On the contribution of technological concepts to the resilience of bridges as critical infrastructure assets

Dániel Honfi, David Lange

SP Technical Research Institute of Sweden, Sweden

Christer Pursiainen, Bjarte Rød

University of Tromsø - The Arctic University of Norway, Norway

Contact: daniel.honfi@sp.se

Abstract

The current paper reports about the progress in the ongoing European project IMPROVER (Improved risk evaluation and implementation of resilience concepts to critical infrastructure), in which a fundamental part is devoted to technological resilience concepts. Within the project a general methodology for resilience evaluation is developed, in which existing concepts in the field of structural engineering are aligned with non-technological domains (e.g. organizational and societal) contributing to resilience. A shift from protection to enhancing resilience leads to a shift in focus from traditional risk management towards crisis management. Some of these issues are exemplified here with the application on bridges as critical infrastructures.

Keywords: resilience, critical infrastructure, bridges.

1 Introduction

Structures and infrastructure assets often represent complex technical systems that may be exposed to several types of hazards resulting in unfavourable events with serious consequences. Further, they often are subject to interdependencies with other types of infrastructure.

According to the EU, Critical infrastructures (CI) are assets essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact as a result of the failure to maintain those functions [1]. Major bridges are typical examples of infrastructure which fits this definition of CI.

Traditionally, the prevalent strategy to reduce the risk to critical infrastructure has been to protect. However, the very nature of crises means that they are often initiated by low probability events or sequences of events. Such exceptional events rarely unfold in the way one expects them to, and protecting infrastructure against all types of incidents ranges from difficult or costly to technologically impossible or prohibitively expensive. Recent years have therefore seen a shift in focus – not only in policy and technological analysis but also on the political level, including the EU – from protection of CI to enchance their resilience [2]. Resilience, in a broad sense, refers to the ability of the CI to resist, absorb, accommodate and recover from the effects of hazards in a timely and efficient manner, including through the preservation and restoration of essential basic structures and functions.

https://doi.org/10.2749/stockholm.2016.0962