THE DRIVE FOR HOLISTIC URBAN RESILIENCE

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Abstract

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The urban environment is becoming more and more complex, not least with regard to security aspects following a decade of continuous threats to cities and their supporting infrastructures. A comprehensive and holistic (systematic) approach to improve the resilience of large scale development against attacks and disruptions has not been developed thoroughly. This paper draws from an EU Seventh Framework Programme project entitled HARMONISE - A Holistic Approach to Resilience and Systematic Actions to Make Large Scale Built Infrastructure Secure - which develops a comprehensive, multi-faceted concept for the enhanced security and resilience of urban infrastructure.This paper builds from the specific themes set out in the 2012 Future Security paper "Security for Critical Infrastructure and Urban Areas: A Holistic Approach to Urban Safety, Security and Resilience", presenting early results of attempts to operationalise holistic security and resilience concepts in urban praxis and demonstrating the need for more integrated resilience governance.

1. Introduction

A range of adverse natural and terrorist disturbances occurring over the last decade have highlighted the growing need for urban systems and their constituent large scale built infrastructure to cope with unexpected shocks and their impacts. In view of the ongoing threats posed by attacks and disruptions, a concerted, holistic (systematic) concept is needed to ensure greater urban security and resilience enhancements to cities and their supporting assets. Yet, to date, such an approach has not been developed thoroughly. This paper draws from the EU's Seventh Framework Programme for research, technological development and demonstration security project - HARMONISE - A Holistic Approach to Resilience and Systematic Actions to Make Large Scale Built Infrastructure Secure - which develops a comprehensive, multi-faceted, yet mutually reinforcing concept for the enhanced security, resilience and sustainability of urban infrastructure and development. This paper will build on the specific themes set out in the 2012 Future Security paper "Security for Critical

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Infrastructure and Urban Areas: A Holistic Approach to Urban Safety, Security and Resilience", presenting early results of attempting to operationalise holistic security and resilience concepts within HARMONISE and demonstrating the need for more integrated resilience governance. Conceptually, this paper sits at the intersection between concepts of security and resilience,illuminating how ideas of preparedness, anticipation, surveillance, fortification, and enhanced social control practices have become prominent in urban affairs, and how collapsing distinctions between internal and external security at a state level draws multiple new actors and agencies into the delivery of security-driven urban resilience.

2. The 'resilience turn' in urban policy

Since the early 2000s, the so-called 'resilience turn' [1] has seen ideas associated with resilience embedded within an array of urban policies and practices, driven by an overarching requirement to secure the future from a range of disruptive challenges, threats and events[2]. Particularly after 9/11 2001 urban resilience has become an increasingly central organising metaphor within the policy making process and in the expanding institutional framework of national security and emergency preparedness across all aspects of the 'resilience cycle' (encompassing mitigation, preparedness, response and recovery)[3]. The language of resilience, although contested, has now permeated a range of disparate disciplinary areas, a range of policy narratives, worlds of professional practice and the popular media. Indeed *Time* Magazine recently declared resilience the 'buzzword' of 2013[4]. Whilst the broader resilience literature has focused on, for example, climate change adaption, disaster risk recovery, economic recovery, migratory trends, individual and group psychology, child education, or, more broadly, a general sense of uncertainty about the future, it is in the field of security that the emergence of resilience concepts and practices have most notably developed [5]. It is particularly important to note the connections between the growth of resilience thinking in security discourses and notions of 'human security' within the political sciences. The latter has sought to pull security away from its traditional bias (defence of the state) and to focus upon the everyday needs of people and populations. It is this theme within the resilience literature which has highlighted the increasing trend of decentralising power and responsibility for resilience to the local scale, inverting traditional security logics based on state level control.

The overall growth in importance of urban resilience as a policy and practice idea has been underpinned by the political prioritisation of the safety and security of communities against an array of perceived hazards and threats. These priorities have been focused on cities because of the particular vulnerability of densely populated political, economic and cultural centres, and rapid urbanisation. The twenty-first century is set to become the century of the city. Since 2008, more than more than half of the world's population are now living in urban areas. This is generating enhanced pressure on cities to deliver services effectively, efficiently and sustainably, while keeping their citizens safe, healthy, prosperous and well-informed.

"Across the globe, governments, business and communities are seeing an ever-increasing frequency of extreme weather-related events. These events are playing out against a backdrop of global population growth and urbanization, leading to a complex knot of interrelated pressures. In emerging and established cities alike, these trends are changing the spatial pattern of risk and radically altering perceptions of whether a city is 'safe' or 'well prepared'. Cities have a tremendous challenge to maintain social well-being and economic vitality in the face of these complex, uncertain and constantly changing risks"[6]

'Resilience' - the capacity to withstand and rebound from disruptive challenges - is a concept incorporating a vast range of contemporary risks focused on the city [7]. There

are also a range of other concepts and ideas which are directly related to urban resilience or form part of a more encompassing resilient approach. Topic areas such as emergency and disaster management, disaster risk reduction, or indeed national security, can be seen as areas where resilient-type approaches have been adopted (even if in some cases the term resilience is not used). In a similar way, concepts of vulnerability, redundancy, adaptation and mitigation are often used interchangeably with resilience, and, in many ways can be seen as important aspects of an integrated and 'evolutionary' resilience approach. Likewise, a number of sources also identify a shift away from a public policy focus on sustainability, towards one of resilience; this is due to the implicit assumption of equilibrium within sustainable approaches, in contrast to resilience, which is based upon a change paradigm.

Recent international work in urban resilience has charted a number of commonalities in how different jurisdictions adopt, and then enhance, their resilience over time in a series of 'waves'. These accounts highlight how resilience has, over time, become more local, proactive and embedded within the everyday practices of built environment professionals.
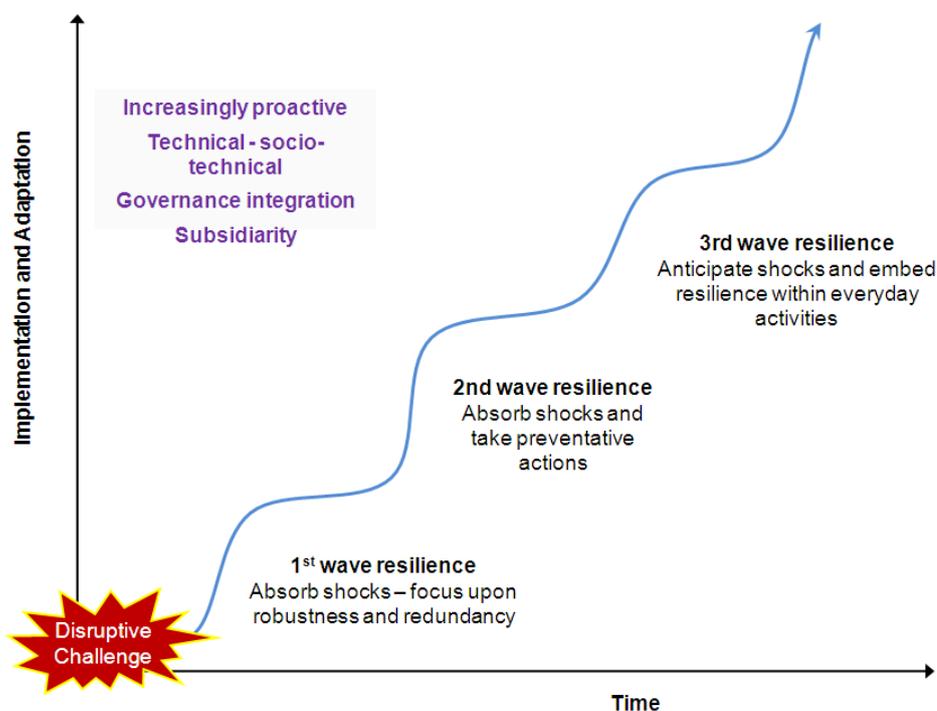

Figure 1 (Above): An Evolving Resilience Process [8]

3. Diverse Resilience Agendas

Yet the emergence of ideas and practices of resilience within academic and policy debates and their relative influence on practice are highly specific to institutional contexts and emergent security risks faced in particular countries and their urban areas. For example, in the UK, the USA and Japan resilience became a highly politicised policy rhetoric in the wake of natural and human induced disasters (most notably 9/11, 7/7 in London, Hurricanes Katrina in 2005 and Sandy in 2012, and the Japanese earthquake and tsunami in 2011) and concerns that the infrastructural system and institutional frameworks *in situ* were ill-prepared to cope with similar future events. In mainland Europe, however, the connection between city planning and resilience has emerged more slowly and has predominantly been associated with

climate change adaptation and inland flooding [9]. For example, in Germany debates around resilience arose as a result of severe flooding in Dresden in 2004 [10].

From the burgeoning work on urban resilience in both academic, policy and practice arenas it is possible to highlight a number of key 'pillars' which are brought together by a range of stakeholders, at multiple scales, to pursue resilience objectives within urban policy and practice. First, the resilience turn in urban policy and practice has ushered in a greater requirement for ***foresight and preparedness***. In this sense resilience is proactive, rather than reactive, and 'the term brings together the components of the disaster cycle - response, recovery, mitigation and preparedness' [11]. In addition,, traditional methodologies for assessing risk within the urban context have commonly been replaced by increased consideration of unpredictable and high consequence 'what if' events as new models for anticipating an uncertain future are developed. Resiliency therefore foregrounds risk prevalence, where risk must be extensively planned for. This has simultaneously led to the rise of what some have referred to as 'precautionary governance' where pre-emptive risk management activities are undertaken to map urban vulnerabilities (often with an emphasis on worst-case scenarios), to plan and test for high-impact 'shock' events, and to develop and enhance practical and technical expertise across a range of built environment and urban management professionals to aid both mitigation and recovery from disruptive challenges. Second, there is a requirement to ***consider multiple risks and hazards in a holistic fashion***. Here, developing urban resilience policy and practice that can respond in a flexible and integrated fashion to multiple risks across a range of cascading scales has been encouraged. As one American commentator has noted:

"resilient cities are constructed to be strong and flexible rather than brittle and fragile . . . their lifeline systems of roads, utilities and other support facilities are designed to continue functioning in the face of rising water, high winds, shaking ground and terrorist attacks"[12]

Whist certain risks, be they the fear of terror attack, pandemic influenza or of wide-scale flooding, might drive forward the resilience agenda at particular points in time, or in specific localities, this should not mean that adequate contingency should not be made for other risks.

Third, there is a need for ***integrated governance of the response***. The changing institutionalisation of the resilience response has become paramount in embedding resiliency principles within policy and practice. Within the urban context, recent years have witnessed a shift to a more transdisciplinary concept of resilience that *integrates* the physical (both built and natural) and socio-political aspects of resilience. As such:

'a resilient built environment should be designed, located, built, operated and maintained in a way that maximises the ability of built assets, associated support systems (physical and institutional) and the people that reside or work within the built assets, to withstand, recover from, and mitigate for the impacts of extreme natural and human-induced hazards'[13].

The new governance approach to enhancing urban resilience emphasises joined-up approaches to decision-making (vertical and horizontal integration). Whereas traditional approaches to urban risk have relied upon a narrow range of stakeholders, contemporary and future schemas should look to draw a full range of professional and community groups into decision-making at a range of spatial scales; from locally-coordinated systems to centralised and sub-national organisation.

The HARMONISE project is being carried out in six European countries: Ireland, Italy, Finland, Spain, Germany and the UK. An initial examination of the resilience policy context has revealed a diverse set of policies and national approaches for resilience across these states, both explicitly towards promoting resilience and more generally in

preparation for adversity. Whilst there are well-developed structures of foresight and preparedness, particularly in the areas of emergency planning, it has become evident that there is lack of the multi hazard/risk approach and transdisciplinary working, which is critical to promoting the security-led urban resilience and the holistic resilience governace that HARMONISE proposes. For example, the term 'resilience' is not used in some member countries of the European Union and it does not have an adequate translation in some languages. Thus, its meaning has remained relatively ambiguous.

4. Challenges in Tool Development and Integration

A preliminary review of 115 existing tools for addressing urban resilience or problems relating to urban resilience was undertaken as part of HARMONISE. This review was not exhaustive, however, and many more tools may be available in Europe and elsewhere. The identified tools were clearly focused on pre-incident resilience (risk mitigation and preparedness), while post-incident resilience (response to immediate effects of an incident and recovery) and the whole resilience cycle gain less attention from the existing tools. Many tools address natural hazards and terrorist hazards, while there are fewer tools targeting man-made accidents, such as explosions, sabotage and pollution of food and water). In addition, most available tools are targeted to experts, decision-makers and authorities, with only a few tools addressing citizen's capabilities to enhance resilience and to cope better with disaster events. Thus, in spite of the numerous tools available, there is clearly a need for more holistic and integrated approach to resilience in Europe.

The need for a more holistic view of urban resilience necessitates that HARMONISE should not only offer separate tools but also support tool integration and interoperability. Integrating the tools is not about bringing all tools together, un-prioritised and unfiltered for the end-user to choose what they please. Neither is it about selecting only one single tool just for a specific purpose. Rather, the integration refers to finding the best possible combinations of tools for each end-users' current need. Turning the focus from single tools to combinations of tools means that not only the tool features are important but also the relationships between the tools matter. It is important to find the right balance between too holistic and comprehensive versus too explicit and focused. With regard to the former, the challenges relate to information overload, user frustration, inefficiency and lack of focus. With regard to the latter, the challenges relate to short-sightedness, narrow-mindedness and bias.

To meet these challenges, HARMONISE will utilise semantic data modelling and processing mechanisms. Using machine-understandable and machine-processable descriptions of tools, HARMONISE can provide users with more relevant and personalised content recommendations and search results based on user profiles containing information about a user's preferences, favourite content, and search requests. The semantic technologies facilitate efficient utilisation of large and complex data resources and enable retrieving different types of data with similar search mechanisms.

5. Conclusions

Resilience is likely to remain a political rhetoric of choice for some time to come as city and community leaders seek strategies to cope with future risks and threats. Yet the transition from rhetoric to reality (to implementation in practice), remains somewhat problematic, However, grounded research (such as that being undertaken as part of HARMONISE) can help us better understanding the ambiguities, potentialities and unintended consequences of the resilience concept.

Emerging results from the project clearly demonstrate that whilst an array of tools, practices and processes exist in the field of urban resilience, there is a significant gap in terms of a **holistic overview**. Existing planning, design and engineering approaches as well as the burgeoning field of 'sustainability' combine to provide a confusing and 'opaque' landscape which is further complicated by discipline specific terminology, a 'silo mentality' and a tendency towards short term decision making - exacerbated by political and financial expediency. There are gaps in the provision of tools and the skill sets required to maximise their potential and also gaps in the *knowledge* about available tools. Increasingly, vast quantities of data and knowledge are available, presenting an 'attention conundrum' for policy makers and practitioners, who can struggle to navigate and make coherent choices regarding products, approaches and techniques. There is a need to both expand and focus the knowledge of relevant stakeholders regarding urban resilience matters and to place at their disposal the technological tools now increasingly available to them in their decision making around large scale built infrastructure.

However, technological tools alone cannot enhance the resilience of cities and their associated large scale built infrastructure. Indeed the adoption of these tools will depend, to a large extent, on whether the wider climate or policy environment will allow such investment to take place. Similarly, the use of such resilience tools will require that built environment professionals have received adequate training and education to enable them to extract and recognise their full value.

As such, changing social, political and economic conventions are often as crucial to the success of city resilience initiatives as upgrading physical assets. In order to provide an adequate 'enabling framework' for resilience enhancements, further guidance is needed. Indeed, within the planning and design sphere particularly, many of the identified gaps will require these types of 'soft' tools (at least in the first instance) rather than a range of new technologies. The HARMONISE project aims to provide a platform to facilitate this learning process, to help with 'sense making' in this complex arena and to foster the evolution of a holistic urban resilience concept, uniting the efforts of involved stakeholders and driving an enhanced and integrated urban resilience approach to the planning, design and operation of large scale urban built infrastructure.

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