SRA EUROPE

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Evidence based, human-centered safety and security design

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Swiss Centre for Applied Human Toxicology

ABSTRACT BOOK

5th Annual Conference SRA E DACHL Chapter: Methods in Risk Research

2025

11 to 12 September 2025
University of Basel, Basel, Switzerland
Riehenstrasse 154, Room 00.015

Keynote 1

Potentials and problems of computational risk assessment of human behaviour

Prof. Dr. Bennett Kleinberg

Department of Methodology and Statistics at Tilburg University (NL)
Department of Security and Crime Science at the University College London (UK)

He previously held a position at the UCL Dawes Centre for Future Crime and obtained his PhD from the Department of Psychology at the University of Amsterdam. His research revolves around the interplay and advancement of computational methods and psychological research to study human behaviour. With his lab, he seeks to answer two questions: (1) How can computational methods enhance our understanding of human behaviour? (2) How can psychological research methods inform our understanding of computational model behaviour? Substantive research interests include deception detection, passenger risk assessment, human resilience, and machine behaviour. Methodologically, his work examines the nexus between complex data (e.g., text) and psychological processes. His lab employs methods from experimental psychological research, Natural Language Processing, (adversarial) machine learning and statistical modelling. He is also an active contributor to the open science community. His research on risk assessment has been funded by the organisations such as the Dutch Ministry of Security and Justice, the Ministry of Defense, and the Royal Netherlands Marechaussee.

Keynote 2

Revolutionizing Health with AI: Navigating the New Era between Benefits and Risks

Dr. Carine Poussin

Head AI for Life Sciences CSEM (CH)

Artificial Intelligence (AI) is rapidly transforming the landscape of healthcare, offering unprecedented opportunities to enhance diagnostics, personalize treatments, and improve patient outcomes. This keynote will explore the dual nature of AI in health—its transformative potential and the critical risks it introduces. The presentation will begin with an accessible introduction to AI, followed by a showcase of cutting-edge innovations and real-world use cases and highlight how AI is reshaping the future of medicine. At the same time, it will address the inherent risks, such as algorithmic bias, data privacy concerns, and the potential for misdiagnosis, emphasizing the importance of responsible development and deployment. The keynote will also spotlight European research initiatives and regulatory frameworks, including the EU AI Act, that aim to ensure ethical, transparent, and safe AI integration in healthcare. This session invites participants from all disciplines to reflect on how we can collectively navigate the evolving risk landscape while harnessing AI's full potential for societal benefit.

Keynote 3

How is AI implemented at Swissmedic

Dr. Nicolas Perez Gonzalez

Swissmedic (CH)

As a national authority Swissmedic is committed to performing its mandate as efficient as possible. One enabler of this efficiency is the implementation of Machine Learning based tools which can increase performance in tasks which were not until recently solvable. With the recent development of ML based tools, Swissmedic has implemented some in-house solutions in its portfolio through the work of its data scientists. When developing these tools, which parts of the tool are the most critical to develop? Which ones need the most thorough testing? In this talk we share our approach to a decentralized collection of expert opinion on the subject matter – how do we ensure we follow best practices as good as we can.

Keynote 4

Systems thinking and modeling for resilience analysis

Prof. Dr. Birgit Kopainsky

Professor in System Dynamics at the University of Bergen (NO)

Her research explores the role that systems thinking and modeling can play in facilitating sustainability transitions, from negotiating a shared understanding among stakeholders with conflicting views and priorities to the use of simulation models as learning tools where stakeholders are better able to continuously test, learn about and develop knowledge and understanding in order to cope with change and uncertainty. She has extensive empirical research and project management experience in a variety of sustainable development domains cutting across scientific disciplines, geographical contexts and societal actors.

Session 1

Adapting data collection methods for research on risk perception in the Global South

Nadja Contzen

Eawag (CH)

A large part of psychological research in general and of risk perception research in particular stems from high-income countries in the Global North. Most of the global population, however, lives in low- and middle-income countries, mostly located in the Global South. Not least because people in these regions are especially vulnerable to both health and environmental risks, there is an urgent need to strengthen risk perception research in the Global South. However, many of the data collection methods we regularly use in the Global North, such as (online) questionnaires, are not directly applicable in the Global South and should be adapted to the respective context. This is especially true when conducting research with vulnerable communities, such as people living in informal settlements or rural pastoralists, as in these communities literacy is usually low. In this talk, I will present some of the data collection methods me and my colleagues adapted in our risk perception research in the Global South, including but not limited to research with vulnerable communities. This includes projects on public opinions on solar radiation management, on behaviour change in the field of Water, Sanitation, and Hygiene (WaSH), and on intentions to switch to sustainable farming. The adapted methods span from questionnaire translation, where group translations have often proven to be the best method, over item testing, for which cognitive interviewing have proven a valuable method, to the actual data collection, which is usually done through structured face-to-face interviews. For each adapted method, I will discuss the lessons learned as well as remaining issues.

Session 1

Mind over Flood: How psychological distance and responsibility shape the willingness to pay for flood risk mitigation

Lois Addo Agyepong

Shandong University (CN)

Flood risk mitigation is a critical challenge in many regions, yet public willingness to pay for preventive measures often falls short of the level required for effective risk management. This study explores the roles of psychological distance, perceived responsibility, and experience in shaping individuals' willingness to invest in flood risk mitigation strategies. Psychological distance, experience, and, perceived responsibility are key factors influencing decision-making. Drawing from theories in environmental psychology and behavioral economics, this research examines how these psychological factors impact the public's willingness to pay (WTP) for flood risk mitigation.

A survey was conducted with (N=900) residents from flood-prone areas and residents in non-flood prone areas in Accra Ghana to assess their perceptions of flood risks and responsibilities, along with their willingness to contribute financially toward flood prevention measures. The logistic regression (logit) model results demonstrate that psychological distance does not have a significant effect on willingness to pay. On the other hand, willingness to pay is positively significant with experience and perceived responsibility. Additionally, in floodprone areas, 75.56% of respondents expressed willingness to pay to support flood mitigation projects, compared to just 2.89% in non-flood-prone areas. This indicates a heightened risk awareness and perceived need among those directly affected. This disparity highlights the significance of experience in shaping financial investment in public risk mitigation initiatives.

The findings suggest that individuals who perceive a higher psychological distance from flooding events are less likely to show a strong WTP, as they view the risk as less imminent or personally relevant. Conversely, those who feel a greater sense of responsibility toward mitigating flood risks whether for themselves or their community tend to exhibit higher WTP. These results highlight the importance of addressing psychological barriers and fostering a sense of collective responsibility in promoting financial support for flood mitigation efforts.

Session 1

Integrating citizens into resilience building

Kristina Koch, Matthias Holenstein, Kimon Arvantis

Stiftung Risiko-Dialog (CH)

In an era increasingly defined by a multitude of crises - such as energy shortages, climate change, the COVID-19 pandemic, and geopolitical tensions - strengthening social resilience is becoming ever more important. How can individuals and communities take collective action in times of crisis and successfully navigate such situations? And how can we create structures that not only respond to acute challenges, but also make society more resilient in the long term? Experiences from the COVID-19 pandemic have shown that a purely top-down approach to crisis management reaches its limits. Social resilience is not only about preventing crises, but about overcoming them together and emerging stronger. It is becoming increasingly clear that grassroots initiatives have a positive impact on society's overall resilience. In order to strengthen the interplay between civil society initiatives and governmental measures, the potential of the population must be systematically considered. This leads to further questions: How can a sustainable culture of resilience be fostered within the population? How can people be involved, and what must be considered in this regard? Through a series of participatory pilot projects, we aim to explore these questions, strengthen social resilience, and develop appropriate measures. Our approach incorporates a variety of elements, including the 'Local Hero' concept and the funding of a collaboration platform. Together with the Security Department of the City of Zurich, we also conduct workshops with young people to strengthen their ability to cope with crises and to empower them as multipliers in their communities. In addition, we support the creation of community-based rituals, such as a "Resilience Week". The goal of these prototypes is to evaluate the effectiveness of our approaches and identify long-term opportunities to expand social resilience initiatives beyond Zurich.

Session 1

Measuring security in Swiss aviation context – a mixed methods approach

Kristina Koch (1), Jakob Seitter (2), Stephanie Walter (2), Franziska Hofer (3)

(1) Stiftung Risiko-Dialog (CH)
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(3) HF Partners (CH)

Measuring security is challenging: As long as nothing bad occurs, we assume to live in a secure environment. But is that truly the case? And how can we be sure that the implemented security measures at airports, e.g. police patrols, CCTV or other technical infrastructure, are in fact effective and hence create security and deterrence? In the comprehensive, multi-year research project «Ready», we are evaluating the system 'airport' and its security measures using a combination of a blue- and red-team approach. We approach our evaluation with multiple studies from different angles. For example, we measured the subjective feeling of security from various perspectives: ranging from potential insiders like airport employees to regular passengers and visitors. In addition, we conducted mock crime studies in which participants should slip into the criminal mindset and take on the role of a perpetrator and make their assessment of security measures, as well as evaluate how likely they would rate the possibility of committing an attack at an airport. Moreover, this work was further completed by expert interviews and additional desk research.In a short talk, we would like to present the project and its various measurement approaches and furthermore illustrate and discuss their advantages and limitations with the audience.

Session 2

(Re) establishing risk science in European policy: Opportunities and challenges

Frederic Bouder

University of Stavanger (NO)

European regulators have been one of the main global purveyors of concepts, frameworks and policies directed towards the assessment and management of risk. In the 1990s, national agencies such as FSA, BfR as well as European agencies such as EFSA and EMA were established with the explicit mandate to assess, manage and/or communicate risk. Holistic frameworks such as the IRGC risk governance framework were also developed to guide decision-makers. Specific mechanisms – such as the European Parliament risk group were also instituted to assist policy making. Where are we today? We observe worrying sings that Europe may- in many ways- be going backwards. These signs include, among others, the weakening of scientific advisory mechanisms to the EU, member state as well as inter-agency divergence in crucial areas of risk regulation, the decline of risk as a key concept as opposed to hazard and precaution, the negative impact of Brexit is felt in terms of scientific and regulatory co-operation. Finally, recent oscillation between EU green and competitiveness goals is creating confusion and uncertainty. In this context, Risk Science is more than ever needed for conceptual and strategic direction. This talk will present an analysis of where we came from, where we may be heading as well as some concrete recommendations to strengthen the role of risk science at the European level.

Session 2

Social science evidence to inform paradigm shifts in European regulatory toxicology – Lessons learned

Angela Bearth

HF Partners (CH)

Transitioning from animal-based toxicological assessments to New Approach Methods (NAMs) marks a paradigm shift in regulatory toxicology. NAMs rely on methodologies, such as in vitro (using human cells) or in silico (using computer models based on existing data) to assess chemical hazards. It holds the promise of higher human relevance of chemical safety testing, cost-efficiency and ethical practices in risk assessment. Nevertheless, the effective use of NAMs in regulatory toxicology has proven challenging for manifold reasons, among them the needs of the manifold actors involved, ranging from regulators, industry representatives, academics to non-governmental and independent institutions. These needs are rooted in substantial differences in aims and incentives of different actors, in established familiarity, knowledge and skills developed over years of regulatory toxicology and in institutional structures and processes that are resistant to change. In this talk, I will present insights from 10 years of social science research within this field. Among the methods applied to assess actors' needs were qualitative interviews with actors in the regulatory toxicology system and a large-scale survey conducted with European risk assessors. The talk will focus on lessons learned and recommendations for how social scientist can contribute to regulatory risk assessment in the future.

Session 2

Structuring Complexity: A Typology for Systemic Risks

Paul Einhäupl, Benjamin Hofbauer, Pia-Johanna Schweizer

Research Institute for Sustainability at GFZ (DE)

Systemic risks, marked by non-linearity, complexity, and transboundary propagation, continue to challenge conventional approaches to risk analysis and governance. Complex interactions across sectors and scales are often approached either through overly broad generalizations or isolated case studies, making it difficult to identify common leverage points for interventions and consolidate specific findings. Our research develops a typology for systemic risks to support consistent analysis of propagation pathways and interdependencies while preserving methodological flexibility. Building on systems theory and established systemic risk research (e.g., Sillmann, Renn, Schweizer), the typology aims to classify systemic risks along key dimensions. These include risk origin and propagation, as well as the dynamics of systemic risk systems. By clarifying terminology and identifying systemic risk types, we take the next step towards organizing and clustering the systemic risk landscape. This approach facilitates the identification of commonalities and differences that support the definition of system boundaries, highlights research and policy needs, and helps bridge science-policy gaps by encouraging cross-disciplinary and cross-sectoral integration. To ensure relevance across evolving contexts, the typology is developed as an iterative and adaptive framework, the typology draws on selected case studies that represent four key societal system categories: socio-environmental systems, socio-technical systems, socio-economic systems, and social systems. It enables identification of leverage points with the aim of supporting more effective responses to cascading, multidimensional impacts. The typology provides a basis for systematic data collection and can inform future efforts to develop an empirically grounded taxonomy of systemic risks.

Session 3

One PPM at a time: A zero-failure risk model for climate-driven collapse

John-Oliver Engler

Bioeconomy and Resource Efficiency Group, University of Vechta (DE)

We have extended the probabilistic framework originally designed by Engler and Fischer (2024) to assess existential technological risk using zero-failure data. This framework is now being used to evaluate ecological tipping points under anthropogenic climate forcing. In this adaptation, cumulative increases in atmospheric CO_2 (measured in parts per million [ppm] above preindustrial levels) are modeled as sequential "draws" from a metaphorical urn. Each draw represents a marginal increase in Earth system stress, and the model estimates the probability of triggering a catastrophic regime shift, conceptualized as a "black ball," in the absence of prior failure observations. We operationalize this framework using Monte Carlo simulations and analytical survival functions. The empirical basis is derived from two Shared Socioeconomic Pathways: SSP5-8.5 (high emissions) and SSP1- 2.6 (low emissions). We translate projected CO_2 trajectories into probabilistic estimates of tipping-point onset. Using the "Rule of Three" to bound the per-unit risk of crossing critical thresholds, we simulate 10,000 stochastic realizations of climate futures and construct survival probability curves through 2100. The results show that under SSP5-8.5, the probability of avoiding a tipping event will decline below 60% by the end of the century, whereas under SSP1-2.6, the survival probability will remain above 85%. This methodological contribution demonstrates the utility of zero-failure risk estimation, which is widely applied in reliability engineering, as a decision-theoretic tool in climate-economy modeling. It offers a parsimonious and tractable way to quantify the probability of catastrophic outcomes under conditions of deep uncertainty and limited historical data.

Reference

Engler, J.O. and J.N. Fischer (2024), Drawing blanks and winning: Quantifying global catastrophic risk associated with human ingenuity, *Sustainable Futures 7,* 100165

Session 3

Public acceptance of new plant breeding technologies in Switzerland

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Swiss agriculture is increasingly challenged by frequent extreme weather events and rising pest pressures, highlighting the need for innovative solutions to ensure affordable and sustainable food production. New plant breeding technologies, such as gene editing, offer promising potential. Nevertheless, public acceptance remains uncertain. In Switzerland, the older generation of gene technologies – such as transgenic methods – has faced strong resistance, often due to concerns about unnaturalness, perceived risks, and limited consumer benefits. New plant breeding technologies are regarded as more precise and may be perceived as more natural than genetic modification, which could enhance the acceptance. This study investigates how the Swiss public perceives risks, benefits, and naturalness of new plant breeding technologies, as well as specific concerns related to their regulation. Two methodological approaches, a nationally representative online survey and a series of online experiments are applied to link these perceptions and related citizen and consumer decision-making to notions of nature and naturalness. The presentation aims at presenting these methodological approaches and discussing the associated benefits and limitations in the context of the generated insights. The research is particularly relevant in light of the current regulatory debates. At the European and the Swiss levels, authorities are currently engaged in deliberations regarding the potential exemption of new plant breeding technologies from the prevailing moratorium that prohibits the utilization of gene technology in the agricultural sector. The findings aim to contribute to the ongoing public and political debate in Switzerland about how to regulate new plant breeding technologies. By identifying the factors that drive acceptance or resistance, this research supports more effective communication strategies and informed, evidence-based governance of emerging technologies in agriculture.

Session 3

Providing complex information via explanatory videos: Experiences from an online survey on wastewater treatment and reuse

Josianne Kollmann, Nadja Contzen

Eawag (CH)

Understanding how the public perceives and accepts environmental and societal challenges and their potential solutions is crucial for developing effective, socially supported measures, such as technological solutions or policies. However, researchers face a significant challenge when investigating this: often, a high amount of comprehensive background information needs to be provided in order to ensure that all participants have the same information required to evaluate the challenge and its solutions. Traditional text-based information delivery can discourage participation due to time demands and may further exclude individuals with limited literacy skills or lower education levels. A promising alternative option are explanatory videos that convey complex information in a more accessible and engaging format. Visual and auditory elements can simplify technical concepts while maintaining participants' interest and increasing comprehension. We tested this video-based approach in an online study in Bengaluru, India. The study focused on public attitudes toward on-site wastewater treatment and reuse as solutions to water scarcity and environmental pollution. Rather than providing written materials, we created two custom explanatory videos that covered all necessary contextual and technical information. Following the videos, participants evaluated the technology and provided feedback on video comprehensiveness. This presentation will examine participant reactions to the video format, including comprehension ratings and qualitative feedback. We will also demonstrate practical approaches for creating effective explanatory videos for public perception research, offering researchers an alternative method for improving participant engagement and understanding in studies that require to provide complex information to participants.