

Jens Ivo Engels *Editor*

Key Concepts for Critical Infrastructure Research



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Introduction

Jens Ivo Engels

This publication is one of the first results of joint work in the interdisciplinary graduate school ‘KRITIS. Kritische Infrastrukturen: Konstruktion, Funktionskrisen und Schutz in Städten’ – ‘Critical Infrastructures: construction, functional crises and protection in cities’. The graduate school is based at Technische Universität Darmstadt and started in autumn 2016. This book has been written jointly by all of the 12 doctoral researchers of the ‘first generation’ in that school and one of the supervisors. It is the fruit of our intensive discussions in the joint weekly *Oberseminar* and of several writing sessions. We think it represents a good argument for interdisciplinary collaboration as it proves that discussions and debates between humanities, social sciences and engineering researchers are possible – and fruitful. Every single author of this text has been confronted with cultures of thought that are foreign to her or his own discipline. That did not change our respective way of doing research. In many cases it was just the opposite in fact: becoming familiar with other research strategies helps clarify and consolidate our own discipline’s approach. However, every author has learned to see the different disciplinary usages of the concepts elucidated in this text, and to ponder their strengths and weaknesses. He or she now will use one or several of the concepts in their own doctoral research with these insights in mind, and will be able to delimit its use from possible alternatives. In some instances, however, he or she will borrow insights from neighbouring disciplines.

The book has been published technically as an edited volume, for pragmatic reasons. In fact, literally every author has contributed to much more than his or her individual chapter. We consider the book as our joint work – not only the last chapter.

In alphabetical order, the book is authored by the following doctoral researchers: Arturo Crespo (Civil Engineering), Marcus Dombois (Civil Engineering), Stephanie Eifert (Medieval History), Ivonne Elsner (Urban and Infrastructure Planning), Jan Henning (History of Technology), Andreas Huck (Urban and Regional Geography), Alice Knauf (Political Science), Kristof Lukitsch (Contemporary History), Manas Marathe (Architecture and Urban Planning), Marcel Müller (Philosophy), Nadja Thiessen (Contemporary History) and Chris Stahlhut (Computer Science).

The chapters have been prepared, after joint discussions, by writing groups, observing the rule of bringing together different disciplinary perspectives. Criticality has been written by Lukitsch, Müller and Stahlhut, Vulnerability is authored by Eifert, Knauf and Thiessen, Resilience has been the task of Elsner, Huck and Marathe, and Preparedness & Prevention has been taken up by Crespo, Dombois and Henning. All of them contributed parts to chapter 7. Finally, Jens Ivo Engels (Modern and Contemporary History) took up the chapters, revised, complemented and merged them into one text and wrote the introduction.

The authors have benefited from the opportunity to discuss their ideas and their texts with several persons. We are thankful to Sabine Höhler, who commented intensively on a draft version when she was at Darmstadt as a KRITIS Mercator Fellow, Markus Lederer, who stimulated the discussions of the criticality redaction group, and Leon Hempel, who contributed to innumerable oral debates and textwork sessions when residing as a KIVA guest professor in Darmstadt. We continually profited from ideas and suggestions by the guests of the weekly KRITIS *Oberseminar* in 2017, especially Jörn Birkmann, Martin Endreß, Stefan Kaufmann, Richard Little, Benjamin Rampp, Christoph Riegel, and Erik van der Vleuten. Last but not least we thank the PIs and PhD supervisors of KRITIS graduate school.

Above all, we would like to highlight the decisive contributions of Jochen Monstadt to the configuration of the four concepts as a systematic approach to critical infrastructure research, as well as his inputs during several discussions over individual concepts. Finally, Tina Enders took care of the editing and publishing process.

1 Background and Aim of the Text

The work of the abovementioned KRITIS graduate school is organised into three research areas, namely the emergence or construction of critical infrastructures, function failures or problems, and strategies to protect these infrastructures against failures or to cope with failures. In the methodological part of our research programme, which is authored by Jochen Monstadt and Jens Ivo Engels, we have identified four key concepts (we call in German ‘Brückenkonzepte’). The key concepts should provide to all scholars involved a kind of common language. These concepts are: first, criticality, being the defining feature of those infrastructures which are analysed by the group, second, vulnerability as a tool that may help assess reasons for the failure of infrastructure, third, resilience as a concept which may help explain why certain infrastructures do not fail, and, fourth, preparedness & prevention, initially conceived as two different strategies to act against failures. On the following pages, however, the reader will notice that we