VIU SUMMER SCHOOL
CRITICAL INFRASTRUCTURE RESILIENCE

Critical Infrastructure Resilience
July 8 - 12, 2019
Venice International University
Isola di San Servolo, Venice

Venice International University

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Scientific Coordinator:

Erdem Ergin, University of Rome Tor Vergata

In its third edition, the summer school on Critical Infrastructure Resilience (CIR) brings together academics and professional experts to discuss an emerging topic with a pragmatic and scientific approach.

Our societies are facing increasing challenges from a variety of sources, ranging from terrorism and cyber threat to natural disasters and climate change. It is foremost the ecosystem services and the socio-economic systems that constitute our daily lives that are at risk. And we see that efforts to build resilience into these systems, and the society overall, have stepped up: whether at national level, at city scale or within a specific sector, we see more resources and attention for the elaboration of resilience plans and implementation of measures, most of them adopting a multi-hazard approach.

The notion of critical infrastructure (CI) come very handy to support efforts for a resilient society. The EU and some countries have developed specific legislation (i.e. the EU Council Directive approved in 2008 or the UK Critical Infrastructure Protection in 2010) to tackle the subject directly. However, the concept of CI is a pragmatic tool in itself and can be applied in many fields, at different scales. It reflects the inter-connected and complex society we live in and allows us to (i) see the dependencies, (ii) deal with the uncertainties, and (iii) understand the impacts and effects within and beyond a specific scale or field of work. This course will discuss the concept of CI and the EU framework, and present a series of tools and solutions for resilience. The participants will gain (i) a clear understanding of the key concepts, (ii) a methodology to apply it to their specific field/scale, and (iii) an overview of specific tools and solutions from recent applications.

The course consists of a mix of theoretical knowledge, case studies/projects and hands-on exercises. The beautiful city of Venice is an ideal place that participants can use to identify a critical infrastructure, assess its risk and develop resilience strategies.

Who is it for?
The first edition drew mainly professionals from the risk management sector and PhD students. This edition targets a similar audience: Graduate

students and working professionals from any university, research institute, or other organization (private companies, government agencies, NGOs) with an interest in critical infrastructure issues and ability to read and write fluently in English. Advanced undergraduates will also be considered.

Faculty

Erdem Ergin, University of Rome Tor Vergata
Marcus Abrahamsson, Lund University
Alexander Cedergren, Lund University
Margot Christeller, Leaver Ltd
Carlo Giupponi, Università Ca' Foscari Venezia
Carlo Papa, Enel Foundation
Venice Port Authority

Topics

Critical infrastructure

We live in an increasingly connected world, where resources, people, knowledge and services are becoming more spatially dispersed. This makes our society and our daily lives increasingly interdependent and complex. Although this allows us to be more productive and efficient, when there is a failure or a problem in some key locations, the impact is also shared throughout the system. We refer to these key locations as critical infrastructure: "An asset, system or part thereof which is 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". The course explains the concept of critical infrastructure, how to identify them, and how they work and fail.

Cascading Impact and ranking criticality

The course will explore ways to understand the complexities involved with our society's interconnected infrastructures and challenges related to addressing critical infrastructure resilience. It will share concrete case studies from events such as the European power blackout in 2006, the Eyjafjallajökull Volcanic Eruption in 2010, and the Hurricane Sandy in 2012 and the assessment of infrastructure resilience through empirical failure data. Based on these case studies insights into the effect of interdependencies and cascading impacts are given, e.g. key characteristics to consider and geographical scale and temporal aspects of different types of critical infrastructures. It will further explore on various parameters to rank the importance of assets and infrastructures.

Resilience

Critical infrastructure resilience has its roots in system theory and complexity theory. We use the broader definition "the capacity of a system to absorb disturbance and re-organize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks." This definition means that we consider 2 types of impact: (i) an extreme event that can affect the physical integrity of a CI and/or disrupt its core function and (ii) a change in operating conditions that can affect the performance of the CI. To give one example for each: A mechanical failure at a key power transmission node in Turkey in 2012 caused turbulence across the European grid and a breakdown of the Gibraltar connection, thousands of kilometers away. The 2010 volcanic eruption over Iceland grounded commercial flights over 20 countries, affecting 10 million passengers. But there was no physical damage to any asset. These examples illustrate how the concept of critical infrastructure can be applied at many scales and across all fields.

Risk Management

As defined by the UNISDR, risk management comprises risk assessment and analysis, and the implementation of strategies and specific actions to control, reduce and transfer risks. It is widely practiced by organizations to minimize risk in investment decisions and to address operational risks such as those of business disruption, production failure, environmental damage, social impacts and damage from fire and natural hazards. Risk management is a core issue for sectors such as water supply, energy and agriculture whose production is directly affected by extremes of weather and climate.

Course outline

The 5-day course consists of 10 modules:

M1 – Definition & role of critical infrastructure
M2 – Risk Assessment & practical challenges
M3 – Cascading impacts & ranking criticality
M4 – Post-impact recovery process with multiple stakeholders
M5 – Novel planning and design thinking for climate change

M6 – Site visit Venice Port Authority
M7 –Sustainability in operations: the case for resiliency to enter the board room
M8 – Applied work session
M9 – Decision-making under uncertainty
M10 – Course wrap-up

Application procedure and cost
The Program will admit up to 25 student participants.

Rolling Admission until April 26, 2019

Fees:
Participants of VIU member universities:
€ 200 incl. VAT.
Participants of other universities/professionals:
€ 500 incl. VAT

The fees will cover tuition, course materials, lunches in the VIU cafeteria and social events. Participants will be responsible for covering their own travel expenses to and from Venice and local transportation.

Accommodation
Participants who wish to stay in the Residential hall of San Servolo island can ask for VIU assistance for booking. Please note that the Residential hall is not managed by VIU and the availability is not guaranteed.

On-line application
Available from March 1, 2019 on the VIU website.

Applicants must submit the application form, a letter of motivation – which should include a brief description of the candidate's research interests, a curriculum vitae and a photo.

Credits
Number of ECTS credits allocated: 2.
A certificate of attendance will be issued at the end of the course.

Location

viu summer SCHOOL

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