

Management of Disaster Risk and Societal Resilience Conference

21 March 2024 (Thursday)

Pre-Conference Workshop for Early Career Researchers

19 March 2024 (Tuesday), Cranfield University, UK

Workshop registration form: <https://forms.office.com/e/ZMDDvJ6QM9>

About the workshop:

The workshop aims to provide a platform for learning research methods used in the MADIS project and provide a hands-on experience, enabling ECRs to apply them in their research endeavours. Additionally, a chance to establish connections for potential future collaboration and foster a supportive network within the research community.

Workshop 1: Analytical Methods to Develop Composite Indexes for Sustainable Future

Speaker:

- Prof Abdullah Konak, Distinguished Professor of Information Sciences and Technology, Penn State Berks, USA
- Prof Mike Jacobson, Professor of Forest Resources, Penn State University, USA

This workshop session will illustrate the usage of analytical methods to elicit expert opinions, incorporate stakeholder perspectives, and combine data from multiple indicators in the process of developing a composite index.

The workshop session will start with an introduction to the frameworks for risk modeling and the biophysical, socioeconomic, and institutional indicators used in these frameworks. Regardless of the framework used, the researchers collect data from various quantitative (remote sensing, socioeconomic statistics) and qualitative sources (interviews, expert opinions) and combine them into a composite index. A composite resilience index is usually defined as a linear function of the indicators multiplied by weights or parameters associated with different indicators. Therefore, determining the proper weights of the indicators is an essential step in index development. The workshop will discuss alternative methods, namely Weighted Average Analysis, Gray Relation Analysis, Data Envelope Analysis, Analytical Hierarchical Process, Fuzzy Logic Methods, and Variance Sensitivity, to combine data from various indicators. These methods will be briefly introduced with an emphasis on their use-case scenarios, underlying assumptions, data requirements, advantages, and limitations. We will demonstrate the usage of these data combination methods through examples from the current risk and resilience models and simplified data sets. Next, we will discuss how data collection methods and procedures (surveys, interviews, and Delphi) can be best structured to take advantage of these data combination methods. This part of the workshop will be interactive with an active engagement of the participants. We anticipate that participants, especially young researchers, will benefit from these discussions as the details of the data fusion methods are usually overlooked in research papers. This workshop session will illustrate the usage of Fuzzy Cognitive Mapping (FCM) technique which is a cause-effect relationship knowledge-based method for modelling complex decision-making systems of humans. It emerges from a combination of cognitive mapping and fuzzy logic and artificial neural network, and this method is increasingly used in social sciences and humanities research. FCM is suitable to both data generated by the researcher as well as big data. The technique can be applied to a variety of research settings, such as consumer behaviour, organisational decision making, and social/public policy decision-making.

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Workshop 2: Fuzzy Cognitive Mapping Technique

Speaker:

- Dr Tanaya Sarmah, Research Fellow, Disaster Risk Modelling, Cranfield University, UK
- Dr Elisabeth Shrimpton, Research Fellow, Governance of Disaster Risk and Energy Systems, Cranfield University, UK

This workshop session will illustrate the usage of Fuzzy Cognitive Mapping (FCM) technique which is a cause-effect relationship knowledge-based method for modelling complex decision-making systems of humans. It emerges from a combination of cognitive mapping and fuzzy logic and artificial neural network, and this method is increasingly used in social sciences and humanities research. FCM is suitable to both data generated by the researcher as well as big data. The technique can be applied to a variety of research settings, such as consumer behaviour, organisational decision making, and social/public policy decision-making.

The workshop session will start with an introduction to the basics of FCM including the use of elements (such as indicators) for creating mental models. The method will be briefly introduced with an emphasis on some use-case scenarios and data requirements. We will demonstrate the usage of this method through examples from our recent data sets collected from small-scale farmers who are impacted by droughts in Morocco, South Africa, and Turkey. Next, we will discuss how the data was collected, analysed, and some key findings that can guide to take advantage of this method. The workshop will discuss the use of Mental Modeler software to run the analyses. This part of the workshop will be interactive with an active engagement of the participants. We anticipate that participants, especially young researchers, will benefit from these discussions as FCM is a notable tool to understand the relations between the elements of a 'mental landscape' that can be used to compute the 'strength of impact' of those elements.

We will use our Belmont Forum and EPSRC funded 'Management of Disaster Risk and Societal Resilience' (MADIS) project as a case study to deliver the workshop content. (See our project websites: <https://sites.psu.edu/belmont/> and <https://www.cranfield.ac.uk/research-projects/madis>)

Schedule:

Time (in UK)	Activity	Speaker
12:00-13:00	Lunch + Registration & Networking	
13:00-14:30	Welcome + Objective of the day	Nazmiye Ozkan, Cranfield University
	Workshop 1: Analytical Methods to Develop Composite Indexes for Sustainable Future	Abdullah Konak, Penn State Berks Mike Jacobson, Penn State
14:30-15:00	Tea & coffee break	
15:00-16:30	Workshop 2: Fuzzy Cognitive Mapping Technique	Tanaya Sarmah, Cranfield University Elisabeth Shrimpton, Cranfield University
16:30-17:00	Closing remarks	Nazmiye Ozkan, Cranfield University