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BISE's Responsibility for our Planet

by

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After the crisis of the New Economy we are now undergoing a second, more severe crisis in this still young millennium with the financial crisis. While investigating common patterns it becomes clear that we – at individual, corporate, and even state level – have systematically overestimated chances and therefore underestimated the associated risks.

At the time of the New Economy hype, the speed of changes in life and economy resulting from the development of the Internet was overestimated. This resulted in the fact that every start-up related to high-tech received the prediction of a golden future – without considering potential risks – and that by the IPO at the latest so much liquidity was provided that many start-ups without clear business prospects followed. We know the result of this exaggeration, especially made on the part of the capital market: Many shakeouts, massive price declines in world stock markets in particular in the field of technology, affecting all markets and resulting in a sharp increase in unemployment.

The financial crisis, the consequences of which the world is suffering today, is also characterized by a non-sustainable, world-wide mismanagement of opportunities and risks. This time starring: The financial services sector, which – thanks to supposed diversification – constructed perfect returns for itself and its clients by means of structured financial securities such as ABS, MBS, CDOs, CDO2s, ABCPs, CDS until the unnoticed or at least severely neglected risks of these complex instruments were revealed and a massive economic downturn began, resulting in the heaviest decline of global trade and economic crisis since World War II.

Although at first glance it seems somewhat premature to discuss the next crisis already now, it takes no visionary: It will definitely arise! And we believe that this crisis could not only affect individual sectors but the economy as a whole. This will happen when resource price increases escalate to trigger the next crisis: the faster energy and commodity prices fall now, the sooner the next crisis will occur, because: If – as a result of low prices and financial problems arising from the financial crisis – investments in resource reduction, processing, conservation, and substitution remain undone, the risk of massive price increases and adjustment shocks will rise at the latest with the recovery of raw material requirements. This will bring the tender shoots of resurgent economy to its knees again – if we still have not managed to learn from the last crises so far.

Let us, therefore, put the question of what can be done at an individual and at corporate level to avoid the next crisis hitting us as hard as the current one. What can companies do especially now in order not to suffer from the foreseeable future resource price crisis or even to be absorbed by it? What kind of necessary steps can be identified at state level to proactively prevent future crises, instead of – as we can currently observe – playing fire fighters in a capital-intensive manner when the buildings of economy burn brightly again? And which water might be used for the fire-fighting – to pursue this analogy further – considering the five-digit billion amount to combat the current crisis? And finally to our contribution: How can business and information systems engineering (BISE) support all these players to proactively immunize against subsequent crises such as the resource price crisis?

To enable us to analyze the causes and effects of the emerging resource price crisis in more detail below, we first have to distinguish two effects which determine the resource price development: It is beyond question that the price of any finite resource – depending on specific availability and specific consumption – grows exponentially in the long term. In addition to an ever more costly exploration, this is due to the fact that a decreasing supply results in increasing prices – which is also essential to continuously reduce demand. Regardless of a resource's exact range (in the

case of peak metals such as indium or platinum the range is currently expected to be at 5 to 15 years), a common feature of all finite resources is the exponential price increase in the long term. This price increase interferes with short-term fluctuations, including those with economic reasons or others we can trace back to speculation. Even today, this volatility is clearly noticeable in the commodity markets – especially in the case of already very scarce resources.

According to the Living Planet Report 2008, the human race – as long as its demands on the planet continue to increase at the same speed – will need the equivalent of two planets in the 2030s in order to maintain its lifestyle. Even if this forecast may seem exaggerated, the impact of the material limits to growth (Christen 2005), which are also proclaimed by science, will increase significantly. Already today, a healthy, safe, and – socially justifiable – comfortable way of life is only possible for a minority of the world population. Indeed, only four out of five people have access to clean drinking water. The population growth will continue to aggravate this situation – and hence also the related resource shortages. The German Foundation for World Population (DSW) adds 2.6 humans per second. Currently, the world's population is growing by more than 80 million humans per year – about as many as now live in Germany. Until 2045, the United Nations expect an increase to over 9 billion people. The run for access to resources and resource efficiency will become significantly worse. Thus, in the long term, the human race cannot afford to treat the available resources in such a short-sighted and inefficient way as is the case today.

- Example energy supply: According to estimates by the EU Commission, in the European Union investments in a range of 1,000 billion Euros are needed to replace aging infrastructure and to meet the projected increase in energy demand during the next twenty years. Current investments in power plants, transmission and distribution networks as well as in new and marketable, more efficient, and environmentally friendly technologies remain far behind the needs.
- Example water: Drinking water networks are approximately three times as expensive as electricity grids with regard to construction and maintenance. The largest part of the infrastructure is underground – out of sight. Losses due to leaks are estimated to amount to 15 to 20 percent, and even to significantly more in developing countries. We treat one of our most precious resources with an amazingly easy mind.
- Example Mobility: Congestion on the roads of the EU countries 2007 cost around 135 billion Euros or one percent of the joint GDP.

Therefore, every rational consumer of commodities – at individual, corporate, or state level – has to become aware of the estimated impacts of resource price fluctuations and increases in his or her area of responsibility in order to be able to develop strategies to reduce the resulting risks. For those who fail to immunize themselves against the consequences of a resource price crisis already today, this can easily lead to existential risk.

We are convinced that the management efficiency of IT plays a crucial role, as reflected in the agenda "A Smarter Planet", in which IBM summarizes its vision of an intelligently networked world. By using intelligent systems and processes, IT for instance helps to make relevant information available at the corporate level, leading to a better assessment of the short- and long-term development of success-critical resource prices and discovery of associated risks. BISE's objective must be to use corporate IT as a platform in the sense of a resource-controlling nervous system for an "intelligent control". By recognizing shortage and hence price development risks this enables a resource management which is efficient in terms of return and risk, and which coordinates the interplay of complex decentralized decisions in a far better way than today and therefore creates corporate value more sustainably.

The starting point of these considerations is the penetration of all spheres of life and work as reached today by technology as well as the massive networks of increasingly less costly components (sensors for measuring, controlling actuators, embedded systems) and devices (computers, (mobile) telephones, etc). Physical infrastructure is being equipped with intelligence: We build "seeing, hearing, feeling" roads and bridges, pipelines and cables, buildings and factories. Every interaction among humans and technology, among components or devices bears the potential of designing a process in a more efficient, resource-friendly, safe, useful, and practical way.

In short: the ubiquity of IT and the convergence of digital and physical systems make the planet smarter – provided that they are used with the necessary intelligence and consistency.

Two levers have to be considered in more detail: First, the transparency and better management of energy and material use by IT, and second the savings provided by modern IT applications that renew and design business processes in an energy efficient way. Transparency and management require the corresponding consumption to be recorded and not to be subsumed in overhead costs or comprehensive real estate budgets. Which data center manager knows about his energy costs today? Why should he or she aim at a more energy-efficient layout of his or her facilities, a different energy mix, or clever consumption control as long as the crucial KPIs are not available? Remedy is provided by data center certifications in terms of energy efficiency. The criteria include extensive requirements on air conditioning, electricity, CO2 emissions, and data center management. The aim is to document the interplay of ecological and economic efficiency in a verifiable and comparable form.

Even though business and information systems engineering is only one of many disciplines that have to contribute to sustainable business practices, we will now highlight how economic activities can be carried out using IT in a resource-efficient and sustainable manner on the basis of three examples at individual, corporate, and state level:

In its consumer studies entitled "Lighting the Way: Understanding the Smart Energy Consumer", IBM surveyed 5,000 electricity customers in twelve countries – including Germany, France, Britain, Japan, Australia, Canada, and the USA. The collected data show that more than 90 percent of respondents not only wish for intelligent electricity meters, but would also welcome tools to better manage their energy use. In addition, electricity costs and concerns about the environment are main drivers for major changes on the customers' side: Four out of five respondents would shift electricity-intensive work in the household to other times of the day if they then benefited from cheaper rates. Nearly 70 percent of electricity consumers are also willing to try out new programs and services to improve their personal life cycle assessment.

Also for the energy supplier intelligent management of energy consumption is a major step forward. The example of the Mediterranean island of Malta clearly shows this fact. During the next five years, the island's companies for national electricity and water supply – Enemalta Corporation and Water Services Corporation – are going to implement a country-wide "Smart Grid". The island's electricity and water systems are inextricably intertwined. As for the total electricity production and more than half of the water supply, which requires filtering through an energy-consuming desalination process, Malta is totally dependent on imported oil. If Malta's greenhouse gas emissions are to be reduced and the availability of sustainable energy for the future is to be saved, a more intelligent energy management is indispensable. 250,000 analog electricity meters are being replaced by intelligent measuring instruments, monitoring the electricity consumption in real-time, identifying leaks and electricity losses, configuring variable rates, and rewarding particularly thrifty customers. Water meters are integrated into a system which is able to monitor and manage the meter readings and residues. Thousands of digital sensors that are integrated in the infrastructure provide data which are collected and analyzed. In that way, the government of Malta can make informed decisions regarding the use, and begin to replace emission-intensive oil by sustainable energy sources.

An example for ecological and economic secondary effects at state level resulting from intelligent IT systems is offered by modern traffic control. Toll collection systems are mostly perceived as punishment by consumers and consequently enjoy a rather limited acceptance. An alternative is demonstrated by the city of Stockholm, which asked the population for their opinion after a successful pilot of its new traffic management system before further roll-out. The majority was clearly in favor of this system. As a city, which in the past has been afflicted by and notorious for its many traffic jams resulting from its special geographical situation with many bridges, bypasses, and bottlenecks, Stockholm has one of the most advanced traffic control systems in Europe. Citizens and administration now enjoy a city with about 20 percent less traffic, an emission reduction of 12 percent, and an increase in the use of public trans-

port by around 40,000 people. This was made possible by the interplay of sensors and control instruments as well as by automatic license plate detection when entering the city. The latter allows pricing based on traffic volume and thus motivates people to switch to public transport depending on the "stress level" of the traffic. These and other reference projects are paving the way for a more intelligent use of resources.

And how can the exemplary measures outlined here be associated with the resource price crisis forecast above? Quite simply: If it is possible – especially with the management efficiency of IT – to succeed in saving resources and using them efficiently, we are less dependent on short-term fluctuations and long-term exponential increases in resource prices. This applies for example to U.S. consumers, who are switching to fuel-efficient and hybrid technologies instead of purchasing a SUV with the air resistance of a refrigerator, the rolling resistance of a tractor, but 250 km/h top speed due to a large eight-cylinder engine. This is also true for companies and countries that have already begun to immunize themselves against the short- and long-term risks of the prospective resource price crisis. And finally, the economy will – from a global perspective – gain stability by any business entity which makes itself independent from resource price risks today in an effective and sustainable way. The resulting overall reduction of risk will be crucial for stabilizing the world economy and thus to prevent new crises. Therefore, we must all aim to ensure that a critical mass of individuals, companies, and economies makes an intelligent contribution to the efficient and economic use of finite resources. The reason: A world economy that is exposed to high risks – for example a high volatility of resource prices, food, energy prices, etc. – mainly enriches speculators. The weakest are always the losers. Anyone who does not face this responsibility today will have to face the consequences of his or her behavior during the next crisis at the latest.

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