

PRESS RELEASE

SINGAPORE-ETH CENTRE LAUNCHES FUTURE RESILIENT SYSTEMS PROGRAMME TO ADDRESS CRITICAL INFRASTRUCTURE SYSTEMS RESILIENCE

- *The Future Resilient Systems (FRS) programme, bringing together NTU, NUS, and SMU, and Switzerland-based ETH Zurich and Paul Scherrer Institute, will study energy-supply systems, which can be applied to other critical infrastructure systems*
- *In small, well-organised, and prosperous (SWOP) countries like Singapore, critical infrastructure systems are the backbone that deliver energy supply, transportation, communication, banking and finance, emergency, and other services*
- *The increasingly complexity and interconnectedness of critical infrastructure systems today call for novel approaches to make these systems more robust and resilient*

12 November 2014 – Singapore-ETH Centre (SEC) launches the Future Resilient Systems (FRS) programme on 13 November to explore new approaches to make critical infrastructure systems more robust and resilient, against the backdrop of increasingly complex and interconnected critical infrastructure systems. In particular, the FRS will focus on energy-supply systems as a model that could be applied to other critical infrastructure systems.

Small, well-organised, and prosperous (SWOP) countries such as Singapore and Switzerland depend on critical infrastructure systems for its continued well-being and development. The disruption of critical infrastructure systems—the ‘backbone’ that provide essential services such as energy supply, transportation, communication, banking and finance, and emergency—could have far-reaching and cascading consequences.

It is timely at this juncture, as Singapore approaches its 50th year of independence, to look introspectively at its resilience as a city-state. The Singapore Exchange’s three-hour trading suspension due to power supply issues on November 5 has no doubt increased scrutiny of power systems. Behind this, and any other critical infrastructure system, are the engineered systems, the interaction between systems, and the people who operate the system - the three core pillars of the Future Resilient Systems.

Bringing together NTU, NUS, and SMU, and Switzerland-based ETH Zurich and Paul Scherrer Institute, FRS approaches infrastructure from a socio-technical perspective, integrating engineered, operational, and user subsystems, thereby building bridges between disciplines and patterns of thought. The FRS will also work closely with Singaporean government agencies, including the National Security Coordination Secretariat (NSCS), DSO National Laboratories, Energy Market Authority (EMA), and National Environment Agency (NEA).

System disruptions and breakdowns are the result of an ‘event-exposure-strain-response-effect’ process. These days, the increasing range of hazards that threaten and strain critical infrastructure systems goes beyond the natural, technological, economic, financial, social, or geopolitical, but also includes cyber and political threats.

Furthermore, analyses of large-scale disruptions such as the NASA Columbia and Challenger explosions, toxic leaks at Bhopal, and radiation contamination at Fukushima have demonstrated that social sub-systems are often the weak link triggering the development of disruptions. It is this systemic behaviour of a socio-technical system—including decision-making behaviour—that results in the emergence of new patterns of disruptive behaviour.

With the increasing uncertainty of triggering events and responses, as well as the increasing connectedness of systems in the ‘hyperconnected’ world of today, systems must now be made more fault-tolerant beyond pure resistance, enabling them to self-organise, recover, and learn, much like a biological system.

Albert Einstein once said ‘We cannot solve problems with the same kind of thinking we used when we created them’.

It is with this understanding that the FRS aims to increase its understanding of the behaviour of complex systems, and to develop the capability to model and predict their behavioural patterns, in order to make critical infrastructure, in particular energy supply systems, more robust and resilient.

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About Future Resilient Systems (FRS)

‘Future Resilient Systems’ (FRS) is a research project that addresses challenges with critical infrastructure systems that provide essential services to modern societies, which is of particular importance to innovation-driven economies like Singapore and Switzerland. FRS provides a cross-disciplinary, cross-cultural environment to jointly explore approaches to make critical infrastructure systems more robust and resilient.

About Singapore-ETH Centre (SEC)

The Singapore-ETH Centre for Global Environmental Sustainability (SEC) in Singapore was established as a collaboration between ETH Zurich and the National Research Foundation (NRF) of Singapore in 2010, as part of the NRF’s CREATE campus. SEC is an institution that frames a number of research programmes, the first of which is the Future Cities Laboratory (FCL), followed by the Future Resilient Systems (FRS).

The SEC strengthens the capacity of Singapore and Switzerland to research, understand and provide recommendations in response to the challenges of global environmental sustainability, motivated by an aspiration to realise the potential for present and future societies. SEC serves as an intellectual hub for research, scholarship, entrepreneurship, postgraduate and postdoctoral training. It actively collaborates with local universities and research institutes and engages researchers with industry to facilitate technology transfer.

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