Research programme

Open Universiteit

Innovating for resilience

Multidisciplinary Research at Open Universiteit

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Introduction

Modern societies face new challenges. Communities, cultures and economies are more interconnected than ever before, technology presents new possibilities but also threats. They often work on the basis of divergent value systems. The various constituting elements of our emerging global village display complex interactions and transformations that are often poorly understood. New and unexpected dynamics emerge frequently, and uncertainty and complexity, often coupled with ambiguity and value disagreements, have become key elements of modern societies. In this fast changing context, the challenges are manifold and they are often characterized by non- linearity, tipping points, and cascading effects.

In such a complex context, *resilience* is a key societal asset. The term 'resilience' refers to the capacity to absorb shocks and still maintain normal systemic functioning on the one hand. On the other hand, it points to the capacity for renewal, re-organization, development or even transformation. More insight in the constituting elements and processes that influence both forms of resilience is an important scientific challenge. It is crucial to better understand why some systems (individuals, communities, companies, economies) can withstand pressures and continue to fulfil their functions. But it is equally important to understand the dynamics of renewal, because societal (and economic, cultural and ecological) environments can change so fundamentally that they leave their "stability domain" and need to radically innovate and transform. In short, societies will need to keep *Innovating for Resilience*. The resilience of people, organizations, cities and societies thus is constantly put to the test. Science and innovations can help to pass that test.

Science can play an important role by increasing the understanding of these complexities and to advance resilience. This can be achieved by producing fundamental knowledge, but also by conducting applied research that offers prospects for action for social actors. Addressing complex issues and solving social problems requires action, and often includes behavioral changes as innovations generally heavily rely on learning.

Because extensive societal developments are multilayered and multifaceted, they can be only understood and managed with *integrated multidisciplinary approaches*. In order to successfully address today's challenges, insights into the operation of all systems, practices and stakeholders involved, are required to understand. As modern transformations emerge at the intersection of social, technological and environmental systems, only multidisciplinary research can generate valuable insights into how to embark on them and how to face the ethical, juridical, technical, governmental and psychological dilemma's involved.

A multi-disciplinary research program could therefore serve the following aims:

1. Integrating disciplinary knowledge and generate scientific insights into modern transformations and their impact on society (individuals, communities, cities, companies, economies, legal systems);
2. Finding solutions to the issues and problems (e.g. social, legal, ethical, normative, and economical) engendered by recent developments in society;
3. Analysing the problems and dilemmas posed by the solutions to these challenges and looking for ways to deal with them;
4. Developing innovative educational activities and practices aimed at tackling these modern challenges.

Addressing these objectives requires the creation of a research environment that facilitates the integration of insights from different research disciplines in order to understand and explain existing and emergent global challenges. The OU accommodates several relevant disciplines that can address these modern global challenges. Moreover, a vital interplay and interdependence between multidisciplinary research and educational innovation is important for contributing to modern global challenges. While conducting multidisciplinary research is a first, important step in understanding these challenges and providing solutions, innovative educational technologies that focus on digital, blended, flexible and activating learning can make these insights useful and ultimately contribute to building a resilient society. In order to address the complexity

of the challenges described above, close collaboration with practice and thus facing real problems is an important aspect of the approach in this multi-disciplinary research.

The multidisciplinary research program *Innovating for Resilience* builds on the expertise within the six OU faculties and current multi-disciplinary research programs, and focuses on tackling some of the global modern challenges in order to build resilient social systems . This program contains several themes that can be grouped along three lines, with all disciplines ideally contributing to each line:

(i) *Safety and Resiliency in Urban Environments*

(ii) *Innovation in Education*

(iii) *Learning and Innovation in Resilient Systems*

These research lines are set out in more detail below.

1 Safety and Resilience in Urban Environments

Introduction

The twenty-first century is a time of massive urbanization across the globe. Since 2007, more than half of the world's population lives in cities, while the increase in the world population is expected to take place mainly in the cities. Migration, cultural diversity and lifestyle diversity poses massive challenges to cities that have a clear relationship with safety and resilience, and require more scientific insights. Social changes, as well as conflicts and inequalities between population groups, are becoming more rapidly and sharply visible in cities. Cities are laboratories of human coexistence, where great creativity and dynamism emerge. Many learning processes take place in cities, both within organizations and individually. For example, in so-called 'smart cities' there is an increasingly advanced technological influence on the behavior of citizens in nightlife; also, creative solutions are devised for '*health-scaping'* the city, through the design of public space, with its associated challenges and problems. The density of people living together in a small area also generates a specific type of stress that manifests itself on a psychological level and in people's behavior, and causes specific safety and resiliency issues. Another challenge is to balance varying cultural perspectives of safety that exist among various social groups in urban areas. Also in the field of health, living close together in the big city raises important new issues. Moreover, different cultural, ethical and legal issues are involved in crowded cities, that relate to safety and resiliency within urban environments.

Safety in Urban Environments (2018-2020)

These issues of urban environments are addressed in *De Veilige Stad* (*Safety in Urban Environments*, *SUE*), an OU-wide interdisciplinary research program that started in 2018. In a mix of short term research projects and Ph.D. projects, this program investigates safety issues in urban contexts in the Netherlands, Europe and worldwide, in past and present societies. As a multidisciplinary research line, it involves different visions and practices of safety in the past and present; it concerns both practical and technical issues in the shaping of a safe urban environment as well as awareness of, and psychological problems that are associated with safety in a healthy city. Additionally, it involves cultural representations of, and ethical and legal problems surrounding safety. The program defines safety both positively, as in shaping a secure, sheltered community; negatively, as in preventing and combating threats to security, and constructively, as in analyzing changing representations and narratives about a safe city.

SUE is a broad-based line of research within the OU, involving all faculties in its projects and activities. In addition to its alignment with the disciplinary research lines of the faculties, SUE closely follows the research profile of the OU Institutional Plan (*Innovative, Open, and Connected*) and its indicators (DALI). SUE is also linked to the Rights and Humanities Sectoral Plan of the SSH Council (April 2019), and various 'routes' within the National Science Agenda.

SUE has resulted in scientific output such as books, chapters, and peer-reviewed scientific publications. As valorization is a core part of SUE, researchers have adopted concrete socialproblems of cities in the Netherlands and abroad, have actively involved citizens in data collection, and have participated in public activities such as lectures and media appearances. In these two first years, a recognizable group of Ph.D. students has developed around SUE, including SUE- subsidized students as well as affiliated Ph.D. students. Future SUE-Ph.D. students are expected to join this group.

Safety and Resilience in Urban Environments (2020-2025)

The new research line, *Safety and Resilience in Urban Environments (SRUE),* builds heavily on the SUE program but now more explicitly recognizes the role of resilience, a concept that is closely linked to safety. Several SUE projects already focused on resilient societies (e.g. Resilient societies, the role of the cities; Future Urban Energy). Resilience is about resilient, robust systems that can respond adequately to various

challenges. Both safety and resiliency are important characteristics of urban environments that contribute to its livability. However, they will be investigated in the context of changing, varying and sometimes conflicting cultural perceptions and representations of safety and resilience.
The themes of urban safety and resilience can be approached from a number of angles, such as sustainability, smart cities, inclusiveness, urban lifestyles and identities, crime and the governance of safety. The focus on the city as a hub of complex interactions between heterogeneous population groups also implies a specific approach, including institutions in the field of security in urban contexts. Moreover, the public health perspective is important for the future, given the risks that viruses such as the coronavirus cause for densely populated areas, while at the same time raising issues about privacy and the powers of authorities. Research on this theme can be both locally (Dutch cities) and globally (comparison with cities in different countries, exchange processes). In this way it links up with the process of *'glocalization'*, the local translation and tackling of global problems. Global issues come together in a community in which citizens are involved in a natural way because of their physical proximity to one another.

The *SUE* research line is based on three guiding questions:

1. Practices

What safety and governance practices have been created in the past, already exist nowadays, or are being developed within Dutch cities and globally? This theme critically evaluates how practices (including networks between different stakeholders, groups, leadership) promote or threaten security and resilience in cities.

2. Critical reflection

This theme critically reflects on the moral, ethical, legal and psychological problems that arise in relation to safety and resilience in cities. Which dilemmas play a role around social trust and vulnerabilities such as privacy, freedom of movement, and accountable governance? Are some groups excluded due to technological developments? Can too much security erode citizens' resilience? What is the relationship between freedom, equality and human rights?

3. Empowerment and design

What safety and resilience related learning processes can be distinguished within cities at the level of organizations and individual citizens? How can technology and design within smart cities help to empower citizens, increase their actual and perception of safety and resilience, and how are the inherent privacy issues resolved?

2 Innovation in Education

Introduction

Innovating for resilience can also be applied to education. Resilient societies ask for educational systems that can meet the demands of rapidlychanging technologies and new types of skills in the workplace. Moreover, they should not only strive for 'cognitive goals' but also foster social cohesion and global citizenship. Innovation in education may help learners to attain these goals. Innovative learning refers to renewing and improving education. Research into innovative education focuses, on a number of challenges, such as preventing the major study drop-out and study delay that occur in higher education. In addition, a shift can be observed towards activating teaching methods and digitization. Universities of today face a changing student population for whom the use of new media has become a matter of course, and most universities work with a digital learning environment that requires new teaching techniques, didactic models and methods. This approach to digital, blended, and activated learning is a key characteristic of the OU.

In higher and academic education, the interaction between the instructor and the student is almost always central. In the past decades, there was a clear contrast between 'traditional universities' using face-to-face teaching methods, and 'distance universities', such as the OU, using online, digital teaching methods. This sharp contrast is gradually fading. Traditional universities are increasingly 'digitizing' in a direction that can be described as blended learning, and distance universities such as the OU are attempting to intensify guidance and to activate students more.

This raises the question how innovative higher and scientific education can be strengthened. The OU in particular is concerned with strengthening its educational model of online activating learning. Greater insight into this is important for the improvement of higher education in general and for the OU education in particular. The OU holds a position as an innovator in the field of digital learning and is also advisor to other institutions of higher and academic education. Important issues relate to design, online and blended learning, activating (motivating, provoking in-depth learning, reducing drop-out rates, binding students), and flexibilization, and have been the focus of research within the OU. Research outcomes are not only academic reports, but also appreciation and proof of effectiveness in practice. Because the VSNU Strategic Evaluation Protocol (SEP) attaches great importance to both components (i.e. both academic quality and demonstrable social impact), research into innovative learning must be effective in both respects.

Research Line Innovation in Education

The objective of the research line Innovation in Education is to improve higher and scientific education in general, and education of the OU in particular, by combining interdisciplinarity perspectives. Research methods that are innovative, for example when it comes to interpreting and understanding the complex educational contexts on which we focus, are encouraged. The research line will combine scientific and practical relevance, so it is crucial that problems and challenges that are addressed are seen as recognizable and relevant by that practice. Projects should have a real impact on educational practice and therefore the emphasis must be on applicability and implementation. The Innovation in Education research line has four guiding themes:

1. Design Methodology

Innovating education, such as focusing on blended learning or shifting from traditional education in lecture halls towards a digital learning environment, always raises design issues. Different techniques have been developed in different fields that can be applied in design-oriented research, such as design based research in computer science and the precede-proceed model in the health sciences. Educational design can involve ethical, cultural, legal and psychological issues that call for an multidisciplinary approach.

2. Digitization and blended learning

The transformation to digitization and blended learning raises several questions. For instance, what are the central and successful characteristics of the educational model for online or blended learning; how do we know what a learner is actually doing in an online environment, what information can be efficiently collected and fed back, and how can an instructor effectively act on and with that information? One possible effect of projects that focus on this can be to reduce the workload of teachers. As these questions involve educational, psychological, cultural, technological, and even legal issues, they can be best tackled with an interdisciplinary approach.

3. Active learning

To increase active learning and prevent drop-out, many universities are busy developing and testing new formats, such as (serious) gaming and played simulations. The use of these new formats are expected to promote motivation and in-depth learning. A related form is the promotion of mutual contact and cooperation between students and/or with instructors, as in for example virtual classes, thesis circles and tools for online presence. Of course, the theme of drop out is also related to resilience in general. Drop out, or a lack of the will or ability to engage in lifelong learning can seriously hamper resilience.
These new developments can raise different questions, and call for multidisciplinary expertise to answer them.

4. Flexibility and assessment

Flexibility concerns designing agile education that is responding to characteristics, prior knowledge, questions or situation of the learner. It concerns issues of, on the one hand, attractive, flexible presentation of content and, on the other hand, optimizing what a (new, future) student wants or needs by knowing as well as assessing where he/she stands or what he/she needs. So flexibility and assessment can be considered as two faces of the same medal. This presupposes reliable and valid assessment of student characteristics. Addressing this theme requires expertise from different disciplines. It can also be linked to learning in organizations, with requires adapted and tailored, flexible learning materials.

3 Learning and Innovation in Resilient Systems

Introduction

The research line Learning and Innovation in Resilient Systems (LIRS) is a multi-disciplinary and integrative research program carried out within the OU. The ambition of the research program is to build on the crucial notion of resilience and address some of the important challenges faced by modern societies that involve a complex interplay between social, economic, technological and environmental systems. While resilience has often been associated with continued performance and stability of certain systems under stress, it is interpreted here in a way that emphasizes the need for adaptation and transformation. Resilience has become a key term explaining the performance of actors, organizations, and systems under external change that potentially disrupts their functioning. The research program is based on the notion that these challenges exist throughout societies, and also pertain to so called social-ecological systems, and human-technology relations. As a consequence, LIRS integrates various insights from social and behavioral sciences, computer sciences and natural sciences to tackle some of the modern challenges that emerge at the intersection of social, economic, environmental and technological systems.

The general aim of LIRS is to increase our understanding of the innovative and learning capacity of resilient systems, with a focus on (i) information and computer systems, (ii) organizational and management systems, and (iii) environmental, cultural as well as justice systems.

The main focus of the research line is the multidisciplinary analysis of resilient systems, as social transformations are multilayered and multifaceted. As such transformations emerge at the intersection of social, technological and environmental systems, only multidisciplinary research can generate valuable insights into how to embark on them. It is the ambition of the LIRS program to involve as many researchers as possible from the OU of the Netherlands in further research projects aimed at dealing with such complex challenges. The heterogeneity of the scientific disciplines represented in the OU, creates a natural research environment that facilitates the comprehensive and multi-dimensional analysis of various complex systems.

LIRS research lines

The LIRS research line has three guiding research lines:

1. Resilience research line

Resilience research aims to increase our understanding of the capacity of systems to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function. It relates to sustainability, aiming at a desirable future state of systems that meet human needs in such a way that future generations may also have their needs met. Systems can be interpreted as information or computer systems, environmental or biological systems, and organizational or management systems, as well as inter- or multidisciplinary systems. Three core research directions are evident in the Resilience research theme: (i) *Sustainability* addresses the design, management and organization of processes and systems contributing to a more sustainable world; (ii) *Services and supply chains* addresses supply chains in which inter-firm collaboration and competition take place; and (iii) *Trustworthy systems* addresses resilience and trustworthiness of software systems and information systems.

2. Innovation research line

Innovation research aims to enhance our knowledge of how innovations emerge, diffuse and impact the world, and the role of agency therein, and includes three research topics: (i) *Innovative systems*; taking a systems approach, the question is why some systems (read: companies, governments, organizations, online networked knowledge systems, information systems, or ecosystems) are more inventive than others. Research focuses on, for instance, the presence and behavior of entrepreneurial behavior, the influence of diversity,

polycentricism, and shadow networks, as well as experimentation; (ii) *Diffusion of innovations* explores the role of scientists in the diffusion of novel environmental policy concepts (such as Corporate Social Responsibility), but also of networks and the way companies influence each other in terms of environmental behavior within supply chains and by changing their own business models; (iii) *Impact of innovations* explores the societal impact of innovative behaviors, taking into account that evaluation can be done at different levels.

3. Learning research line

Learning research aims to improve our understanding of learning processes in individuals, groups and organizations, and includes three research topics: (i) *Teaching and social learning* explores the collaborative nature of learning and teaching as it takes place in networks of organizations, collaborative information systems and IT applications; (ii) *Learning organizations and inter- organizational learning* explores how organizational learning and knowledge management contributes to processes of continuous improvement and innovation within organizations, and how in turn this has an impact on social, ecological and economic performance of organizations; (iii) *Learning regions* explores learning as it takes place in dynamic, interacting networks of organizations, in which universities, regional governmental institutes and firms are important actors; both network studies and regional innovation system research fit into this line of research.