The Dynamics of Critical Infrastructures in Cities

FINAL CONFERENCE: NINE YEARS OF THE RTG KRITIS

19th to 21st March 2025

GEORG-CHRISTOPH-LICHTENBERG-HAUS, DARMSTADT, GERMANY

Call for Abstracts

Submission deadline	15 October, 2024
Word count	max. 300
Language	English

1 Concept of the conference

The final conference of the interdisciplinary Research Training Group KRITIS at TU Darmstadt will focus on the *Dynamics of Critical Infrastructures*. We will explore how these dynamics shape urban capacity for development, resilience, and quality of life, offering a fresh perspective on this crucial topic.

Since 2016, KRITIS has been a Group of Professors and PhD candidates from various disciplines including history, civil engineering, planning, philosophy, computer science, political sciences, sociology and architecture who have made significant contributions to conceptualising critical infrastructures. In the first phase, the RTG defined five key concepts for critical infrastructures – *criticality, vulnerability, preparedness, prevention, resilience* – and used them as a basis for analysing networked socio-technical infrastructures, enabling the RTG to gather new findings in connection with functional crises. In the second and third phases, the key concepts were further explored and expanded with dynamics as a characteristic of critical infrastructures, now focusing on the three phenomena of *transformation*, *circulation*, and *system of systems*. All of these concepts have been shown to be in tension between stability and dynamics. Dynamics are especially challenging in the research and practice of infrastructures.

Traditionally, technical infrastructures have been conceived as factors of stability, causing lock-in and path dependency. However, recent research has shown the importance of dynamic processes of infrastructures. These processes are expressed in material and social transformations that change the form and fluctuation of new and existing infrastructural systems. However, recognizing the dynamic nature of infrastructures also requires adjustments in planning and maintenance and demands flexible security measures. We want to discuss and bring together these challenges and findings with local and global perspectives of critical infrastructures in cities in a broader interdisciplinary context of research and practice.

Critical infrastructures, which we understand as socio-technical systems that are crucial to the functioning of our modern urban society, are characterized by both, their continuity and tendency to dynamic change. Due to their high degree of cross-sector interdependence, urban infrastructures are to be understood as a system of systems, which in turn is to be understood as a system-inherent cause of dynamics. In turn, external events and processes are also responsible for infrastructures' dynamics, such as climate change, security threats and social developments such as increasing urbanization and the rise of digital networking.

Processes of change manifest themselves through space and time. Time serves as a unit of measure to gauge the speed and intensity with which changes take form. Eventually, these incremental systemic changes materialize in spaces of existing and new infrastructural systems. Thus, time and space provide a perspective that allows recognition of different change patterns.

In a different sense, critical infrastructures also function dynamically, circulating goods, services, and people through their work. This feature of infrastructures makes cities a particularly interesting focus for infrastructural research due to their high density in population and infrastructure systems forming a highly dynamic environment.

2 Topics and Questions

To discuss the dynamics of critical infrastructure, we invite scholars and practitioners from different disciplines to contribute to our conference. Proposals may focus on, but are not limited to, the following topics and questions:

System of Systems represents an analytical perspective on critical infrastructures for describing interdependencies and complexity of different infrastructural sectors and systems. In urban areas, it is particularly substantial that the challenges resulting from systems of systems interdependencies are addressed.

We are particularly interested in the following key questions:
- → What exactly is a system of system?
- → How can the system of systems approach be modeled as a cause of dynamics?
- → How can dynamic changes be analysed using the system of systems approach?
- → How can the system of systems approach be used to enhance our understanding of functional crises and concepts such as vulnerability and resilience?
- → To what extent can urbanization be understood as a system of systems challenge or problem?
- → How can the interdependent systems of infrastructure impact the evolution of new urban structure types? Is it a hindrance or in fact an acceleration?

Transformation represents the change of infrastructures as socio-technical systems and is both the result and cause of dynamics. It is a central challenge for society and technology, and is currently being discussed primarily concerning topics such as digitalisation or energy transition.

We are particularly interested in the following key questions:
- → Under which conditions do transformations of the infrastructure take place?
- → Under which conditions do they lead to functional crises, and how can the crises be avoided?
- → Considering the nature of the transformation phenomenon, what is the relationship between transformative change and incremental change? Should these two be distinguished from each other?
- → How are transformations managed? Which instruments and procedures are suitable for actively steering transformations?
- → Can transformations be deemed as the result of identified vulnerabilities and thus enhance resilience? Is resilience the result of adaptation processes?
- → How do existing vulnerabilities stimulate dynamic processes?

Time and Space

The dynamics of infrastructures always manifest themselves in the dimensions of time and space. Changes such as ruptures and dynamics always take place on a temporal level. If we assume infrastructures as the key elements of consisting space, then changes and dynamics always lead to a change in the use of space and a reorganization of spatial relations.

We are particularly interested in the following key questions:

→ To what extent do spatial and temporal conditions influence the dynamics of infrastructures in cities?
→ How are the rhythms of infrastructural circulation related to the dynamics of infrastructures?
→ How do the vulnerabilities of infrastructures vary over time and space and initiate dynamic processes of change?
→ Which spatial conflicts can be caused by dynamics of infrastructures, e.g. competing usages of space, conflicts of value?
→ Which elements of continuity and persistence manifest themselves at the spatial level of infrastructures, and how do these dynamics connect to each other?

3 Keynote lectures

We are happy to announce that the conference will feature six interdisciplinary keynote lectures by **internationally renowned** scholars, namely:

Opening Lecture
Prof. Dr. Jens Ivo Engels
TBA

Topic of the speech: TBA

Keynote Speaker 1
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Topic of the speech: TBA

Keynote Speaker 2
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Topic of the speech: TBA

Keynote Speaker 3
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Keynote Speaker 4
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Topic of the speech: TBA

Keynote Speaker 5
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Topic of the speech: TBA

Keynote Speaker 6
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Topic of the speech: TBA

4 Roundtable Discussions

The ending roundtable of the RTG-KRITIS involved professors

Moderation by the speaker(s) of the RTG-KRITIS

5 You are welcome to join!

How to apply

- **Individual Submissions:** submit the title and an abstract of the presentation (max. 300 words); the talk should be no longer than 15 minutes.
- **Panel Submissions:** submit the title and abstract of the panel and each presentation (max. 300 words per abstract); should consist of 3 to 4 people and should not exceed 60 minutes. We only accept panels that are made up of different universities and/or projects.
- Language: English
- Please add a short academic CV (for each person by a panel submission)
- Please send a single PDF file (max. 2 MB)
- Send your application to dynamicsconference@kritis.tu-darmstadt.de by 15 October 2024, 23:59 CEST
- Accepted applicants will be informed within six weeks after the deadline
- We welcome everyone to register as an attendee at https://kritis.gitlab.io/dynamicsconf2025 (From August 2024)

6 Contacts

If you have any questions, please don't hesitate to get in touch with us:

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