering – what Warren Buffet calls the "moat." You have to have a moat around your castle, as without that your competitors will breach the fortress very easily and you will be unable to earn superior returns on your investment. So from a competitive perspective it is absolutely necessary to have that competitive advantage. Increasingly, products are no longer the areas where that competitive advantage is achieved or attained.

What influence does digitalization have on innovation trends?

Niraj Dawar: It does present tremendous opportunities. Communities already talk to each other, and are able to wrest control of the rules of the market from companies doing the selling, broadcasting and marketing. But at same time, digitalization also represents opportunity in terms of customization and in terms of understanding the needs and benefits of individual consumers and being able to deliver product information that is customized to the needs of the customer. So when we think of how the product is delivered, when we think of how we are selling it can change quite radically.

For example, companies that sell food could limit themselves to selling packaged food via supermarkets. But they are going way beyond that today in terms of the relationship with the customer. In terms of the "how," for example, they are setting up databases where they encourage customers to log on to websites, call them, e-mail them, and thereby set up interactive communication with millions of customers simultaneously. Interactive communications are remarkable in that every time the customer contacts the company, the company recognizes this customer, knows who they are and remembers all the past interactions they have had with this customer, so they never have to ask the same customer a question twice.

"Bringing in 'how'-based innovation requires internal systems. It also requires changes in the culture of the organization."

They can personalize the offer to the customer. If selling food, they can provide recipes that are customized to the family and stage of life of that customer. They will understand what that customer will want and when. Often they will predict what the customer wants before the customers even knows it themselves.

Are product innovations in all sectors less sustainable than innovations in the area of interaction between seller and buyer?

Niraj Dawar: The answer is that "how"-based innovations require internal systems. They require different parts of the organization to work together, they require a certain type of organizational structure to be put in place.

Because of all that, they also require changes in the culture of the organization in which the "how" becomes visible rather than invisible. The company must systematically go out looking for ways to innovate in the "how." It takes a long time for that to happen, but if it takes a long time in the innovating company, then it will take at least as long in the competitor company.

I would say the opportunities for innovating in the "how" have tremendous potential, in so far that there is a lot of opportunity still unexploited. "How"-based innovation is just starting down the road – there's so much to be done.

Does this also apply to all markets – both emerging markets and markets in developed, industrialized nations?

Niraj Dawar: The distinction isn't relevant – I would argue that the "what" and "how" apply equally across all markets. In today's world, product parity is product parity everywhere. We're operating in a global marketplace. ■

How to profit from innovation

Shrinking of markets

Networking and collaborative technologies – and people growing up using them – are shifting economic power toward individuals, enabling the creation of micro markets. They are also enabling companies to reach specific consumers with targeted marketing programs. This trend is disrupting the Industrial Revolution's mass market paradigm.

"One of the biggest 'how' innovations of recent years has been the ability to predict what people want based upon what a million people like them want." Niraj Dawar

"The most important force in the world is the power to connect. When things become connected, it enables combinatorial growth that is not possible in any other way. The big trend of our era is that things work better when they are connected." Chris Anderson

"Innovations from the developing world are becoming critical to the developed world. We have always assumed the developed world will dominate the developing world, but that is changing." C. K. Prahalad

"India alone is adding six million new wireless subscribers per month. Can Motorola, Nokia or Samsung really afford not to be there?" C. K. Prahalad

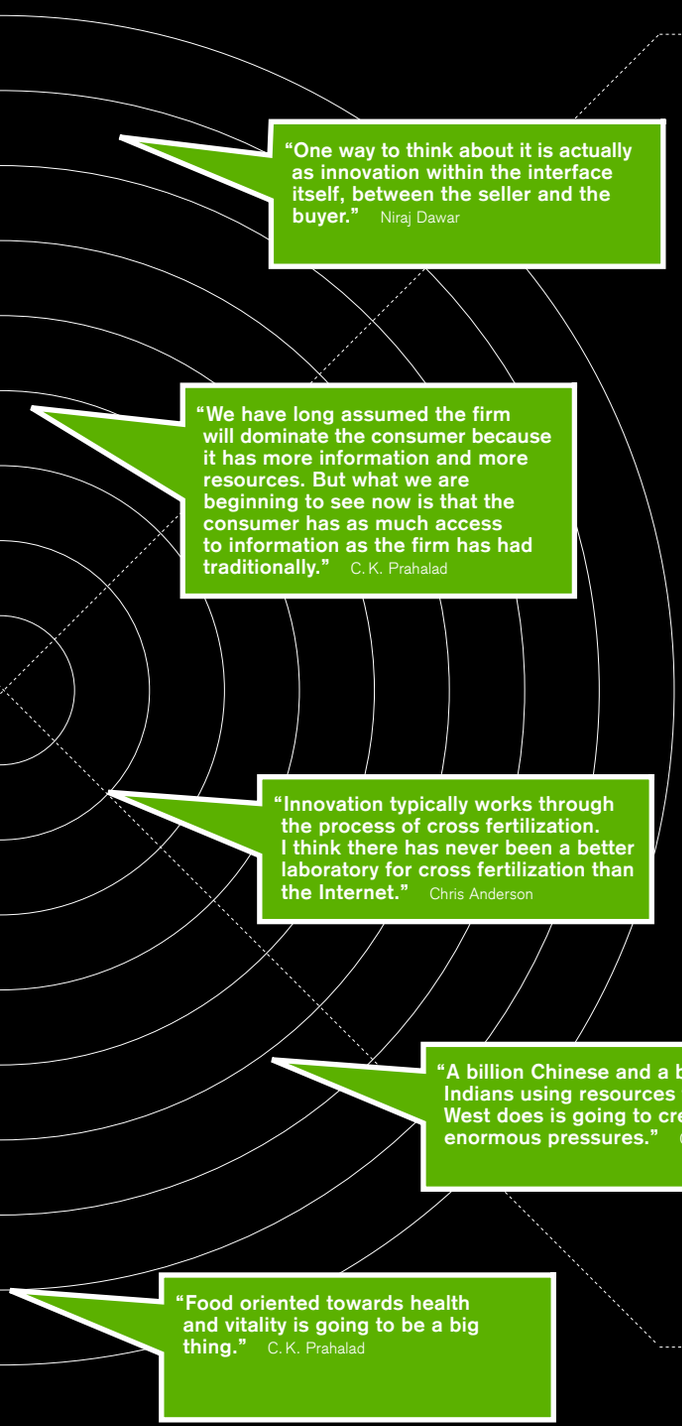
"Market development among the world's poor does not involve less technology, it requires more." C. K. Prahalad

Redefining the rich/poor relationship

Emerging market development can bring over four billion people "on line" into the global economic system. Connectivity/collaboration technologies are speeding the pace and enhancing the aggregate economic power built.

Redefining the customer/supplier relationship

In a world where information flow is becoming increasingly ubiquitous and free, industries' product development curves are steepening, and public/private/social partnerships are becoming more economically valuable, companies must constantly rethink their business models and how they interact with their customers as a part of sustainable competitive advantage.



"One way to think about it is actually as innovation within the interface itself, between the seller and the buyer." Niraj Dawar

"We have long assumed the firm will dominate the consumer because it has more information and more resources. But what we are beginning to see now is that the consumer has as much access to information as the firm has had traditionally." C. K. Prahalad

"Innovation typically works through the process of cross fertilization. I think there has never been a better laboratory for cross fertilization than the Internet." Chris Anderson

"A billion Chinese and a billion Indians using resources the way the West does is going to create enormous pressures." C. K. Prahalad

"Food oriented towards health and vitality is going to be a big thing." C. K. Prahalad

New infrastructure / resource consumption

New distribution, logistics and production mechanisms are needed to sustain 21st-century global economic development. Emerging markets are developing without the existing resource-intensive infrastructures that developed markets have. As the world's average standard of living rises, resource consumption will need to become far more efficient.

Connectivity

Wavecom HOLD
AVM FP
Market leader in machine-to-machine communication via wireless devices, with strong growth prospects in the automotive industry.

Equinix BUY
EQIX US
A leading operator of Internet data centers and services to provide connectivity between different Internet networks.

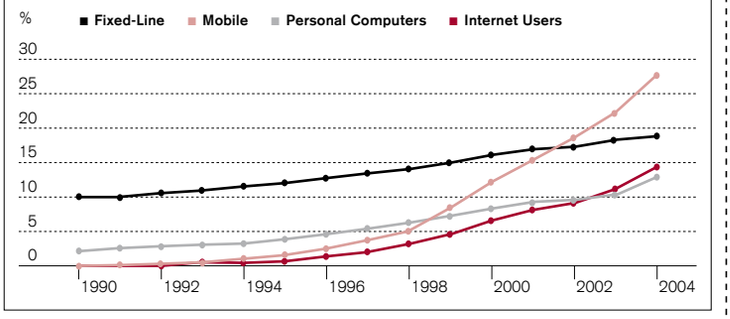
Akamai BUY
AKAM US
A major provider of digital-content delivery services, enabling efficient and effective transmission of digital products.

Alcatel-Lucent BUY
ALU FP
As market leader in IPTV-system integration, the company should benefit from next-generation upgrades by telecom service networks.

Cisco BUY
CSCO US
A leading global supplier of communications infrastructure equipment and a growing presence in the collaboration technology market.

Texas Instruments BUY
TXN US
A leading provider of semiconductors and other components that enable a variety of wireless connectivity services.

Proportion of world population with telephone subscriptions



Source: Millennium Development Goals Report 2006

Worldwide revenues from mobile Internet services are expected to grow more than fourfold from USD 3 billion today to more than USD 13 billion in 2011. The impact will be felt in different ways in developed and developing economies but the core effect will be the same – communication and information-connectivity technologies unleash a global wave of individual expression, creativity and economic participation. In developing economies, people are connecting at a pace that may not be fully appreciated in the West. Millions of new subscribers are joining wireless networks each month in India, China and sub-Saharan Africa. Millions – perhaps billions – of people will come "online," and so enter into the global economic value equation over the next ten years, creating a significant market force. This process is already under way in developed markets. As consumers connect with the modern economic value chain, their choices multiply. They liberate themselves from the physical distribution network and marketing devices established by large companies under the 20th-century economic paradigm. They gain access to vast and numerous information networks, enabling the creation of powerful niche consumer groups. Connectivity leverages the value of individual initiative and creativity, while reducing the disparity in knowledge of products and services between consumers and corporations or suppliers. For investors, there are different ways to benefit from these innovative trends. Advertising via mobile phones and radio frequency identification (RFID) billing are two interesting areas, but both are still at the early stages of development and have weak visibility. Investors should find more promising investments in companies that manage, control and secure connectivity services and products, given soaring network traffic growth.

Wavecom develops hardware and software to enable wireless communication for automotive and industrial applications. The company's smart modems and modules can enable any device to transmit and receive both data and voice communications. With the acquisition of Sony Ericsson's machine-to-machine operations, the company has taken another step forward and now has a 30% global market share in this segment. Alcatel-Lucent has a 40% market share in the growing Internet protocol television (IPTV) infrastructure market. The IPTV market is driven by next-generation network upgrades by telecom companies around the world, providing innovative digital mobile and broadband connectivity services.

Akamai has a 70% share of the Internet content delivery market, positioning it to benefit from a number of attractive trends, including digital advertising, Internet video, e-commerce, Internet software delivery and digital social networking. The Internet is a compilation of networks owned by thousands of companies, which often lack incentives to work efficiently together. Akamai's proprietary technology and an unmatched network of over 20,000 servers placed at strategic global points within the World Wide Web help ensure fast, efficient high-bandwidth Internet transmissions. When someone downloads a popular iTunes song, for instance, the chances are that it arrived via Akamai technology.

Equinix operates data centers within which lie much of the Internet's content. As the clear market leader, and with a sizable presence in the USA and Asia, servers within Equinix's centers connect directly to 90% of the world's Internet routes. Akamai, for example, has a presence within Equinix's data centers.

Cisco provides an investment gateway to the connectivity trend in the same way that investors might buy IBM shares to gain exposure to the IT sector. Cisco has leadership in several key network product segments and an unmatched compilation of network technologies. The company's recent acquisition of WebEx gives it a 65% share in the collaborative communications market. As communications costs decline, companies can gain vast efficiencies in bringing innovations to the market using collaborative technologies. As new devices become smaller, more capable and more affordable, new technologies capable of extending these trends come into heavy demand. Texas Instruments is a global technology leader in these types of connectivity technologies, merging previously separate device functions, such as voice, video, data, memory functions and even m-banking into a single chipset. It is working directly with several major cell phone companies to design new 3/3.5G devices, and is also a leader in new chips that enable the production of highly capable, very affordable phones, fitting well with C.K. Prahalad's "Bottom of the Pyramid" thesis. **Uwe Neumann, Steven Soranno**

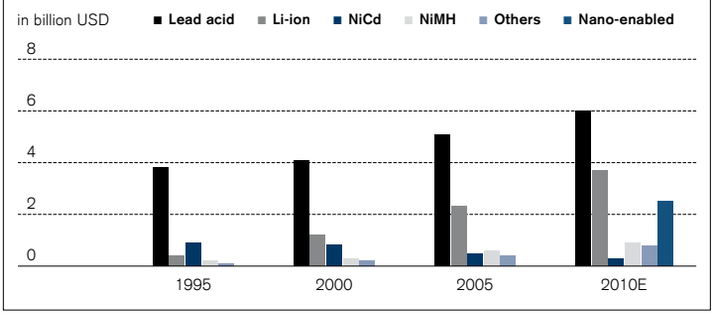
Renewables

FuelCell Energy BUY
FCEL US
Leader in large-scale residential fuel cell technology, FCEL benefits from growing clean-tech power demand.

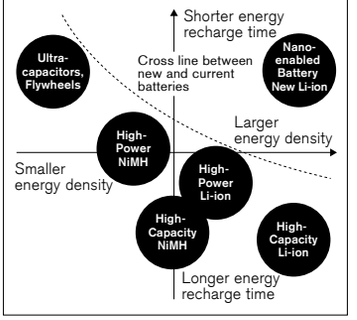
Medis Technologies HOLD
MDTL US
The largest developer of direct liquid fuel cells. Its Power Pack is aimed at the portable device market. Strong growth prospects.

Altair Nanotechnologies BUY
ALTI US
A pure-play nanotech firm whose superior, already commercialized battery implies high sales potential in the electric vehicle market.

World demand for rechargeable batteries



Energy storage characterization



Power from readily available renewable energy is often generated at different times and places from when and where it is needed. Efficient energy storage is therefore a crucial element for the alternative electricity market. On the consumer side, off-grid systems, mobile devices and electric cars are just a few applications which stand to benefit tremendously from new energy storage technology. New generations of batteries, fuel cells and supercapacitors justify the hope that the missing link in a steady alternative energy supply might soon be found.

The global battery market is worth about USD 50 billion, of which roughly USD 6 billion is allocated to rechargeable batteries, according to the Freedonia Group. For a long time advances in battery technology came at a slothful pace, especially when compared to the electronic devices they typically power. Batteries tend to be heavy and bulky. Reusable batteries often have short life cycles and shelf lives, low output power and long recharge times. When they do die, batteries do not make straightforward material for recycling or disposal.

But all that looks set to change. Young start-ups like Altair Nanotechnologies, A123 Systems, mPhase and Advanced Battery Technologies are bringing a new generation of nanotech-based batteries to the market. Altair's NanoSafe battery, which is already commercialized in electric cars, can be recharged in just a few minutes thanks to a special nanocoating of its electrodes. mPhase is currently marketing its "smart" nanobattery capable of producing current on demand after long-term storage. Long shelf life is achieved by a special nanosurface, preventing chemical discharge from occurring while the battery is not operational. An early commercial leader for nano-enhanced Li-ion batteries is A123 Systems, whose batteries are in production for Black & Decker's 36-volt power tools and reportedly recharge to 90% of capacity in less than ten minutes.

For fuel cells to be used in stand-alone power plants, they need to be rechargeable. In such so-called regenerative fuel cells, an electrolyzer transforms the electricity from solar, water or wind power into reactants like hydrogen and oxygen, which are then converted back into electricity and water by the fuel cell. Overall efficiencies range between 30% and 50%, while a cheaper battery might return more than 90%. But the clear advantage over batteries is that the amount of stored energy in a fuel cell is not limited by internal capacity and the achievable energy density is considerably higher. To compress more power into smaller volumes, some manufacturers like Plug Power and Medis Technologies have begun to build fuel cells on the fuzzy frontier of nanotechnology. The German enterprise Smart Fuel Cell, a leading maker of direct methanol fuel cells (DMFCs), has increased efficiency of its newest product by 33%. Another DMFC manufacturer is FuelCell Energy, which builds large-scale, ultra-low-emission residential power systems.

Many of the available fuel cell systems are not yet rechargeable. But the vision of next-generation fuel cell developers is nothing less than the hydrogen economy. This would encompass totally power-independent family homes or office buildings with rooftop solar panels and a regenerative fuel cell in the basement, or hydrogen vehicles like the one recently announced by Honda. Last, but not least, ultracapacitors offer a cheap way of storing energy, allowing for huge surges in demand and virtually indefinite charge cycles. Though they still lack the energy density of batteries, nano-enabled ultracapacitors could soon become a viable alternative method of powering electric cars.

The rapidly growing portable device market is spurring demand for lightweight, quickly rechargeable batteries. However, the market in solar power systems is expected to grow at an even higher rate over the next few years, and the new generation of cheap and safe storage systems will probably speed up the emergence of electric or hybrid vehicles and off-grid power generation, both in developed and emerging economies. In light of the most innovative breakthroughs, recommended investment exposure on a company level would be to pure energy system developers like FuelCell Energy, Medis Technologies and Altair Nanotechnologies.

Dominik C. Müller, Miroslav Durana

Source: Freedonia, Credit Suisse, Physorg

Food

Lindt & Sprüngli LISP SW — **BUY**
A strong degree of innovation enables Lindt & Sprüngli to expand into new markets and to continue above-average sales growth.

PepsiCo PEP US — **BUY**
PepsiCo is also one of the most innovative and dynamic marketing companies and has a firm grasp on consumer trends.

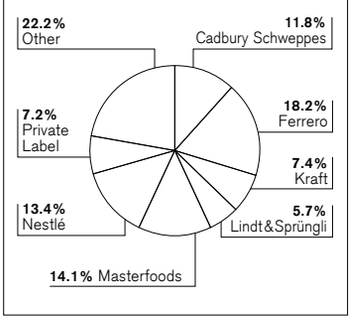
Danone BN FP — **BUY**
Clear, focused and well-managed business of fresh dairy products, beverages and biscuits. Best in class at launching innovations.

Kellogg K US — **HOLD**
One of the highest-quality US packaged food companies due to product innovation and marketing spending to support existing brands.

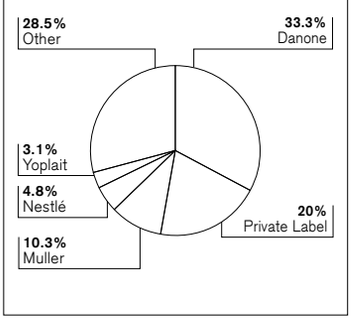
Nestlé NESN VX — **BUY**
Successful transformation from a traditional food manufacturer to a health-and-wellness company.

Hiestand HIEN SW — **BUY**
Superior business model with a focused and well-managed bakery business and an integrated logistics system. Highly innovative.

Chocolate confectionary Europe



Yogurt Europe



Intense competition, consumers' burgeoning bargaining power and increasing input costs have all fostered the growth of innovation in recent years. Innovation not only helps drive food manufacturers' organic growth and improve their profitability by enabling them to charge a premium, it also allows them to penetrate the mass-market segment in emerging markets.

Innovation doesn't just cover product formulation, but also extends to packaging, distribution and advertising. There are three broad areas of product innovation: health and wellness, premium and convenience. Driven by aging populations, cultural changes and societal diseases such as obesity, high cholesterol levels and cardiovascular diseases, health and wellness is the most important driver of the food products industry, as the sector where companies invest most. In this segment, growth rates of above 10% and EBIT margins of 15% – 20% are projected. Nutrition, ingredients with scientifically proven health benefits, baby food and weight management are the main fields of innovation here.

Major manufacturer product reshuffling has clearly benefited this segment, as the example of Nestlé shows impressively. Customization of weight management solutions, like Nestlé's Jenny Craig brand or NutriSystem, permits companies to move into areas of low price elasticity. Furthermore, product reformulation and the reduction of unhealthy components such as trans-fats and sugar have become important fields of innovation in recent years, particularly in the USA. For example, Barry Callebaut started to invest in healthier product lines such as sugar-free chocolate and organic chocolate.

Against the backdrop of a recovering economy with steady growth in discretionary income, the demand for premium products has become very strong in developed markets, and consumers are spending more and more money on indulgence products. Companies that are either pure plays in premium products, or have managed to shift their product range toward the higher end through innovation, have been particularly successful and will increasingly be so. In Europe, Lindt & Sprüngli may be considered a good investment as a pure-play producer of premium products. Convenience is increasingly critical: consumers are demanding products which are convenient in terms of format and packaging, preparation, consumer mobility and customization. This is the reason why food products companies not only invest in product innovations but are also highly engaged in marketing, advertising, distribution and delivery in order to better reach consumers with fast-moving consumption habits. In Europe, it is worth looking at Hiestand, which managed to develop from a pioneer baking company to a leading producer of frozen and convenience bakery products.

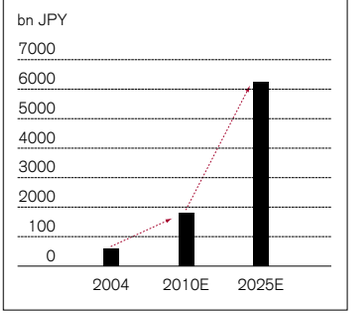
Among the large caps in Europe, interesting stocks include Nestlé, with its increasing focus on nutrition, and Danone, which is best in class in launching innovations. On the other hand, innovations at Cadbury Schweppes may be less promising, and Unilever is probably behind the curve, despite its attempt to target health and wellness. In the USA, PepsiCo, with its Frito-Lay division, and Kellogg, with its healthy cereals, could be viewed as most innovative, whereas Kraft is lumbered with traditional products. Future areas of innovative thrust must deal with anti-aging, mental health, brain development and customization, and possibly also with certain aspects of nanotechnology.

Olivier P. Müller, David A. Williamson

Source: AC Nielsen (12-month period ending 1 February and 1 April, 2007), Credit Suisse

Robotics

The robot market will grow



Larger peer, iRobot, has sold over two million units that help people keep clean.

2,000,000 units

Robotics "is developing in much the same way as the computer business did 30 years ago," according to someone who should know – Bill Gates. The South Korean Ministry of Information and Communication plans to have a robot in every home there by 2013. In Japan, where the robot industry began in the late 1960s, development has moved well beyond factory automation, to becoming an integrated aide to daily life.

Japan's Ministry of Economy, Trade and Industry's Next-Generation Robot Vision Panel estimates the robot market will grow to JPY 1.8 trillion in 2010 and JPY 6.2 trillion in 2025. Honda Motors' charismatic humanoid robot, Asimo, is widely known, but the Honda Research Institute is going much further, conducting in-depth research to build a "brain computer," a manufactured device that would work exactly like a human brain.

Such levels of artificial intelligence would allow robots to adaptively interact with humans in the real world and learn from the situations they encounter. NEC's PaPeRo can not only entertain children with conversations and quizzes, but also perform voice and face identification to distinguish which child is which. It can recognize who gave the right answer in a quiz, for example. More importantly it can take attendance numbers, so if somebody is not there, PaPeRo will know. If a parent contacts PaPeRo from a mobile phone, the robot can locate the relevant child and transmit the scene by video, while the parent and child communicate by videophone.

Toyota recently introduced several eye-opening examples of mass-produced artificial intelligence. Its flagship Lexus cars can be equipped with an intelligent parking system that allows a driver to park the car backwards or sideways into a parking lot by indicating the desired space on a touch-sensitive video screen on the dashboard. Sensors evaluate distances and help precisely maneuver into the lot with little ado from the driver. The company is also developing systems that it calls judgment-assist functions, which help the driver to avoid danger and make appropriate maneuvers.

Robotics is unique in being one of the focal points of the global arms race, while also being one of the key beneficiaries of the socioeconomic creative forces unleashed by global connectivity technologies such as the Internet. During this year's FIRST Robotics Competition, 32,500 students on 1,303 school teams from 23 countries competed to build the best robot.

At this early stage of the industry's development, most pure plays with financials stable enough to trade publicly have large government contracts, but remain in the small-cap category. AeroVironment conducted a public equity offering in January. It supplies parts and systems to the unmanned aircraft industry (80% of sales). At present, most of these vehicles are capable of being carried by one man (man-portable) and designed for reconnaissance. The company is also developing a solar-powered unmanned vehicle on which it hopes to house 3G cellular communications transmitters. This initiative includes the US and Japanese governments and NEC/Toshiba. The other 20% of AeroVironment's sales comes from innovative energizer systems that keep industrial vehicle batteries efficiently charged.

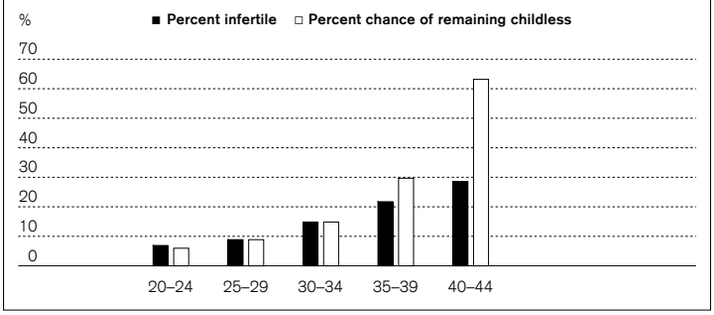
Larger peer, iRobot, has sold over two million units that help people keep the household clean. It also has a significant business selling robotic vehicles to the military for the detection and disposal of bombs. Its USD 130 iRobot Create kit allows individuals to design and program their own robotic assistants, similar to designing toys with Lego (another key robotics innovator). In just a few months of availability, the Create kit has given rise to large, online, idea-sharing communities. Helen Greiner, iRobot's Chairperson and cofounder, has been named "Technology Review" magazine's Innovator for the Next Century, and was invited to the World Economic Forum as a Global Leader of Tomorrow. Asked why she started the company, she replied: "The vision has always been to make robots that touch people's lives every day."

Steven Soranno, Marc-Antoine Haudenschild

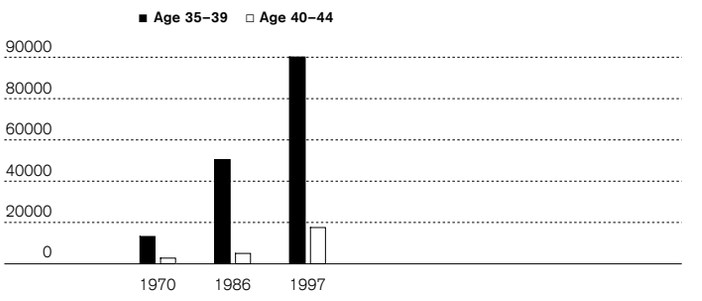
Source: JETRO, METI

Fertility

Infertility increases with age



First child birth by age group in the USA



Women today lead rich and demanding lives, full of opportunities. As a result, many of them choose to start their families later in life. But nature isn't fair. While men can father children in their golden years, the female biological clock is far less forgiving. A woman's fertility begins to decline at age 27 and significantly deteriorates after 35. By 40, her odds of conceiving are only about 5% each month. Currently the most widely used treatment for couples that would like to have children later in life is in vitro fertilization, but in the past few years there is increasing excitement about the new technology of oocyte cryopreservation, or egg freezing.

One innovator in this field is Christy Jones, founder and CEO of Extend Fertility, a company that works with leading reproductive and medical research centers around the USA to offer women the opportunity to prolong their fertility using innovative egg-freezing technology. A seasoned entrepreneur with a successful track record of bringing new technologies to market, Christy was featured three times on the cover of Forbes, named a Top 100 Young Innovator by MIT "Technology Review" and billed as one of the Top 20 Leaders under 30 by "Working Woman" magazine.

Until recently, the procedure of egg freezing was restricted to young women facing chemotherapy, but since 2004, Extend Fertility offers it to any woman with healthy ovaries. Jones says that currently 60% of her clients go through the procedure for non-medical reasons. While egg freezing does not guarantee a successful pregnancy, "it can greatly improve a woman's chances of conceiving at age 40 and older, and gives women a sense of empowerment that they have taken advantage of all of their options," says Jones.

Because the human egg is large and contains a high percentage of water, it is highly susceptible to freezer burn. Recent advances in techniques for freezing eggs, however, have helped overcome this challenge, resulting in dramatically improved success rates. The procedure starts with hormone injections, which increase the number of eggs a woman produces to about a dozen. The eggs are then extracted, treated with a protectant and submerged into a tank of liquid nitrogen. Years later, eggs can be thawed and fertilized. The entire process lasts two weeks and costs between USD 10,000 and 15,000. The procedure, first performed in Italy in the mid-1980s, has resulted in more than 200 successful pregnancies in the last few years. In the past year, eight babies have been born from frozen eggs at Extend Fertility clinics, with world-leading egg survival rates of over 80%. In April 2007, a 36-year-old woman, who was enrolled in an Extend Fertility-sponsored research study, made history by giving birth to the first USA baby born from both a frozen egg and frozen sperm.

The increased number of women who choose to become mothers later in life has spurred a tremendous growth in reproductive health clinics in the USA and Europe. Currently Americans spend over USD 1 billion a year on medical fertility procedures. The number of fertility clinics in the USA has grown from 200 in the mid-1990s to over 400 today. Extend Fertility alone has frozen the eggs of over 200 women in the past three years, and the number has doubled each year. The technology is still considered investigational in the USA, and in general, the Food and Drug Administration is putting tighter controls on fertility clinics. Jones suggests future clients and investors in the fertility field be very selective and choose clinics that invest in research and education, that can show a record of a significant number of pregnancies and that manufacture their product under current Good Manufacturing Process guidelines.

While egg-freezing science is still new, it is promising and can give women another chance to take control of their reproductive health. "It's our generation's answer to the birth-control pill," says Jones. "Our moms had the birth-control pill, and that gave them a lot of freedom, and the next generation will have egg freezing, and that will give them freedom in a different way." **Tania Dimitrova**

Source: American Society for Reproductive Medicine, A Guide for Patients, 2003, The National Vital Statistics Report, April 1999

Solar energy

Solarworld SWV GR — **BUY**
As one of the few fully integrated solar companies, Solarworld should benefit from high upstream margins and economies of scale.

Tokuyama Corp. 4043 JP — **BUY**
Integrated manufacturer with strong technological expertise and high-margin polysilicon exposure: our favorite solar stock.

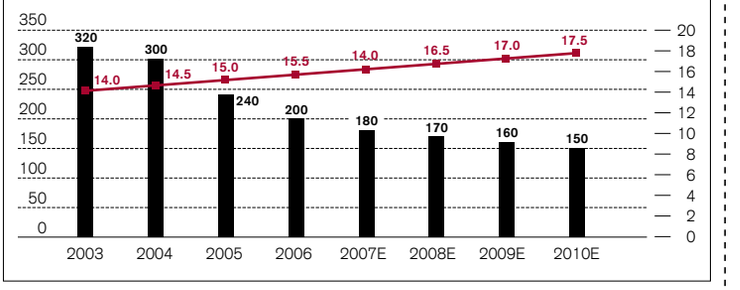
Q-Cells QCE GR — **HOLD**
Global number two solar cell producer with high visibility in feedstock supply and above-average growth potential. Thin-film project starts 2008.

Suntech Power STP US — **BUY**
Among Chinese solar firms, Suntech is best positioned from the viewpoint of both technology and cost, with a secure silicon supply.

Renewable Energy Corporation REC NO — **BUY**
Integrated manufacturer with strong technological expertise, full control of costs and high-margin polysilicon exposure.

First Solar FSLR US — **HOLD**
As the leader in thin-film solar cell technology, FSLR is independent of silicon pricing and enjoys the lowest cost per watt in the industry.

Wafer thickness and cell efficiency development



Source: EPIA, Credit Suisse

Global warming, high oil prices, carbon trading schemes and energy security issues have all brought unprecedented public focus on alternative energies. The surge on the demand side has driven up solar share prices in recent months. But as capacities through the entire value chain are ramped up and new solar technologies mature, the upside potential of selected stocks remains intact.

Of all alternative energy sources, the most groundbreaking changes can be expected in photovoltaic (PV) technology. While the hydropower market share of global power generation is 16%, wind and solar still account for less than 2% according to the International Energy Agency (IEA). Solar electricity prices are expected to continue falling, and once they become commercially competitive, there is huge expansion potential for the industry. The European Photovoltaic Industry Association (EPIA) forecasts annual market growth of 26% through 2010. By then, PV shipments will reach about six gigawatts, equivalent to the combined power output of eight coal-fired plants. The bulk of this huge demand will be met by first-generation, silicon-based solar cells produced by large manufacturers like Q-Cells, Solarworld and the Renewable Energy Corporation (REC). With demand soaring, silicon suppliers like Hemlock, MEMC and Tokuyama are busy boosting capacity.

Even so, silicon shortages might persist through 2008, and since raw material prices are unlikely to fall substantially, they will continue to account for about 60%–70% range of the manufacturing costs of conventional PV cell producers. This presents a great opportunity for second-generation, thin-film manufacturers like First Solar, whose novel modules are based entirely on readily available cadmium telluride. In addition, thin-film cells use significantly less material. As a consequence, First Solar enjoys by far the lowest capital costs per watt in the industry. However, the current lack of broader investment opportunities in emerging thin-film technology is reflected in the recent stock price rally of those companies.

With the driving forces behind falling per-watt production costs being lower raw material usage and higher energy conversion efficiency, the solar industry should enjoy a significant advantage over wind or biofuels. While today's wind turbines arguably work at close-to-optimum performances, solar cells of the third generation promise a broad repertoire for efficiency improvement. In the future, quantum dots and nanoparticle-based solar cells might double or even triple the efficiency of currently installed cells, reaching 30% or more. Moreover, ultra-thin films, organic and dye-sensitized cells promise to beat down material costs substantially. Such new PV systems could be integrated in glass windows, facades, or even paint-like coatings of mobile devices, offering the perspective of cheap and ubiquitously available electricity. Many of these nanotechnology-based developments are pushed by BP Solar and small private companies like Konarka, Octillion, Stion Corporation or DyeSol. Some of their products should hit the mass market within the next five years.

Wind plants are already up and running, and the sector provides rather clear visibility on fair growth and return. The solar market is a somewhat more volatile equity story due to unknowns linked to future government subsidies and silicon supply/demand balance developments. Hence, the Credit Suisse Global Alternative Energy Index (CSGAE Index; please refer to Global Investor Focus January 2007) is recommended as an appropriate way to get a diversified exposure to a rapidly changing global alternative energy landscape. The world's biggest pure solar players like Solarworld, Q-Cells and REC, as well as Tokuyama Corp. and Suntech Power Holdings, are worth consideration by investors. For those seeking exposure in thin-film technology, First Solar is an interesting stock. **Dominik C. Müller, Miroslav Durana**

Education

Bright Horizons Family Solutions — BUY
BFAM US

A leading provider of day-care and educational services delivered in partnership with employers and located on corporate campuses.

New Oriental Education — HOLD
EDU US

Well positioned to grow in an emerging industry.

Pearson — HOLD
PSON LN

Pearson is able to deliver strong results thanks to the improved competitive positioning of its portfolio of operations, especially in education.

The move toward a knowledge-based economy, shifting demographic trends and the opening up of global markets are the cornerstones of a changing landscape for education providers. According to UNESCO and the OECD, the number of students in middle-income countries seeking higher education is skyrocketing, with enrollments jumping by 77% over the past decade, compared to 43% in high-income countries.

As emerging markets develop, so demand from the service sector for highly educated workers increases, often at a faster rate than the existing education system can absorb. One solution to this shortfall is for companies to build their own education infrastructure, a measure that has been employed in India – one of the first big emerging markets to face this challenge.

In fact, India possesses some of the world's most renowned universities and higher education is not its largest problem. The country has even bigger challenges at the primary education level, and here too, the private sector is starting to play a large role, complementing rising government investment.

Meanwhile, China's dynamic and fast-growing economy is emerging as the world's most challenging and potentially lucrative education market. According to some estimates, the sector could be valued at more than USD 70 billion. The country has a huge unmet demand for post-secondary education, and while the private education market is still very small, there is sizable potential for further growth.

The big US education market also continues to offer investment opportunities. Here, shifting demographic trends will play an important role in shaping the development of post-secondary education companies. **Steven Soranno**

Toys

Nike — BUY
NKE US

The Nike brand is synonymous with quality, performance and innovation. Broad-based growth initiatives position it well for the future.

Mattel — HOLD
MAT US

Dominant toy maker Mattel has a strong new product cycle, excellent brand awareness and a key licensing/marketing tie-in with Disney.

Marvel Entertainment — BUY
MVL US

Marvel should benefit from exciting new media content over both the near and long term, plus a tie-in with Hasbro.

Hasbro — HOLD
HAS US

Hasbro results strengthen on the back of its Spider-Man and Transformer franchises, as well as on innovation and interactive learning.

Build-A-Bear — BUY
BBW US

Build-A-Bear is a leader in toy customization, offering customers the ability to make their own stuffed animals in an interactive environment.

The world's largest toy manufacturers have made dramatic changes to their business plans to meet the demands of Generation X and Y consumers for more personal service and customized offerings. While innovation has forever been the credo of the toy industry, individual customization is a trend that has really gained significant momentum in the last five years.

Mattel, the world's largest toy maker, has revolutionized the doll category through its American Girl division (acquired in 1998 and with 2006 revenues of USD 440 million). Every girl can now find and design a Just Like You doll that matches her own spirit and appearance through customization of hair and eye color and skin tone, as well as outfits and accessories (both girl and doll sizes to match). Mattel plans to open several American Girl boutique units in select US cities in 2007/2008, adding to three destination stores in Los Angeles, Chicago and New York. In 2006, Mattel developed a Hot Wheels custom car factory at the famous FAO Schwarz toy store in New York City, where a child can design a car and have it manufactured within ten minutes. Also, Mattel's Radica unit changed the landscape of the electronic toy industry in 1999 with a line of breakthrough products for girls, some using voice recognition and others offering customization of design and outcomes. Perhaps one of the most striking examples of customization in the toy industry has been by Lego (a privately held company) with its www.LEGOFactory.com website launched in 2005. Here, one can design a unique 3-D Lego model, name it, create the graphics for the packaging, and have the entire model built and shipped to their home. Other users can also modify someone else's design, and Lego reserves the right to mass-produce an original model designed by a consumer.

Build-A-Bear, founded in 1997, has grown to 300 stores with USD 500 million in sales worldwide, and has followed Mattel's lead in dolls by dominating the customized plush animal segment, while Hasbro has teamed up with Marvel Entertainment in the customizable action-figure category geared toward boys. In a related leisure industry, Nike consumers have been able to design their own athletic shoes via the Internet since late 2005. **David A. Williamson**

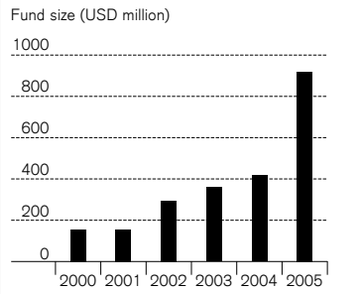
Source: Credit Suisse

Carbonomics

EcoSecurities **BUY**
ECO LN

EcoSecurities offers a pure investment in the attractive carbon credits trading market. Risks: limited float, early stage, still loss-making.

World Bank carbon finance funds



Source: World Bank

Climate change raises new and complex challenges for global long-term economic growth. One immediate challenge is the potential for an increased number of severe weather events. The impact of such occurrences is likely to be amplified by the continued worldwide expansion of unplanned and poorly regulated urbanization. The long-term impact on the financial industry will be huge, but the immediate impact is already significant. The insurance sector, for example, is now having to tackle the challenge of handling an increasing number of virtually uninsurable risks. Insurance losses have increased 11-fold over the last 40 years. Risks like these are partially balanced by opportunities such as CAT bonds or carbon trading.

A consensus has emerged that CO_2 emissions have to be reduced and controlled, but there is still a significant debate over the best mechanism to drive reductions. Trading carbon emissions based on further clear laws providing registerable rights with appropriate legal status is an obvious possibility. This mechanism was proposed in the Kyoto protocol from 1997, and has resulted in an active market in Europe, but, so far, it has not become fully developed. Given recent climate change studies highlighting substantial evidence of global warming, the carbon trading market can be expected to pick up significantly.

The carbon market will, in our view, require the development of a global banking value chain from origination to structuring and finally to distribution. A carbon trading regime capable of adequately addressing the challenges of global warming will ultimately touch most divisions within global investment banking. Within origination, some banks are already prepared to act as preferred buyers of carbon globally using their balance sheets. They also provide financing to project sponsors using carbon as collateral, as well as sourcing carbon through their global client network.

The demand from institutional as well as private clients regarding carbon-linked products will grow, given the market opportunities created by the need to reduce and manage carbon emissions. Structured financial products using carbon as the underlying contract are likely to develop. To make the value chain complete, successful banks will need an efficient underlying distribution network to provide products to those buyers that need certification in order to be CO_2-compliant, as well as other liquidity providers such as institutional buyers (asset management) or private client purchasers (retail and private banking). Some forecasters predict the greenhouse gas (GHG) credit trading market could be worth over USD 2 trillion by 2012. Comparable markets are expected to emerge for green power certificate trading, CAT bonds and hedging instruments for energy-related products.

Many scientists now believe that the carbon dioxide ceilings under existing treaty frameworks are too high to help avert serious climate change. This emerging consensus enhances the prospect for an increasingly attractive and robust market going forward. Companies well positioned to profit from the development of GHG markets include small specialized houses, such as EcoSecurities, as well as the major global investment banks. For global banks the proportion of earnings from the emissions business will remain relatively small compared with their overall capital markets businesses, particularly in the short term. Other companies well positioned for growth in carbon markets, such as Climate Change Capital or CarbonNeutral, are not yet publicly traded, having relied on venture capital or other private investors for funding.

Paul J. Ezekiel, Christine Schmid

Chips

TSMC BUY
2330 TT

Foundries in general and industry leader TSMC in particular benefit from greater outsourcing by semiconductor manufacturers.

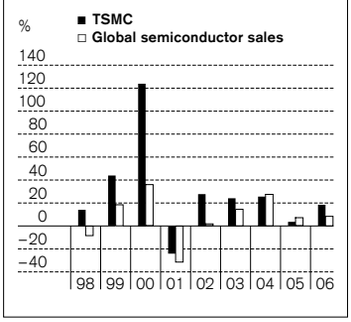
ASML HOLD
ASML NA

The ongoing miniaturization of line width in chip manufacturing requires outstanding lithography technology. ASML supplies this equipment.

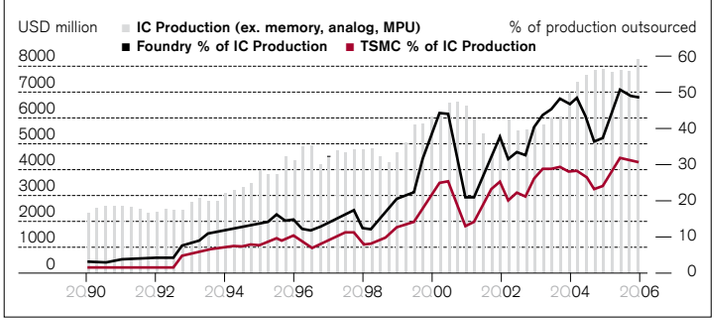
SEZ HOLD
SEZN SW

SEZ, with its new Esanti product platform, will benefit from the success of single-wafer technology in FEOL applications, starting in 2007.

TSMC shows stronger sales growth



Outsourced production in the semiconductor industry



Until eight years ago, integrated semiconductor companies outsourced only around 5% of their production to dedicated foundries. By 2006, this figure had risen to 20% and it will be substantially higher in five years' time. At the beginning of the current decade, a broad shift in strategy became discernible in the semiconductor industry, away from pro-cyclical investment in capacity expansion and in favor of increased cost consciousness. Now there are new factors underpinning the continuation, and even acceleration, of this outsourcing trend. There has been a sharp increase in the costs associated with new production plants, a trend which has prompted integrated semiconductor manufacturers, in particular, to push ahead with their so-called asset-light strategy (optimizing existing production combined with outsourcing) in order to improve both profitability ratios and cash flow.

As a result, sales in the foundry services segment are expected to expand at approximately twice the rate of those in the semiconductor industry in the years ahead. This is why Morris Chang, founder of the dedicated Taiwanese semiconductor foundry TSMC, predicts that foundries will account for around 40% of total semiconductor production in coming years. However, this is not the only good news for foundries. Integrated semiconductor manufacturers such as Infineon Technologies, Texas Instruments, Freescale and NXP (formerly Philips Semiconductors) are planning to outsource all or part of their process technology to foundries in order to devote themselves exclusively to chip design. Even though the demands being made on the foundries are growing, this additional service provides them with the opportunity to command higher prices from their customers. Given the resultant economies of scale, the concentration of production activities at foundries also appears attractive from a cost viewpoint.

At TSMC, so-called gigafabs are already either at the planning stage or under construction. The aim of these supersized foundries is not only to create substantial cost advantages relative to smaller production units, but also to increase the quality of production and to shorten timetomarket. This last factor will be of particular importance in future. On the back of this trend, the technological leadership of foundry services companies will continue to be enhanced. Naturally, this will require a sufficient level of investment in new production facilities. Although, in turn, this will lead to increased dependency on foundries on the part of semiconductor equipment suppliers, it will also make it possible for the latter to introduce new production equipment far more rapidly and in larger volumes.

TSMC's technological leadership is based, to a significant extent, on the company's close cooperation with ASML, the world's leading provider of lithography systems. Developments within this product segment are decisive in terms of the ongoing miniaturization of line widths in chip manufacturing, which is critical for containing costs. At the same time, however, this ongoing miniaturization places high demands on the purity and thus the preservation of chip functionality. In this regard, the structure of cleaning systems is undergoing a process of change. Smaller line widths, in particular the transition from 65- to 45-nanometer chips, can be expected to result in increased demand for single-wafer cleaning systems. The Austrian manufacturer SEZ boasts a product portfolio that in future will be capable of targeting the entire market for wet chemical cleaning systems.

Given that foundries are among their most important customers, the manufacturers of lithography systems and single-wafer cleaning systems are currently benefiting from the trend toward smaller line widths and from the foundries' anticipated relatively high production volumes. In our view TSMC, ASML and SEZ will be the main beneficiaries for the continuing acceleration and miniaturization trend. **Ulrich Kaiser**

Source: TSMC, SIA, Credit Suisse, UMC, Chartered Semiconductor, SMIC

E-payments

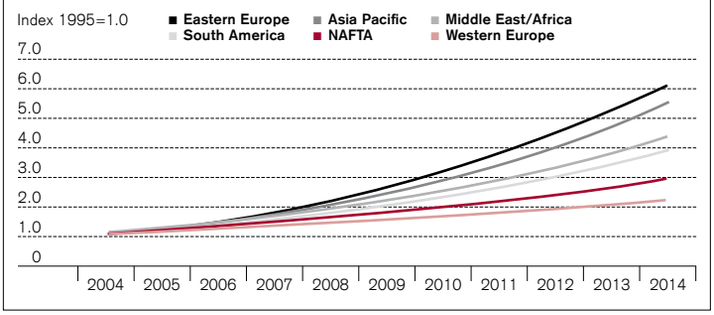
eBay BUY
EBAY US

A strong asset portfolio, including commerce platform, e-payments and peer-to-peer communications, should create digital opportunities.

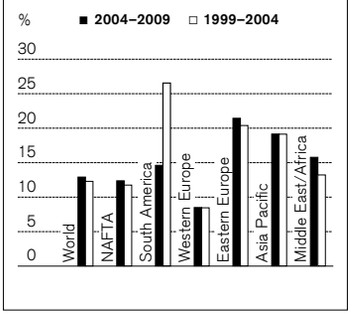
Global Payments HOLD
GPN US

Electronic payment trends should benefit the firm. International growth should offset US revenue/margin challenges.

Regional growth rate for electric payments



Electronic transactions growth



As the primary touch point between customers and suppliers, the payment process can be the key to customer/supplier relationship innovation. Its importance does not stop there. National payment systems are the pillars of economic development in an increasingly connected world that is undergoing dramatic change. Most governments have recently issued standards for the next generation payment infrastructure.

With low variable costs, e-payment processing is big business. In emerging markets, e-payments are a vital tool in the development of supportive financial infrastructures, where only weak ones existed before. The emerging market cards per capita ratio is only 0.2 (versus 3.3 in the USA, for example), suggesting substantial room for growth. The fastest expansion is forecast in Latin America, Asia Pacific and Africa, where card penetration and usage is lowest. In Europe, telecommunications costs for new e-payment methods, such as chip-based systems, can be dramatically lower than those of traditional ones, such as swipe machines. This is not so in the USA, where the virtually nonexistent cost difference is insufficient to drive spending commitments for new infrastructure. While deployment of new technologies has been faster and more headline-grabbing elsewhere, the underlying demand drivers in the USA are quite solid, forcing e-payment innovations to take a slightly different course.

Global demand drivers are diverse. E-commerce sales volumes are expanding at significantly faster rates than those of bricks-and-mortar, for both consumer and business-to-business. This is a trend we expect to continue long-term. Prepaid cards solve the problem of consumer credit worthiness, a vital factor in the evolution of economic infrastructure in developing markets. In developed markets, prepaids are a strong new entrant to the retail gift-giving season, during which the bulk of annual spending occurs. Microtransactions are rapidly becoming a key component of many corporate online strategies. The paying of small amounts for simple online items – music, for example – has the potential to turn the Internet into a virtual toll road of "a-la-carte" consumption, with profound implications for transaction volumes. The maturation of the online generation is a powerful support. Over the next ten years, the PC and Internet generations will become the world's largest wealth demographic. Their comfort with, and unyielding demand for, the convenience of electronic transactions far higher than that of the Baby Boomers who have dominated the economic landscape in recent years.

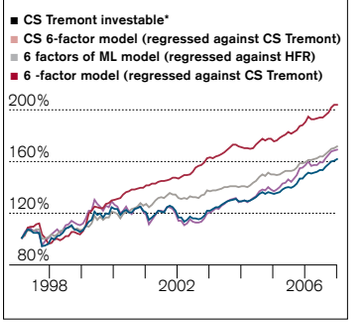
This generational shift will be a key underlying driver of new payment mechanisms, such as mobile payments – a system also supported by low-cost deployment attributes for emerging market rural areas. Taking receipt signing out of the transaction process speeds up checkout times, lowers costs, and enables the use of e-payments for bill sizes far lower than previously realistic. It also enables retailers to create highly valuable client-relationship programs that offer micromarketing programs (such as product incentives) to individual customers. In this way, new e-payment mechanisms are allowing retailers to change the dynamics of the customer/supplier relationship. Sellers can serve mass markets and individual markets simultaneously, and more efficiently.

The global general-purpose card space, which includes both credit and debit cards, is dominated by three players: Visa (60% market share), MasterCard (27%) and American Express (11%). Visa is likely to conduct an IPO within the year. Verifone is a leading global provider of secure electronic payment technologies and is providing the point-of-sale infrastructure for many of the new e-payment initiatives globally. eBay's PayPal is the world's top e-commerce payment system. eFunds processes a significant portion of prepaid volume (through American Express) and develops processing software, risk management and fraud-prevention products. Global Payments is a leading e-payment processor. Through a joint venture with HSBC, the company is a very active player in Asia Pacific. **Gregory Siegel, Steven Soranno**

Source: ACI Worldwide

Hedge funds

Hedge fund Indices



Percentage of returns explained

Equity Hedge (long/short)	88.5%
Equity market neutral	35.3%
Short selling	81.2%
Event driven	79.3%
Distressed securities	68.4%
Merger arbitrage	52.9%
Fixed income arbitrage	40.5%
Convertible arbitrage	54.0%
Global macro	49.7%
Managed futures	34.3%

The next generation of alternative investments is emerging and might become a new growth area. Hedge fund clones based on quantitative models are now seeking to generate hedge fund-like returns. Over the last decade, hedge funds have been one of the best-performing investment areas, but they have been largely reserved for institutional clients and ultra-high-net-worth clients. The new products now on offer to the mass market are replicating hedge fund strategies in lower-cost and higher-liquidity instruments. While there are a large number of experienced hedge fund managers applying sophisticated strategies and exploiting market inefficiencies, most are not applying rocket-science techniques.

Hedge fund returns can be broken into three main divisions: alpha (non-correlated returns); beta (systematic market risk) and alternative beta (returns that can be extracted by using hedge fund techniques like short selling, leverage and derivatives). Synthetic products deliver a combination of the beta and the alternative beta components of hedge fund returns. Alpha, net of fees, is usually hard to find and comes with significant liquidity, transparency, capacity and regulatory constraints. Meanwhile, the alternative beta component of hedge fund returns tends to vanish in a broadly diversified hedge fund portfolio.

While the returns of single hedge funds are hard to replicate, the performance patterns of broad hedge fund indexes and funds of hedge funds can largely be explained by overall movements in financial markets. Risk exposure can then be calculated, and the underlying markets can be traded, permitting at least partial replication of hedge fund returns.

A number of asset managers (Partners Group, State Street) and investment banks (JP Morgan, Merrill Lynch Goldman Sachs, Credit Suisse) are launching products aimed at replicating the performance pattern of hedge fund indexes. The potential advantages of these products are substantial: reach to a broader investor community, high liquidity, no time-consuming due diligence processes, better transparency, low-cost products, the ability to get short exposure to hedge fund strategies and no constraints on capacity. This will attract investors as it gives access to an investment category that was previously closed off. **Cédric Spahr**

* CS Tremont index for 1998-99; CS Tremont investable index afterwards. Source: Credit Suisse, Datastream, Jaeger/Wagner (2005). Percentage of returns explained by chosen market factors for specific hedge fund styles (period: 1994–2004)

Focus on Asia

China Shenhua 1088 HK — **BUY**
With efficient cost structure, strong production growth, high ROA and backup from its parent, Shenhua is a core holding.

Huaneng Power 902 HK — **HOLD**
Aggressive acquisitions have been well-supported by a strong balance sheet. Higher tariffs should offset rising coal costs.

Shanghai Electric 2727 HK — **BUY**
We are positive on the company due to strong domestic power demand, especially on efficiency and environmental protection concerns.

Datang Int'l 991 HK — **HOLD**
Its integrated model and secured coal supply are still competitive advantages, although it will experience slower future growth.

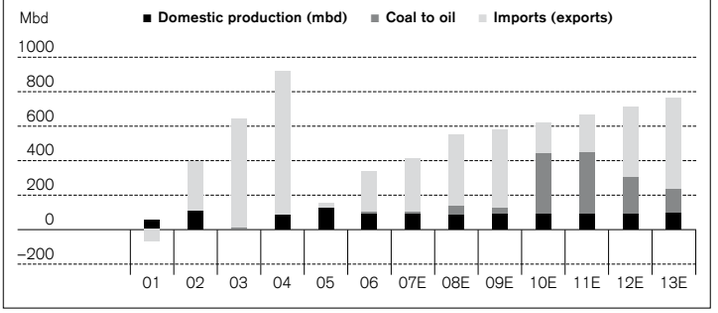
Suntech Power STP US — **BUY**
Among Chinese solar companies, Suntech is the best-positioned for both technology costs, with a secure silicon supply.

China Petroleum and Chemical 386 HK — **HOLD**
Good results already priced in. Upstream growth positive, but driven by low-margin gas business. Refining still drags on earnings.

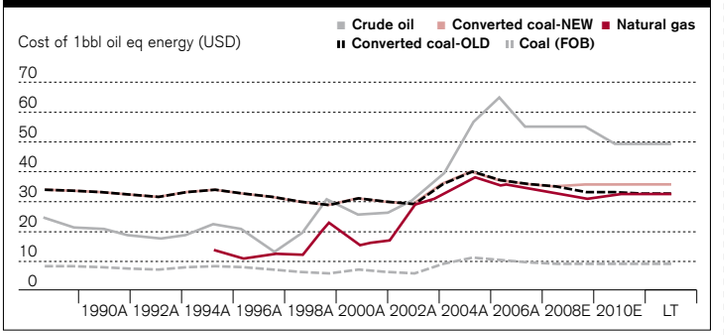
In order to strengthen their hand amid intensifying global competition, Asian governments have formulated new policies to invest significantly in promoting innovation. Japan stands out as a regional pioneer in technological innovation, and the government has set a strategic national goal of "becoming an advanced science and technology-oriented nation." The Japanese government has always emphasized the development of new ideas through its Science and Technology (S&T) Basic Plans. In March 2006, the Third S&T Basic Plan (FY2006–2010) was formulated and the government decided to spend a total of JPY 25 trillion to promote innovation over the next five years. Four strategic areas have been prioritized: life sciences, information and communications technology, environmental sciences, and nanotechnology and materials science. Korea and Taiwan are two smaller Asian countries pursuing progressive innovation policies. The Korea Science and Engineering Foundation (KOSEF) has provided the basis for R&D development in the country. Programs and initiatives like the General Research Grant and Centers of Excellence have helped foster the development of new ideas at the company and individual level. National R&D programs like the 21st Century Frontier and National Research Laboratory have also assisted in breaking new technological frontiers. KOSEF's counterpart in Taiwan, the Industrial Technology Research Institute (ITRI), serves a similar function. ITRI has traditionally provided both technical support and seed funding to encourage development of new technologies.

In order to build a more sustainable and energy-efficient growth model, China has attached great strategic importance to scientific and technological innovation in its 11th Five-Year Plan (2006–2010). Beijing plans to increase spending on science and technology by about 20%, with technological upgrades in the manufacturing and information industries, a rise in agricultural production capacity, and the development of energy-saving technologies and clean-energy resources as key objectives. According to the National Guidelines on the Medium- and Long-Term Program for Science and Technology Development (2006–2020), issued by the State Council, China will push enterprises to spend more on R&D and support enterprises taking part in national R&D projects. A key policy initiative is to promote innovation in renewable energy

China's incremental oil demand



Energy cost comparison for one barrel of oil equivalent



technologies, with the target of generating 15%–20% of total consumable energy from alternatives by 2020.

There are understandable reasons for diversification. The development of alternatives lowers China's reliance on imported crude oil, and thus contributes indirectly to an improvement in national security. Alternatives also offer one more way of slaking the thirst for energy created by primary industrial growth and subsequent consumer demand. On 16 June 2006 the Ministry of Finance announced the "Management Rules for Funds Dedicated to the Development of Renewable Energy" as well as the "Directional Instruction for the Development of Renewable Energy Resources." These two instructions are the most important guidelines mapping out China's alternative energy future. Various forms of subsidies, interest-free loans and consumption-tax exemption are being provided to encourage development and innovation in various categories of alternative energy, including wind, solar, biomass, geothermal, ocean and hydropower.

Coal-to-oil conversion: The parent of China Shenhua Energy, the largest coal producer in China, has pioneered the development of coal-to-oil (CTO) conversion technology. It intends to inject these CTO projects into the listed company when the business matures. For more details on coal-to-oil projects in Asia, please refer to our Research Weekly Asia: "Coal-to-oil conversion bodes well for long-term coal prices" dated 2 November 2006.

Wind: China's wind power capacity grew at a robust CAGR of 32% between 2000 and 2005. The National Development and Reform Commission (NDRC) plans to further increase the capacity from 1.3 gigawatt (GW) in 2005 to 5 GW in 2010. Together with their parent companies, Huaneng Power, Datang International and China Shenhua are three of the active participants in this area. Shanghai Electric also has plans to go into the wind turbine manufacturing business.

Solar: China is the fifth-largest solar photovoltaic (PV) market in the world. The government has three major programs to promote the use of solar PV, namely the Brightness Program, the National Township Electrification Program and the Renewable Energy Development Program. As the largest solar cell manufacturer in China, Suntech Power will be a key beneficiary.

Nuclear: The Beijing government is focusing mainly on the development of 1 GW-class nuclear units with a view to increasing domestic content to 60%. Currently China is capable of producing 300 megawatt (MW) nuclear units with 95% domestic content, but 1 GW units with only 50% domestic content. So far, Datang International is the only Chinese Independent Power Producer (IPP) looking to aggressively diversify into nuclear power generation over the next decade. It has already invested in a joint venture in a 2 x 1 GW nuclear plant in Fujian for estimated completion in 2013. Equipment providers such as Shanghai Electric will also benefit as they start to diversify into the nuclear turbine manufacturing business.

Biofuel: China is the third largest ethanol fuel producer in the world, after Brazil and the USA. In its 11th Five-Year Plan, the government is targeting a rise in ethanol fuel production from the current 2% of gasoline consumption to 3.3% by 2010E and 10% by 2020E. China Agri-Industries, a spin-off from China Food, controls two out of four licensed ethanol fuel players in China. China Petroleum and Chemical and its parent hold interests in the other two licenses. **Cheuk Wan Fan, Timothy Fung**

Source: Credit Suisse, industry sources

Alzheimer's

Wyeth BUY
WYE US
Wyeth offers an attractive combination of solid core product growth and an interesting new product pipeline.

Eli Lilly BUY
LLY US
Eli Lilly's industry-leading pipeline, low exposure to patent expirations and improving operating margins support our positive stance.

Myriad Genetics BUY
MYGN US
Credit Suisse's BUY rating is for long-term investors looking for risky stocks. Phase 3 data on Alzheimer's drug Flurizan is expected in 2008.

Neurochem HOLD
NRM CN
Caution is advised with this stock, as unpredictable data from Alzhemed studies, due Q2 2007, will have a big impact on the share price.

Promising treatments

Drug name	Company	Ticker	Mechanism	Phase
Alzhemed	Neurochem	NRM CN	Prevent formation of amyloid deposits	3
Flurizan	Myriad Genetics	MYGN US	Decreases production of amyloid	3
Bapineuzumab	Wyeth and Elan	WYE US and ELN US	Clear amyloid deposits	2
LY2062430	Eli Lilly	LLY US	Possibly influences amyloid production	2
LY450139	Eli Lilly	LLY US	Blocks amyloid-making enzyme	2

Alzheimer's disease (AD) affects more than 25 million people worldwide. According to a Johns Hopkins University study published this year, AD prevalence will quadruple by 2050, leaving one in 85 people worldwide living with the disease. With no means to prevent the disease, no cure and poor methods of treatment, the picture looks bleak. Last month, US lawmakers proposed a package of legislation aimed at enhancing patient care, describing AD as the "number one health crisis of the 21st century." There are strong grounds for concern, as the situation could become a severe economic burden to society, as patient care already costs an estimated USD 91 billion per year. That makes it the third most costly illness in the USA after heart disease and cancer.

To gain precious time, it is better to detect the disease early. Limitations in achieving such early diagnosis are currently a huge hurdle in the race to treat patients. Existing methods to screen for AD are based on cognitive tests, which sometimes lead to misdiagnosis. More refined methods such as lab tests are being developed that detect molecular markers of AD in spinal and cerebral fluid. Promising new molecular approaches in detection include a nanotechnology-based diagnostic tool being developed by Applied NeuroSolutions Nanosphere.

Research efforts are primarily focused on the aberrant amyloid plaque deposits formed in the brain of AD patients. Current drugs only treat the symptoms of AD, but do not block the molecular basis of plaque formation and progression. Japanese scientists recently developed an oral vaccine for AD which has proved effective in monkeys. The team may move to clinical trials this year. Professor Tabira, the director of the research institute, explains: "It seems likely that [the] vaccine prevents or delays the onset of AD." He also says that they are currently seeking large companies for a partnership.

Drugs on the market treating the symptoms of AD include Aricept from Pfizer, Exelon from Novartis, Namenda from Forest Labs, and Razadyne from Johnson & Johnson. A new treatment concept could be introduced with the launch of the so-called disease-modifying drugs (DMDs) from 2009 onwards. The key mechanism behind DMDs involves blocking the underlying biological causes of AD. A number of drug companies have come up with interesting data from late-stage clinical trials in this new paradigm. Of particular interest are large companies such as Wyeth and Eli Lilly. Smaller companies such as Myriad Genetics and Neurochem are conducting clinical studies for promising drugs that directly attack the underlying basis of the disease, not just the symptoms.

In the case of patients for whom all available pharmaceutical options have failed, brain-stimulation technology shows significant potential. One very promising avenue for influencing the living brain has emerged in the past few years, based on the use of pulsed magnetic fields. This novel noninvasive magnetic field technique is called transcranial magnetic stimulation (TMS). The technique employs head-mounted wire coils that send strong but very short magnetic pulses directly into specific brain regions, thus safely and painlessly inducing tiny electric currents in a person's neural circuitry. TMS is currently being tested for the treatment of a number of neurological diseases, including AD. The companies actively conducting TMS research in this area are Neuronetics (not listed), Magstim (not listed), Nexstim (not listed) and Medtronic. **Carri Duncan, Tania Dimitrova, Maria Custer Sigrist**

Source: Credit Suisse

Transportation

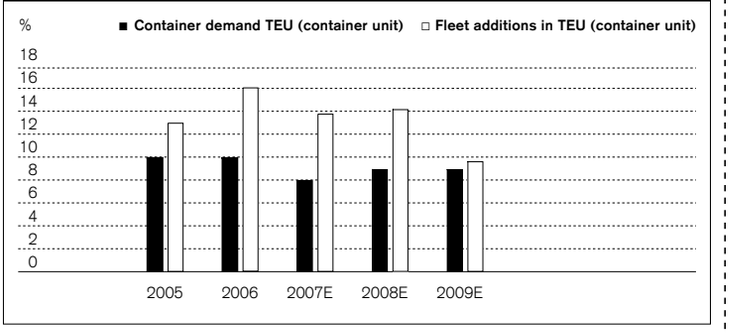
Panalpina BUY
PWTN SW
Attractive asset-light business model and competitive positioning offer benefits from growing globalization and logistics demand.

Kühne & Nagel HOLD
KNIN SW
A main player in the industry's consolidation. New strategic focus in land transport via acquisitions. Cautious about high setup costs.

Deutsche Post BUY
DPW GY
Strong long-term position, offering attractive integrated service model and global reach. Turnaround potential in US Express.

Cargotec BUY
CGCBV FH
Global leader in the growing cargo-handling business. Strong margin expansion potential from growing container demand and trade.

Global shipping demand and supply



Source: International Energy Agency, Credit Suisse

Nowadays, awareness of the link between travel and the environment is acute. Both confirmed and estimated volumes of carbon dioxide emissions are receiving more and more attention from the public. It has been claimed, for example, that transportation was responsible for 24% of global carbon dioxide emissions in 2004. Accidents such as the Prestige oil spill off the coast of northwest Spain in 2002 have probably harmed the reputation of all companies involved.

In the interest of both logistics companies and their customers, modern means of conveying goods need to be not only cost-efficient but also safe and environmentally friendly. Means exist for businesses to obtain independent verification of their "green" credentials. Certificates like the ISO 14001 take pollution into account as globalization raises demand for mobility and flexibility.

The world's appetite for goods and products from other countries is set for steady growth. According to Transport Intelligence, an industry researcher, the global contract logistics market rose by 10.3% in 2005 to USD 150 billion and is likely to grow compound by close to 14% in the next three years. Well-arranged logistics are the backbone of any organization dealing with goods globally. But corporations increasingly face a conflict of interest between ecological and economic imperatives. In an ideal world, the route that best satisfies all these interests would be on water, either by sea, river or canal, depending on the distance, size and destination. Unfortunately, waterways are not always available and the next best solution would be rail transport. Both waterway and rail transport share similar challenges, with bottlenecks at ports and loading stations.

The Finnish specialist Cargotec is the world's leading provider of cargo-handling solutions, applying the latest technology to this market. The company generates around EUR 2.6 billion in revenues, of which 95% stems from the transportation industry.

Rail transportation is regaining attention for economic and ecological reasons. Innovations such as hybrid technology for diesel engines and new speed records for electrified trains are focusing minds back on this form of transportation. In order to make rail more efficient, privatization is becoming an increasing issue within several European countries. The last big change for global logistics was the introduction of the standardized container; the next will be efficiency gains and reducing pollution. For companies with global concerns, the most efficient way to deal with logistics is to outsource it to a specialist. Asset-light logistics brokers such as Panalpina and Kühne & Nagel are not attached to out-of-date assets and can provide access to the latest and most effective transportation facilities.

With regard to the transportation companies themselves, those providing the latest technology will at least be able to retain their margins. Maritime transportation will be improved by satellite navigation, enabling faster and larger ships cruising with smaller distance between the vessels. In Europe, privatization of rail logistics will boost interest, while high-speed tracks will be used by faster, larger, satellite-controlled trains traveling less than two minutes apart on the same line. Among the operators, Deutsche Post is a stock worth looking at. With its DHL brand, the company is well positioned in Europe and Asia to offer a "one-stop shop" solution. Another key element of the company's future success, however, will be the turnaround of its US activities. **Markus Mächler**

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As a member of the Private Banking Management Committee of Credit Suisse and Head of Investment Services and Products Arthur Vayloyan has the responsibility for integrating and delivering Credit Suisse's products and services to the Private Banking units around the globe. Since joining Credit Suisse in 1992, he has been in charge of the Representative Office in Uruguay, led the Latin America/Iberia desk and was Head of Private Banking Switzerland. He is particularly interested in nanotechnology, innovation and microfinance. He was an invited speaker at the United Nations during the Year of Microcredit and he serves on the board of responsAbility Social Investment Services AG (see page 22, 23). Arthur Vayloyan has a Ph.D. in Physical Chemistry from the University of Berne and received his MBA from the French business school INSEAD.

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Chris Anderson has been Editor-in-Chief of "Wired" magazine since 2001. He previously worked for the two leading scientific journals "Science" and "Nature" and was an editor for business magazine "The Economist" for seven years, where he was responsible for writing articles in London, Hong Kong and New York covering topics such as the US economy and technology, among others. In an article published in "Wired," "The Long Tail", he defined a new economic model describing the business potential of niche products. Anderson later expanded the article into a book titled "The Long Tail: Why the Future of Business is Selling Less of More." Chris Anderson was born in 1961, studied physics at George Washington University, and today lives with his wife and four children in Berkeley, California.

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Richard Weingarten joined the United Nations Capital Development Fund in 2005 as Executive Secretary. In 1991, he established Richard Weingarten & Company, Inc. to provide a broad range of financial advisory and investment banking services to clients in both the private and non-profit sectors. The firm assisted clients with strategic, financial and operational issues, including financings, mergers and acquisitions, and strategic alliances. As investment banker Richard Weingarten had worked with many non-profit organizations, particularly in the area of economic development. In various roles he traveled to Asia, Africa and Latin America. His experience includes working on microfinance and local development projects. Mr. Weingarten has held several board positions for a number of non-profit organizations.

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Disclosure appendix

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Equity rating history as of 04/06/2007

Company	Rating	Date (since)
AKAMAI TECHNOLOGIES (AKAM)	BUY	30/04/2007
	BUY	01/05/2006
	HOLD	30/03/2006
ALCATEL-LUCENT (CGE FP)	BUY	24/10/2006
	HOLD	24/03/2006
	BUY	04/01/2005
	HOLD	09/01/2004
	SELL	12/09/2003
ALTAIR NANOTECH (ALTI US)	BUY	08/01/2007
ASML HOLDING (ASML NA)	HOLD	22/01/2007
	HOLD	18/01/2006
	BUY	03/03/2004
	HOLD	09/01/2004
BRIGHT FAMILY SOL (BFAM US)	BUY	31/01/2007
BUILD-A-BEAR WORKSH (BBW US)	BUY	09/05/2007
CADBURY SCHWEPPES (CBRY LN)	HOLD	20/02/2007
	HOLD	04/07/2005
	SELL	15/01/2004
CARGOTEC -B- (CGCBV FH)	BUY	14/05/2007
CHINA PETROLEUM & CHEMICAL -H- (386 HK)	HOLD	10/04/2007
	HOLD	06/04/2006
	HOLD	23/09/2005
	HOLD	30/03/2005
	HOLD	10/02/2004
	BUY	13/01/2004
CHINA SHENHUA ENERGY-H (1088 HK)	BUY	20/10/2006
	SELL	08/02/2006
	HOLD	17/11/2005
	SELL	10/08/2005
	BUY	26/07/2005
CISCO SYSTEMS (CSCO US)	BUY	08/02/2006
	HOLD	10/11/2005
	BUY	15/07/2004
	HOLD	04/05/2004
DANONE (BN FP)	BUY	24/04/2007
	BUY	22/02/2006
	HOLD	20/07/2005
	BUY	26/04/2005
	HOLD	15/01/2004
DATANG INTL POWER -H- (991 HK)	HOLD	07/02/2007
	BUY	03/05/2005
DEUTSCHE POST N (DPW GR)	BUY	19/04/2007
	HOLD	14/08/2006
	BUY	10/01/2006
	HOLD	02/09/2005
	BUY	13/04/2005
EBAY (ebay)	BUY	20/05/2007
ECOSECURITIES GROUP (ECO LN)	BUY	18/05/2007
ELI LILLY & CO (LLY US)	BUY	23/03/2006
	HOLD	06/02/2006
	BUY	15/04/2005
EQUINIX (EQIX US)	BUY	10/10/2006
FIRST SOLAR (FSLR US)	HOLD	07/05/2007
	REST	04/05/2007
	HOLD	29/03/2007
FUELCELL ENERGY (FCEL US)	BUY	11/05/2007
GLOBAL PAYMENTS (GPN US)	HOLD	21/05/2007
HASBRO INC (HAS)	HOLD	09/05/2007
HIESTAND HLDG N (HIEN SW)	BUY	11/04/2007
	HOLD	12/06/2006
HUANENG POWER -H- (902 HK)	HOLD	28/04/2005
	SELL	22/01/2005
KELLOGG (K US)	HOLD	30/04/2007
	BUY	27/07/2006
KRAFT FOODS-A (KFT US)	HOLD	08/02/2007
	HOLD	18/02/2004
	BUY	03/10/2003
KUEHNE+NAGEL INT N (KNIN SW)	HOLD	23/04/2007
	HOLD	14/03/2007
	HOLD	14/10/2005
LINDT & SPRUENGL PS (LISP SW)	BUY	16/06/2006
	HOLD	01/09/2004
MARVEL ENTERNAIN-MENT (MVL US)	BUY	26/01/2007
	BUY	27/06/2005
MATTEL (MAT US)	HOLD	22/12/2007
MEDIS TECHNOLOGIES (MDTL)	HOLD	30/01/2007
MYRIAD GENETICS (MYGN US)	BUY	18/05/2007
NESTLE N (NESN VX)	BUY	19/01/2007
	BUY	15/01/2004
	HOLD	16/09/2003
NEUROCHEM (NRM CN)	HOLD	18/05/2007
NEW ORIENT ADR (EDU US)	HOLD	23/05/2007
NIKE -B- (NKE)	BUY	23/02/2005
PANALPINA WELTTRA N (PWTN SW)	BUY	10/05/2007
	BUY	19/04/2007
	HOLD	16/03/2007
	HOLD	28/02/2007
	BUY	10/08/2006
	HOLD	04/01/2006
PEARSON (PSON LN)	HOLD	23/06/2006
	HOLD	28/02/2005
	BUY	05/10/2004
PEPSICO (PEP US)	BUY	08/02/2007
	BUY	12/01/2005
	BUY	04/01/2005
	HOLD	21/04/2004
Q-CELLS (QCE GR)	HOLD	31/05/2007
	BUY	15/05/2007
	BUY	05/02/2007
	HOLD	12/12/2006
RENEWABLE ENERGY (REC NO)	BUY	27/04/2007
	BUY	04/04/2007
	REST	15/02/2007
	HOLD	28/11/2006
SEZ HLDG N (SEZN SW)	HOLD	07/05/2007
SHANGHAI ELECTRIC -H- (2727 HK)	BUY	24/05/2006
	SELL	23/02/2006
	HOLD	27/01/2006
	BUY	20/07/2005
SOLARWORLD (SWV GR)	BUY	04/05/2007
	BUY	13/11/2006
	HOLD	20/06/2006
SUNTECH PWR ADR (STP US)	BUY	31/05/2007
	BUY	30/01/2007
TAIWAN SEMICON MANUFAC (2330 TT)	BUY	21/05/2007
	REST	10/05/2007
	BUY	25/01/2007
	BUY	26/01/2006
	BUY	16/07/2003
TEXAS INSTRUMENTS (TXN US)	BUY	10/01/2006
	HOLD	07/12/2005
	BUY	08/01/2004
	HOLD	10/09/2003
TOKUYAMA (4043 JP)	BUY	14/05/2007
	BUY	06/02/2007
	HOLD	19/12/2006
	BUY	02/03/2005

Company	Rating	Date (since)
UNILEVER CERT (UNA NA)	HOLD	08/02/2007
	HOLD	30/07/2004
	BUY	27/08/2003
WAVECOM (AVM FP)	HOLD	04/05/2007
	BUY	25/04/2007
	BUY	16/03/2007

Company	Rating	Date (since)
WYETH (WYE US)	BUY	02/03/2007
	BUY	31/08/2006
	HOLD	30/11/2005
	BUY	01/02/2005
	N/R	31/01/2005
	BUY	07/06/2004

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Equity rating allocation as of 04/06/2007		
	Overall	Investment banking interests only
BUY	45.76%	44.49%
HOLD	50.08%	51.21%
SELL	2.00%	1.87%
RESTRICTED	2.16%	2.43%

Relative performance
At the stock level, the selection takes into account the relative attractiveness of individual shares versus the sector, market position, growth prospects, balance-sheet structure and valuation. The sector and country recommendations are “overweight,” “neutral”, and “underweight” and are assigned according to relative performance against the respective regional and global benchmark indices.

Absolute performance
The stock recommendations are BUY, HOLD and SELL and are dependent on the expected absolute performance of the individual stocks, generally on a 6–12 months horizon based on the following criteria:

BUY	10% or greater increase in absolute share price
HOLD	variation between –10% and +10% in absolute share price
SELL	10% or more decrease in absolute share price
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HOLD	Expectation that the bond issue will return average performance in its segment
SELL	Expectation that the bond issue will be among the poor performer in its segment
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AAA	Best credit quality and lowest expectation of credit risks, including an exceptionally high capacity level with respect to debt servicing. This capacity is unlikely to be adversely affected by foreseeable events.
AA	Obligor’s capacity to meet its financial commitments is very strong
A	Obligor’s capacity to meet its financial commitments is strong
BBB	Obligor’s capacity to meet its financial commitments is adequate, but adverse economic/operating/financial circumstances are more likely to lead to a weakened capacity to meet its obligations
BB	Obligations have speculative characteristics and are subject to substantial credit risk due to adverse economic/operating/financial circumstances resulting in inadequate debt-servicing capacity

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Eureka!

Eureka is an exclamation originating from the ancient Greek word "*heurēka*", which translates roughly as: "*I have found it!*" The Greek engineer and mathematician Archimedes purportedly shouted "Eureka!" while running naked through the streets of Syracuse in Sicily, after discovering what is now known as Archimedes' principle, while taking a bath. The principle states that any body submerged in a fluid is acted upon by an upward force equal to the weight of the fluid displaced by the body. Since then, "Eureka!" heralds the successful solution to a difficult task.

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