urban science

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Social Innovation Systems for Building Resilient Communities

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Received: 16 January 2018; Accepted: 31 January 2018; Published: 1 February 2018

Abstract: Social innovation—while not a new practice in itself—has re-emerged since the global financial crisis in 2008 as an approach to solving our collective intractable global challenges. Despite its renewed popularity, there is no common definition for the phenomenon, not least in the context of its application when planning the built environment or civic infrastructures. This paper seeks to position the practice of social innovation as a means for holistic collaboration between disciplines to develop sustainable social ecologies and systems that provide for resilient communities. It tests a hypothesis that social innovation develops over phases (feedback loops)—that of the network, framework and architecture phase—to design for social, environmental and economic resilience. It looks to theories emerging in other subject areas like sociology and technology, that can inform its application in a planning context, such as Actor-Network and Adaptive Complexity theories. It explores the mechanisms that provide for resilience through action research and engagement with a number of international case studies and scenarios. Lastly, the paper identifies further avenues of research pertaining to networks, frameworks and architectures to develop models of best practice for inclusive, sustainable and iterative community development.

Keywords: social innovation; urban planning; networks; frameworks; architectures; social systems; social change; participatory decision making

1. Introduction

Social innovation is an umbrella term for a host of collaborative actions that employ multidisciplinary approaches to solving the great number of challenges facing communities and urban settlements in the twenty-first century. By definition, it is something that comprises multiple actors working in concert. Until now, disciplines have worked in isolation on very niche aspects of these problems, meaning that knowledge and best practice can become siloed. Following the financial crisis in 2008, there has been a greater impetus on resource sharing and collective responses to planning for sustainability and resilience. This paper seeks to understand the parameters of networked social innovation and the opportunities for its application in the context of planning and the built environment. The paper will first explain why social innovation is necessary, introduce social innovation as a design process that aims to increase social, economic and environmental resilience, and then describe a networked model for holistic social transformation of communities as they influence the proposed research methodology. Subsequently, the factors which encourage its incubation, growth and eventual impact of social innovation on community resilience are explored. The main conclusions point to the importance of developing a common vision, purpose and narrative among a diverse group of stakeholders through participatory practice that may unite a community eco-system around a sustainable framework for inclusive development.

One of the strangest dichotomies that arises in the research on social innovation is the fact that, while a social innovation can present a novel solution to a problem or societal challenge, it is not

always adopted, as a status quo might be preferred by more powerful institutions, with environmental, social or economic consequences. Equally, innovation can simply be forgotten over time due to market behaviours or failures in communication or understanding of their value to society. It is no coincidence that the amount of new knowledge and academic literature concerning social innovation is increasing, perhaps as the intensity of urgent global problems grows. Bonneuil and Fressoz [1] argue that humanity is experiencing a 'cognitive dissonance' from existential threats by refusing to accept and acknowledge the gravity of global imbalances. They point out that the introduction of the atomic bomb in the twentieth century allowed humanity to view the world abstractly, as a commodified whole product. This dangerous materialistic individualism, which emerges in the rituals and beliefs of neoliberalism renders us powerless to act, whether as individuals or together. Many modern challenges were identified—and even troubleshot with some success—by previous generations, most notably by the left-leaning Situationists of the 1960s [2]. Social innovations from this period—attitudes to the commons, collective resources and sustainability—were largely discounted until the most recent climate change narrative emerged following the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 [3] and the international agreements on climate change, including the one in Paris in 2015 [4]. What is more worrying today, is that in spite of alerts sounding throughout our world-system feedback loops (hurricanes, earthquakes and typhoons all raising havoc for vulnerable communities), public leaders choose to ignore, or even worse, deny these signs [5], rowing back on internationally-agreed commitments [6] and frameworks for change. Social feedback loops show that the social fabric in the UK (and across the developed world) is collapsing due to non-strategic procurement, non-user-centred social design policies, and deep cuts into public services. In the UK and across the world, rising inequality and job insecurity are impacting household debt, homelessness and mental health [7].

The neoliberal system is broken, meaning that perceived 'growth' no longer brings increases in well-being or life expectancy. Similarly, the financial crash of 2008 was the same alarm bell ringing through the economic system [8]. This is a perilous context, even before exploring the impacts of automation and the related growing social unrest caused by Neoliberalism's prescriptions, resulting in job losses, identity vacuums and migration. What is clear, as the Anthropocene continues, is that the systems—tools, frameworks and policies—that have worked for previous generations are failing. The need to work together across multi-disciplinary networks of diverse talent, experience and expertise is pressing, in order to collectively meet the challenges of the twenty-first century. Monbiot [9] recognises the need for systems-wide transformation of the kind not offered by Social Democracy or Neoliberalism. Monbiot [10] argues that by "reviving community, built around the places in which we live, and by anchoring ourselves, our politics and parts of our economy in the life of this community, we can restore the best aspects of our Nature", and proposes new frameworks for reviving community life: greater participation in decision-making ("returned to the smallest political units that can discharge it") based around the commons, and participatory models of social enterprise.

In order to safeguard the planet's own resilience as an "ecosystem of services" [11] rendered to the world, society must embrace our destiny as humans and "the supreme cooperators" [10]. Therefore, in order to meet collective global challenges, societies should realise the potential for closer, more participatory democracy offered by technology. For the built environment, this is about allowing the public into our professions and working with very disparate professionals and subject experts. The built environment sector has been slow to see the value of technology in allowing for more social innovation in the planning and construction process [12]. So far, the great potential of digital technologies has been limited to the design team, using BIM to allow for real-time collaboration between architects, engineers and contractors. This and public-sector policies that promote lean procurement mean that there are ever-increasing interfaces building up between the designers and eventual users of buildings. If digital innovation is not embraced and adopted in education and practice, there is a danger that another generation of architects will not be able to design buildings that are user-centred or fit-for-purpose.

As a species—in a planetary eco-system—humanity's desire for survival would seem inherent. At every juncture of social development, challenges were met with new forms of association, legal innovation and behavioural change. Although to some degree, rampant individualism means that capacity to absorb current changes may be somewhat diminished. The question is whether the world of policy and governance is able to facilitate the opportunities for social innovation, and whether in the context of the built environment, the same mistakes will be repeated as when unquestioned rationality and straightforwardness—devoid of any humanity—were imposed by urban zoning, practice and order-obsessed planners [13]. Modern architects are allowing a narrow set of criteria or technological algorithms to dictate how and what can be designed, as was done when strict rules and orthodoxies around planning and community development were defined from the late nineteenth century onwards [13].

As revolutionary ideas for community solutions continue to be thwarted [14], often by restrictive boundaries of inflexible planning policy or development incentive, how can technology best provide for holistic social innovation for communities? The power of the network in the context of place-making, supported and energised by technological innovation, is already becoming clear. Organisations such as Opendesk and Wikihouse—incubated within the pioneering socially-innovative architecture practice Architecture 00—are demonstrating distributed models of design, informed by the type of community-led agile development behind Wikipedia and the Linux operating system. A glimpse of Jeremy Rifkin's "zero marginal cost society" [15] is seen in the knowledge exchange that occurs within these and other networks. In his book, Rifkin quotes Eben Moglen, echoed across modern economic literature, who noted that the development of the Linux kernel demonstrated that it was "possible to aggregate collections of programmers, far larger than any commercial manufacturer could afford, joined almost non-hierarchically in a development project ultimately involving one million lines of a computer code", and admitted "a scale of collaboration among geographically dispersed unpaid volunteers previously unimaginable in human history" [16].

Social innovation is required as a response to "an unmet social need" [17], or triggered by an event or crisis. It is closely linked to concepts of sustainability and resilience, and is often seen as a means to develop models, solutions and prototypes that provide for these conditions and support communities to become self-sufficient systems. Increasingly, social innovation is informed by political ecology and theories promoting complex and diverse systems that can adapt and respond to change and challenges [1,18–22]. These challenges fall into three broad areas—the environmental, social and economic—that are nevertheless generally informed by each other through relationships and interdependencies as diverse as life itself. What is constant among these challenges in the twenty-first century is that they have emerged due to a toxic combination of neo-liberal policies and extractive modes of production since the industrial revolution [9,15]. The impact can be seen in rising levels of inequality [9,23], the effects of anthropogenic climate change [1], and a broken and dysfunctional economic model, based on a pseudoscience [24].

We have been here before, in particular some progressive post-war societies of the 1960s were adept at developing new and often co-operative models for creating more equal, often utopian societies [23]. Between the two World Wars, many new forms of government, which had emerged from the upheaval of disintegrating hierarchical European empires, brought socialism and its collective infrastructure. Even before this, the social chaos caused by the industrial revolution itself, colonialism, and the rapid urbanisation of many societies, saw a raft of new social innovation—from the concept of the 'weekend' to the trade union. The benefits of collaboration as a means of problem-solving are well understood [9]. In the last decade, the concept of social innovation has reached maturity, becoming central to policy development and strategic planning for organisations such as the United Nations Development Programme (UNDP) [25] and the European Commission (EC) [26]. Multiple definitions have existed over this period, yet consensus over how to define the practice is emerging.

Social innovation, as a concept has been defined in a number of different ways, emanating from a number of different disciplines such as social science and information technology. This is perhaps due

to the fact that, as Moulaert [27] writes, "it forces us to bypass the delimitations between problems and fields of knowledge or practice" because social innovation "is never 'purely scientific', but is always about human development ambitions as represented by a diversity of social actors and individuals". Owing to the holistic nature of this inter-disciplinarity, there can be many, sometimes conflicting, definitions for social innovation. Moulaert [27] surmises that, broadly-speaking, "when we talk about social innovation we refer to finding acceptable progressive solutions for a range of problems" and therefore takes social innovation to mean, "fostering inclusion and well-being through improving social relations and empowerment processes: imagining and pursuing a world, a nation, a region, a locality, a community that would grant universal rights and be more socially inclusive". In this regard, we must recognise many collective actions that benefit and advance an equal society to be social innovation and not only novel architecture(s)/solutions or systems, but also frameworks, policies and behaviors.

In the UK, organisations such as the innovation foundation Nesta [28] and The Young Foundation [29] have supported pioneers in the field of social innovation, like Indy Johar and other architects who have all been part of a community of practice which has begun to coalesce around a common understanding of the potential and impact of social innovation, and in particular what it may mean for a more participatory process in place-making. Anecdotally at least, it would appear that architects are well represented in the field of social innovation, partly due to the timing of the recession and its impact on built environment professions, and partly due to a uniquely transferable skillset. Johar [30] laments the fact that "institutional renewal for society has not materialised out of the social innovation field so far". Until now, social innovation has been concerned about "tinkering and fixing at the very edges", and has not brought about the type of wholesale systems change that prevailing global challenges call out for. Johar [30] believes that we need to "rewrite the models of change", moving from a position that is "sector focused to place focused".

As a profession, architecture has lost its social contract with the general public through decades of opaque partnerships with developers and the market [31]. Many of our great challenges—those of housing, homelessness and community displacement—are direct outcomes of the failure of the profession to affect public policy. This paper is a first step to identifying the pathways through which the built environment professions can most effectively participate in social innovation collaborations, and steward social value into resilient communities through responsive civic infrastructure and architectures. "Architecture" is defined as "the complex or carefully designed structure of something" [32], not only of the physical architecture of the built environment, but also of emerging non-physical architectures such as online portals, community platforms and digital experiences. This double meaning for architecture, to convey non-physical structures and concepts, is evidence of the commonalities in designing for physical or digital spatial experiences, and to new frontiers for the profession to address.

2. Social Innovation

2.1. Social Innovation as a Design Process

The first section of this paper looks at the history of social innovation as a collaborative approach to problem-solving, and proposes how it can be cultivated for architectural practice. Social innovation is increasingly seen as a panacea to solving our most complex global challenges, after a hiatus of some fifty to seventy years. The type of socialist thinking that accompanied the French New Wave and other movements in the sixties [33] has re-emerged in the twenty-first century, in our reimagining of the commons [15], and of general social value [9]. Disruptive innovation and game-changing business models—distributed across networks, where supply and demand are calculated using real-time data—means that the world's most dominant mobility firm Uber owns no cars, and the world's most successful hotelier Air BnB holds no accommodation [34]. These new models of commerce are taking us closer to what Rifkin [15] calls "the zero marginal cost society" where, as the cost of production falls

towards zero, products (and in the case of digital products we are already there) cost virtually nothing to produce. We are already seeing the impact of these and other technologies on how we collaborate in the design and planning of our built environment. Building Information Management (BIM) and concepts such as "Building as a Service" are changing how physical architecture is perceived, and how buildings are designed for adaptability and sustainability. Above all, new business processes (coming from the world of technology), software development and information architecture—whose vernacular language shares much with the concepts and theories of physical architecture and the design of buildings—are allowing for more agile and iterative design practice, increasingly participatory and inclusive of numerous stakeholders and viewpoints. Social technologies [35] are allowing us to connect better in both engagement and practice, helping open social innovation to spread, and ultimately building resilience for a community.

2.1.1. Community Resilience

The failures of our existing social infrastructure to safeguard and provide for community resilience are the focus of this section. Missimer et al. [36] point out that the definition of resilience, provided by Walker et al. [37] as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks" has expanded to encompass "adaptability and sometimes even transformability", two additional capacities suggested by Folke et al. [19]. Jung similarly defines community resilience as "a set of adaptive capacities that focus on resource mobilisation and facilitate successful adaptation to unpredictable adversities" [38]. It is widely understood that community resilience entails "Robustness, Rapidity, Resourcefulness and Redundancy" [39–41]. Increasingly, this also includes developing the tools and capacities within the community that can develop new responses to new challenges as they emerge. This has meant identifying historical patterns of innovation—to understand economic waves of growth—and the impact that the resulting social change may have had on individual societies and communities. Impacts on community resilience are manifest in three broad arenas—the environmental, social and economic—meaning that to get a holistic view of the global problem, these aspects need to be considered together.

2.1.2. Environmental Resilience

In the late twentieth century, the impacts of anthropogenic climate change resulting from policies that maintain dysfunctional economic systems [1] have brought about numerous environmental catastrophes, death and displacement. Hopkins [41] points to a core set of environmental researchers who agree that collaborative multidisciplinary practice across a wide set of subject areas—and only made possible by new technologies—can provide new mechanisms for decision-making around our environment [41] that will reduce the alarming rate of material degradation [42]. Bonneuil and Fressoz [1] refer to the work of Hardin, who has estimated "the monetary value of services rendered annually by nature on the planetary level" at "between $16 trillion and $54 billion dollars or the same order of magnitude as global GDP" [43]. Bonneuil and Fressoz [1] echo Mason [8] and Monbiot [9] in calling for an ecology-led approach to development to enable understanding of our planet's complex ecosystems and their processes. This allows for the design of sophisticated social infrastructures—comprising many actors and agents working in unison to iteratively improve and repair the environment—empowered by cutting-edge technology in distributed systems [15], information networks [15] and feedback loops [9].

2.1.3. Social Resilience

While much has been written in the last few years about environmental sustainability and resilience [1,9,41], we are still some way from a consensus around what constitutes social sustainability—ultimately measured through metrics such as the Gini coefficient or Happiness Indices [44]. Following the financial crash in 2008, Pickett and Wilkinson [23] have indicated that while

economic 'growth' has persisted, it has not delivered any increase in the quality of life for citizens of developed countries, with inequality leading to an increase in mortality rates in some areas of the USA. Understanding what constitutes the "social resilience" of a community, and what barriers—such as inequality and non-participation—may be impediments to achieving this, are key to planning adequate interventions. Sennett [45] emphasises the need for coordinated collective actions as the means to emancipate societies from the increasingly detrimental effects of unchecked neo-liberal capitalism.

2.1.4. Economic Resilience

There is a steadily growing criticism of prevailing economic models and modes of production that have put the world in a precarious position of continuous growth for growth's sake, while ignoring the catastrophic effect this is having on our planetary fabric, our mental and general health and socio-democratic systems. Orrell [46] joins Earle et al. [24] in exposing the failures of economic theory, and leads to questioning the capacity of our current economic model to provide for inclusive economic resilience. "Economics affects everyone, sometimes painfully so", and according to Earle et al. [24] "economists and their frameworks have been unable to help societies address some of their most important problems". Orrell [46] claims that the behaviours of the economy can be predicted with no greater accuracy than the weather, and is understood to the degree that we understand the workings of clouds (not very much). However, "the economy has more in common with a living organism than it does with a machine". Again, this line of inquiry points to concepts of complexity science—which view economic systems as complex ecologies of interdependent relationships—being more appropriate tools in understanding the opportunities for redesign and strengthening resilience. The Club of Rome models of degrowth in the 1970's [47] initiated subsequent criticism of growth for growth's sake at the peak of the industrial revolution [1].

2.2. A Networked Model for Holistic Social Transformation

Moulaert [27] writes how "innovation often emerges from conflict: opportunity spaces at micro scales may make creative strategies possible at macro scales". This hypothesis informs the research approach of my investigation, that networks, frameworks and architectures can be viewed as phases of the design process. The investigation proposes that social innovation occurs through these three distinct development phases, those of the network, framework and architecture development.

1. The network phase occurs on the ground, brought about by the collective action of a group or a community around a shared mutual objective for transformation.
2. The framework phase encompasses the policy and the structures that may enable sustainable community (renewal) transformation to take place.
3. The architecture phase entails socially innovative solutions and civic infrastructure are manifest within our (digital and) built environment to provide for community resilience.

In the context of the research, the following definitions are proposed:

Network—A group or system of interconnected people or things [48]
Framework—A basic structure underlying a system, concept, or text [49]
Architecture—The complex or carefully designed structure of something [32].

2.2.1. Networks

Over the last decade, as the capacity for social networking—improved by new technologies, platforms and infrastructures—has grown, the value of networks in driving and supporting innovation has been well-documented. Recent studies looking at self-organised collaboration networks in South Korea [38], as well as global alliances of cities and local governments [50], have shown that strong connections between social actors and consistent channels of knowledge transfer across networks are core to building resilience. Jung [38] identifies two general network structures to explain the

social positions of local actors: bonding and bridging structures, which have been tested in the field by Andrew and Carr [51]. More work is required to understand the value of these structures in practice. The work of Latour [52] around Actor Network Theory, and Sloterdijk's philosophical work [53] will inform a more detailed understanding of networks, their behaviours and characteristics, in subsequent research.

2.2.2. Frameworks and Architectures

Since much of the most valuable research points to taking a whole systems approach—informed by concepts of environmental, political and social ecology—the next part of the analysis will look at models, frameworks and policies that engage a wide set of stakeholders into a mutually-beneficial co-design process. The importance of this participatory approach is emphasised by Mason [8] and Monbiot [10], acquiring for the community an "embodied social knowledge" [45] as an important feature in developing capacities for resilience. As the research evolves, the success of the 'settlement houses' [45] in the USA of the twentieth century and communal architectures such as the Soviet social condenser, on which several new papers have recently been published by Murawski and Rendell [54], will be analysed. Besides the capitalist and communist systems—their frameworks and architectures—the decentralised Gaelic system in Ireland [55,56] and new and emerging systems and approaches, arising in Barcelona [57] and elsewhere, will be studied. This research will draw on insights developed in other sectors and knowledge areas in order to identify best practice from outside the realm of the built environment. Knowledge exchange between disciplines, and collective decision-making based on a large variety of data sources and opinions, are key to developing more strategic plans for growth and development [50].

2.3. Research Aim, Objectives and Methodology

2.3.1. Research Aim and Objectives

The research aim is to increase the understanding of social innovation and its potential application within the built environment, and specifically around planning for more resilient communities and urban settlements. In particular, this means testing the hypothesis that social innovation occurs at different scales, in order to understand the ways in which these scales impact and inform each other.

The first objective is to investigate how sustainable networks, frameworks and solutions are spun out to impact other communities. Part of this is to understand how social innovation provokes patterns and behaviours away from traditional (sectored and siloed) ways of working, towards holistic and place-based approaches to development. In order to increase the understanding of social innovation—both as practice and as an approach to problem solving—and its application in the context of the built environment, it will be important to engage with its leading protagonists. This includes working with pioneers within the profession of architecture and planning who are already working in this nuanced way to understand the changing shape of practice. Unsurprisingly, the success of collectives such as Assemble Studio demonstrate that architects can be at the forefront of socially innovative practice, in spite of the ever-present failure of the wider profession to address inequalities manifest through the built environment. This research will identify case studies and international best practice, where architects are collaborating in diverse non-traditional teams informed by deep ethnographic engagement and engagement tools [58–61].

The second objective is to investigate the changing roles and responsibilities of the architect as social actor and community advocate, and the need to wear several different hats or perform somewhat contradictory roles within a change network. This research will indicate what it means to be an architect in the twenty-first century by analysing the hybrid roles or blurred professionalisms that are emerging within the context of socially innovative practice, and what that might mean for architectural education, skills and capacity-building going forward. Is the architect well-placed to take

on roles of project management, stewardship or client in this new world, and how can the profession clearly demonstrate a value to modern society?

The third objective is to better understand, evaluate and identify best practice from scenarios where networks, frameworks and architectures are taking a clear place-based approach to designing holistic plans and inclusive growth strategies that connect up physical and social outcomes. Local authorities, such as Helsinki [62], are joining up built-environment and community planning functions as a pathway to ensuring sustainability and resilience for their communities, developing a common language, and aligning multiple agencies and partners across their network toward more measurable shared outcomes.

2.3.2. Research Methodology

As much as possible, action research will be used, engaging directly with projects, communities and challenging contexts to test theory in the field. "Action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities" [63]. The action research approach will be appraised through peer review, supported by dedicated engagement with the architectural profession and their collaborators, and by opening up a dialogue in workshops, symposia and participatory practice on live projects that feature in the case studies.

The overarching enquiry model will examine three key aspects of social innovation: network (transformation), framework (policy) and architecture (solutions) to understand a model for social innovation—a trajectory, processes and the interfaces between each scale and how they inform project development. This will be done by identifying a series of case studies—in environmental, social and economic areas—at each scale, and engaging project actors through workshops, surveys and participation through consultancy or skills transfer. This will help to identify commonalities and shared processes across a number of scenarios, helping to understand touchpoints, key milestones, phases and stages over the course of a socially innovative project or action.

The research to date has focused on the smallest, network scale, and has identified three scenarios on which to focus, engage and conduct research:

1. Environmental—Christchurch, Canterbury, New Zealand
2. Social—Glasgow, Scotland and Dublin, Ireland
3. Economic—Recife, PE, Brazil

Later in the course of research, a survey questionnaire will be designed, looking at aspects of "Robustness, Rapidity, Resourcefulness and Redundancy", as mentioned by Jung [38], and referring to the work of Bruneau et al. [39] and Norris et al. [40] with respect to networks. This will then be circulated to a number of selected community networks.

As the research is conducted through practice—by interacting with real-world projects, sharing knowledge and engaging through consultancy and shadowing—it has the potential to not only build a network of social innovators but expand the capacity of others to work in this more open and collaborative way. As research progresses to examine social innovation at the framework scale, the focus will be on policy and support infrastructures in scenarios such as:

- Environmental—Transition movements or post-conflict contexts, for example, Ireland
- Social—Social Condensers (of the USSR), Moscow, Russia
- Economic—Settlement Houses for ex-slaves, Chicago, USA

3. Initial Findings of Action Research

This section of the paper presents initial findings on social innovation networks based on engagement-led investigation.

3.1. Networks

As evidenced through literature review, there is a clear consensus among academics on the value of networks for social innovation in the context of planning [50,64,65]. Rifkin [15] recognises their value in transitioning to a new economic system, built around the Commons and references the work of Benkler, who states that in order "to flourish, a networked information economy rich in social production practices requires a core common infrastructure, a set of resources necessary for information production and exchange that are open for all to use" [66]. The research has identified three types of networks, each responding (not exclusively) to an overarching need or challenge—environmental, social or economic—and has selected relevant case studies for each of these.

3.1.1. Environmental Networks—Christchurch, Canterbury, New Zealand

Two earthquakes of magnitude 7.1 and 6.3 hit this area in 2010 and in 2011 respectively. 80% of buildings in the Central Business district were damaged beyond repair, with a demolition cost of around $1.5 billion [67]. The cost of rebuilding has been estimated at around $30 billion, with additional costs such as business interruption, inflation, new standards, etc. Five years on, the research investigates how social innovation in the built environment influenced strategies for a resilient, regenerated Christchurch. The interviews were conducted in Christchurch in April 2017 to understand the engagement around the resilience context of the Canterbury earthquakes. Through interviews and mapping exercises, it was possible to comprehend how the networks built up around a pressing need, i.e., the consequences of the earthquake.

A number of interviewees were selected through engagement with key local stakeholders—architects, historians, social scientists and community organisers from organisations such as Studio Christchurch, Ministry of Awesome, FESTA, Regenerate Christchurch, Otakaro Orchard and OHU. Each interview followed a predefined structure encompassing a core set of questions, which were put to each stakeholder identified among the ecosystem working to regenerate the city. Initial questions focused on the motivations for collaboration—almost all respondents highlighted the need for building connections between the 2011 Canterbury earthquake survivors as a support mechanism for dealing with the trauma in addition to pooling resources and developing recovery strategies. Respondents were asked about the shape of the network, what members and professional capabilities it contained, and how forms of governance emerged to strengthen the network as a result of their conversations with the local authority and other state agencies. The next set of questions focused on the social innovation that emerged from the collaboration—the ideas matrix, projects and prototypes, how they were tested and evaluated, and what challenges they faced in realising more sustainable implementation of these prototypes within the wider community in Christchurch. Lastly, questions were put to respondents around the barriers to participatory collaboration, co-design and working with more traditional processes in the public sector, how to overcome challenges and the ideal delivery mechanisms for regeneration. Questions were also asked around the legacy of the network and how successful it is in enacting change.

The interviews indicated the resulting social innovation, technology, new models for change, governance and transformation that emerged, along with the challenges that the networks have faced and how they are impacting strategies for renewal and redevelopment [68].

The most important lesson from Christchurch is the value of prototyping—through agile and flexible programmes, "meanwhile" uses and temporary structures—in developing new and socially innovative physical architecture. The legacy of the Festival of Transitional Architecture (FESTA) [69], now a biennial event creating a collective positive experience for the people of Christchurch and

visitors) in developing a culture of prototyping in the city is well documented [70]. Organisations such as Gap Fillers [71] and the Ministry of Awesome (built up to support new models of social enterprise and entrepreneurship) have crystallised into profit-making stand-alone agencies with delivery contracts for the local authority. One of the most interesting aspect of what has emerged in Christchurch is the establishment of a dedicated strategic layer, Regenerate Christchurch, to sit between the local authority and regional government, and acting independently to reduce barriers and bottlenecks in delivery caused by restrictive planning policy. Senior architects have migrated from Christchurch Council into this new entity in order to effect change and bring projects to fruition. As part of this, a new programme of community engagement and participatory design has begun [72], which is focused on developing solutions for the Red Zone (a large, residential area of Christchurch which experienced intense damage and liquefaction in the 2011 earthquakes).

Socially innovative projects, which would otherwise find it difficult to be accommodated under older planning policies (such as Otakaro Orchard, a local food resilience movement), are to be accommodated within the Red Zone. The social ecology of the food resilience network, and its resultant ethos (value system) around incremental development, connecting the right actors and ingredients to develop a complex interdependent ecosystem, is an important driver of these projects. Openness, transparency and a dialogue with stakeholders ensure that strategy is continuously improved upon through established communication channels and feedback loops. More importantly, it is through the process of socially-innovative regeneration itself that the skills are acquired among the community to truly enact change. The newly established community-practice Ohu Development [73] defines its purpose: to 'build communities by building buildings' by enabling communities to develop assets which will financially strengthen their organisation. One negative aspect, however, is the time it has taken to build up the right capacities and establish a culture of social innovation, where actors can make a positive change and profoundly shift some of the fundamental institutions that remain steadfast in the way of innovation. McCrone asked whether Christchurch had missed its chance to develop a truly socially innovative, user-centric infrastructure for the twenty-first century, and instead, burdened by lack-of-vision and bureaucracy, as a community representative put it, "rushed to build the last version of a 20th Century city ever to be constructed" [74]. Going forward, further engagement with these networks is planned through a survey to better understand behaviours and performance.

3.1.2. Social Networks—Glasgow, Scotland and Dublin, Ireland

Dublin and Glasgow are two post-industrial centres, with historically large port communities, a shared history and generational social challenges. Both are experiencing rapid growth and change, with many communities feeling left behind. In the Dublin docklands, growth and regeneration have negatively impacted indigenous communities and have acted as barriers to social mobility and wealth distribution [75,76]. The research is undertaken through direct involvement in a number of projects in these areas that seek to improve social outcomes for communities through network-based collaboration. This includes work to establish the Dublin Docklands Cultural Network to manage a collective vision for change in that place. This work entailed designing and conducting strategy workshops to define the scope of the network, broad thematic areas and their audiences. The network was invited to represent community and cultural stakeholders on the Docklands Oversight and Consultative Forum [77], which advises Dublin City Council and their strategic policy committees on proposals for the Dublin Docklands Area. Work is ongoing on the next stage of engagement to solidify the network through a web-based platform and target partnerships and events. The network is an important stakeholder in several projects looking to develop built assets in the area through the regeneration of the existing fabric. Advocacy organisations or groups that constitute social innovation networks in Dublin (Dublin Docklands Cultural Network, GAA and Innovate Dublin) and Glasgow (Chamber of Commerce, Glasgow Social Enterprise Network) will be engaged through the network survey.

Considering that a social network needs to be supported by infrastructure, start-up accelerators (programmes to support new business formation), policy, business models, forms of association,

new roles and partnerships, a coherent brand or presence within the community and prescribed audiences, an established ecosystem to support social innovation, participatory dialogue and social enterprise must be in place in order to allow communities to take advantage of existing government supports. In Dublin, this is currently being put in place, and can be advantageous where communities need to demonstrate robustness and capacity in conversation with private developers, government agencies and other stakeholders [78,79]. The work of the Transition Town movement—which inspired network-building in the form of Transition Linlithgow [80], in a town between Glasgow and Edinburgh—is an important precedence here.

As research in these contexts is looking at early stage network formation, it was felt that it would not be beneficial to evaluate the outputs of socially innovative actions of these communities at this time. Future research will put the same set of questions asked in Recife and Christchurch to stakeholders within these ecosystems.

3.1.3. Economic Networks—Porto Digital Network in Recife, PE, Brazil

In Recife (in the state of Pernambuco), Porto Digital emerged out of a need to respond to a brain drain, where local authorities were facing challenges to retain a highly educated set of technology graduates [81]. A distributed technology park, dotted within a set of previously decaying colonial port buildings, has emerged as a thriving creative ecosystem for entrepreneurs, impacting public policy and development strategy through a bike scheme and other socially innovative actions [82]. Porto Digital has an international reputation, both as a network for innovation and as a widely praised mechanism for regenerating post-industrial communities [83].

During interviews with two key stakeholders from Porto Digital, their strategy and business liaison officers who created the innovative ecosystem there, respondents were asked to outline the context of need for social innovation in the city of Recife and what drove the establishment of the Porto Digital network. Both respondents pointed to the economic challenge of brain drain and the impact it was having on wealth creation and urban development. The next set of questions pertained to how the network was formed, its shape and governance structure and how it worked with partners in the private sector and the local authority. The organic nature of development, was emphasized here, where technology startups were grown in the Recife Center for Advanced Studies and Systems (CeSAR) business incubator, and allocated a specifically renovated building as their needs and spatial requirements grew. A final set of questions was put around the social impact and legacy of Porto Digital, in terms of both the local community and its role in inputting into strategic urban development with local government—both of the city of Recife and the State of Pernambuco—through the establishment of Agência Recife para Inovação e Estratégia (ARIES), a strategic planning spinout. The holistic—and strategically phased—and responsive development model, which was born at Porto Digital has inspired regeneration strategies for elsewhere in the city and surrounding region [84]. An economic network needs to be united around a common vision, and an agreed set of measurable outcomes or impacts for the place and community. In the case of Porto Digital, the impacts of graduates leaving the city for jobs in Sao Paulo, alongside issues of crime and public safety, came together to provide an impetus for a diverse cross-sector cohort to work together [83].

4. Conclusions

As the research evolves, the characteristics of impactful networks—and what this means for community-led holistic planning practice—will be identified. The discussion continues in Christchurch as to whether opportunities have been missed in designing the regenerated city to build on the engagement at the grassroots level, and build sustainable modern social infrastructure agile enough to promote resilience and inclusive growth. In establishing Regenerate Christchurch, the government has gone some way in providing a mechanism for transformation outside of the current regional/local government structures. Looking past the network to the next scale, that which enables innovation to flourish and can provide a policy context for social innovation in the built environment, the next

phases of the research will focus on the framework. Case studies will be provided to illustrate where policy frameworks and innovative systems or mechanisms have allowed communities to make more democratic planning decisions. All over the world, communities are hosting pilots and prototype projects around concepts such as Universal Basic Income, Circular Economy [85] and cooperative models for social housing and social enterprise [86]. Finally, the research will look to communities that have developed sophisticated networks and policy instruments to underpin inclusive growth, and to the resulting plans, strategies and physical architecture being developed by them, as well as the supporting social service infrastructure.

Future research will be guided by common themes such as examining in more detail the ecological—and therefore holistic—approaches to planning, and coordinated or collective collaborative actions by multiple agencies in expert-led problem solving. The next stage of the research will look at these approaches alongside others, manifest as policy or programme. Many governance systems do not yet allow for multi-agency decision-making or even participatory processes of citizen engagement, the radical nature of which is called for in pursuing place-based social innovation. Following on from the research into networks, the research focus will be on identifying socially transformative frameworks and policy innovation from local and international examples. This will include work to understand how agile and iterative design or development frameworks from others sectors (namely Technology) may be accommodated in planning and decision-making for the built environment.

Acknowledgments: PhD studentship has been provided by the University of Strathclyde and Building Research Establishment Trust. The author would like to thank interviewees who participated in the research to date.

Author Contributions: This paper has been written by Donagh Horgan with supervision by Branka Dimitrijević.

Conflicts of Interest: The authors declare no conflict of interest.

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