

Tuesday, 26<sup>th</sup> March h 11:00

TRAPEZIO – T11 room

Università Campus Bio-Medico di Roma

Via Àlvaro del Portillo, 21 - Rome



Critical Infrastructure Preparedness and Resilience Research Network

# Lecture

## Optimal Security Investments for Critical Infrastructure Systems

**Dr. Maria Paola Scaparra**

*Director of the MSc in Management Science and Business Analytics at Business School,  
University of Kent*

### ABSTRACT:

A crucial issue in today's distribution, supply and emergency response systems is to guarantee continuity and efficiency in service provision in the face of a variety of potential disruptions. Planning against possible disruptive acts of nature or sabotage is an enormous financial and logistical challenge, especially if one considers the scale and complexity of today's infrastructure systems. Since it is generally impractical to secure all assets, it is important to optimize the protection of key system components. Protection investment problems against worst-case losses are typically formulated as bi-level or tri-level optimization problems. This lecture presents some recent optimization models for identifying efficient investments in protection and security measures for distribution and transportation systems. These models incorporate a variety of different issues such as: capacity restrictions; correlation of disruptive events and disaster propagation effects; dynamic investments; different objectives (demand coverage, cost, travel time, passenger flow); stochastic aspects (e.g., extent of the disruptions); and resiliency aspects (e.g., recovery times of the disrupted components and disruption frequency). Efficient solution methodologies for solving these complex models will also be briefly discussed.

**Dr Maria Paola Scaparra** is a Reader in Management Science and the Director of the MSc in Management Science and Business Analytics at Kent Business School, University of Kent. Dr Scaparra earned a M.Sc. in Engineering-Economic Systems and Operations Research from *Stanford University* in 2000 and a Ph.D. in Mathematics Applied to Economic Decisions from the *University of Pisa*, Italy, in 2002. Before joining Kent Business School, she held a position as a postdoctoral researcher in infrastructure and transportation planning at the *University of California*, Santa Barbara.

Dr Scaparra's research interests include the application of optimization techniques to location analysis, critical infrastructure protection planning, and reliable service and supply system design among others. She has published more than 20 papers and book chapters on these topics in top-ranked operational research and geography journals, and has been involved in several international, multi-disciplinary and consultancy projects, including EPSRC, DSTL and European projects. She is a member of the editorial board of the journal *International Regional Science Review* and associate editor of the journal *Networks and Spatial Economics*.

The remote participation via web is possible at <https://connect.portici.enea.it/unicampus/>

The participation is free, but registration is required for logistical reasons at <https://www.ciprnet.eu/lectures.html>

For further information please send an email to [m.demaggio@unicampus.it](mailto:m.demaggio@unicampus.it)



CIPRNet Lecture [www.ciprnet.eu](http://www.ciprnet.eu)