Disaster Resilience Education and Research
Roadmap for Europe 2030

ANDROID | DISASTER RESILIENCE NETWORK

Lifelong Learning Programme

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Introduction

In recent years, the European higher education community has played an increasingly important role in moving disaster science from a responsive, primarily technical discipline, to a broad, multi-disciplinary movement that seeks to build societal resilience to disaster. This movement coincides with the increasing global emphasis on the need to tackle the inter-related challenges of disaster risk reduction, sustainable development and climate change.

In 2005 the United Nations convened the Second World Conference on Disaster Reduction in Kobe, Hyogo, Japan. During this conference the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA)[1] was negotiated and adopted by 168 countries. This international agreement shifted the paradigm for disaster risk management from post disaster response to a more comprehensive approach that would also include prevention and preparedness measures.

The HFA outlined five priorities for action, and offered guiding principles and practical means for achieving disaster resilience. Its goal was to substantially reduce disaster losses by 2015 by building the resilience of nations and communities to disasters. This meant reducing loss of lives and social, economic, and environmental assets when hazards struck. It was intended to secure the commitment and involvement of all actors concerned, including governments, regional and international organizations, civil society including volunteers, the private sector and the scientific community. The five priority areas for action were to:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.

2. Identify, assess and monitor disaster risks and enhance early warning.

3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

4. Reduce the underlying risk factors.

5. Strengthen disaster preparedness for effective response at all levels.

HFA also provided the basis for many other initiatives, including the Global Assessment Report on Disaster Risk Reduction (GAR), the Global Risk Identification Portal (GRIP), and the UN campaign on Making Cities Resilient.

Since the adoption of the HFA, countries in all regions have been reporting steady progress in strengthening their institutional, legislative and policy frameworks. Many have suggested that this has contributed to decreasing mortality risk, especially from floods and tropical storms. Progress has also been made in risk assessment, education, research and public awareness, and many countries have been increasing their investments in risk reduction, as well as developing risk-transfer mechanisms. Such reports suggest that the HFA has been an important instrument in raising institutional awareness and understanding, while also instilling political will.

Despite this positive evaluation, biennial reports of countries on the HFA implementation indicate that exposure of people and assets in all countries have been increasing faster than vulnerability has been decreasing. This has resulted in new risk and increasing disasters losses, with significant socio-economic impact in the short, medium and long terms, especially at the local and community level.

There are persistent challenges around implementation, including allocating budgets for risk reduction in countries, addressing deeply rooted underlying causes of vulnerability as well as firmly embedding science and education into policy, an aspect that is of particular significance for higher education.

Disaster resilience

The risks and vulnerabilities exposed by natural hazards and disasters are on the rise globally, and the impacts are severe and widespread: extensive loss of life, particularly among vulnerable members of a community; economic losses, hindering development goals; destruction of the built and natural environment, further increasing vulnerability; and, widespread disruption to local institutions and livelihoods, disempowering the local community. Rising population and infrastructures, particularly in urban areas, has significantly increased disaster risk, amplified the degree of uncertainty, challenged emergency arrangements and raised issues regarding their appropriateness[2].

What is becoming equally apparent, however, is the importance of resilience - not only in the structures that humans design and build, but in the way society perceives, copes with, and reshapes lives after the worst has happened: to use change to better cope with the unknown. In ancient times, cities like Pompeii were

1 HFA (2005) Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters (http://www.unisdr.org/we/coordinate/hfa).

2 Haigh, R. and Amaratunga, D. (2011), "Introduction: Resilience in the built environment", In: D. Amaratunga and R. Haigh (eds.), Post-Disaster Reconstruction of the Built Environment: Rebuilding for Resilience, Chichester: Wiley-Blackwell, pp. 1-12.

simply abandoned after disaster struck - a move that today seems unthinkable. But learning to bounce back is an emergent behaviour that must be both improvised and adaptive, and our creativity is vital.

According to statistics issued by the UNISDR, natural disasters caused the deaths of more than 780,000 people and affected more than 2 billion others during the last decade. These losses occurred from 3,852 natural disasters and destroyed US $960 billion worth of property and infrastructure[3]. A more detailed examination of these figures also shows that disasters strike most often in poor countries. The losses of life and destruction of the economy, as a percentage of overall growth, are far greater in these more vulnerable regions. It is also true that the three main categories of "natural" disasters - floods, earthquakes and tropical cyclones, which account for 90 per cent of the world's direct losses - tend to revisit the same geographic zones[4]. As if to complete the vicious natural cycle, these disasters in turn limit the ability of those communities to emerge from the mire of poverty. In 2011 the Eastern Horn of Africa saw the worst regional drought in 60 years, with the lives and future of more than 12.4 million people in Somalia, Ethiopia, Kenya and Djibouti at serious risk. However, the disaster is not only the result of failed rains, but also underlying chronic problems that have increased vulnerability, such as limited water supplies, increased populations, migration patterns and environmental degradation[5].

But wealthier, well-developed communities are far from immune. In 2005, in New Orleans, it was not Hurricane Katrina that devastated the community, but flooding, caused by the faulty design specifications and substandard construction and maintenance of the levees. The city, federal government later acknowledged[6], had been badly prepared. Similarly, much of Europe has suffered significant losses. During 2000 - 2008, Europe accounted for 10.62% of lives lost globally due to natural disasters[3]. Compared to the rest of the world, economic loss per capita is high in Europe partly because it is very densely populated. Even countries that had previously not been considered at high risk are now needing to re-evaluate and strengthen their disaster prevention strategies and capacities. Earthquakes in Italy and Greece, and extreme floods in the UK, the Czech Republic, France, Germany,

and Poland, are recent examples. Floods and storms explain part of the economic losses, as weather related disasters have devastating effects on infrastructures, which have on average, a higher value in Europe than in Asia or Africa. Significantly, the upward trend is expected to continue, as climatic changes are expected to bring more frequent and severe hazards to Europe in the future[7].

Despite 'resilience' having been widely adopted in research, policy and practice to describe the way in which they would like to reduce our society's susceptibility to the threat posed by such hazards, there is little consensus regarding what resilience is, what it means to society, and perhaps most importantly, how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards. If the concept of resilience is to be a useful framework of analysis for how society can cope with the threat of natural hazards, it is necessary to understand attributes that enable physical, socio-cultural, politico-economic and natural systems to adapt, by resistance or changing in order to reach and maintain an acceptable level of functioning.

The ANDROID disaster resilience network has addressed this challenge in a series of linked activities and work programmes that will promote discourse and produce data from cross-national studies in Europe. The ANDROID consortium of applied, human, social and natural scientists, supported by international organisations and a stakeholder board, will work together to map the field in disaster resilience education, pool their results and findings, develop interdisciplinary explanations, develop capacity, move forward innovative education agendas, discuss methods, and inform policy development.

Capacity development

The concept of capacity building or capacity development appeared in the late 1980s and became deeply entrenched within the development agenda in the 1990s. Rather than representing a new idea, it reflected growing criticism of many development assistance programmes. In contrast to this extraneous approach, it emphasised the need to build development on indigenous resources, ownership and leadership and by bringing human resources development to the fore.

The concept of capacity development was therefore a move away from 'aid' or 'assistance' towards a 'help yourself' approach that was designed to prevent a dependency on aid emerging.

3 UNISDR (2010), Disaster risk reduction: an instrument for achieving the Millennium Development Goals, Geneva: IPU and UNISDR, ISBN: 978-92-9142-456-6.

4 IFRC (2010), World Disasters Report 2010 - Focus on urban risk, Geneva: International Federation of Red Cross and Red Crescent Societies, ISBN 978-92-9139-156-1.

5 US Committee on Foreign Relations. (2011), Responding to drought and famine in the horn of Africa, Hearing before the subcommittee on African Affairs, Washington, DC: US Government Printing Office.

6 US Homeland Security and Counterterrorism. (2006), The Federal Response to Hurricane Katrina - Lessons Learnt. Washington, DC: US Government Printing Office.

7 IPCC Intergovernmental Panel on Climate Change. (2012), The Special Report for Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, Cambridge: Cambridge University Press, ISBN 978-1-107-02506-6.

Capacity development is based on learning and acquisition of skills and resources among individuals and organisations. While this process may rely on some imported resources, external capacity is seen as a knowledge-sharing device, which allows the strengthening and developing of the local capacity. As such, it relates closely to some definitions of resilience, which stress the objective is to build resilience by maximising the capacity to adapt to complex situations[8], and whereby resilience describes an active process of self-righting, learned resourcefulness and growth[9].

Capacity development is committed to sustainable development, to a long rather than short term perspective, and attempts to overcome the shortcomings of traditional donor- led projects that have been prevalent in many pre- and post-disaster projects and — typically criticised for being too short-term rather than sustainable, and not always addressing the needs of the recipients. Development within a capacity building context allows communities and countries to identify their own needs, and design and implement the best resilience building strategy within the local context. As a process, it builds on monitoring and evaluation in order to identify existing capacities, deficiencies and the progress and achievements of development towards resilience.

According to capacity development principles ownership of disaster risk reduction and reconstruction projects is transferred from the donor to the recipient community. For this reason, capacity development is not necessarily linked to development aid but can also describe a community or country's effort to meet their resilience building goals regardless of external assistance.

The role of higher education in capacity development

At the individual level, capacity building refers to the acquisition of skills, through formal education or other forms of learning. Although skills and knowledge can be acquired in various settings, formal education systems play a paramount role in this connection.

At the organisational level, capacity building focuses on infrastructure and institution building, the availability of resources and the efficiency of processes and management to achieve effective and quality results within existing infrastructures. In education, this level signifies the improvement of domestic educational

institutions, e.g. universities, through additional resources and a better use of those already available.

At the sector/network level, capacity building seeks to enhance the consistency of sector policies and promote a better co-ordination between organisations. In education, capacity building could for example aim at improving links between vocational and academic educational institutions, between research-intensive and teaching-only institutions or to improve the co-ordination of institutions across different academic fields.

In general, the higher education sector plays a significant role in any capacity development strategy. The ultimate goal of a capacity development strategy is to achieve progress and development. Higher education has a unique privilege as a built-in feature of any capacity development strategy. Whatever the sector, including those engaged with disaster risk reduction and reconstruction, capacity building relies on the strengthening of individual capacity through training and learning, in order to raise the domestic or regional stock of human capital in a specific field. This can be done by setting up specific educational programmes in the formal education system or by other forms of learning. Although some of the necessary skills would typically be acquired on-the-job or through learning-by-doing, countries characterised by less efficient organisations of work or by obsolete technologies might need to rely more on formal vocational education and training. What level of education (primary, secondary or tertiary) is required to achieve this goal depends on the kind of competence to be built. Post-secondary education, including degree-granting tertiary education, is certainly important for developing capacity in building resilience to disasters due to the complexity of the associated challenges.

Global policy convergence

The year 2015 sees the convergence of three global policy frameworks: the post-2015 Framework for Disaster Risk Reduction (March 2015), The Sustainable Development Goals (September 2015; SDGs) and the Climate Change Agreements (December 2015: COP21). This represents an opportunity to emphasise cross-cutting themes, including the importance of research and education across the different global policy agendas in disaster risk reduction, sustainable development and climate-change mitigation and adaptation, and in doing so, to support evidence-based decision-making.

The new Sendai framework for disaster risk reduction includes a strong call for the research and education communities to support the understanding of disaster risk and promote risk-informed decisions and risk sensitive planning from the local to the global levels.

8 Lengnick-Hall, C. and Beck, T. (2005), "Adaptive Fit Versus Robust Transformation: How Organizations Respond to Environmental Change", Journal of Management, Vol. 31 No. 5, pp. 738–757.

9 Paton, D., Johnston, D., Smith, L., Millar, M. (2001), "Community response to hazard effects: promoting resilience and adjustment adoption", Australian Journal of Emergency Management, Vol. 16, pp.47-52.

It also calls for the coordination of existing networks and scientific research institutions at all levels and all regions. The goal is to strengthen the evidence-base in support of the implementation of the new framework.

Researchers and educators must work with policy-makers and practitioners to co-design and co-produce research that can be used effectively. Higher education must also play a vital role in translating that research into action through its educational programmes.

ANDROID disaster resilience network

In recognition of the vital role that the higher education sector has in promoting inclusive resilience knowledge, the ANDROID disaster resilience network was established in 2011 (Academic Network for Disaster Resilience to Optimise Educatlonal Development). The network was set up to promote co-operation and innovation among European Higher Education and in doing so, to increase society's resilience to disasters of human and natural origin. An underlying tenet of ANDROID is that higher education should be more innovative, providing opportunities to work in close collaboration with industry, communities, humanitarian agencies, private sectors and other higher education institutions.

The ANDROID Network is funded under the EU Lifelong Learning Programme. With a budget of nearly €7 billion for 2007 to 2013, the programme funded a range of actions including exchanges, study visits and networking activities. Projects are intended not only for individual students and learners, but also for teachers, trainers and all others involved in education and training.

It set out to gather a wide and advanced set of competencies in the field of disaster resilience, sharing knowledge, discussing methodologies, disseminating good practices and producing and promoting innovation. It aimed to achieve these goals by bringing together a range of addressing topics of direct relevance for European Union policy.

The network brought together a consortium of inter-disciplinary scientists and inter-sectorial partners. The academic partners comprise scientists from applied, human, social and natural disciplines. These partners from across Higher Education were chosen for their complementary skills, expertise and competences in order to identify and understand the varied attributes of resilience that underpin the capability and capacity of a community to cope with the threat posed by natural and human hazards. The consortium also has major International Organisations as partners, including the UNISDR, and a Stakeholder Advisory Board that includes representatives from key actors in disaster management. These partners offer strong inter-sectorial linkages and have been established

to assist the network in becoming a reliable partner as stakeholders seek to reduce society's vulnerability to hazards. In recognition of the global impact of disasters and the complex nature of their causes, which frequently require international action to address them, alongside the 64 European partners from 28 countries, the consortium also includes partners from Australia, Canada and Sri Lanka, who contribute specific scientific expertise.

The network's teaching and research is concerned with what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards. The network seeks to create a European approach that will help us understand the attributes that enable physical, socio-cultural, politico-economic and natural systems to adapt, by resistance or changing in order to reach and maintain an acceptable level of functioning. The network is also raising awareness and promoting a common understanding among stakeholders of the importance of disaster resilience education and the essential role of European Higher Education in improving society's ability increase disaster resilience.

At the outset, three objectives were identified for the network:

1. Promote discourse among European applied, human, social and natural scientists to, pool their results and findings, discuss methods and develop inter-disciplinary explanations that increase society's resilience to disasters;

2. Describe, analyse, and compare the capacity of European cities and HE to address disaster risk, and thereby reinforce the link between education and society; and,

3. Build the capacity of HE to address emerging challenges in disaster resilience, strengthen the link between research and teaching, and inform policy development.

This roadmap represents an important output of the network, bringing together existing literature in the field, as well as the results of various analysis and study projects undertaken by project partners. A more detailed overview of the ANDROID workplan and associated projects is given in Annexures 1 and 2.

Moving from 2015 to 2030: challenges and opportunities

1. Link research, education and action

The Sendai Framework for Disaster Risk Reduction 2015-2030 aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health, and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years.

It has been recognised that the success of this post-2015 framework hinges on creating and implementing policies that are built on the best available knowledge. Higher education has a vital role in supporting this move to a more disaster resilient society by 2030.

This roadmap considers the challenges and opportunities that must be addressed by higher education in Europe if it to effectively support Sendai Framework for Disaster Risk Reduction 2015-2030.

The prime focus must be that the policy-science gap is closed with research that can be translated to action. Research studies document a trend of increasing disaster losses, but the translation of research findings into practical actions has proven difficult and remains a barrier that prevents the best use of science.

There remains a recognised need for higher education, through researchers and educators, to provide and communicate actionable knowledge with explicit links to inform effective, evidence-based decision-making. As well as creating new knowledge, higher education has a vital to play in capacity development and in doing so, providing a means by which effective knowledge transfer can take place.

2. Integrate all hazards, stakeholders and disciplines

The research needs identified through the ANDROID network special interest groups and as part of the emerging post-2015 framework on disaster risk reduction will require new approaches and partnerships. Higher education will need to develop multi-actor and multi-sector alliances to tackle the type of emerging priorities in areas such as understanding disaster risk, governance arrangements, investment decisions, preparedness, and rehabilitation and reconstruction. These alliances will support the development of problem-based education and research programmes, and thereby help to create and implement evidence-based, resilience building policies and practices.

A multi-disciplinary approach

An all-hazard, problem-focused approach should be used in resilience building research and education to address the complexity of disaster risk. This will require collaboration and communication across the scientific disciplines. Higher education can promote this approach by providing researchers and students with:

- Exposure to a variety of disciplinary work

- Exposure to interdisciplinary work

- Exposure to and experience with tools and methods from a variety of disciplines

- Exposure to and experience with interdisciplinary tools and methods

- Experience working with others in an interdisciplinary mode

Higher education programmes and research training must develop the skills to shift perspectives easily, and continually see things in new ways. Researchers and students must be comfortable with multiple languages and a variety of ontologies, epistemologies, methods, tools, and theoretical perspectives, and shift easily among them.

Funders, publishers and editors must not reinforce disciplinary silos, and should promote and encourage the development and publication of multi- and inter-disciplinary research. The scope of scientific panels and peer-reviewed journals should reflect the importance of problem-focused research, rather than be defined by traditional academic disciplines.

Review panels, editorial boards and scientific committees should reflect the diverse array of disciplines required to address major societal challenges such as building disaster resilience.

A multi-stakeholder approach

Researchers and educators must interact and collaborate with policy-makers and practice based actors at the local, national, regional and global levels. Collectively they must work to identify and address problems and knowledge gaps from the field.

Rather than being passive recipients of new knowledge, policy makers and practitioners should join with higher education to form multi-stakeholder groups that work together from the outset to design and deliver new knowledge. The scientific results will be more relevant and actionable.

Address problems from the field and calibrate solutions to the local context

Higher education must recognise the importance of public engagement before, during and after research, in particular with institutions and individuals as risk of disasters. This can serve a number of often overlapping purposes:

Informing: inspiring, informing and educating the public and making the work of higher education in building resilience more accessible.

Consulting: actively listening to the public's concerns and insights - institutions and individuals at risk of disasters should be invited to participate in research (surveys, vulnerability assessments and other activities) to collect local knowledge.

Collaborating: working in partnership with communities and the public to solve problems together, drawing on each other's expertise.

Localisation: a lot of disaster knowledge has been developed at an abstract level, or based on a specific context. Public engagement can help calibrate knowledge to a local context, extending the impact and reach of existing research.

3. Collaborate regionally and globally

There are already a number of regional initiatives that promote collaboration among higher education towards building resilience. The ANDROID conferences provided a showcase of the type of international, multi-disciplinary and multi-sector engagement that is required. These networks and events have helped to gather a wide and advanced set of competencies in the field of disaster resilience, sharing knowledge, discussing methodologies, disseminating good practices and producing and promoting innovation. These networks should be supported and encouraged to grow.

Given their different capacities, the EU must continue to strengthen its engagement with developing countries through international cooperation and global partnership for development, and continued international support, to strengthen their efforts to reduce disaster risk. In supporting this, the current regional networks should collaborate to form a global higher education network that can influence strategic agendas.

This global network should collaborate with existing bodies such as the UN ISDR Scientific and Technical Advisory Group to ensure that the role of higher education is understood and can be exploited towards achieving the objectives of the Sendai Framework.

Coordination mechanisms for science

Funding bodies for science should coordinate their efforts to ensure that resource are being deployed effectively and efficiently, and to promote collaboration across disciplines, as well as regionally and internationally. This will help to avoid duplication of effort and integrate funding.

4. Facilitate policy dialogue, knowledge sharing and capacity development

Greater priority should be put on sharing and disseminating scientific information. The research community must make more effort to translate traditional outputs into practical methods that can readily be integrated into policies, regulations and implementation plans towards building resilience.

National research assessment exercises, the European Union and national funding bodies, and higher education promotion policies, which often emphasise traditional academic outputs (e.g., peer reviewed journal articles), should appropriately incentivise and reward non-standard scientific outputs, such as research summaries and policy briefs.

Open access

The recent shift towards open access of research outputs and education is to be welcomed and should continue to be encouraged.

The high levels of disaster risk found in low-income countries make it an imperative that European research and education is made widely available. The European Union and other research funding bodies should require all funded scientific outputs to be made available as open access. This includes the use of green publishing routes where possible, or financially supporting gold publishing as necessary.

Higher education should be supported to develop open educational resources that are freely accessible and openly licensed, for use in teaching, learning, and assessing as well as for research purposes linked to building resilience.

Understanding language of policy makers

Educators and the research community must take time and effort to understand the audience they are seeking to inform.

Scientific results are often subject to misunderstanding due to poor comprehension of numbers and statistics, as well as conflicting languages and terminology. Correct comprehension depends not only on the skills and knowledge of the reader, but also on the way the information is presented. By assuming a weaker background knowledge (e.g. of scientific language) and low "statistical literacy", evidence summaries can add information to help readers better understand the strengths and limitations of the scientific evidence being summarised. Adding meta-information that explains concepts such as the quality of the evidence may help eliminate frustration and trigger reflection.

An aggregator of knowledge to improve access and focus on quality

The volume of research activity and associated outputs has rapidly increased over recent decades. While expanding the knowledgebase may be considered positive in one sense, it has made the field increasingly difficult to navigate, whether it be for experienced researchers and educators, early career researchers and students, or other stakeholders, including policy makers. Identifying and accessing the most recent and high quality science is proving increasingly challenging despite the advance of technology.

Methods and tools for aggregating knowledge must be developed to facilitate access to science, technology and innovation outputs that help inform policy-making and practice, and also ensure that educational programmes and researchers have access to and can build upon the state of the art.

Common language

Science provides an evidence base that can be relevant to and therefore draw together different areas of policy. Knowledge integration provides a starting point for building and operationalizing resilience through the co-design of policies and interventions by scientists, practitioners, policy makers and communities themselves. Standardised definitions are essential to the operationalization of concepts such as resilience for research, monitoring and implementation purposes. For example, in epidemiology, case ascertainment/ definition is essential to accurately understanding the causal relationship between a disease exposure and its outcome.

Common understanding amongst all actors is essential for effective disaster risk reduction and management. Approaching towards 2015, the Joint Research Centre of the European Commission has been contributing to identifying the most common terms and definitions used in disaster risk reduction. This background information would provide a solid basis to continue updating the terminology and contribute to the implementation of the post-2015 framework on disaster risk reduction.

5. Develop flexible and customisable education programmes

There is an expanding field of disaster management, but simultaneously, a lack of young professionals with appropriate skills and knowledge to support the building of resilience within relevant stakeholders. There is a need to maintain and expand the network of key persons, including change agents and facilitators.

ANDROID's survey on education supply and demand found that despite considerable need for programmes to support the building of resilience, there is currently a lack of programmes that meet employer needs. It also found that the availability of programmes differed greatly across Europe, and that most programmes are recent developments, with very few having been in operation for over 5 years. This emphasises the immaturity of the discipline and the needs for further studies to better understand market needs.

Higher education within Europe must develop flexible and customised programmes and curricular, whether a module in regular Masters or Undergraduate curriculum, or as dedicated postgraduate programmes.

Detailed market research is required to understand the need and interest in potential students, with clear linkages to future job markets.

This will help to ensure that educational programme address the problems from the field and can promote affordable solutions, as per local context, including the cultural calibration of technology.

Educational programmes should promote a multi-disciplinary approach and understanding, drawing upon a combination of different faculty.

The problem-based nature of the field determines that programmes should offer an appropriate balance of theory and field experiences. Internship programmes for students in government, NGOs, UN agencies, private sectors, research institutions should be strongly promoted.

At the same time, the pace of scientific discoveries demands that programmes are research linked to ensure that what is being taught by higher education is consistent with the state of the art. Improving the link between research, education and action will require the transfer of research knowledge into teaching but also recognising that the research and teaching link as a two-way knowledge transfer process. In a 'knowledge society' all graduates have to be researchers. Not only are they engaged in production of knowledge; they must also be educated to cope with risks and uncertainties generated by the advance of science.

Annex 1: ANDROID Disaster Resilience Network

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1 Haigh, R., Amaratunga, D., Thayaparan, M. (2014) "ANDROID: an inter-disciplinary academic network that promotes co-operation and innovation among European Higher Education to increase society's resilience to disasters". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

ANDROID workplan

ANDROID set out to achieve these objectives through a series of inter-linked projects, identified as work packages (WP) and led by a sub-group of international partners. This section describes these projects and highlights key outputs achieved to date. Many of these outputs can be downloaded from www.disaster-resilience.net or accessed via the referenced publications indicated.

Inter-disciplinary doctoral school (WP3)

WP3 aimed to develop HEI capacity for research and teaching by establishing an EU-based Doctoral School that is open to all interested doctoral candidates from Europe and beyond. The ANDROID Doctoral School is a fully coordinated, innovative, and international interdisciplinary doctoral teaching and research programme focused on the most salient issues and features shaping society's ability to tackles the challenges posed by disaster risk. The School has provided two online and two residential innovative research training programmes aimed at honing the students' skill set and drawing on the wide disciplinary base of the network's partners to promote inter-disciplinary working for doctoral students. In particular, the School has raised awareness and understanding of inter-disciplinary methodologies and good practice, and promoted coordination of education across Europe. The two residential doctoral schools resulted in the publication of formal proceedings that can be downloaded from the network website.

Capturing and sharing innovative approaches to inter-disciplinary working (WP4)

WP4 aimed to gather information on the state of art and practice in the field of disaster resilience and promote co-operation and interdisciplinary methodologies in research and education. A survey was carried out by means of a questionnaire focusing on disaster-resilience projects and on the main challenges faced in interdisciplinary working. The results of the questionnaire[2], which collected 57 answers from more than 20 European countries and few extra European countries as well, allow for three main considerations: i) projects involved 5 different disciplines as average and geography and sociology were present in the majority of the projects; ii) the level of interconnection between disciplines seems intermediate, meaning that information and methods are exchanged, but a full integration of methods and concepts into a common shared language and system of axioms is missing; iii) the lack of a common framework and common terminology

represents a major barrier to good interdisciplinary work. The results highlight the role played in disaster-resilience design by social and cultural aspects, which are instead not often adequately considered in the practice. The establishment of an education on resilient design of urban system, which includes both social and technological aspects, emerges as a possible solution to overcome barriers to interdisciplinary work and improve the efficacy and quality of resilience design.

Surveying European education to map teaching and research programmes in disaster resilience (WP5)

WP5 aimed to establish the current teaching and research capacity among European HEIs in the field. In the subsequent survey[3], 96 participants directly related to disaster resilience education responded. The findings suggest that disaster resilience related educational programmes across Europe are enjoying rapid growth and there is still potential for further growth. The field is also multidisciplinary in nature and involves a variety of organisations, including academia, professionals, governmental organisations and research institutions. The survey also found that the multidisciplinarity nature of these programmes will prepare specialists for organizational positions with a good, broad knowledge. However, the knowledge will not be deep enough for many detailed spheres. Therefore the specialists must also be able and ready to cooperate with many other branches/organizations and specialisations.

Analysing the capacity of European public administrators to address disaster risk (WP6)

WP6 aimed to establish the capacity of local government's public administrators in European urban areas to address disaster risk. The team conducted a survey of the capacity at both national and local levels. The survey respondents represented organisations with total disaster resilience personnel of approximately 19,000 people.

Of these people, only 13% reportedly held an educational qualification in a disaster resilience field. A majority of the organisations (68%) were reported to be interested in their staff obtaining disaster resilience-related academic qualifications. In terms of progress in implementing the HFA priority actions, the majority of respondents reported moderate progress having been made. With regard to all 5 of the national actions and all 7 of the local level actions, a majority of respondents indicated that the necessary capacity to fulfil the actions existed so that the non-completion of

2 Faber, M.H., Giuliani, L., Revez, A., Jayasena, S., Sparf, J. and Mendez, J.M. (2014) "Interdisciplinary approach to disaster resilience education and research". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

3 Perdikou, S., Horak, J., Palliyaguru, R., Halounová, L., Lees, A., Ranguelov, B. and Lombardi, M. (2014) "The current landscape of disaster resilience education in Europe". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

the actions was due to other factors (e.g. time, other priorities, etc.) rather than being a consequence of capacity constraints. Those respondents who did report the existence of capacity constraints indicated that the financial resources dimension of capacity presented the greatest challenge to their organisations (at both local and national levels). The capacity dimension most directly reflecting the demand for disaster resilience education, staff knowledge and skills, was ranked as the third most pressing constraint facing local level organisations after financial resources and staff availability. For national level public administrations, staff knowledge and skills, was one of four capacity dimensions considered to be equally pressing in second place behind financial resources (the other three being staff availability, systems and infrastructure and legal framework).

The survey has thus given insight into the relative demand for academic qualifications within European public administrations and the degree to which staff knowledge and skills have affected the implementation of disaster resilience initiatives.

Emerging research and teaching concerns in disaster resilience (WP7)

WP7 selected Venice and its territory as an emblematic case study of a region that could be affected by cross-border disastrous events. A case study was carried out not only as an engaging exercise, but with the purpose to provide a reference point for scientists and teachers interested to translate multifaceted knowledge into specific solutions. A series of papers have been written[456] which deepen respectively hazard, vulnerability/resilience, and mitigation about the site taken into consideration.

Developing and hosting OERs for disaster resilience education (WP8)

WP8 aimed to develop innovative educational resources in order to support capacity building for improving societal resilience to disasters. It has set out to achieve this by developing an Open Educational

Resources (OER) platform to host digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research. The platform is based on a set of Open Educational Resource standards defined by the project team[7], which set out the platform, accessibility and inclusion, rights management, and approaches for ANDROID network members to describe, manage, and share learning resources online.

Developing a roadmap for European education (WP9)

A major output of the first ANDROID workplan, is the development of this roadmap for European education in developing societal resilience to disasters. The roadmap collates the major findings that have arisen from the network's survey and analysis projects in order to set an agenda for educational policy in the field.

This report is not about predicting the future. Instead, its starting point was simply to consider some of the greatest challenges and opportunities for education in the 21st century in helping society address the threat posed by hazards of natural and human origin. The report considers society's requirements in terms of skills and scientific advances. It also considers the existing capacity of European HEIs to meet these requirements. Finally, the report considers what needs to happen in education policy to help address this key European and global challenge. The report is a major output for the network that can be disseminated to key stakeholders, and also form the basis of the network's future activities.

Network conferences (WP10)

A series of annual conferences across Europe brought together network members, lecturers and researchers in universities and other higher education institutions with an interest in disaster resilience, as well as those in NGOs and policy fields. The full network met on three occasions: Tallinn, Estonia in 2012; Limmasol, Cyprus in 2013; and, Salford, UK in 2014 (https://www.buildresilience.org/2014/). While the first two events were only open to ANDROID partners, the third conference was held in conjunction with the 4th International Conference on Building Resilience. The four-day event attracted more than 350 academics, researchers, practitioners and policy makers. There were four keynote addresses, which provided a global perspective and vision for disaster resilience research. They were given by Jerry Velasquez, who is Chief of the Advocacy and Communications Section and Head of the Making Cities Resilient Campaign of the UN Office for Disaster Risk Reduction; Dan Lewis, the Chief of Urban Risk Reduction, UN-Habitat, Kenya; Professor

4 Indirli, M., Knezic, S., Borg, R., Kaluarachchi, Y., Ranguelov, B., Romagnoli, F. and Rochas, C. (2014) "The ANDROID case study; Venice and its territory: a general overview". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

5 Kaluarachchi, Y., Indirli, M., Ranguelov, B. and Romagnoli, F. (2014) "The ANDROID case study; Venice and its territory: existing mitigation options and challenges for the future". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

6 Knezic, S., Scudeller, M., Indirli, M., Romagnoli, F., Kuzņecova, T. and Perdikou, S. (2014) "The ANDROID case study; Venice and its territory: identification of hazards and impact of multi-hazard scenarios". In: R Haigh & D Amaratunga (eds.). Procedia Economics and Finance: International Conference on Building Resilience 2014, 8th - 11th September. 2014, Salford, UK.

7 Haigh, R. (2013) ANDROID Open Educational Resource Standards. ANDROID Disaster Resilience Network.

> " The ANDROID Conference came at an exciting time in global efforts to build resilient communities and a resilient planet. In the UK, dynamic public/private sector partnerships and a vibrant academia have contributed significantly to this international process "
>
> **Margareta Wahlström**
> Special Representative of the Secretary-General of the United Nations for Disaster Risk Reduction

Siri Hettige, of the University of Colombo in Sri Lanka; plus Professor Janaka Ruwanpura, who is Vice-Provost (International), University of Calgary, Canada.

The aim of the conference was to explore the concept of resilience as a useful framework of analysis for how society can cope with the threat of hazards, helping to understand the attributes that enable physical, socio-cultural, politico-economic and natural systems to adapt. Themes included the built environment, communication, disaster risk, healthcare facilities, plus governance and education in the wake of disaster. The event was also used to disseminate the key outputs of the ANDROID network.

The event had strong links with the United Nations International Strategy for Disaster Reduction and its campaign named Making Cities Resilient: My City is Ready campaign. At the start of the conference, representatives of the 10 authorities which make up Greater Manchester, attended an official ceremony in which they to pledged their support to the Making Cities Resilient campaign. Another dimension of the conference was that it hosted the 2014 meeting of the United Nations International Strategy for Disaster Reduction's Making Cities Resilient campaign steering committee.

Margareta Wahlström, Special Representative of the Secretary-General of the United Nations for Disaster Risk Reduction commented: "The Conference came at an exciting time in global efforts to build resilient communities and a resilient planet. In the UK, dynamic public/private sector partnerships and a vibrant academia have contributed significantly to this international process".

Annex 2: Status of disaster resilience education in Europe

Policy context

Among many communities in the EU and beyond, disasters pose significant concerns and challenges. With growing population and infrastructures, the world's exposure to hazards - of both natural and man-made origin - is increasing. In addition to loss of life, disasters greatly hamper the social-economic capacity of the member countries and also of the union as a whole. Swiss Re's latest sigma report[1] highlights the 308 disaster events in 2013, of which 150 were natural catastrophes and 158 man-made. Almost 26,000 people lost their lives or went missing in the disasters. Europe suffered the two most expensive natural disasters in insurance terms. The first was the massive flooding in Central and Eastern Europe in May and June, after four days of heavy rain that caused large-scale damage across Germany, the Czech Republic, Hungary and Poland. It led to $4.1 billion in paid claims on $16.5 billion in economic losses. The second was the hailstorm that hit Germany and France in late July, causing $3.8 billion in insurance payments on $4.8 billion in economic losses. Most of those claims came from heavily populated areas of Germany. Altogether, Europe had economic losses worth $33 billion for $15 billion in insurance payouts[2]. For the first time in history the world has experienced three consecutive years where annual economic losses have exceeded $100 billion due to an enormous increase in exposure[3].

Disaster risk is a new multi-trillion dollar asset class: Global capital flows have transformed the landscape of disaster risk, creating a new pile of toxic assets for businesses and governments that do not currently appear on balance sheets. Globally, US$71 trillion of assets would be exposed to one- in-250 year earthquakes. Agriculture is also at risk: in Mozambique a one-in-10 year drought would lower maize yields by 6% and GDP by 0.3%[4].

Compared to the rest of the world, economic loss per capita is high in Europe, in part due to high population density. Countries previously considered as not high risk now need to re-evaluate and strengthen their disaster prevention strategies and capacities in order to become more resilient. UNISDR[4] added that, "the trend will probably continue to rise as natural disasters are expected to become more frequent and severe for Europe in the future."

Despite these projections, reports such as, "Strengthening the EU capacity to respond to disasters"[5] highlight the gaps in overall EU civil protection capacity. A major contributory factor to disaster risk is capacity, which needs to be deployed before the hazard visits a community in the form of pre-disaster planning. Effective mitigation and preparedness can greatly reduce the threat posed by hazards of all types. Likewise, capacity can also be deployed following a major disruptive event. The post-disaster response can impact the loss of life, while timely reconstruction can minimise the economic and social damage that may otherwise result. Accordingly, the future resilience for disasters rests upon shortening the distance between emerging scientific evidence and actionable policy. A rising trend in natural and man-made disasters underlines the need for a well-coordinated European action, both in terms of response and also in terms of preparedness and prevention. New legislation to strengthen European policy on disaster management was approved in December 2013. The revised legislation aims at further improving cooperation and coordination to strengthen preparedness, and provide for a fast and efficient response when a disaster strikes. This means better protection for EU citizens and affected communities worldwide[6].

EU Member states need to be able to better coordinate preparation, prevention and eventually respond to disasters within Europe and globally. The management of disaster risks is heavily dependent on scientific knowledge and therefore greater use of science and technology can significantly reduce the devastating impacts of disasters. There is a need to enhance the scientific knowledge in the disaster resilience subject domain to face current and future challenges, and to convert knowledge and ideas into products and services for economic and social benefit.

For every €1 spent in disaster prevention, we save €4-7 in disaster response. Disaster risk prevention has been included in key EU policies, including health, environmental impact assessment, climate change adaptation, eco-systems, agriculture, transport and energy, research and innovation. The European Commission supports and complements the prevention efforts of participating states in the EU Civil

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1 Swiss Re, Natural catastrophes and man-made disasters in 2013.

2 http://www.azcentral.com/story/money/business/2014/03/26/disasters-led-b-insurance-losses/6907491/.

3 http://www.unisdr.org/archive/31685.

4 UNISDR (2013). Global Assessment Report (GAR) on Disaster Risk Reduction.

5 European Commission - DG Environment (2009). Strengthening the EU capacity to respond to disasters: Identification of the gaps in the capacity of the Community Civil Protection Mechanism to provide assistance in major disasters and options to fill the gaps – A scenario-based approach (http://ec.europa.eu/echo/civil_protection/civil/prote/pdfdocs/Final%20Report%20-%20scenario%20study.pdf).

6 European Commission - MEMO/13/1120 10/12/2013): New legislation to strengthen European policy on disaster management.

Protection Mechanism by improving access to disaster data and encouraging the countries to undertake risk assessment and hazard mapping, and the Commission supports innovative solutions for financing disaster prevention, including the use of insurance as a tool for disaster management and as an incentive to promote risk awareness[7].

Higher education must also link with the directions of the Sendai framework for disaster risk reduction that was adopted by UN member states at the Third UN World Conference in March 2015 in Sendai, Japan. The "Science and Technology Major Group input" to inform Member States and Stakeholders submission[8] clearly identifies the need to promote scientific research into risk patterns and trends, as well as the causes and effects of disaster risk in society; and engage with the national/sub-national research and practitioner community involved in risk reduction to strengthen the science-policy interface. "In order to enable the integration of science and technology into disaster risk reduction and resilience building fully, and scale up their positive impacts, there is a need to strengthen coordination across scientific and research organisations, institutions and networks currently delivering scientific information on disaster risk reduction, and connect them to policy-makers and practitioners".

The report from the 2015 global platform consultations[9], with the overall objective to determine to what degree the Hyogo Framework for Action has been fit for purpose, and identify improvements to be addressed in the Sendai framework, has highlighted a number of areas where further intervention is required in terms of achieving disaster resilient communities and environment. The importance of community level involvement, the role of science, knowledge sharing and education, financing, and private sector involvement in disaster risk reduction, are some of the main areas that have been identified as lacking.

Along with some of these disaster risk reduction and resilience building specific agendas, there are a number of other broader policy initiatives and strategies that are intended to make education and training more responsive to labour market needs.

Lisbon strategy

The original Lisbon Strategy was launched in 2000 as a response to the challenges of globalisation and ageing. The European Council defined the objective of the strategy for the EU "to become the most dynamic and competitive knowledge-based economy in the world by 2010 capable of sustainable economic growth with more and better jobs and greater social cohesion and respect for the environment". However, the original strategy gradually developed into an overly complex structure with multiple goals and actions and an unclear division of responsibilities and tasks, particularly between the EU and national levels. The Lisbon Strategy was therefore re-launched in 2005 with more focus on growth and jobs. The re-launched Lisbon strategy thus aims to stimulate growth and create more and better jobs, while making the economy greener and more innovative. The Lisbon Strategy's objective for the EU to become a knowledge economy centred on an ambitious research and innovation agenda and created an impact on the research and innovation policy at the EU level.

Europe 2020 strategy

Europe 2020 is the European Union's ten-year growth and jobs strategy that was launched in 2010. It is about overcoming the crisis from which EU's economy is gradually recovering and about addressing the shortcomings of EU's growth model and creating the conditions for a smart, sustainable and inclusive growth. EU2020 Strategy, the successor to the Lisbon Strategy, highlights education as a key priority area where collaboration between the EU Member States can deliver positive results for jobs and growth. This strategy shows how the EU can come out stronger from the crisis and how it can be turned in to a smart, sustainable and inclusive economy delivering high level of employment and social cohesion. It further set a target of 3% of the EU's GDP to be invested in research and development.

Since 2010, with the approval of the Europe 2020 strategy, a variety of flagship initiatives have been launched as follows:

- Youth on the Move (YotM), whose aim is to help better equip young people for the job market – which includes boosting the literacy of the less skilled – and to improve their education and training levels (http://ec.europa.eu/youthonthemove/index_en.htm).

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7 European Commission – Humanitarian Aid and Civil Protection : http://ec.europa.eu/echo.

8 STMG (2014) "How the science and technology community can be strengthened for implementation of the post-2015 framework for disaster risk reduction, Second Preparatory Committee for the United Nations World Conference On Disaster Risk Reduction, Geneva.

9 Global Assessment Report (2015) http://www.preventionweb.net/english/hyogo/gar/2013/en/home/index.html.

- The Agenda for new skills and jobs, which includes literacy as an important part of the right mix of skills needed for success in the future labour market (http://ec.europa.eu/social/main.jsp?langId=en&catId=958).

- The Digital Agenda for Europe, which recognises the role of digital literacy for empowerment and participation in the digital era (http://ec.europa.eu/digital-agenda/).

- The European Platform against Poverty and Social Exclusion, which proposes the development of innovative education for deprived communities to help lift them out of poverty and social exclusion (http://ec.europa.eu/social/main.jsp?langId=en&catId=961).

New skills for new jobs

'New skill for new jobs' is a policy initiative in the field of education launched with the aim of supporting the development of citizens' skills as well as improving education and training systems so that they are better able to respond to the needs of the economy and society. The objectives of this initiative are to promote better anticipation of future skills needs, to develop better matching between skills and labour market needs and to bridge the gap between the worlds of education and work. One of the main trends in reforming education and training systems is the move towards education frameworks based on skills and competences. To achieve its purpose, the initiative has developed several practical measures including analysis of emerging trends at sectorial level and the development of sectorial skills councils. Disaster resilience, which is inter-sectorial and multi-disciplinary, is an emerging market need in the present world. Imparting sufficient disaster knowledge will help people to understand the process of mitigation and the process of recovery following a disaster. Making the disaster risk reduction knowledge available to a wider community is vital to achieve societal resilience and sustainable development.

Education and training 2020 work programme

In 2009, the Council drew up the Strategic Framework for European Cooperation in education and training (ET 2020). Since then, the economic and political context has changed, creating new uncertainties and constraints. The European Union had to take further action to stem the worst financial and economic crisis in its history and, in response, has agreed on a strategy for smart, sustainable and inclusive growth: Europe 2020.

Each EU country is responsible for its own education and training systems, so EU policy is designed to support national action and help address common challenges, such as ageing societies, skills deficits in the workforce, and global competition. If Europe is not to lose out to global competition in the education, research and innovation fields, this crucial sector of the economy and of society needs in-depth restructuring and modernisation. In this framework, higher education has an important role to play. Governments and higher education institutions are looking for ways to creating better conditions for universities. At the same time, the strategic framework for European co-operation in education and training, adopted by the Council in May 2009, underlines the need to promote the modernisation agenda for higher education to improve the quality and efficiency of education and training. Thus, Education and Training 2020 can make a major contribution to achieving Europe 2020's objectives.

Through the strategic framework for education and training, member states have identified four common objectives to address these challenges by 2020 as follows:

- Making lifelong learning and mobility a reality;

- Improving the quality and efficiency of education and training;

- Promoting equity, social cohesion, and active citizenship;

- Enhancing creativity and innovation, including entrepreneurship, at all levels of education and training.

Other initiatives

In addition to the above initiatives, the Directorate General for Education and Culture (DG EAC), which is the branch of the European Commission charged with Education, Training, Youth, Sport Languages and Culture, has also focused on other initiatives and opportunities.

Education and training for social inclusion

Education and training policy should enable all citizens to benefit from quality education and to acquire and update over a lifetime the knowledge, skills, and competences needed for employment, inclusion, active citizenship and personal fulfilment. Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities. As such the education and training for social inclusion agenda is an important initiative in setting an agenda for the educational policy in the field of disaster resilience.

Opening up education through new technologies

Open and flexible learning is about fully exploring the potential of ICT to improve education and training systems, aligning them with the current digital world. ICT tools, Open Educational Resources, and open practices allow for an increase in the effectiveness of education, allowing for more personalised learning, a better learning experience, and an improved use of resources. Such measures also promote equity by increasing the availability of knowledge. The European Commission launched the Opening up Education initiative in September 2013, presenting the actions that the EC will implement, including policy orientation for operations funded under Erasmus + and Horizon 2020.

Opportunities for sustainability

Opportunities are available for EU member states to improve equity and inclusion through education and training, and to do research and development to increase societal resilience to disasters. Among these, Erasmus + and Horizon 2020 are two significant programmes that will create greater opportunities for EU member states to boost skills and employability; to modernise education and to support the objectives of the EU2020 strategy.

Erasmus +

Erasmus+ is the new EU programme for Education, Training, Youth, and Sport for 2014-2020. Erasmus+ will support transnational partnerships among Education, Training, and Youth institutions and organisations to foster cooperation and bridge the worlds of education and work in order to tackle the skills gaps we are facing in Europe, including those concerned with tackling societal resilience to disasters.

At the higher education level, there are several opportunities for staff, students, trainees and opportunities for cooperation between institutions, with business and outside EU. Strategic partnerships offer the opportunity for organisations active in the fields of education, training and youth, as well as enterprises, public authorities, civil society organisations to cooperate in order to implement innovative practices leading to high quality teaching, training, learning, youth work, institutional modernisation and societal innovation. Knowledge alliances will develop new, innovative and multidisciplinary approaches to teaching and learning; stimulate entrepreneurship and the entrepreneurial skills of students, academics and company staff; and facilitate the exchange, flow and co-creation of knowledge.

Horizon2020

Horizon 2020 is the biggest EU Research and Innovation programme with nearly €80 billion of funding available over 7 years (2014 to 2020). It is a core part of Europe 2020, Innovation Union & European Research Area: responding to the economic crisis to invest in future jobs and growth; addressing people's concerns about their livelihoods, safety and environment; strengthening the EU's global position in research, innovation and technology. Horizon 2020 has 3 main sections such as excellent science, industrial leadership and societal challenges. The societal challenges refer to a challenge-based approach that will bring together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities. There are specific calls on disaster resilience under some of these societal challenges such as climate and security.

Capacity and competence in disaster resilience in Europe

Given the increasing numbers of disasters in Europe and around the world, and the complexity and interconnectedness of adverse societal consequences of disasters, public authorities need to have a high capacity in working professionally with preparedness and response as well as with disaster resilience. A crucial component of this capacity is well-educated public administrators and a high level of formal competence. So far, the actual level of competence and capacity of disaster resilience in public administrations in Europe has not been examined. Nor has the kinds of education offered at European HEIs in order to produce disaster resilience competence been explored. Thus, the match and possible gap between 'demand and supply' regarding competence in disaster resilience has previously not been studied and described.

In order to find the possible gap between supply and demand in disaster resilience competence, ANDROID developed and carried out two pan-European surveys during 2013: one collecting data on what kinds of disaster resilience education are offered at European HEIs, and one gathering knowledge on the level of disaster capacity in public bodies around Europe at national and local levels. The rest of this chapter briefly presents the surveys and the findings from each of them. The last section of the chapter discusses what conclusions can be drawn from the surveys, and describes how the demand and supply of disaster resilience competence matches.

The United Nations' International Strategy for Disaster Reduction acknowledges the central role of all levels of government in enhancing the disaster resilience of communities and emphasizes the need to foster better knowledge and understanding of the causes of disasters to build and strengthen coping capacities through educational and training programmes.

In order for higher education institutions to support these efforts with capacity-building educational programmes, it is essential that the priority areas for capacity development are first identified. To this end, the ANDROID academic network designed a survey to assess the capacity of European public administrations at both national and local levels.

The survey on disaster resilience capacity took the form of an online questionnaire, which was provided in 5 language versions. 127 responses were received. This represented an unfortunately low number of responses for a Europe-wide survey of this nature. No responses at all were received from 25% of the 28 target countries and more than half of all responses came from just 1 country (Sweden).

While this certainly did not present a representative sample, and the small number of responses prevented meaningful country comparisons of the data, the results did provide a valuable initial indication as to the demand for disaster resilience education and qualifications in public administrations, the progress made towards the fulfilment of the HFA priority actions and the capacity constraints affecting implementation of these actions which, in turn, can suggest possible areas of focus for future disaster resilience educational offerings.

The survey found that only 13% of disaster resilience staff in the responding organisations currently hold disaster resilience-related higher education qualifications and a strong majority (68%) of the organisations were reported to be interested in their staff obtaining such academic qualifications.

Current progress in terms of the fulfilment of obligations under the Hyogo Framework for Action (HFA), at both the national and local levels, is reported to be moderate, and, given that the agreed timeframe for implementing the HFA is soon to end (in 2015), this suggests general underperformance.

Surprisingly, most respondents reported that their organisations had sufficient capacity to complete the HFA actions. This suggests that other factors, such as HFA fulfilment not being a current priority, are influencing HFA implementation. The minority of respondents who indicated that capacity constraints were affecting public organisations' efforts to implement the HFA reported that the largest gap between resource importance and availability existed in relation to financial resources.

In the case of both disaster resilience not being given sufficient priority and the capacity constraints identified, there is a valuable role for disaster resilience education to play.

Despite suffering from a low number of responses, the survey did determine that a substantial demand for disaster resilience-related education and associated qualifications exists in public administrations across Europe.

The survey responses also indicated that the performance of the HFA actions and, by extension, disaster resilience in general, is not being given adequate priority within public administrations. This is worrying given the considerable effort and resources, which have so far been expended and the large number of global and regional initiatives to drive forward the disaster resilience agenda in recent years. This conclusion is reinforced by the finding that the least progressed of the HFA priority actions at both national and local levels related to the development of a culture

of safety and resilience. There is, therefore, a need for further advocacy for disaster resilience awareness and education.

From the limited data collected, the most significant capacity gaps pertained to financial resources for both national and local administrations. This seems to relate to both the insufficient priority given to disaster resilience by governments being reflected in their budgetary allocations and also the great flexibility of financial resources, which enables them to be conveniently converted into the outsourcing of other capacity dimensions.

The multidimensional conception of capacity relative to the fulfilment of the HFA priority actions took into account that capacity related to both the inputs and the transformation process in fulfilling the actions. The existence of sufficient capacity did not necessarily ensure that the actions were fulfilled, and education / knowledge and skills represented only one among several dimensions of capacity but it also has an influence or a role to play in all the other dimensions as well. While this conception helped ensure a realistic and robust conception of capacity which enabled its measurement, the acceptance that nonfulfillment of actions may not be a consequence of capacity constraint and the need to consider multiple dimensions of capacity (not only education/knowledge and skills) both called for a higher number of responses (since not all non-fulfilment of actions translated into capacity constraint data and also the data being captured was more detailed or granular). It also imposed a greater burden on respondents and reduced the convenience of producing local language translations because it made for a longer, more complex survey questionnaire. In this way, it may have influenced the low response rate.

Disaster resilience education

Education in disaster resilience is of great importance for administrators forming policies and planning disaster response, managing post disaster actions and performing risk and vulnerability assessments. The lack of adequate continuing education and training for administrators is of vital importance, as highlighted in a study on the two massive earthquakes that struck Turkey in 1999[1]. The educational level of those responsible for safety is also of crucial importance[2].

The objective of the survey was to develop an inventory of disaster resilience related education programmes

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1 Perkins, J.B., Harrald, J.R., Renda-Tanali, I. (1999) Kocaeli and Düzce, Turkey, Earthquakes – Lessons for Local Governments on Hazard Mitigation Strategies and Human Needs Response Planning.

2 Bründl, M., Etter, H.J., Steiniger, M., Klingler, Ch., Rhyner, J., Ammann, W.J. (2004) IFKIS – a basis for managing avalanche risk in settlements and on roads in Switzerland, Natural Hazards and Earth System Sciences, 4, pp. 257–262.

currently being undertaken within Europe. The inventory aimed to capture, describe, analyse and compare disaster resilience related education programmes in order to establish existing capacity among European HEIs to address the threat posed by hazards of natural and human origin. The inventory referred to teaching and research programmes covering the full scope of disaster resilience education from applied, human, social, and natural sciences at European HEIs.

For more straightforward comparison and analysis of the data, it was decided that only programmes directly related to disaster resilience should participate. This excluded programmes with emphasis and learning outcomes in different subjects offering a very small proportion of courses on disaster resilience related issues. Otherwise these programmes would have unduly biased the results of the survey.

Whether a course was directly related to disaster resilience or not was decided by the programme coordinator and depended on the core course learning outcomes of the programme, based on the 'Disaster Resilience definition by UNISDR'. The programme was considered to be directly related to disaster resilience if the coordinator decided that the learning outcomes of this course fit the definition given by UNISDR: Resilience is the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

The survey ran for 1 year and 98 participants have been reported. The findings of this survey are summarised as follows:

- 40% of the survey participants do not offer degree programmes in the disaster resilience field suggesting that there is high potential to increase the number of programmes in this field. This is important considering that only targeted experts in the disaster resilience field participated on the survey, yet their HEI does not offer such courses.

- 58 programmes were identified that offer courses at different EQF levels in 18 different countries. Results showed good geographic distribution, but in some countries there are many more such courses than in others especially considering the country size. Iceland is such an example offering 5 programmes (short duration programmes). Iceland has a population of only around 300,000, which demonstrates the potential to increase the number of programmes offered in more populous countries. For example, the same number of programmes per capita repeated throughout Europe would result in 11,000 programmes!

- Out of 58 programmes, only 6 were found to be at bachelor degree level while the rest are at postgraduate level. This shows the need for more degree level courses. This very small number might also be due to the multidisciplinary nature of disaster resilience related courses which is more rare at bachelor level.

- Engineering was the discipline with the most programmes (30%). A significant proportion (7%) of programmes were identified as multidisciplinary. Sixteen different disciplines were identified between the 58 programmes, stressing the multidisciplinarity of disaster resilience. None of the bachelor degree level courses are in engineering discipline.

- A majority (72%) of the programmes surveyed have some form of link with industry in a form of mentorship, practical training and internship. Also, the highest proportion (over 40%) collaborates with local/national authorities.

- The great majority of programmes have been running for 5 years or less or are new/planned. Less than 20% of programmes are over 10 years old, confirming that disaster resilience is a relatively new field of academic study. In a majority of programmes nearly 60% of teaching is performed by both academics and professionals.

Regarding the capacity survey, from the considerable variations in cooperation and data collection achieved in the different countries, it appears that the survey's coverage in conjunction with its level of detail may have been overly optimistic. For the development of follow-up surveys, it is recommended that:

- additional measures are taken to increase the data collection efforts of in-country partners; and/or,

- a shorter and simpler survey tool be deployed; and/or,

- a more specific survey population be selected.

The survey on education demonstrates the lack of disaster resilience related programmes offered by HEIs across Europe and the great need for such programmes. It also demonstrates very clearly the multidisciplinary nature of this field as well as the involvement of academia, professionals, governmental organisations, research institutions etc in this effort to promote disaster resilience.

Interdisciplinary collaboration in teaching and research

Interdisciplinary collaboration in disaster research is frequently seen as essential but difficult to sustain in practice. Yet, complex factors underlying exposure and the development of solutions for disasters often require a collaborative approach. Best practice guidelines can help overcome some of the obstacles of sustaining this form of research. The ANDROID Disaster resilience survey has explored this theme by collecting case based information from interdisciplinary projects and the views of researchers on the process of interdisciplinary working.

The general aim of the survey was to gather information on all type of projects (research, industrial and educational projects) that had disaster-resilience design as primary or secondary aim and where collaboration between experts in different disciplines was required.

The purpose of the survey was to collect information pertaining to existing inter-disciplinary partnerships in order to:

- better understand the level of cooperation currently available in the field of disaster management and resilience

- identify best practice models in terms of engaging stakeholders, policy makers and academics in the field of disaster resilience

- to provide practical recommendations on the desired skill sets, resources and conditions to promote inter-disciplinary cooperation.

The term disaster-resilience design is intended as a design that takes into account not only the direct consequences of a disaster on the system performance, but also the long term effects caused by the downtime of failed elements from the point of view of reparation costs and negative feedback on the performances of the rest of the system. The definition of resilience used by the MCEER[1], being well-known in literature, is taken as reference for highlighting the various areas of expertise involved in the problem and the importance of interdisciplinary work for achieving an efficient disaster-resilience design.

1 Cimellaro, G., Reinhorn, A. & Bruneau, M. (2010) Framework for analytical quantification of disaster resilience. Eng. Struct. 32(11), p. 3639-49.

Depending on project and on the complexity of the problem, different degrees of interconnection between disciplines can be required. The terms multidisciplinary, interdisciplinary, and transdisciplinary are defined in literature on the basis of loose or tight integration between two disciplines[2]. It is here suggested that the level of integration required could be directly dependent on the coupling between the problems classically ascribed to each discipline. Since the level of interdisciplinary work required in the project was one of the intended outcomes of the survey, a broad sense of the term interdisciplinary work has been used in the survey, which incorporates all various degrees of discipline interconnection and integration[3].

The survey has been carried out by means of a questionnaire, which has been implemented having the following goals in mind: i) collecting aggregated data to be used for statistical purpose; ii) making the data available in an free online repository; iii) giving insights on the main challenges faced in interdisciplinary working and on possible solutions; iv) having a broad distribution and a good answer rate among respondents. In consideration of these goals, 24 questions have been formulated and structured into 4 main survey areas: i) general information on the project; ii) content and characteristics of the projects; iii) challenges faced in interdisciplinary working; iv) impact and availability of projects' outcomes. About half of the questions foresaw multiple-choice answers, while short comments could be inserted as answer to the other half of the questions.

The questionnaire was distributed and advertised through the ANDROID network and has collected 57 answers from more than 20 European countries and few extra European countries as well.

The survey questionnaire was carried out from June 2013 to December 2013. The data set consists of 57 answers which also represents activities from over 40 different countries mainly European but also international.

The outcomes of the questionnaire allow for three main considerations:

- projects involved 5 different disciplines as average and geography and sociology were present in the majority of the projects; this highlights the importance of social and cultural aspects in disaster-resilience design, which are instead not often considered in current studies on the topic

- the level of interconnection between disciplines seems intermediate, meaning that information and methods are exchanged, but a full integration of methods and concepts into a common shared language and system of axioms is missing;

- the lack of a common framework and common terminology represents a major barrier to good interdisciplinary work.

From the considerations above, the establishment of an education on resilient design of urban system emerges as a possible solution to overcome barriers to interdisciplinary work and improve the efficacy and quality of resilience design. The development and transmission of a set of knowledge that includes both social and technological aspects in an organized way and with a consistent terminology will promote the development of resilience-based design as a new discipline and drive the approach to disaster resilience from an interdisciplinary approach to a trans-disciplinary one. For this aim to be achieved, efforts in developing new courses and establishing education lines are required from higher education institutes.

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2 Choi, B. & Pak, A. (2006) Multidisciplinarity, interdisciplinarity, and transdisciplinarity in health research Clin Invest Med, 29(6), p. 351-364.

3 Jacobs, J. & Frickel, S. (2009) Interdisciplinarity: A critical assessment. Annual review of Sociology, Volume 35, pp. 43-65.

ABOUT ANDROID

The ANDROID disaster resilience network was established in 2011 (Academic Network for Disaster Resilience to Optimise Educatlonal Development). The network was set up to promote co-operation and innovation among European Higher Education and in doing so, to increase society's resilience to disasters of human and natural origin. An underlying tenet of ANDROID is that higher education should be more innovative, providing opportunities to work in close collaboration with industry, communities, humanitarian agencies, private sectors and other higher education institutions.

The ANDROID Network is funded under the EU Lifelong Learning Programme. With a budget of nearly €7 billion for 2007 to 2013, the programme funded a range of actions including exchanges, study visits and networking activities. Projects are intended not only for individual students and learners, but also for teachers, trainers and all others involved in education and training.

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