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EDITORIAL

Editorial

Stefan Hiermaier[1]

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Terrorist attacks, natural disasters, catastrophic technical failures and human errors: these are a variety of so-called "disruptive events" that are harmful to vital components of societies and can be lethal to more or less randomly affected individuals. For society to avoid the effects of disruptive events, to reduce their impact if and when they occur and to recover as quickly as possible, a holistic approach seems inevitable. Protective technologies, data acquisition and processing for precise situation awareness, governance and control in the immediate reaction phase as well as legal conformity and societal acceptance are all part of a requisite integrated solution.

The articles published in this issue of the *European Journal for Security Research* present ideas and possible solutions in response to this complex multi-disciplinary challenge. The broad spectrum of several recent incidents illustrates the respective dimensions involved: A catastrophic accident involving two commuter trains in Bad Aibling, Germany in February 2016. The small town of Simbach, Germany witnessed a deadly flooding in June. In July a terrorist killed more than 80 people in Nice, France and another one injured 15 people in a suicide bombing in Ansbach, Germany. Hurricane Matthew hit the Caribbean in September. In October, a fatal explosion at a BASF chemical facility killed several people. A Tsunami hit New Zealand in November. And in December, yet another terrorist abused a truck to commit a fatal attack on a Christmas market in Berlin. Some of these events were known, yet could not be prevented, some were unexpected. Some can also be seen ex post as examples of positive security measures: successful preparation, protection and recovery. Finally, some probably caused more damage than necessary.

✉ Stefan Hiermaier
stefan.hiermaier@inatech.uni-freiburg.de

[1] Department of Sustainable Systems Engineering (INATECH), Albert-Ludwigs University, Freiburg, Emmy-Noether-Straße 2, 79110 Freiburg, Germany

Resilience Engineering offers ways to deal with unexpected disasters to complex socio-physical structures using means, methods and technologies from the engineering sciences. Resilience has been a highly debated concept within numerous scientific disciplines within the last 60 years. Stemming from the Latin word "resilire", the basic meaning of resilience common to all branches of science using it, relates to the ability of an individual, a population or a system to bounce back to a stable state after experiencing a disruptive event. With a mechanical synonym, resilience is often illustrated by a spring that deforms elastically and is able to bounce back to its original state after loading without permanent deformation. Today, resilience is mostly defined as a comprehensive, holistic approach towards ensuring the well-being of societal, technical and socio-technical systems when they witness stress:

> Resilience is the ability to repel, prepare for, take into account, absorb, recover from and adapt ever more successfully to actual or potential adverse events. Those events are either catastrophes or processes of change with catastrophic outcome which can have human, technical or natural causes (Scharte et al. 2014, p. 17).

The previous issue of this journal contained a list of recommendations for engineering sciences towards more resilience in our societies (Thoma et al. 2016). Statements demanding capabilities and strategies such as the

- sustained critical functionality of a system as long as possible,
- switch to a graceful degradation of functionalities if needed,
- immediate initiation of recovery and adaption system functionalities after a disaster,
- creation of generic capabilities as heuristics that can be applied to a broad set of previously undefined disruptions,

show that Resilience Engineering as a scientific discipline is still in an early, developing phase. This journal, with its current and future issues, will cover the next steps necessary to shape a consistent scientific framework.

Wolfgang Kröger's article is an important step to concretize this concept. He argues that our large-scale infrastructure changes into complex "systems of socio-technical systems" that tend to witness multiple, cascading failure scenarios. To deal with these kinds of events, we need to develop and use advanced modeling and simulation techniques as well as a holistic understanding of resilience.

One aspect of complexity in our modern society is the huge amount of digital data generated. Following the article of Sven Brinkhoff, more and more intelligence agencies use data mining to understand and analyze this Big Data, e.g., Dutch police forces. Notwithstanding possible benefits from these technologies, Brinkhoff hints at legal and ethical aspects that come along with their use. He formulates criteria for the implementation of regulation on Big Data into the Dutch Code of Criminal Procedure (CCP) and sees these criteria as a useful starting point for international discussion on data mining by police agencies.

In her article for this issue, Diana Panke shows the importance of taking an active part in international negotiations on security issues—for which Brinkhoff's topic of data mining could be one example. Panke analyzes the role of different regional actors, like the EU or the Arab League, in such negotiations with the help of international conflict and cooperation theories. She states that regional actors play varying but sometimes surprisingly important roles in such negotiations, depending on the topic but also the characteristics of the actors themselves.

Landmines are still a relevant international security issue with over 100 million threat objects buried worldwide. Markus Peichl's article focuses on a standoff technology for the detection of landmines. Current annual clearing rates range at about a few hundred thousand pieces. Among other things, this is due to slow and dangerous detection techniques such as the usage of metal-detectors and dogs, where human operators need to get as close as one meter to the threat object. Peichl describes the physical background, system design and results of validation testing for a novel radar detection technology.

The four articles in this issue of the European Journal for Security Research make for an impressive example of the broad spectrum of topics the journal covers. At the same time, the connections between such different areas like infrastructure resilience, regulation for data mining, international security negotiations and de-mining activities are thrilling, though not necessarily obvious. Applying the holistic concept of resilience within security research allows for discovering such connections and for improving civil security by understanding them.

References

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