

SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

The STSM applicant submits this report for approval to the STSM coordinator

Action number: CA15127

STSM title: Disaster-resilience and survivability assessment

STSM start and end date: 16/04/2018 to 20/04/2018

Grantee name: Poul Heegaard

PURPOSE OF THE STSM/

The main objective of the STSM was to work on a joint publication with researchers from Gdansk University of Technology (prof Jacek Rak), NTNU (profs Bjarne Helvik and Poul Heegaard) and Duke University (prof Kishor Trivedi). The paper will investigate the state of art in disaster-resilience in optical networks, and survivability assessment of optical and future 5G core networks.

The STSM belongs to WG1: Large-scale natural disasters (although relevant for other WGs as well)

DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

The STSM was implemented at the Gdansk University of Technology, Poland, and was hosted by Prof. Jacek Rak.

A presentation of my research on “Network Survivability Quantification” was given for the collegium at Faculty of Electronics, Telecommunications and Informatics.

During the STSM we had long and fruitful discussions on the content and structure of a potential paper on “Disaster-resilience and survivability assessment”. Gdansk University of Technology has expertise in disaster resilience of optical networks, and NTNU (together with Duke University) expertise on survivability (the performance and recovery) of a network after a fixed disaster scenario.

Before the STSM, Prof Jacek Rak had started drafting an extensive overview of state of art in disaster-resilience in optical networks. The focus of the discussions during the STSM was therefor on connecting this to the survivability modeling framework (NTNU/Duke). What turned out to be a promising approach is to integrate “Resilience Engineering” [1] and “Fault Management”, modelled by the survivability framework [2]. The idea is then to use disaster-resilience in optical networks as a case to demonstrate the potential in such an approach.

[1] E. Hollnagel, “The four cornerstones of resilience engineering,” 30(16), 2563-2573 (2012) in *Resilience engineering perspectives, preparation and restoration*, C. Nemeth, E. Hollnagel, and S. Dekker, Eds. Farnham, UK: Ashgate, 2009, vol. 2, pp. 117–134.

[2] Poul E. Heegaard and Kishor Trivedi. “Network Survivability Modeling,” *Computer Networks*, Volume 53, Issue 8 (2009), pp. 1215 -1234. Elsevier. <http://dx.doi.org/10.1016/j.comnet.2009.02.014>



DESCRIPTION OF THE MAIN RESULTS OBTAINED

A clear objective and scope is defined, and an outline of a paper on “A Tutorial on Resilience Engineering and Fault Management: Disaster Recovery in Optical Networks“ has been drafted, and part of the content has been added.

FUTURE COLLABORATIONS (if applicable)

Prof. Rak, Prof. Helvik and Prof Heegaard (and invite Prof Trivedi to join too) will continue the work on the paper with the goal to submit to a journal.