Risk KAN Working Group Critical Infrastructures

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Rationale

Climate extremes, natural as well as man-made hazards affect people often directly, but sometimes aggravated by impacting essential infrastructure services such as water, food, health, energy, information, security, or cultural identity. Critical infrastructure such as networks or distribution hubs can provide relief aid and key preparedness as well as recovery, however, when impaired can just drastically diminish such efforts, too. Critical infrastructure, however, is more than just technical or structural – it also consists of humans either as users, providers and regulators of the services, goods and processes of infrastructure systems, whose priorities and understanding of appropriate ways to supply infrastructure are intertwined with expectations and practices of use, both of which are equally significant. When users do not trust failing governance systems or technologies, it adds to the failure of an infrastructure service. In relation to climate and global change, growing local as well as global interconnectivity also means growing interdependencies of infrastructure networks, services and users. It is a key characteristic that critical infrastructures can be part of cascading effects of extremes events leading to systemic failure, or when they are roubst mitigate and withstand such failure and contribute to preparedness. For example, failure of a power station due to a flood can produce an additional, compounding situation to the flood itself by power failure, hence affecting many people directly, and indirectly many more by additional failure of backup systems of many other infrastructure sectors. As the vulnerability paradox states; the more developed a society, the more vulnerable to unexpected failures of infrastructure it becomes. However, this must be analysed further for both developing and developed country contexts.

Aims

Terminology and paradigm: while the term critical infrastructure has evolved within a terror threat context in the USA in the 1990s, it has first spread within praxis and academia in a security and technical structure notion. It mainly had been coined to describe national assets and processes with key interests to governments, but gradually has been picked up at sub-national level, too. Critical infrastructure includes human and physical infrastructural systems that interact and communicate with one other; they receive inputs and send outputs, including water and energy resources, services, food and other products, and information systems such as weather forecasts and guidelines to respond to emergencies. Interdependencies and dependencies are at the heart of the concept of cascading effects triggered by threats. Both refer to a connection between two or more infrastructures. However, while a dependency denotes a process through which the state of one infrastructure unidirectionally influences or correlates to the state of the other, an interdependency denotes a bidirectional relationship or correlation between the two infrastructures. Cascading effects are effects that occur as a direct or indirect result of an initial event. They depend, to some extent, on their context, and thus their diffusion is associated with enduring vulnerabilities of interdependent critical systems. For instance, power failures following heat waves or wildfires, or disruptive damages after hurricanes and floods demonstrated a pressing urge to address this vulnerability of modern society, too.

Methodology

The topic of critical infrastructure has pushed development of methodologies to identify and priorities infrastructure first assets, then processes and more recently, services. Assets or technical elements first, since they were easy to detect, then came the notion of processes involving staff, organization and regulation were involved, and lately, more and more literature focuses not only on the technical system of production and distribution, but also on the outputs, and their interaction with people. Prioritisation also prompts to scrutinize, elicitate and integrate goals and values of different stakeholders, ranging from being safe from harm, over regulatory and economic to environmental goals.

Integration: critical infrastructure offers a wide range of options for better integration of different fields in all parts of sustainability, climate, disaster risk and many other fields due to its cross-cutting character. While the topic emanated from a governmental, western and security related background, it has been picked up now by the Sendai Framework for Disaster Risk Reduction and also blends in with many more related fields of what is termed green, blue and grey infrastructure, logistic chains, housing or ecosystem services. Methodology also supports such integration, for instance the criticality identification and prioritization, but also existing interdisciplinary frameworks and conceptual approaches on socio-technical resilience, socio-technical systems and modelling approaches, such as resource network analysis, for example.

This Working Group will establish a network by organizing workshops on specific themes to foster conversations between different disciplinary communities, to host seminars, draft research and programmatic papers/follow-up proposals, and to develop web-content as well as other dissemination materials. Working Group members can seek Risk KAN endorsement for activities such as themed sessions at major conferences or workshops.