From community resilience towards urban resilience: exploring the grassroot initiatives' role in cities

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1 Introduction

Climate change and resource scarcity effects pose challenges by themselves. In the context of the complexity of cities, these challenges become wicked and ill-defined as e.g. social-economic issues are added. To face these challenges, a city's resilience on multiple scales has to enable it to both mitigate the causes and adapt to the aforementioned effects. In resilience literature the concept of panarchy connects resilience of multiple scales in a system, e.g. a city, and shows a causal relationship between them: a system is only as resilient as it's sub-systems. Much like a chain being as strong as its weakest link. Despite the panarchy-principle, the complexity of the city thwarts pointing out the effects increasing resilience in a sub-system may have on the scale of the city.

In an era of disruptions so significant that we refer to them in a single-name shorthand (think: 9/11, Katrina, Fukushima, Haiti, Sandy) what gives cities their ability to bounce back? In this study we focus on the social systems in cities, and specifically on grassroots initiatives.

The number of grassroots initiatives (GRI's) has increased tremendously over the last 10 years. Two major groups can be identified: those instigated by an immediate cause, e.g. in the wake of disasters like hurricane Katrina or Sandy, and those dealing with long term goals, such as those that are sustainability driven like the Transition Town movement. The latter GRI's actively shape cities through themes like food growing, insulation of residential buildings , local energy generation, and civil participation.

GRIs operate on the lowest organisational level in cities and form a loose, but potentially large system within the city. The hypothesis of this study is that despite the complexity of cities, GRIs contribute significantly to the social resilience of cities.

To investigate this effect, a good understanding of their role in cities is necessary.

This paper reviews relevant literature and combines them with observations to formulate a framework, within which GRIs can be placed. To test this framework, a first case study is done. Additionally, directions for further research will be discussed.

2 Background

In literature much has been written on climate change related effects, resource scarcity and their effect on cities around the globe. Studies show that climate change causes changing weather patterns and more extreme weather events (e.g. Alley et al., 2007, Knutson et al., 2010), threatens global health (e.g. Costello et al., 2009, Lafferty, 2009), the world's marine ecosystems (e.g. Hoegh-Guldberg & Bruno, 2010). Furthermore it proves difficult to predict the pace of climate change (e.g. Roberts, 2008) and to provide well-grounded scenarios for further climate change and its effects (e.g. Moss et al., 2010).

Reviewing the effects of climate change on cities, the complexity and scale of cities is seen to cause specific issues. Complexity theories of cities (CTC) is a domain of research that portray cities as complex, self-organizing systemic networks. These studies have shown that cities are large-scale collective artefacts, and that cities are dual-complex systems; that is, the city as a whole is a complex system/network and each of its components (the urban agents) is a complex system/network by itself. Their behaviour depends on many factors and when facing a danger, people react in different ways. Complex systems are much more tuneable, and therefore more responsive to subtle variations, but also much more likely to malfunction in situations of macro variation.

Lindley et al. (2006) describe, cities, or con-urbated areas, suffer from specific risks concerning climate change due to 'high concentrations of people and associated infrastructure' dependence. Increasing heat load (urban heat island-effect)(e.g.(McCarthy et al., 2010), drinking water shortages and excess water run off (Gill et al., 2007), high demand on resources (e.g. (Newman et al., 2009), poorly equipped to adapt to change, socio-economic problems, increased health risks (e.g. (Hunt & Watkiss, 2011).

To deal with these challenges, cities are both mitigating the causes and adapting to the aforementioned effects (Hunt & Watkiss, 2011). Through risk-assessments, changes to existing management and planning strategies, current policy is shaped to fit the new demands. Furthermore, there are a multitude of top-down initiatives where climate action is taken outside of regular policy and management. On city government level, an example is the C20 Cities initiative (now C40), started by Ken Livingston in 2005. This is a global organisation, which aims to implement sustainable climate actions locally by stimulating cooperation between cities globally. A similar concept is found in the Sustainable Cities Network, founded in Canada, 1993. Members of this network can be found in Canada, the U.S., Africa, Asia, and Latin America. Their impact lies predominantly in the political field. Cooperation between local government and universities can also be found, for instance the Sustainable Cities Research Institute, Newcastle, founded in 1997, or VEIL in Melbourne

Australia, started in 2007. These institutes undertake research, consultancy and design, and bring local stakeholders, academics, and government together.

At the same time, more and more grassroots initiatives are emerging all over the globe. Initiatives like Guerilla Gardening, amongst others in New York, Copenhagen, London and Rotterdam, planting vegetation at abandoned city sites to improve its spatial quality and liveability, the Transition Town Movement, initiated in Totnes, UK, aiming to drastically lower the energy consumption of the world population, or the Relocalisation initiative in Boulder, Colorado, USA, trying to source more and more products and services from their own locale. These initiatives work on a non-professional basis on issues like decarbonisation of energy, alternative food sources, or lowering environmental impacts of human life. They are becoming more visible in cities due to both organising events and intervening in the physical built environment. In some cities, existing organisations play a vital role in the formation of these infrastructures -- such as Sustainable Enterprise Strategies in Sunderland (UK), which provides support to small businesses and social enterprises in deprived communities, or the Social Media Surgeries in Birmingham (UK), which helps communities understand how social media can help them share resources effectively and create social value.

While each of these initiatives operates on a local scale, a worldwide trend becomes visible. Communities are formed or solidified through sustainable action. This indicates a growing awareness of climate change related issues and willingness to act.

The presence of these grassroots initiatives raises the question how they relate to the complex problems that cities face and what exactly their contribution is. To investigate this, this study approaches the question from two angles. From the field of the built environment we try to understand the nature of cities and the social structures therein, and their interrelationship. From the field of resilience we look for a framework to put the urban problematic, adaptation and mitigation, grassroots initiatives and multiple scale action together. In the following sections this study dives deeper into what the relationship between the physical and social components of cities are and is focussed on how the social components influence the physical components. Next, the role of the social components in the resilience of cities is investigated. Lastly, a framework is presented that combines the findings from literature towards an operationalisation of social resilience of cities and recommendations are made for further research.

3 The city in a social perspective

The last century has witnessed the fastest population growth in human history and the fastest urbanization processes with the result that, for the first time, more than 50% of the world population lives in cities. In Europe, of course, the rates are much higher, for example, in England – over 70%, Germany over 74%, France over 85%, Israel over 95% and in Belgium over 97%. In the Netherlands it is over 83%. This process is still advancing. In order to understand social structures within the city, or urban built environment, it is necessary to investigate and define both independently. Traditional ways of describing the physical urban built environment are myriad. In literature many definitions of scale for cities can be found, ranging from density of residents (e.g. Lahti, 1997 via Niemelä 1999), percentages (e.g. Niemelä, 1999), size of radii or area (e.g. Jong, 1996), or typologies (e.g. Urhahn & Bobic, 2000). Van Timmeren (2006) has compiled a comprehensive overview of relevant scales.

Scale (radius)	Physical form / Experience	Typology
~ 30m / 100m	Residence	'individual space'
~ 100m / 300m	Neighbourhood	'semi-public space'
~ 300m / 1km	(city-) quarter	' collective space'
~ 1km / 3km	Urban area	'the city'
~ 3km / 10km	City and hinterland	'city landscape'
~ 10km / 30km	Urban network	'city region'
~30km / ++	Trans-regional	'inter-regional planning'

Table 1. Overview of levels of scale - after Van Timmeren, 2006

Links of these definitions to communities can be found as well. Communities are often put in the scale of neighbourhoods. However, this place-based definition of communities excludes communities that operate based on ideals and whose activities may range across scales. Examples are for instance internet-communities, operating in a network that has no physical meeting point, or the Transition Town movement, with members from a specific city spread all over that city.

Fig 1. Diagram of tension in built environment. Meijer, 2013

There is an interesting field of tension in the built environment between the physical and the social (fig 1). In this light a framework encompassing both social structures and the physical urban built environment is formulated, transcending spatial rigidity. From Mumford, in his book 'The City in History' (1961), can be found that the city is constructed from the structure of society and therefore its physical manifestation reflects that society's values. Lawrence and Low's definition of the built environment take amore abstract approach, saying the built environment is 'any physical alteration to the natural environment' (Lawrence & Low, 1990). Santamouris (2001) says that 'the built environment is not just the collection of buildings; it is also the physical result of various economic, social and environmental processes, which are strongly related to the standards and needs of society'. Pearce et al. (2003) define it 'as the set of all facilities constructed by humans to meet their needs and aspirations'. Handy (2002) claims that 'The "built environment," as we define it, comprises urban design, land use, and the transportation system, and encompasses patterns of human activity within the physical environment.'

These definitions explicitly name human components within cities, ranging from the physical city being a physical representation of social structures, to human activity within the physical built environment.

Rapoport's approach (Rapoport, 2005) to the built environment is interesting in this respect for several reasons. First of all, he too considers both physical and non-physical elements as parts of the built environment. But he specifically investigates the influence of both the built environment and human behavior and culture on each other, as well as regarding these influences on several scales.

Rapoport identifies the built environment as being constructed of three components: 1) a cultural component, the organization of space, time, meaning, and communication, 2) a physical component, the cultural landscape and 3) a mediator between these two components, a myriad of systems of settings. The built environment is often characterized in a spatial dimension and other aspects are excluded. Time is such an aspect; over time space, its use and its users change. Including and allowing for this change is important. Meaning is attributed to activities and 'function'. It is equally important, since it is a critical element in needs, evaluation and preferences of environments, and many of it characteristics. Meaning helps in communicating cues, activities, rules, appropriate behaviour etc.

The social component of the built environment are broken down to individual elements, that are interrelated. The social built environment is a collection of systems of settings. In a system of setting we know how to behave and how to use it because of norms, rules, standards and expectations that are established in social contracts. These contracts are

based on ideals, schemata, meaning and images, the basic components of the values of society (fig. 2).

The concept of cultural landscape comes from cultural geography. It refers to the results of interaction between human behavior and the 'primeval' landscape over time. The urban built environment is part of the cultural landscape, which is not designed or shaped as a whole, but has evolved through many iterations on all possible levels of scale.

The most concrete conceptualization of the environment is it as a composition of fixed, semi-fixed, and non-fixed elements. Fixed elements are infrastructure, buildings, etc. They change slowly over time and infrequently. Semi-fixed elements are the 'furnishings' of the environment, both interior and exterior. Examples are streetlights, benches, trees, etc. Indoors it means chairs, tables, ornaments, decoration etc. Non-fixed elements are animals and humans, their behavior and attributes like vehicles, hairstyle, clothing. It includes social interaction, communication, and rules systems. In settings cues are given through all elements present, most importantly through the semi- and non-fixed elements. The latter becomes important when the other elements do not provide adequate cues.

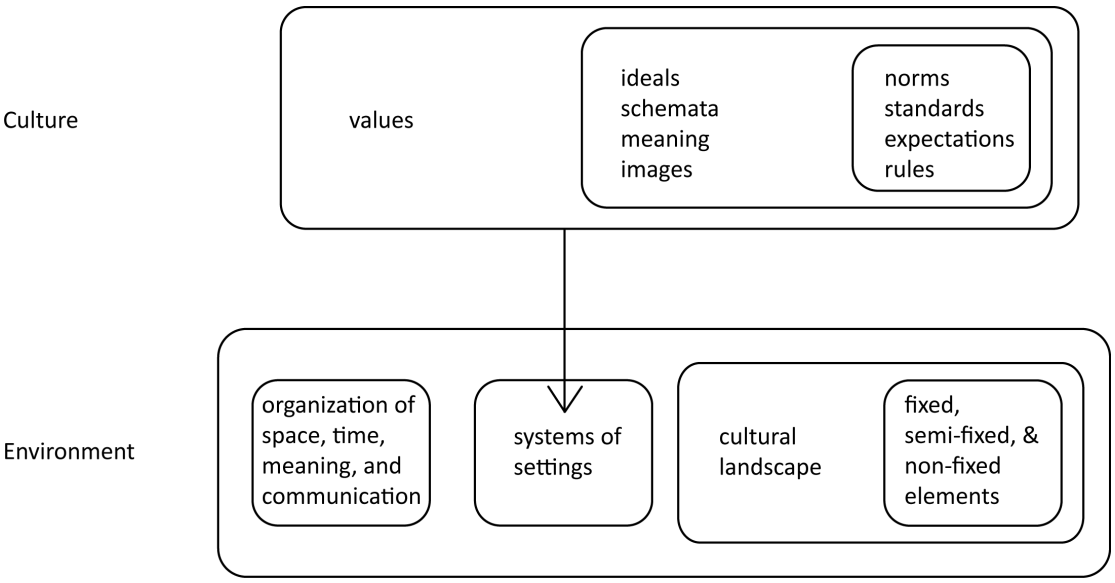

Fig 2. Diagram of Rapoport's model for built environment. Meijer, 2013

This illustrates how immaterial values translate to and transcend physical scales. At this point Rapoport relates social structures to the physical built environment. The importance of these connections lies with the reciprocity in this relationship; the physical built environment is shaped by the social structures on the one hand, the physical built environment on the other

hand invites to act. Rapoport's definition of the built environment is not specifically aimed cities, but includes them.

Rapoport's definition of the built environment can also be extended to define grassroots initiatives. Regarding grassroots initiatives as a specific kind community, this study defines a community as a group of individuals that share common ideals, schemata, meaning and images, expressed and operationalized based on shared norms, rules, standards and expectations.

The definition of grassroots initiatives needs to be more specific in the scope of this study. Seyfan and Smith (2007) discuss 'grassroots innovations' in the context of sustainability and define the term as 'networks of activists and organisations generating novel bottom–up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved'. Following them, the term 'grassroots initiatives', as used in this study, is defined as 'communities of activists and organisations initiating bottom–up action for sustainable development showcasing a willingness to challenge current practices in society'.

Grassroots initiatives are thus an integral part of the cities they operate in, both by being elements of the social structures from which the city has been constructed, and by using and shaping the physical built environment. Now the type of relationship between the city and grassroots initiatives has been established, the paper will look into the nature of this relationship given the context of dealing with climate change related effects with a resilience perspective.

4 Resilience of cities in a social perspective

Different fields have researched resilience and use the term to mean slightly different things. In engineering, for example, resilience generally refers to the degree to which a structure like a bridge or a building can return to a baseline state after being disturbed. In emergency response, it suggests the speed with which critical systems can be restored after an earthquake or a flood. In ecology, it connotes an ecosystem's ability to keep from being irrevocably degraded. In psychology, it signifies the capacity of an individual to deal effectively with potentially traumatic events. In business it's often used to mean putting in place backups (of data and resources) to ensure continuous operation in the face of natural or man-made disaster. Though different in emphasis, each of these definitions rests on one of two essential aspects of resilience: continuity and recovery in the face of rapid change. And, in our volatile age, they're all going to be part of the field we call urban resilience.

How much shock can a system absorb before it transforms into something fundamentally different? That, in a nutshell, is the essence of resilience. A good working definition, particularly in an urban planning context, is: “the ability to maintain core purpose, with integrity, under the widest variety of circumstances. More broadly, it’s the ability to recover, persist or even thrive amid disruption” (Andrew Zolli, in:(Florida, 2012).

4.1 Social resilience

Both the ecological and physical types of resilience often seem to regard the city as a black box. Zooming in on the black box, we can see several scales of social structures, each with their own levels of resilience. Literature points to the necessity of both physical and social resilience.

The issue about all disruptions involving people is that each one is different – and so, while rehearsal and preparedness is hugely helpful, one can never be perfectly prepared. Resilient responses therefore need to be mixing both a formal institutional response and informal, often citizen-led response in an improvisational stew. Godschalk et al. (Godschalk, 2003) propose policies of urban hazard mitigation to create resilient cities against disasters, both natural and technological, tying it in with disaster risk management. A resilient city consists of both communities, including the ‘formal and informal, stable and adhoc human associations’ (Godschalk et al. 2003:2) and the physical systems, which are ‘the constructed and natural environmental components’ (idem). They argue that, although it is logical to focus on a resilient physical system, creating a resilient community is necessary because they create the physical systems.

Important within this context is the question how people behave prior to a crisis.

There are two aspects to this question: one that concerns the daily routines of humans not aware of a possible danger; and another that concerns human behaviour in face of “high risk low probability” events. The latter situations are associated, firstly, with unpredictability and uncontrollability, (Foa et al., 1992) which are among the major causes of fear (a response to a perceptible threat) and anxiety (a response to an abstract danger, e.g. earthquake). Secondly, there are questions of collective action in preparation for and management of crises. This is organised through the institutions or formal government and governance. This is meant in the sense of the wide range of actors in state, market and civil spheres of society at different spatial scales from EU to local that have some influence over policy and decisionmaking (Pierre, 1999), (Dühr, 2010)). Urban governance and particularly the cognitive capabilities of urban planning and design (the ability to think ahead and to act

ahead toward the future) are also an important means to prepare for crisis situations and their cascading effects and improve resilience of cities (Medd & Marvin, 2005).

It is clear that communities in cities are an integral part of its general level of resilience. The requirements of a city to withstand changing circumstances therefore have to be met not only by physical properties of cities, which should be able to adapt. Communities also need to have the ability to act upon change and set in motion the adaption needed in the physical city.

4.2 Social resilience in cities

One way to make cities more resilient is to design in more opportunities for improvised, self-organised responses to occur. And at the same time, it is only by enabling the co-creation of new services by all of the stakeholders within city communities that a citizen-centric approach can be systematically and universally enabled.

A group of studies focusing on the bottom-up approach of resilience in cities. Rudel (2011) puts local 'environmental beneficial actions' into a larger context. Within this approach, one can define a resilient community as helping people self-organize, build greater local self-reliance and care for one another more than they have to. Taking a historical approach he uses Bak's model of 'self-organised criticality' (Bak, 1996)) to show how the emergence of organizations and networks eventually will lead to a state where any small action within it has a network-wide impact and thereby triggering 'major structural changes'. He mentions that it is however 'empirically unlikely' that this will happen without external stimuli, so-called focusing events like famines, hurricanes, etc. He proposed a model of environmental reform, in which all dynamics are visualised. Gotham and Campanella (2011) illustrate the importance of cross-scale interactions for vulnerability and resilience by analysing post-Katrina New Orleans. They define cross-scale interactions as 'communicatory infrastructure through which information, resources, and other forms of capital flow'. Because they do not view urban ecosystems as being either vulnerable or resilience, but being constructed of vulnerable and resilient components they can focus on the interplay between urban ecosystem actors on different scales. They recognise the "possibility that local events and actions [...] can have far-reaching and long lasting consequences".

They point out that cross-scale interaction can have both adaptive and mal-adaptive couplings, much like the concept of social capital can evoke (e.g. Adler & Kwon, (2002). Gotham and Campanella build on the work of Young et al. (2006):309) who say that 'the existence of many interconnections may enhance the robustness or resilience of large-scale [social-ecological systems] by diluting and distributing the impact of strong changes in

individual elements upon other elements of the system'. Or as Florida (2012) states: Among other things, resilient systems sense and respond to their own state and the state of the world around them, compensate or dynamically reorganize themselves in the face of novel shocks, decouple themselves from other fragile systems when necessary, fail gracefully, and have strong local self-sufficiency.

It is clear that social resilience cannot be achieved from either a sole top-down or bottom-up approach. The interaction between these two approaches is necessary to trigger timely and correct action in the face of change. There are plenty of systems that achieve resilience by embracing modularity, interoperability, and a kind of distributed localism. What is necessary is diversity – of scales, and of modes of operation. So, despite the complex nature of cities, it is beneficial for cities to harbour cross-scale interaction. Grassroots initiatives have the potential to embody these cross-scale interactions. Having established how grassroots initiatives can be embedded in social resilience, the question rises how they can influence resilience on a larger scale, the scale of a whole city through the cross-scale interactions.

4.3 Panarchy

These cross-scale interactions strongly relate to the notion of panarchy. Walker et al. (2004) introduced this notion in the debate on resilience, stating that the level of resilience of a system is partly determined by the level of resilience of its subsystems (fig 3.). This can be applied to the levels of scale (fig. 4), discussed earlier in this paper (see overview in table 1).

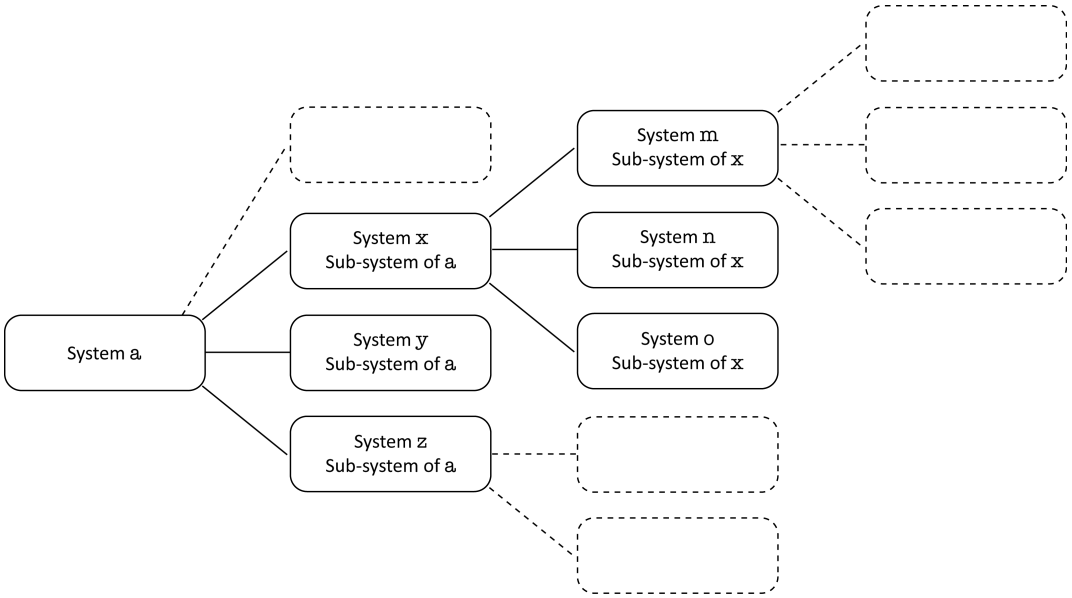

Fig 3. Diagram of panarchy in system a. Meijer, 2013

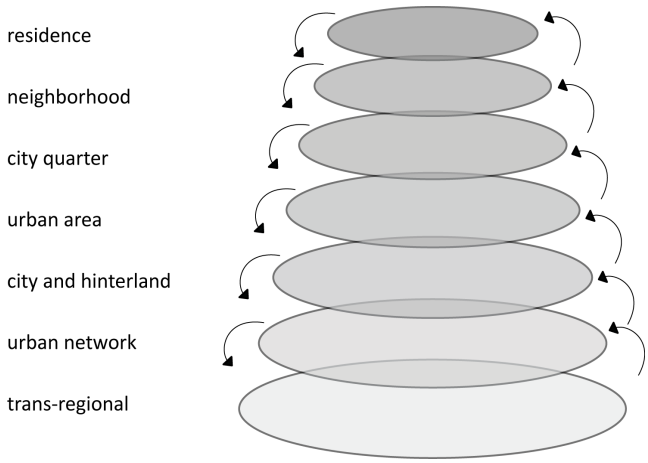

Fig 4. Diagram of panarchy in resilience of the built environment. Meijer, 2013

The panarchy-principle dictates a relationship between all levels of resilience in a system. Bak's model of 'self-organised criticality' tells us that a network may become so tightly packed that a minor change will tip a system over to another state and thus actuating change. By itself this is neither positive nor negative. However, this attribute can be used to the advantage of the impact of GRIs.

Resilience literature provides a framework of attributes of systems that make up the resilience of that system. The graph below illustrates this.

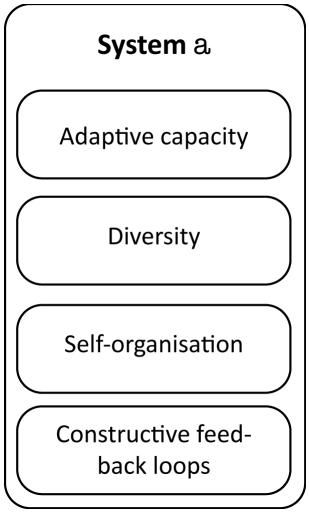

Fig 5. Diagram resilience attributes. Meijer, 2013

When the notion of resilience and panarchy are projected on the social structure of cities, focusing on grassroots initiatives, the question arises how grassroots initiatives (GRIs) should be classified. We identify two viewpoints:

1. The resilience of cities is partly determined by the resilience of GRIs as individual entities (panarchy-principle). In this case, the contribution of GRIs to the resilience of cities is to be measured by its resilience as an organisation.
2. The resilience of cities as determined by its attributes.
    a. Adaptive capacity: this lies with the agents in the city. The nature of these agents can range from city administration officials to GRIs to individual members of the public. Their activity, given time and circumstances, determines how the city 'reacts' to changing circumstances. Their available resources, in turn, determine the range and effectiveness of their activities.
    b. Diversity: the more divers the agents in the city, the more resilient the city will be. It will be better equipped to deal with a wide variety of problems.
    c. Self-organisation: the more agents are able to self- or re-organize themselves in times of need, the more resilient the city will be. When existing organization structures do not suffice in dealing with a given problem, the ability to self-organize succesfully determines the resilience to the given problem.
    d. Constructive feedback loops: when agents in a system get proper feedback on how the system reacts to changes, the system as a whole will be beter capable of responding to changes that threaten the status-quo of the system.

In this light the following can be said concerning GRIs:

Ad a. GRIs are agents in the city. They therefore contribute to the adaptive capacity of the city.

Ad b. The number and range of GRIs contribute to the diversity of actors in the system.

Ad c. The presence of any GRI is a demonstration of the self-organizing capacity in a city.

Ad d. The appearance of GRIs can indicate possible issues arising in a city. Therefore they can be part of feedback loops. The effectiveness of feedbackloops in the city depends on their embeddedness in the network of agents in the city.

On a theoretical level either viewpoint is valid. However, as we indicated earlier, cities need to actively strengthen and harvest the capacity offered by grassroots initiatives. On a practical level it is important to identify a productive approach to achieve this. For this social capital theory and social network theory can offer handholds.

5 Operationalising resilience using social capital and network theories

Literature suggests several ways of increasing resilience using social networks. Kingsley Davis (1963) suggests that cross-scale initiatives directed at a common problem lead to multiphasic response. Liu (2007) concluded that an increase in the extension, intensification, and acceleration of cross-scale interactions can influence pace and trajectory of both post disaster ecoogical and community system recoveries. Also, going back to Rapoport's theory on the built environment, we can see that part of the social aspects indicates are social networks. Social networks are the extension of individual norms, rules, standards and expectations. This is an indication to explore the possibilities of looking at GRIs through a social network lens. We investigate the notion of social networks in social capital literature.

Lin (1999) describes social capital in the context of the notion of capital as it existed before social capital was coined by Putnam. Lin starts at the oldest notion as formulated by Marx, who said that 'capital is part of the surplus value captured by capitalists or the bourgeoisie, who control production means, in the circulations of commodities an monies between the production and consumption processes' (Lin, 1999 from Brewer, 1984).

Lin links the notions of social capital and social networks. This follows from the definition Lin proposes, being 'resources embedded in a social structure which are accessed and/or mobilized in purposive actions' (Lin, 1999) . This definition states that social capital needs a structure, a network of actors to be able to be accessed, implying that the presence of social capital cannot be analysed without taking in regard the social network in which it manifests. Lin goes on to say that 'network location is the key element of identifying social capital' (Lin, 1999). But social capital is not only the existence of social relations and networks: 'it evokes the resources embedded and accessed' (Lin, 1999). This idea is shared by scholars like Flap, who defines social capital as 'a combination of network size, the relational strength, and the resources possessed by those in the network' (Flap, 2002). Portes (1998) adds to that the 'social relations and networks' in the analysis of social capital. Table 2 gives an overview of leading authors in the field defining their views on indicators for social capital.

(Lin, 1982)	Bourdieu	(Burt, 1992)	(Flap, 2002)	Portes (1998)
Resources embedded in social networks	Function of:	Structural holes	Network Size	Social relations
Strength of position	Size of capital	Structural constraints	Relationship strength	Social networks
Strength of tie	Volume of capital		Possessed resources	
	Capital: economic, cultural, symbolic			

Table 2. Overview of social capital indicators, Meijer

The findings from social capital and social network theories allows us to operationalise resilience. To measure social resilience within cities in a climate context, investigating social capital and social networks is used. To apply this approach, a method was developed. In a workshop the ability of capturing social resilience of case in social capital and network concepts was tested.

5.1 Climate resilience method

In our method we take Flap (2002) as a basis and replace possessed resources with Lin's social capital approach of resources embedded in social networks (1982). To measure social resilience, we use the following indicators, juxtaposed to their operationalised counterparts:

Social resilience indicators	Operationalisation
Network Size	- Number of connections - Type of actors
Relationship strength	- Ideological relationship - Activity relationship
Resources embedded in social networks	- Capacities - Activities - Resources

Table 3. Social resilience indicators and operationalisation

These indicators are used to analyse a network. The context of the network has to be taken into account: when gathering data, the indicators are embedded in the subject of the system's resilience. In this case it means that the indicators are embedded in the context of climate resilience in the local urban built environment.

6 Case: the White Rose foundation, Delft, the Netherlands

6.1 Case study setup

To test the method, a case study is done. The question this exploratory case should answer is whether the analysis of a social network in a city can be used as an indicator for the presence of social resilience. The context of the research limits the scope of the social network selection for the case to those networks that operate in the field of sustainability. As described in the previous sections, the focus in the case study lies with the indicators in Table 3. These indicators function as the units of analysis. The methods used are qualitative; the evidence of the case consists of direct observations, film registrations, and documents. This case is a prelude to a series of cases and serves as an experiment.

6.2 The White Rose Foundation

This research is connected to the Livinggreen.eu project[1]. In this context our framework could be tested in the Livinggreen Lab on the theme Climate Resilience. EU-project partner the White Rose Foundation (WRF) hosted the workshop. The WRF is an independent organisation that aims to inspire and support urban residents in choosing sustainable behaviour by presenting sustainability as concretely and challenging as possible. The WRF has a widespread network, including municipality officials, local businesses, sustainability experts, local residents' representative organisations, etc. The WRF is well connected to the Delft sustainability sector.

[1] The Livinggreen.eu project is a Interreg IV-B funded project aimed at stimulating renovation of cultural-historic important buildings. 5 Themes are specifically highlighted, being energy, water, ecomaterials, architectonic values and resilience. One of the actions is the organisation of workshops, so-called Livinggreen Labs. These aim to contribute to the goal of the project by using (elements of) the product design process as researched at the faculty of Industrial Design Engineering of the Delft University of Technology.

6.3 Participants

The foundation's network was invited to participate in the Livinggreen Lab Climate Resilience. Close to 20 participants took part in the Lab. The range of participants was wide: as diverse as policy makers from local municipality and (ex) aldermen, to local entrepreneurs and representatives of local residents.

6.4 Goal and setup

The goal of the workshop is twofold: for our study the workshop yields test results on the use of our framework, for the project the result would be a plan to increase climate resilience by utilising and expanding the local network and its capacities. The setup of the Livinggreen Lab followed the Livinggreen Lab method (Franken et al., 2013), (Meijer et al., 2013), using techniques from the field of design. The workshop was divided in two parts. Part 1 fulfilled the research goals and consisted of three phases: 1) preparation, 2) consolidation, and 3) diverging. The second part fulfilled the project goals and consisted of two phases: 4) converging, and 5) implementation, reflection and adaptation. In the coming paragraphs the phases will be explained.

Phase 1 - Preparation

Prior to the Livinggreen Lab participants are asked to fill out a short questionnaire. This is done for two reasons. Firstly, answering the questions intends to sensitize the participant for the Lab and theme. Initial ideas about the topic can be expressed in the answers. Secondly, it provides us with information about the level of knowledge of the participants on the theme and on their own network, capacities and activities, as well as their wishes or constraints concerning climate resilience. The questionnaires are processed by us prior to the Lab, so the results can be used as a starting point for the three phases during the Livinggreen Lab itself, as described below.

Phase 2 - Consolidation

This and following phases take place during the Lab itself. During this phase the information gathered with the sensitizer is combined to a draft definition of climate resilience. The 'vision' in this phase is a shared definition and understanding of what climate resilience means to the participants in the context of their locale. The participants have a moderated discussion to come to the shared definition.

Phase 3 - Diverging

The participants are asked to discuss the provided analysis of their answers to the sensitizer questions concerning their networks and capacities, and activities. The analyses are presented in the form of visual representations, called mappings (see fig. 6).

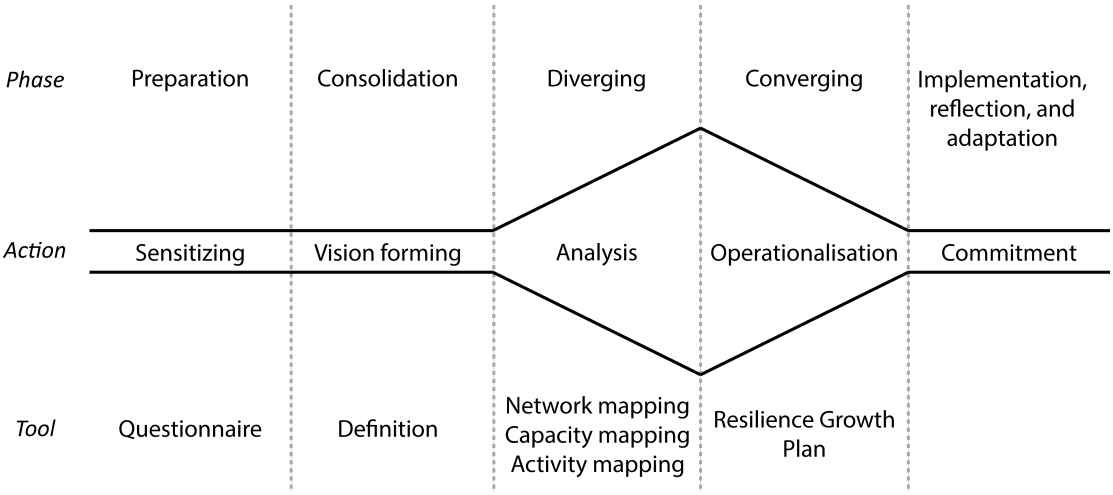

Fig. 6 Workshop process

These mappings are to be checked and completed, or replaced as necessary and to be reviewed in the light of the shared definition on climate resilience. The goal is to see whether the present network, capacities, and activities contributed to reaching or increasing the climate resilience and, if not, to conclude what would be necessary to do so.

Phase 4 - Converging

To operationalise the definition of climate resilience, the participants are asked to create a so-called resilience growth plan. This plan is to represent all actions, capacities and actors, existing or to be created, necessary to increase climate resilience.

Phase 5 - Implementation, reflection and adaptation

Although not part of the Livinggreen Lab itself, the intention and use of the mappings and resilience growth plan is to be used after the Lab, acting as a guide for future action and networking. One of the goals of the Livinggreen Lab being the development of a service, the outcome of this Lab should be revisited after a while, to reflect on what has been done after this Lab and how the courses of action of the participants should alter with the times. To get

an indication of how participants would act in this phase, they are asked to what they would commit doing after the Livinggreen Lab.

7 Results

Phase 2 - Consolidation

The Livinggreen Lab started with a presentation of the draft definition of climate resilience in the context of Delft, in a plenary session. The definition came in two parts: a draft definition based on the sensitizer (illustrated by a Resilience Mapping, fig 7) and a more general definition, following from literature. The definition held much elements of sustainability thinking (such as the triple bottom line, closing loops), which was then coupled to elements from resilience thinking (such as ever changing circumstances, need for adaptation).

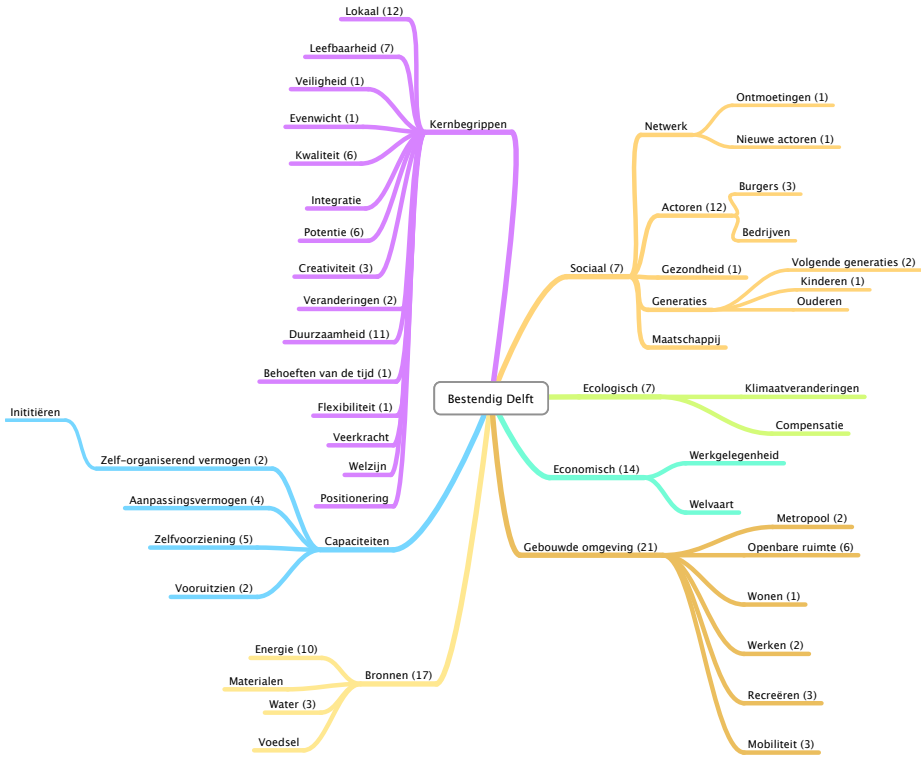

Fig. 7 Resilience Mapping

Phase 3 & 4 - Diverging and converging

After the first phase, having the jointly established definition as common ground to work from, the group was split in two. This ensured a more intimate atmosphere in the group, in which more people are able to actively join the discussions. Furthermore, it makes facilitation easier. Group 1 deviated least from the intended Lab program. Nonetheless, the facilitator, to adjust for what the participants found most interesting or relevant to discuss, followed the flow of the group. This in itself is a demonstration of resilience on a small scale. In group 2, the planned schedule of the Livinggreen Lab was let go very early. Facilitation followed the flow of the group. Before the end of the session 5 concrete topics were picked as most interesting to base a Resilience Growth Plan on. Two of these topics were picked by the facilitators and put to the group to choose from for elaboration in a resilience growth plan.

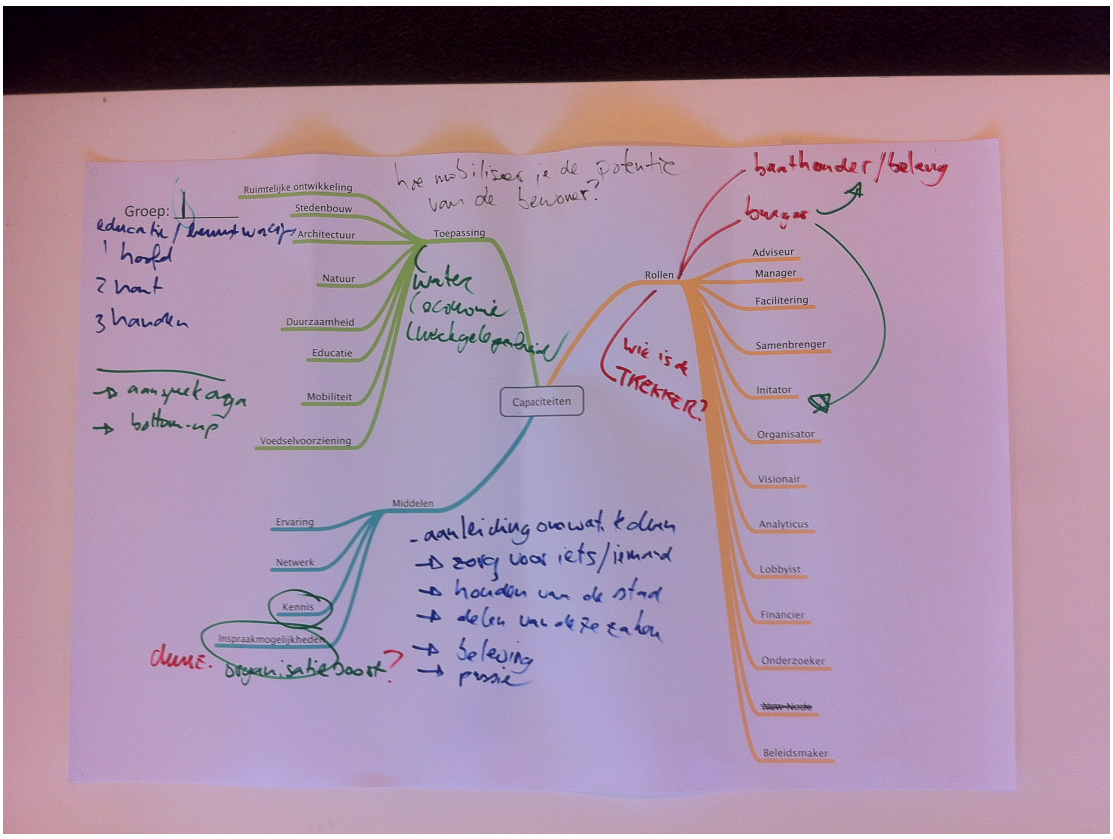

Fig. 8 Capacity Mapping group 1

Phase 5 - Implementation, reflection and adaptation

An important result from the discussion was that the group found agreement on the idea that an environment needs to be created in which people are able to act instead of react. This means that the municipality has to change the way they work, by giving room to initiatives.

And that ‘bottom-up initiators’ have to make use of this space to implement their ideas. This is a cooperative process. Both municipality and bottom-up/grassroots organisations, like the resident’s organisations present, have a role in communicating these possibilities and supporting that ideas are actually put in practice.

Another important outcome was that participants got to know each other and exchanged experiences (practices, knowledge, barriers they encounter). Thus a basis is formed for future contact and cooperation when a common goal is to be achieved.

8 Discussion

The prepared definition of resilience in their own terms was readily accepted, and improved upon with elements traceable in resilience theory in discussion during the workshop. This definition held many elements of both sustainability and resilience thinking. This is a clear indication that the sustainability trend has yielded a thorough understanding of sustainability principles. Surprisingly, many participants, both in the sensitizer and the consolidation phase, contributed important elements to the definition of resilience. It is unclear from where this understanding of resilience comes.

The translation of the concept of social resilience in elements of social capital and networks was underpinned during the discussion on the definition of resilience, as well as during the capacity and resources discussions. As expected, the themes of the discussions revolved around relationships between actors in the local network, rather then on physical or financial resources. The number of connections was not analysed during the workshop. This did not seem to influence the potential for social resilience. An explanantion can be that the gathered participants were already familiar with each other beforehand, through earlier meetings and projects. The type of actors, however, was found important. One type was missing in the network, according to the participants: the citizen. The reason for this was unclear. Participants could not provide a clear solution to bring in the citizen.

The nature of relationships was not adequately mapped. During the workshop, the flow of the program did not allow this particular subject to be dealt with.

The participants indicated that the presentation of the social capital and network mappings and the ensueing discussions were too abstract, because of lack of a concrete case to which the concept of social resilience could be applied.

The workshop as a means to test the framework was hindered by the context of the Livinggreen.eu project. The project provided a good host for the case study, but its goals interfered with the goals of the research. Therefore the results are a mixture of outcomes aimed at the two goals. This contaminates the conclusions that can be drawn.

Operationalising resilience through the use of the concepts of social capital and social network shows promise. The proposed indicators adequately single out the four attributes of resilience within the context of social networks. The mappings that have been made before and adjusted during the workshop illustrate this: network actors' number, type, and diversity, resources, capacities, and activities as part of adaptive capacity and self-organisation are thus documented.

The framework has to be refined further. To that end the intended series of case studies will take place, using different organisations and their respective social networks.

For further application of the framework it is recommended to take a direct approach to social resilience, based on a problem that concerns the participants in a concrete way. This has several benefits. It will create better understanding of and commitment to the workshop itself. The effects of social resilience in a social network context will be better distinguishable, since cause, effect and result of utilizing social network capacities and resources are readily identified.

A more specific result of the workshop should be aimed at. This will be partly achieved by the previous recommendation, but should also be very clearly stated to the participants. This will contribute to the focus of the participants to the workshop and the task at hand.

The findings of this study imply that mapping GRIs through a resilience lens is possible. It gives us insight in the potential of GRIs in a general perspective, and a resilience perspective specifically. It allows us to place GRIs in a larger perspective and shows us how GRIs can be used or stimulated, so urban resilience may be enriched.

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