

ETH zürich



TRACK: A Socio-Technical-Environmental Perspective on the Resilience of Infrastructure Systems

International Conference on Resilient Systems

ICRS 2026 Delft, the Netherlands, 23-25 March, 2026

INTRODUCTION TO THE TRACK

This track seeks to advance our understanding of the resilience of critical civil infrastructure systems, such as roads, water networks, and energy grids, through a socio-technical-environmental system perspective. Infrastructure systems deliver a wide range of essential services to society and are therefore foundational to the functioning and prosperity of modern communities. For instance, without water infrastructure, many of the world's low-lying deltas would be uninhabitable. Due to climate change, population growth, and land use changes, many infrastructures are undergoing significant transitions while simultaneously operating beyond their intended service lifetime. This highlights the need to fundamentally reassess how infrastructure systems are planned, governed, and maintained.

TRACK TOPICS

This track invites contributions on a range of topics related to infarstructure resilience, including but not limited to the following:

1. System transformation: Infrastructure systems are durable, interconnected and resource-intensive structures with relatively long lifetimes. This implies they are difficult to adapt in response to societal and environmental changes, particularly because of their interconnectedness. Changes in one system can lead to undesired impacts for another infrastructure system. Moreover, they have long been perceived primarily as technical systems with engineers playing a key role in designing, constructing and maintaining them. Materiality, institutions and practices imply that infrastructure systems and management practices are resistant to change. This raises questions related to transforming complex systems. What needs to change? What change is desirable and when? What are new concepts to get a grip on the complexities of interconnected infrastructure systems? How can the behaviour of interconnected infrastructure systems be modelled or simulated?





(SEC) SINGAPORE-ETH Centre





- 2. Governance of infrastructure: Infrastructure systems provide a wide range of public values, which change over time particularly in face of climate resilience. Despite the growing attention for maintenance and abandoned infrastructure, project-based investment logics prevail. How to govern infrastructures as functions and public values are changing? How can innovations in public-private collaboration support infrastructure resilience? How can asset owners, managers and users effectively coordinate and/or collaborate? And how can decision-support tools facilitate resilience action?
- 3. Community-focused approaches: The delivery of infrastructure services is often taken for granted by society. Yet, it is communities who are impacted most if infrastructure fails. Understanding resilience from a community perspective and engaging them can help in implementing measures that reduce disaster impacts more equitably, effectively, and efficiently while also making communities less vulnerable and more resilient. How to best engage citizens and communities? How to ensure equitable and just access and use?
- 4. Nature-based solutions: In water infrastructure systems, the use of natural processes and materials plays an increasingly important role. Bio-materials are also seen as important means to improve the sustainability of the asphalt sector. Yet, compared to traditional materials and solutions, natural materials and nature-based solutions are often surrounded by uncertainties. Moreover, their effectiveness is often perceived with scepticism, they need to be tailor-made, and they require additional or other resources such as land. How to cope with uncertainties? How to balance between different and competing interests and values?

TYPE OF CONTRIBUTIONS:

- 1. Call for Extended Abstracts (1.000 words) see website for the template.
 - Including the possibility of submitting a Case Study in this same template
- 2. Call for Posters & Demonstrations see website for the template
- 3. Call for Pitches (500 words) see website for the template
 - The pitches (5 min.) will serve as the starting point for round table discussions among stakeholders, policy makers, and researchers."

AUTHORS

We are well embedded in the 4TU Centre for Resilience Engineering and have close connections to researchers and practitioners affiliated with the Dutch NG Infra (Next Generation Infrastructure), the Dutch knowledge platform CROW and related networks in the Netherlands. This session is partly following up on two sessions on infrastructure systems organized at EU-SPRI in 2024 (see <u>call for abstracts</u>).





(SEC) SINGAPORE-ETH CENTRE





TRACK CHAIR AND CO-CHAIR

The chair and co-chairs are experienced organizers of conference sessions, workshops and other events. Relevant publications that we will build upon include:

- Aydin, N.Y., Celik, K., Gecen, R., Kalaycioglu, S., Duzgun, S., (2025). "Rebuilding Antakya: Cultivating urban resilience through cultural identity and education for post-disaster reconstruction in Turkey." *International Journal of Disaster Risk Reduction* 117, 105196. <u>https://doi.org/10.1016/j.ijdrr.2025.105196</u>
- Vinke-De Kruijf, J., Heim LaFrombois, M. E., Warbroek, B., Morris, J. C., & Kuks, S. M. M. (2024) <u>Climate-resilient water infrastructure: A call to action</u>. *Journal of Critical Infrastructure Policy*
- Kammouh, O., Noori, A. Z., Cimellaro, G. P., and Mahin, S. A. (2019). "Resilience Assessment of Urban Communities." *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, 5(1), 04019002. doi: <u>https://doi.org/10.1061/AJRUA6.0001004</u>.
- Doornkamp, T. J. L., Vinke-de Kruijf, J., Pahlow, M., & Matheson, D. (2024). <u>How flood risk</u> management projects can improve urban resilience: a combined assessment approach of <u>functional resilience and adaptive capacity</u>. *Australasian Journal of Water Resources*, 1–11.
- Pedde, S., Grendelman, R., Cumiskey, L., McCullagh, D., Vinke-Kruijf, J., & Hölscher, K. (2024).
 <u>Leveraging climate resilience capacities by (un) learning from transdisciplinary research projects.</u> *Climate Risk Management*, 100675.
- Warbroek, B., Holmatov, B., Vinke-de Kruijf, J., Arentsen, M., Shakeri, M., de Boer, C., ... & Dorée,
 A. (2023). From sectoral to integrative action situations: an institutional perspective on the energy transition implementation in the Netherlands. *Sustainability Science*, 18(1), 97-114.

Joanne Vinke-de Kruijf * joanne.vinke@utwente.nl Department of Civil Engineering & Management, University of Twente
Beau Warbroek w.d.b.warbroek@utwente.nl Department of Civil Engineering & Management, University of Twente





(SEC) SINGAPORE-ETH Centre





Omar Kammouh o.kammouh@tudelft.nl Systems Engineering Delft University of Technology
Nazli Aydin N.Y.Aydin@tudelft.nl Systems Engineering Delft University of Technology

*Corresponding Chair

