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The Global Risk Landscape: Disasters Indicate a New Topography

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Climate change, innovation and new technologies, developments in legislation, our economic rules and globalization, human behaviour and ambitions, political instabilities as well as systemic dependencies, which have developed as a consequence of complexity, describe the different dimensions of a risk space which can no longer be considered in terms of static, linear parameters.

The dynamics of our “Risk System Earth” accelerated so much in the past decade that we can no longer neglect the interdependencies of the different dimensions, which sometimes exhibit almost chaotic behaviour.

A multitude of disasters, catastrophes and threats has shaken our risk landscape in the last decade so much that we are faced now with a new risk topography:

- The new risk topography is on one hand shaped by disasters in analogy to earthquakes and volcanic eruptions shaping geological formations but at the same time by invisible residual forces which can bear the potential for future catastrophes.
- The costs in terms of the gross national product of these changes in risk topography are already tremendous because our actual risk governance schemes are not adequate to manage these developments, though it should generally be possible to anticipate these developments and changing risks in advance.

We knew about the devastating power of hurricanes, the stochastic nature of their pathways and that it was only by chance that in the past the hurricanes in the Gulf region did not cause much more severe damage. And we knew of the rising frequency of hurricanes due to climate change.

Everybody knew about the fact that wide areas of New Orleans were below sea level and protected by impropriate dams. Politicians knew about all the weaknesses. However, nobody took action. The hurricanes Katrina and Rita are examples of a detailed knowledge about the risks and its causes and - never-the-less - “perfect” failures to act.

There are other examples: Many experts are aware of the weaknesses and vulnerability of our electricity power supply systems in many parts of the word and our vital dependencies on electric current, never-the-less severe power cuts with enormous economic losses happen.

More than that, the topography of risks is superimposed by a layer of insurance covers. Why did the insurance industry not force action to reduce the obvious risks in the Gulf region? Even this did not happen.

Instead, insurance companies active in this region were also struck by surprise, partly because of un-foreseen cumulative effects, partly because of weaknesses in their risk assessment systems, but probably also because a lack of awareness and of probably uncontrolled and cash-flow driven underwriting.

All the knowledge did not help to prevent human tragedies and tremendous economic losses with extremely costly consequences for the insurance industry: the hurricane losses for the first three quarters of 2005 amount to US$ 29.4 billion (US statutory catastrophe losses), primarily from Katrina and Rita, or 9.2 points in terms of the combined ratio. By comparison, in 2004 the four hurricanes in the South-East of the USA caused insured losses of US$15.4 billion, or 4.9 points on the combined ratio scale.

Why does all this happen in spite of our modern and – as we claim – sophisticated risk management? Where are the reasons why we on one side are able to push our technical, economic and social development and at the same time fail to keep up with our risk management?

Political or entrepreneurial decisions to take provisions against rising risks are very dependent on actual striking "proofs", catastrophes and catastrophic losses. Short term thinking and limited periods of responsibility do not favour an intelligent precautionary far-looking behaviour.

We know already that today's lack of long-term thinking, the thinking in terms of "sustainable development", will threaten the future of our next generations.

Fortunately, within business, governments and civil society there is raising awareness about this problem and the need for action. For example, 190 of the largest companies of the world with a market capitalisation of more than US$ 5200 billion demonstrate as members of the World Business Council for Sustainable Development (WBCSD) awareness and are committed to eco-efficiency and social responsibility.

Driven by social expectations, these companies are dedicated to find a balance between their economic growth, innovation and the costs of success like ecological damage and social discrepancies. Nevertheless, the achievements towards a sustainable development in terms of our global performance in eco-efficiency and practices to strive for social justice are still very limited and insufficient.

The consequences of this actual performance with regard to sustainable development are not reflected properly in our corporate risk management strategies. We have to take into account, that un-sustainability and risks are complementary to each other. Natural hazards caused by climate change are the consequence of our ecological footprint and a weakened social fabric is the consequence of an increasing economic imbalance.

At the same time we realise an increasing vulnerability of our economy and society because of systemic complexities, high value concentrations, dependence on infrastructures with systemic criticality and - as open societies – the offering of "easy" targets for terrorists. In our actual sustainability strategies we do not accept that un-sustainable development not only threatens future generations but also turns into risks of today.

Up to now, we have not paid enough attention to this aspect in our risk governance and risk management systems. The aim of the International Risk Governance Council (IRGC), for instance, is to close this gap in the future especially in global fields without "natural" authorities.

We are faced today with three important risk shaping factors - natural as well as anthropogenic - which have taken a dramatic turn in the last decade:

Climate Change - Infectious Diseases - Systemic Complexity

Climate Change

Independent from the question of to what extend the climate change we observe is man made or not, climate change shapes our risk landscape in two aspects: weather conditions become more extreme and the geographical distribution changes.

We observe already more storms with a higher severity and a shift of storms into regions which were up to now less problematic.

Also, draughts and floods become more extreme with negative consequences for agriculture as well as critical infrastructures, such as power plants.

This means that to a wide extend our “risk experience”, the basis for vital and long term decisions and our technical safety norms and standards will increasingly be out-dated, resulting in more damages and more catastrophes due to this mismatch.

Infectious Diseases

Infectious diseases like SARS or Bird Flu are an entirely different type of risk, which have only developed into a global threat to industry and the economy in the past few years.

The lung disease SARS appeared at a first glance less critical, but in the end the economic losses exceeded by far the losses caused by the tsunami in South Asia and by the storm Katrina. In contrast to the locally isolated shocks caused by most natural catastrophes, such as earthquakes or storms, SARS spread uncontrolled and with high speed. And there was hardly any experience about the outcome. For months it was causing panic among people and the financial markets. SARS hit metropolis like Beijing, Taipei, Hong Kong and Singapore simultaneously with catastrophic economic consequences.

Today we know that the criticality of these infectious diseases comes mainly from the fact that the origins are rural lifestyles with close contacts of animals and humans. Only in combination with the modern mobility, which spread viruses within hours all over the world, these infectious diseases become a threat.

This interplay forced governments to close down airports, reduce mobility and exclude whole regions from normal traffic. Thus the collateral damages of SARS were dramatic.

Up to now, we are fortunate that the highly infectious bird-flu virus can only be transferred between animals, and from animals to humans when there is a close contact. Infections from human to human have fortunately not yet been observed. But we are faced with the risk that one day there might be a modification of the virus enabling it to cross the species border.

These unintended consequences of our global economic development are still blind spots within our efforts of a sustainable development because risks are considered to be short term issues.

Systemic Complexity

Our modern world - and our progress - are characterised by interconnectivity, such as the Internet, and interdependences of technology, mobility, transport, trade, infrastructure, governance, legislation, social systems, acceptance, culture.

However, the added value we gain out of these complex systemic interactions has its prize. New risks emerge which are not easy to be managed. SARS - mentioned above - is one of the most striking examples for these types of risks.

And there are others: Electric power cuts cause tremendous simultaneous problems for industrial production and supply chain management, for super markets, traffic management, information and communication, even for agriculture and basic supplies for people. Power industries invest huge amounts of capital to limit technical failures, but can hardly control environmental conditions. Yet environmental conditions have a strong influence on the security of electric power supply. Nuclear power stations have to be shut down, when there is a lack of cooling water. Wind power generators do not function if there is either not enough wind, or too much. The secondary systemic consequences of climate change are much worse than the primary damages from natural events.

In addition, legal changes, missing social acceptance or political instability somewhere in the world can be the causes for similar cascading damages for industry and the economy because of systemic interdependencies.

Risk Topography and Risk Management

Today, technology enables access to almost unlimited information from numerous sources. This creates new market opportunities, improves the efficiency of corporate business and accelerates the speed of innovation.

It also challenges companies to make decisions on the basis of increasing amounts of information in diminishing time frames. This complexity in conjunction with time constraints presents industry with leadership and risk challenges, including the need to cope with increasing uncertainty, managing globalisation, accepting and absorbing the right cost of “success” as part of normal business expense and dealing with constant change.

Additionally, the speed of innovation reduces the time available to, and the creativity needed by, organisations to manage risks and to navigate through the new dynamic, multi-dimensional risk topography. Risk management thus needs to develop appropriate approaches, methods, and tools which make use of our new information, communication and data processing possibilities to cope with these challenges.

A database organised as a globally complete two-dimensional grid of "risk-cells" numbered by their geographical co-ordinates which contain the risk parameters of interest is not beyond reality today.

These "risk-cells" could be characterised by three sets of parameters describing both reactive and active properties:

1. vulnerabilities with regard to the relevant threats (i.e. storms, floods, fire, explosion) and parameters, which describe:
2. the threats and risks posed by the cell (explosion, fire, pollution, emissions, infectious disease) and
3. the range of these threats, and the pathways and time constants of how the threats interact with their environment.

The risks can then be exposed to external threats like storms of a given or by extrapolation of an expected severity. The response of the "risk-cells" to this external disturbance and the interaction of the "risk-cells" among each other over space and time would then allow the development of scenarios for probabilities and magnitudes of losses.

By this, it would be possible to gain the basic landmarks for a better and safe navigation through the new complex risk topography.

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