Risk Center

All-round risk assessment

Whether it is a financial crisis, an avalanche disaster or the collapse of the power supply – risks can soon turn into catastrophes. That is why it is so important to recognise them as early as possible and understand their full complexity. This means they have to be looked at from more than one angle: all-round risk analysis requires engineers, scientists, economists and social scientists to model and assess the technical, natural, economic and social risks, for example in a particular region, and how they interact.

That is the aim of the ETH Risk Center. This nucleus for risk research and integrated risk management is laying the foundations for exactly this kind of interdisciplinary cooperation – primarily in research, but also in education. ETH Zurich offers no fewer than five Master programmes and further training courses where risk is the main area of interest – focusing on different hazards.

During 2012 the centre, founded six months previously, has developed further and expanded its third role in addition to providing education and conducting research: sharing its knowledge with other risk research centres and acting in partnership with end users of the research. A "Partnership Council" has been set up for this purpose. This is intended to strengthen the links with the major companies which, thanks to the ETH Zurich Foundation, have supported the initiative from the start. Other sponsors will join them in future.

The whole subject of risk is more topical than ever, and business leaders and politicians are looking for scientific principles and answers to the question of how crises and catastrophes can best be avoided or at least coped with. Because the competence of ETH Zurich in this area is well known, the experts and expertise in the field have now been brought together in the Risk Center, an organisation of national and international standing.

www.riskcenter.ethz.ch →

Information security

Tracing security gaps

Unlimited freedom of communication opens up undreamed-of opportunities – and not only for honest Internet users. For criminals, too, the cyber world is a gold mine. This is because of the growth in the networking of computer systems, which are therefore becoming more and more complex and consequently more and more difficult to monitor.

To drive forward research and education to do with information security, since 2003 there has been a centre specialising in it at ETH Zurich: the "Zurich Information Security and Privacy Center", ZISC for short. Its researchers, who come from all kinds of different disciplines, have made it their job to trace and eliminate security gaps as soon as possible.

In their interdisciplinary work, the ZISC researchers look at the specific needs of various different sectors and cooperate very closely with partners from industry. This means that scientific discoveries find their way into practical applications very quickly.

Thanks to a donation to the ETH Zurich Foundation, a new chair of Information Security was very rapidly set up in 2012. In Professor Adrian Perrig, ETH Zurich found one of the leading experts in the field of systems security. Before coming to Zurich, he was head of the "Cylab" at the Carnegie Mellon University, Pittsburgh, one of the world's largest research centres for information and computer security.

www.zisc.ethz.ch →

The risks in cyberspace are omnipresent. ETH researchers at the "Zurich Information Security and Privacy Center" are helping to make the data network more secure for the state and for business and society.

Scientists did not find any nanoparticles in the exhaust gas from a waste incineration plant, but they did find them on the residue from combustion.

Nanoparticles

Studying nanowaste

Nowadays, chemical particles on a nanoscale occur almost everywhere in our everyday lives – in building materials, dyes, textiles and cosmetics. However, it is still largely unclear what risks are associated with them. ETH scientists are working at full speed to close this gap in our knowledge. In 2012, three teams of researchers in the fields of chemistry and environmental engineering published a study on nanoparticles in waste incineration plants. The teams led by Professors Stefanie Hellweg, Detlef Günther and Wendelin Stark wanted to find out what happens to synthetic nano cerium oxide during waste incineration. Cerium oxide itself is a non-toxic ceramic material, non-biodegradable and widely used as a basic component of car catalytic converters and diesel soot filters. Experts fear that non-degradable nanomaterials could in the long term be as harmful for man and the environment as a material like asbestos.

At a waste incineration plant in Solothurn, the scientists sprayed ten kilograms of cerium oxide particles measuring 80 nanometres in diameter on to waste for incineration, so creating particle-rich waste. In a second experiment, they sprayed the particles directly into the combustion chamber and so simulated a possible "worst case" where there was a massive release of particles during incineration.

It emerged that the cerium oxide was not much changed by the combustion process. The mechanisms for separating out the fly ash proved to be extremely efficient: the scientists found that no cerium oxide nanoparticles had escaped in the exhaust gas from the plant. However, there were loose nanoparticles on the residue from combustion in the plant, and some remained in the combustion system. The fly ash separated out from the smoke also contained cerium oxide nanoparticles.

The residue from combustion – and so also the nanoparticles adhering to it – currently ends up in landfill sites or is processed again to extract copper or aluminium, and this is where the researchers see a need for action. Measures should be taken to ensure that the nanoparticles cannot enter the food or water supply through the landfill sites, and are not released into the atmosphere by further processing operations. People carrying out maintenance work should also be aware that there could be nanoparticles in the combustion system. Appropriate protective measures should be taken to ensure that the particles are not inhaled. However, the scientists believe that a long-term solution to these problems can only be found by developing degradable nanoproducts.

www.ethz.ch/environmental_assessment →
www.ethz.ch/micro_analysis →

Risk research

Industry, politics and society, technology and the environment are becoming more and more closely interwoven and the associated risks are becoming greater and more complex. An increasingly networked world calls for a new way of thinking about security. In order to understand risks better and be able to react to crises more quickly, ETH Zurich has brought together its specialist expertise in this area, in a centre of competence and various interdisciplinary research organisations. This kind of cross-subject cooperation allows experiments, simulations, analyses and models to be combined in unprecedented ways.

www.ethz.ch/themen/risk_and_security/index_EN →