

Risk Research and Education: The Opportunity Lying in Risk

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Natural risks threaten technical and societal systems. (Photo: Mauro Piccardi, Fotolia.com)

It is not in scientists to unduly stress concerns. But it can be stated that our modern world is increasingly exposed to higher risks. This is due to the fact that our infrastructure is increasingly interlinked, which applies to information technology as well as to the energy or transportation sectors. Other risks result from environmental changes, from climate change to ground sealing to plastic waste in oceans.

At Karlsruhe Institute of Technology (KIT), we are aware of this changed risk scenario: Two years ago, I organized a survey to identify the research potentials existing at KIT institutes with respect to natural risks. This balance, of course, is far from being complete, but still impressive and documented on the webpage www.klima-umwelt.kit.edu/english/285.php.

At an institution, such as the KIT that feels committed to research, innovation, and education, the question arises as to how the research potentials and education are interlinked. Or in other words: How can scientifically based findings and sharpen-

ed awareness of risks be conveyed to KIT students?

When the Center for Disaster Management and Risk Reduction Technology (CEDIM) was established in 2002 at the then University of Karlsruhe, it quickly gave rise to the idea of establishing a corresponding study program. However, we had to realize that a "Master of Disaster" is no job profile in Germany and that such an education hardly makes any sense.

What is the alternative? In my opinion, contents covering risks and risk management and of relevance to university graduates in their future profession should be integrated into existing programs and curricula: The architect wishes to study architecture and to plan buildings later on. But during studies, she/he should learn something about natural hazards buildings and infrastructure facilities are exposed to. The electrical engineer wishes to focus on the construction and building of electrical systems. But during the studies, she/he should learn something about the risks faced by such

systems and how they can be minimized or managed.

I think that a stronger focus on these topics is urgently required in academic education. The relative safety in which we live in the context of technology today is the result of 200 years of risk research, even though the term is much younger: Investigation of risks started with the frequently exploding steam vessels of the late 18th and early 19th centuries. The results of these activities were technical and regulatory measures to reduce these risks. Today, engineers concentrate too much on the inner functionality of their plants. They are seldom aware of the fact that there are impacts from outside – floods, storms, earthquakes, or terror – that may affect systems with serious consequences for the environment, infrastructure, and society.

Hence, risks do not have to be analyzed separately or internally, such assessments have to become mainstream. As many students as possible of as many relevant programs as possible have to come in touch with it. We have to develop modules that can be integrated easily into specific academic education programs.

Such an integrated education in risk management will contribute to making technical and societal systems safer and more resilient and to minimizing direct damage of a system by external impacts, such that its function can be restored quickly. But resilience is more: For very complex systems in particular, it is decisive to develop the capability of adapting to the (emergency) situation. This applies to power grids that may be exposed to very different and difficult to foresee impacts: We cannot foresee everything and we cannot model and quantify everything. But we can try to make an adaptation to such impacts possible.

Education in the academic sector is a crucial step in this direction. The KIT with its high research potentials relating to risk may become a Europe-wide model. This is where the big opportunity for us lies in risk.