

Stronger together

Improving disaster resilience

Andrew Staniforth and **David Fortune** introduce project CORE, a three-year long endeavour that aims to improve the societal response to disasters at the most local level, including those caused by floods arising from climate change



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The intense storms across Western Europe during July dropped as much as 15 cm of rain in 24 hours on Germany and Belgium, swelling streams that burst their banks, washing away houses and cars and triggering landslides and flash floods. The destruction was unimaginable and the loss of life more than local communities could bear. At least 196 people died in the floods; 165 in Germany and 31 in Belgium.

The scale of the devastation has proved a challenge to assess, as hundreds of family homes became piles of sediment and rubbish, while mudslides buried local cemeteries and damaged historical buildings and landmarks.

Local and federal governments are now counting the cost of extensive flood damage, with the German Finance Minister Olaf Scholz, reassuring communities living in affected areas that they could count on fast, unbureaucratic emergency aid worth more than €400 million. This is in addition to the estimated overall reconstruction costs, which are estimated to be more than €6 billion.

Responding to the crisis, Scholz stated: “We have spent almost 400 million euros in emergency aid after the last major flood disaster. We already know that we have to spend much more this time – and we are ready to do so. After the last major flood disaster, we’ve spent six billion euros on reconstruction to the present day, the federal and state governments together. And the destruction that I have now seen, if you have all of this in view, you can already safely say that we will probably need a much larger amount to get the reconstruction done.”

As water levels receded, public authorities and environmental researchers are beginning to unravel

the complex web of climatic, hydrological and social factors that contributed to the catastrophe. But already a series of contributory factors is emerging, including a warming climate that can supercharge rainstorms, and European disaster plans that focused on major rivers rather than the lower volume tributaries that were hit hardest by the July storms.

For years, scientists have warned that climate change will result in the rise of flooding incidents in Europe and elsewhere, because warmer air holds more moisture and this can translate into heavier rainfall.

As the magnitude of the destruction from flooding in Germany and Belgium becomes clearer, European scientists are wrestling with how such damage could have happened in some of the world’s wealthiest and most technologically advanced countries, despite major investment in flood forecasting and preparation catalysed by previous flooding events.

According to the European Commission’s Joint Research Centre, by the close of this century, flood damage on the continent could cost as much as €48 billion per year – up from €7.8 billion today – if nothing more is done to prepare for the consequences of climate change, which will give rise to increasing incidents of flooding.

Societal response

While visiting communities devastated by the flash floods in July, German Chancellor Angela Merkel stated: “One flood isn’t an example of climate change, but if we look at the last events of recent years, decades, then they are simply more frequent than they were previously – so we must make an effort, a great effort.”

To improve the societal response to disasters at the

most local level, including those caused by floods from climate change, a multidisciplinary consortium of partners has joined forces to progress project CORE – sScience and human factOr for Resilient sociEty – a three-year innovation action funded by the Horizon2020 European Commission Secure Societies programme. Commencing in September and co-ordinated by the University of Salerno in Italy, the project is built on the activities and results of previous and ongoing disaster management projects at the European level. It is driven by crisis response end-user partners within the consortium and their wider stakeholder networks.

The ambition of project CORE is to develop a harmonised vision of disaster risk reduction, crisis management awareness and capability. The CORE consortium of partners acknowledges the need to strengthen disaster resilience at the level of municipalities, member states and European Union (EU) agencies, which must take into account the diversity of European society and the variability of human factors. This approach can only be achieved through transdisciplinary collaboration involving the environmental science and social science communities. In this way, human factors, social, societal and organisational aspects can be supported by the scientific results obtained in research on environmental and anthropogenic risks.

Embracing this transdisciplinary approach, project CORE will define a new code of conduct, an ethical charter for communicating risks to society to make planners and responders conscious of the diversity of vulnerability and needs within the population. The complexity in disaster preparedness and response is one of the most relevant challenges for people and organisations

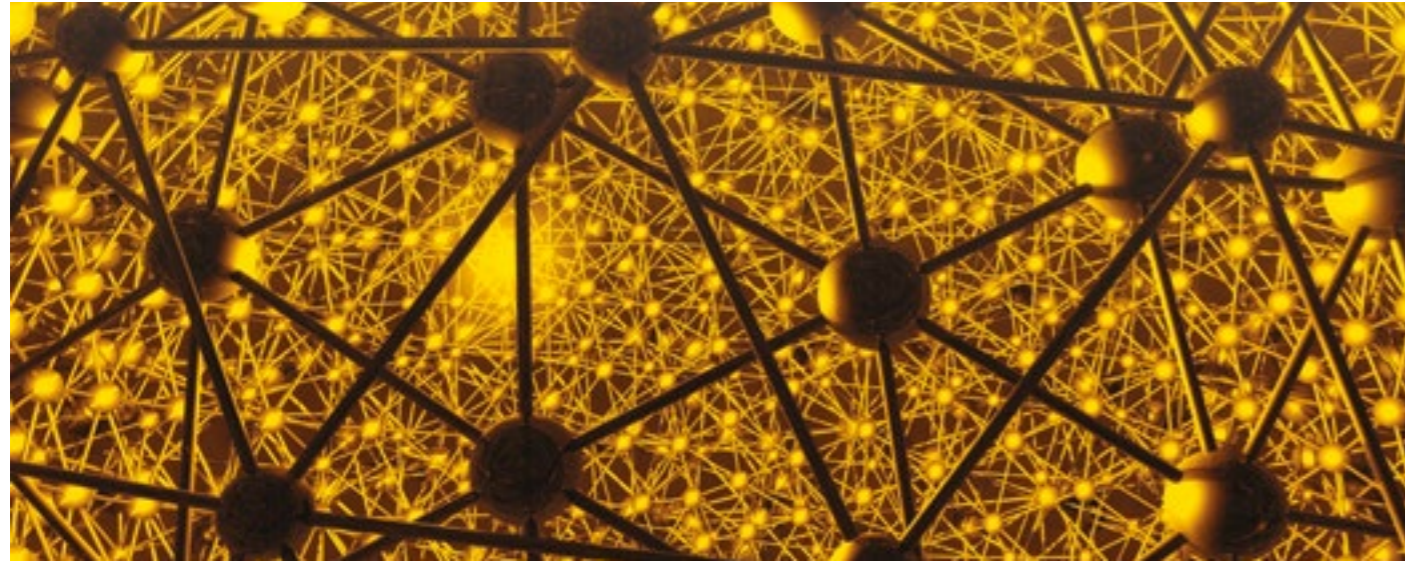
Digital data sets from citizen data trails during a crisis reveal patterns of information spread among social media users and identify the effects of this information on risk perceptions

in charge of contemporary disaster risk reduction.

A relevant component of such complexity relies on the wide diversity in levels of vulnerability, risk awareness, safety culture, social and science trust among interested populations, either at regional or European scale. The amplification of risk is driven by increasingly complex and interdependent urban systems and urban-rural interlinkages. Population vulnerability is compounded by old and new risks, including climate change and floods, terrorism, pandemics and cyberattacks.

Two lessons learned in the ongoing Covid-19 pandemic across the world are that risk is systemic and that crises are cascading. Disasters result in more disasters in other areas, threatening and jeopardising human lives. Furthermore, even if everyone is affected by the current crisis, not everyone is affected equally – the elderly, people with disabilities, the poorly educated and low income families are often the most vulnerable when crises unfold.

Social scientists also insist that culture in general, and safety culture in particular, is a characteristic of groups, not of individuals. This is a key point when



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The CORE project will identify the best ways to link risk communication – including new social media – with improved community resilience to inform the public

examining communities' disaster resilience because values, knowledge and behaviour of each group of citizens can represent both a benefit or strength for the success of prevention, preparedness, emergency management, response, recovery and continuous learning actions led by public authorities and government officials.

Some organisations have investigated the role of safety culture in their organisational safety performance across a variety of critical contexts and have not only achieved a conceptual framework, but have identified practices to investigate, measure and improve. The consortium of project CORE partners therefore recognises that the safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour, which determine the commitment to, and the style and proficiency of, an organisation's health and safety management.

Organisations with a positive safety culture are characterised by communications that are founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures. Safety culture can be positive or negative and can also be measured and improved in the field of disaster management thanks to a variety of indicators.

In light of this conclusion, project CORE will investigate such differences at EU member state level and at transversal social groups level, in order to build insights into differences in strengths and weaknesses of safety culture aspects among considered groups, as well as to elicit the variety of knowledge and communication

needs resulting from safety culture specificities and differences. The latter will allow CORE project partners to design profiled tools, actions and practices to bridge the gap in top down communications from public actors to individuals and groups of citizens.

Working on achieving scalable solutions, an important aspect of the CORE project will also analyse the increasing role of social media during disasters, which is now widely used to access and develop networks of friends, families and relevant professionals.

Project CORE will specifically investigate ethical concerns related to social media in disaster management through potential impacts upon human autonomy, dignity, integrity and vulnerability, as well as how social networks could affect equity, justice and freedom. Moreover, the spontaneous production of large digital data sets created by citizens engaged in crisis events provide 'digital trails' that can provide unique insights into the interactions between natural and human-caused risks and the social perception of these risks.

Project CORE consortium partners will monitor these digital interactions and their effect on building and strengthening resilience. It will also examine datasets involving: An iteration between manual and automated extraction of key terms; aggregated analysis of publication incidence and key term incidence; graphical representations based on measures of semantic proximity between key terms; automated visualisation of clusters; visual observation of the graphs; and quantitative analysis of their nodes and edges.

The reason for examining digital data sets from citizen data trails during a crisis is to reveal patterns of information spread among social media users and to identify the effects of this information on risk perceptions prior, during and after the emergency situation. The process will also highlight the most influential, trusted and frequently used sources of information in social media to strengthen crisis response.

The findings of this digital data analysis from social media will support the provision of a harmonised resilience planning framework, scalable from local to European level.

This framework, which handles risk vulnerability and resilience building based on advanced data knowledge and management – including data relating to human, social and societal factors in both affected population and responders – will be delivered in line with the Digital Europe Strategy to boost enforcement of the Sendai Framework for Disaster Risk Reduction.

The CORE project has several strategic objectives over the course of its three-year planned duration. The scope of research planned as part of the project will serve to define a comprehensive methodological approach to review and evaluate the diversity in risk perception as a result of education and scientific knowledge, geography and locality within social groups, alongside public attitudes, public perceptions, institutional trust and social trust, including a variety of personal and cultural variables.

Project CORE will evaluate and review inherent and structural vulnerabilities, along with behaviours and understanding of responses to crises in order to propose new collaborative approaches and strategies for community awareness, leadership and crisis readiness and management, with a particular emphasis on the usage of new technologies, including those that are facilitating the spread of misinformation and fake news. This will serve as a solid basis for further recommendations to policymaking, decision-making and resource allocation within the EU.

Lifecycle of misinformation

The methodological framework will target the public as users and will be developed via a co-creation approach to improve understanding of the stakeholder ecosystem and the lifecycle of misinformation. Co-creation can also be beneficial in the development of new tools while adapting the features of these tools to the requirements of various stakeholder groups to increase their usage and usefulness. Project CORE consortium partners will identify critical elements for community resilience to support policymakers in building resilience before a disaster.

The CORE project will also identify the best ways to link risk communication – including new social media – with improved community resilience to inform the public, facilitate the social re-engagement of people after a disaster and promote social connectedness. Special attention will be given to the best means to incentivise individual and community preparedness. In doing so, the project pays special attention to end users' engagement and to understanding and identifying the best metrics for monitoring and evaluating resilience-building activities.


Ultimately, project CORE aims to enhance collaboration during a crisis. The awareness of risks by all individuals and social groups, and the knowledge of how to prevent and mitigate environmental risks and

protect the environment and society as one ecosystem, will enhance the resilience and wellbeing of societies. Project CORE will therefore provide a specific focus on the needs of the most vulnerable people, to raise their awareness and prepare them to manage and mitigate disaster risks during major incidents and other crisis events.

The consortium partners recognise that it is essential not to subsume these needs as only pertaining to very specific groups or minorities of disadvantaged people; the overall project will be driven by the principles of inclusive design and equal access to individual and collective resources, including knowledge and information, thereby driving improvements in disaster risk resilience for all society members.

To achieve improvements in crisis response across society, project CORE is formed by a team of partners with long-lasting expertise in the field of disaster risk assessment, resilience and disaster risk reduction from a multidisciplinary perspective. The consortium includes participants from eight European member states, as well as partners from Switzerland, UK and Israel, which brings forward a broad European dimension.

The consortium of 19 partner organisations is formed of eight research institutions, five small/medium enterprises, five first responder emergency agencies and a municipality. This cross-section serves to bridge the gap between government bodies, academic institutions and private industry, all of which have an integral part to play in developing the next generation of disaster risk and resilience processes.

The philosophy adopted in creating the unique consortium of project CORE partners has been to balance the participation of social and environmental scientists, bringing together the two communities to collaborate with selected end users, which feature the International Federation of Red Cross and Red Crescent Societies, the largest humanitarian organisation in the world, among others. This organisation will make a major contribution to project CORE through the sharing of knowledge and communication of project achievements, especially through its youth networks. This will serve to bring project CORE research to operational reality for the direct benefit of a new generation of crisis responders and disaster risk and resilience professionals. 

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