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Social innovation and temporary innovations systems (TIS): insights from nature-based solutions in Europe

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Abstract

Purpose – The purpose of this paper is to examine the applicability of the complexity-based temporary innovation system (TIS) framework to social innovation and examine the extent to which "nature-based solution" (NBS) projects may be understood through a TIS lens. It is proposed that TIS provides a framework to facilitate multi-actor engagement in social innovation responses to the complexity of wicked problems? The goal is to explore if TIS provides a useful framework for understanding the evolution of social innovation projects and enabling more consciously designed and facilitated social innovation with the potential for large-scale, long-term impact.

Design/methodology/approach – The research uses a case study methodology in which 10 NBS projects in 3 European cities are examined and compared to the expected features of a TIS as proposed by anonymised for the review process (2018; 2019)

Findings – Of the 10 NBS projects, only 3 were "TIS-like", each of which was targeting wicked problems in the city/community. As only one of the remaining 7 projects was aimed at a wicked problem, the authors concluded that the TIS framework may be best suited to those social innovations that address one or more wicked problems and that NBS projects may not display this feature.

Research limitations/implications – The authors conclude with a reflection on theoretical insights arising from applying the TIS framework to NBS in particular, and social innovation generally – and proposes the next steps in developing the TIS framework in relation to social innovation.

Originality/value – This paper applies a new complexity framework to empirical data that have not been examined previously. This analysis contributes to the development of a new framework for designing and analysing complex social innovation initiatives and challenges existing theories presenting NBSs as addressing complex "wicked" problems.

Keywords Complexity, Social innovation, Nature-based solutions, Temporary innovation system

Paper type Research paper

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Introduction

Social innovation as a concept – and indeed as an activity – has been around for a long time but is nevertheless still subject to the debate around its meaning and its practice (Seelos and Mair, 2012; Mouleart *et al.*, 2017). Definitions of social innovation generally coalesce around the idea of an organised process involving the generation of ideas applied to meeting social needs or solving social problems and more often than not incorporate the creation of new relationships amongst multiple actors into this process (Murray *et al.*, 2010; Nicholls and Murdock, 2012; TEPSIE, 2014; Mouleart *et al.*, 2017). It is this combination of idea generation and multi-actor relationships that first led us to wonder about the potential for complex systems theory in explaining the evolution of social innovation activities and the relationships amongst individuals and organisations that engage in them. In the Trinity Centre for Social Innovation (CSI) [1] scholars and practitioners have been working together on research, engagement and teaching of social innovation through a lens of institutional evolution, management practice and complex systems over the past several years (*anonymised for review process* 2018, 2019) and the study reported here is a product of this collaboration.

Beyond the CSI, scholars and practitioners are increasingly examining the potential of systems perspectives for generating insights and influencing practice in the area of social innovation and social enterprise (Senge *et al.*, 2015; Trivedi and Misra, 2015; Kirsch *et al.*, 2016; Schwab Foundation and Bertha Centre for Social Innovation and Entrepreneurship, 2017), largely relating to the scaling of social innovations to achieve greater impact and the need to engage with "wicked problems" (Rittel and Webber, 1973; Peters, 2017). What we are interested in is how complex systems theory may inform the *initial* interventions by social innovators and entrepreneurs seeking to address social needs under circumstances in which the involvement of *multiple actors* is necessary from the outset. In undertaking this research, we hope to contribute to institutional theories of social innovation and eventually to enable more productive collaboration amongst stakeholders across organisational boundaries, recognising that "social innovation doesn't have fixed boundaries [and] [. . .] much of the most creative action is happening at the boundaries between sectors (Murray *et al.*, 2010, p. 3)". Our belief is that the conditions for the successful creation of social value at scale may be identified by studying cases in which a range of actors are involved from the start, tied together by mutual interests and interdependencies but with sufficient differences in perspectives and resources to enable innovation to emerge and thrive.

There is any number of complex systems "lenses" through which to study the examples of multi-actor social innovations and in this paper, we make the argument for using a "temporary innovation systems" (TIS) framework, drawn from Frenken (2017) and elaborated on in (*anonymised for review process 2018; 2019*). Whilst earlier papers developed the TIS framework by applying it to one case (a social impact bond (SIB) project in Ireland), this paper seeks to extend the analysis to multiple cases addressing a different problem and in multiple country contexts. The goal is to further explore if TIS provides a useful framework for understanding the evolution of social innovation projects and enabling more consciously designed and facilitated social innovation with the potential for large-scale, long-term impact.

The paper is organised as follows: we first present the core elements of the TIS framework and make the prima facia case for using it as a lens to study social innovation. The research approach is then described along with a justification of the choice of nature-based solution (NBS) projects as examples of multi-actor social innovation initiatives. Following a short description of the European cities in which the NBS projects were found, the results of the case analysis are presented and discussed. The paper concludes with a reflection on the benefits of the TIS framework in relation to NBS and preliminary thoughts on the implication for theory and practices for NBS in particular and social innovation more broadly.

The case for a temporary innovation systems framework

The initial case for adopting a TIS perspective on social innovation – arising from Frenken's (2017) original concept – was made in Rhodes and Donnelly-Cox (2018, 2019) and was based on specific issues with SIB projects as complex, multi-actor social innovation initiatives. Issues such as high set-up costs, unequal distribution of risks, institutional barriers and social/economic legitimacy are foregrounded in the literature on SIBs, but Rhodes and Donnelly-Cox pointed out that the focus on financial incentives, flows and risks obscured process and participant characteristics that also present challenges to the successful implementation of a SIB – not so much in relation to the financial or economic aspects, but in relation to the actual impact achieved and the sustainability of the change desired. In so doing, they (re)connected the examination of SIBs to the wider social innovation research domain in which the processes of interaction amongst stakeholders to achieve impact *and* "enhance society's capacity to act (Murray *et al.*, 2010, p. 3)" is fundamental.

The basic argument of those recommending systems approaches to social innovation is that innovation at the scale required to address the most challenging issues facing society and the planet will require different approaches and institutions than those that are deeply embedded in the approaches and institutions we have today – in short, "systemic change". This is because the challenges we face – such as climate change, income/wealth inequity, homelessness and pandemics – are driven by regional, national and global systems, involving people and artifacts from many different cultures and perspectives, which contain multiple interdependencies that have evolved over time and produce unanticipated consequences when disturbed. Many of the publications linking systems perspectives to social innovation and change are focussed on how to engage in "systems thinking" (Senge *et al.*, 2015; Stroh, 2015; Misra and Mazwell, 2016) – recognising that the way we think about a problem will shape the solutions we propose. Authors frequently combine systems thinking with systems leadership approaches (Senge *et al.*, 2015) and collaboration/relationship-building (Misra and Mazwell, 2016) and often refer to Kania and Kramer's (2011) conceptualisation of "collective impact" as the inspiration for perceiving social innovation and change as requiring interventions across multiple agents focussed on the solving a particular large-scale problem. Frenken's (2017) contribution was to draw on innovation theory *and* complex systems theory to propose the specific conditions necessary to enable "diversification into activities that contribute to solving societal challenges (p. 35)".

Frenken sets the TIS context as problems and/or opportunities arising from the market and/or systems failures that are best addressed through "unrelated diversification". In other words, problems requiring *exploration* rather than *exploitation* innovation processes – a distinction that is well-covered ground in complex adaptive systems theory (Levinthal, 1997; Siggelkow and Levinthal, 2003; Siggelkow and Rivkin, 2005). Towards the end of the paper, he proposes that "wicked" societal problems are such a context as they are ill-defined, contested, involves heterogenous actors and "result from behavioural and social processes that are hard to understand, let alone to influence by policy" (Frenken, 2017, p. 44). Therefore, the first "feature" of a TIS is the context that leads to its formation – a persistent, challenging wicked problem that appears resistant to change. We will return to this formative feature of a TIS-friendly context later in the paper.

The second key feature in establishing a TIS is a "locally-defined" clear objective. "The formulation of a clear objective mobilises existing organisations to work together in finding ways to meet it, through collaboration and coordination of actions fitting in their respective roles and competence" (Frenken, 2017, p. 44). Frenken notes those who are most affected by the issue are most likely to be effective contributors to the solution set – which is what he means by "locally-defined". He argues that for a TIS to form and operate, there needs to be a

process including a range of relevant participants that results in an agreed objective, at the same time acknowledging that this is a challenge given the "wicked problem" context.

Frenken further states that: "a temporary innovation system, thus, cuts across existing, more institutionalised innovation at sectoral, technological and territorial levels" (Frenken, 2017, p. 44) – implying that the relationships between actors involved in a TIS are different than those they may (or may not) have already established. Further, he states that: "there is no need to institutionalise the TIS itself, avoiding possible clashes between already existing institutional logics, sunk investments and interests" (Frenken, 2017, p. 44). Thus, the third feature of a TIS is the engagement of a broad range of actors with different competencies, engaging in new and "temporary" relationships with each other.

Whilst the clear objective draws this disparate set of actors together, Frenken recognises there needs to be more if they are to effectively collaborate and coordinate actions to generate new solutions. For this, he notes – but does not elaborate on – Kuhlmann and Rip's (2014) concept of "tentative governance", as providing a useful fourth concept for how Ts may be governed. Whilst Kuhlmann and Rip's original paper offers only a brief description of tentative governance, the concept was elaborated by Kuhlmann *et al.* (2019) in-depth in a special issue of *research policy,* in which they describe "modes" of tentative governance as "provisional, flexible, revisable, dynamic and open approaches to governance that include experimentation, learning, reflexivity and reversibility" (Kuhlmann *et al.*, 2019, p. 1091). Later in the paper, they define it, thus: "We consider governance to be "tentative" when it is designed, practiced, exercised or evolves as a dynamic process to manage interdependencies and contingencies in a non-finalising way; it is prudent (e.g. involving trial and error or learning processes in general) and preliminary (e.g. temporally limited) rather than assertive and persistent" (p. 1093). We observe that this description of tentative governance echoes Lindblom's (1959) description of the "Science of 'Muddling Through'". Frenken characterises tentative governance as letting the solutions "emerge" from the interactions amongst actors – a clear reference to complexity theory, which underpins Frenken's model throughout. This approach to managing complex public systems is discussed extensively in Rhodes *et al.* (2011).

The fifth and final feature of Frenken's TIS is the explicit incorporation of knowledge production processes – an aspect of innovation theory that does not feature in the literature on social innovation as much. Frenken refers in an endnote to "Mode 2" knowledge production from Gibbons *et al.* (1994) as elaborated in Hardeman *et al.* (2015). Hardeman *et al.* (2015) propose that knowledge production in contemporary innovation systems requires increased interaction across multiple spheres – with "distance", rather than proximity, being the norm. In their research, Hardeman *et al.* (2015) assessed the impact of the distance between actors who work together in terms of cognitive, organisational, social, geographical and institutional "proximity". They concluded that collaborative research in this area "generally follows a logic of proximity", meaning that the closer the participants were in terms of the various distance dimensions, the more likely they were to collaborate. However, Frenken posited that cognitive, organisational, social, institutional, geographical *distance* will be important in a TIS to increase the likelihood of "unrelated diversification", Navigating this distance will be a feature of knowledge production and innovation processes therein.

Our conceptual framework for analysing NBS projects as TISs incorporates a sixth component that is not found in Frenken's discussion – but was identified in our previous efforts to apply the TIS framework to social innovation in a SIB case. This is the role of "translation consultant", adapted from Nichols and Wagner's (2017) "transaction consultant" in their analysis of 16 SIB projects undertaken 2010–2017. Following Nichols

and Wagner, we suggest that the greater the knowledge distance between participants in an innovation system, the greater the need there is for "translation" so that all the actors in the system can engage in some form of co-production, regardless of the distance between them. For example, translation in a distributed system might be achieved by organising regular face-to-face meetings, when the actors are geographically distributed. Translation consultants are likely to be a focal point for communication between stakeholders in a SIB, explaining the contribution of one group to others or presenting common objectives in different terms to actors who effectively speak different languages and we are interested to see if this is the case in a different type of social innovation.

To conclude, in the original article Frenken (2017) was theorising what might be necessary for large-scale innovation with the goal of contrasting these to current approaches to innovation theory, policy and practice. In our first exploration of the usefulness of this framework for social innovation theory and practice, we looked at a single case of social innovation SIB in Ireland (*anonymised for review process* 2008, 2019) and identified five core features of TIS along with a sixth feature that appeared to be necessary in the case of SIBs and – potentially – other initiatives in which transformative social innovation is the goal. These 6 components of our developing TIS theory are summarised in Table 1 below.

In this paper, we seek to extend our analysis to another domain of social innovation and across multiple cases of the chosen phenomena, i.e. NBS. In the next section, we explain why these cases were chosen along with the research methods.

Case selection and research approach

During the early stages of the *H2020 Connecting Nature* [2] project, the authors had identified possible links between the developing TIS framework and the phenomena called "nature-based solutions". NBS is defined "as solutions to societal challenges that are inspired and supported by nature [. . .] [which] bring more nature and natural features into cities, landscapes and seascapes through locally adapted, resource-efficient and systemic interventions" [3]. Governments around the world – as well as the UN – have recognised the importance of such innovations for combating climate change and social and economic inequalities (UNEP, 2019). For this reason, we believe that NBS is an important and developing domain of social innovation, albeit combining environmental concerns and objectives alongside or even ahead of the socially oriented ones.

Initial ideas on the intersection between NBS and the TIS framework were presented at the Social Enterprise World Forum in Glasgow in 2018 (McQuaid and Rhodes, 2018), but as there was little data available on the NBS understudy at that time, the topic was not initially pursued. As the case study approach was adopted for the first application of the TIS framework – due to the exploratory and longitudinal features of the research aims – this approach was adopted again to answer the following questions: does the TIS framework enhance our understanding of the evolution and effectiveness of social innovation projects and are there insights arising from the application of the TIS framework that can enable more consciously designed and facilitated social innovation with a potential for large-scale, long-term impacts?

The cases were drawn from work being undertaken within the Connecting Nature project; a five-year European innovation project aimed at understanding and measuring the impact of NBS to develop policy and practices necessary to scale up urban resilience, innovation and governance using NBSs. Therefore, case selection was largely a function of the original aims of the Connecting Nature project as described above. However, the 10 cases selected for this analysis represented a subset of the NBS examined in the Connecting Nature project and these were selected to represent social innovation in different stages and

Feature	Description	References (beyond Frenken)
1) "Wicked problem" context	The formation of a TIS is appropriate in cases in which there are persistent market and/or systems failures; involving a range of different actors who do not fully agree on solutions; require innovation across economic, technical and institutional domains; and which "incremental" change is unlikely to resolve	- Peters (2017) - Weber and Rohracher (2012) - Rittel and Webber (1973)
2) Locally-defined objective	A "clear" (set of) objective(s) – and a process for achieving clarity around objectives is a necessary precursor to the formation of a TIS. Furthermore, the participants in this process must include those closest to the targeted issue(s) and with something to gain from their resolution. The phrase "demand articulation" is used to express this activity in innovation theory and "demand articulation failure" is identified by Weber and Rohracher as one of the four likely areas of failure in urban transformation theory	- Boon *et al.* (2011) - Weber and Rohracher (2012)
3) Temporary coalition of heterogeneous actors	Frenken posits that to achieve "unrelated diversification" through innovation it is necessary to have a broad range of participants that bring different competencies and expertise to bear. However, he notes that the interactions amongst these actors should not be formalised to "avoid possible clashes between already existing institutional logics, sunk investments and interests (p. 44)"	*None – other than Frenken (2017)*
4) Tentative governance	Echoing Lindblom's (1959) description of "muddling through", this is an unspecified set of activities and connections between the actors participating in the temporary coalition above. Kuhlmann *et al.* (2019) describe it as a "dynamic process to manage interdependencies and contingencies in a non-finalising way; prudent (e.g. trial and error or learning processes in general) and preliminary (e.g. temporally limited) rather than prescriptive and persistent"	- Kuhlmann *et al.* (2019) - Rhodes *et al.* (2011) - Lindblom and Woodhouse (1993) - Lindblom (1959)
5) "Mode 2" knowledge production processes	Originally identified by Gibbons *et al.* (1994) as a phenomenon of greater interdisciplinarity arising out of the globalisation of information exchange, Mode 2 knowledge production involves a broader range and variety of participants. This paved the way for the concept of "triple-helix" innovation processes (Leydesdorff and Etzkowitz, 1996) involving business, government and universities. Frenken suggests that whilst difficult to achieve, Mode 2 knowledge production is a likely route to "unrelated diversification" innovation. Our insertion of the "transaction consultant" below is aimed at facilitating Mode 2	- Hardeman *et al.* (2015) - Leydesdorff and Etzkowitz (1996) - Gibbons *et al.* (1994)
6) Translation consultant	Originally identified in Nichols and Wagner (2017) in relation to SIBs in the US, this actor appears in a number of SIB projects across the EU and so was identified by Rhodes and Donnelly-Cox (2019) as a potentially key factor in temporary innovation systems involving stakeholders from diverse backgrounds, holding different assumptions about the context and speaking in different institutional "languages". The translation consultant provides a "translation" service between institutional actors and – in the case of SIBs – helps to clarify risk and return for each participant	- *anonymised for the review process* (2018; 2019) - Nichols and Wagner (2017)

Table 1.
Features of a TIS – Frenken (2017) extended/ summarised

in three different European cities to provide a reasonably broad data set to test the framework. The three case study cities of Glasgow (UK), Genk (Belgium) and Poznan (Poland) were originally selected for the Connecting Nature study due to their recognition by the EC as "front-runner cities" in the NBSs and as such would provide leading indicators of how these types of projects might unfold.

Case data were collected by one of the authors of this project and consisted of primary data collected through semi-structured interviews with key informants (project managers and/or initiators) and meeting notes from project team meetings, supplemented by secondary data collected from local government strategic planning documentation and official websites which identified the administrative structure and decision-making processes in operation in each city.

In total, 14 semi-structured individual face-to-face interviews were completed each lasting approximately 90 min. Interviewees came from different departments in local government (finance (2), planning (2), environment (1), regeneration (2) and parks (2) departments), regional development agencies (1), independent project management consultants (1), academic project participants (1), private investor/philanthropists (1), non-government organisations (NGOs) and citizen groups (1). Detailed memos capturing relevant data from onsite project meetings with city officials in each city (9 meetings in total) were completed in real-time and research memos capturing relevant data from bilateral or group conference calls (14 in total) over the 18-month research period were also completed in real-time. Features of each case were captured in a comprehensive database (in Excel) to facilitate analysis from a number of different perspectives.

The case data resulting from the above were then analysed by one of the other authors and the presence [or not] of TIS elements was identified. This preliminary analysis was then checked with the original researcher and clarifications on particular aspects of a number of cases were sought to facilitate the TIS analysis. A third pass at the characterisation of cases involved the third author – who has deep knowledge of the TIS framework – and the results reported below and in greater detail in Appendix 1 were developed and agreed upon. In the summary table of results in the next section, each row represents an NBS case study and the columns represent TIS elements. TIS Elements are numbered consistent with their presentation in Table 1 above and case studies are identified by name and city location. The presence (or not) of a TIS element in each case is colour-coded for ease of analysis and reference, using a "traffic-light" system of green if the TIS element is present; red if it is not and mustard if there was mixed evidence or some question/uncertainty about the case data.

Results of case studies of 10 nature-based solution cases in 3 European Cities

In this section, we first present a summary of the results of the analysis of the case studies to establish the presence of TIS elements as per the coding system described above. We then provide a short description of the 10 cases that were examined, highlighting any observations in relation to the TIS framework considered to be relevant. In the description of the case studies, we also highlight aspects of the city context in which the NBS projects were located which were deemed to be of relevance to our research questions in course of analysing the cases.

Nature-based solution projects in Genk, Belgium

Genk is a medium-sized city in the Flanders region of Belgium – a country that has historically been viewed as being run under a traditional public sector administrative model with a highly bureaucratic and hierarchical culture (Pollitt and Bouckaert, 2011). Elected politicians play a lead role in shaping policy priorities which are then implemented by a

highly compartmentalised public service. Nevertheless, there have been public sector reforms that have trickled down into city government such as decentralisation, outsourcing and citizen engagement. Key challenges in the city include unemployment and relations between the diverse, multi-cultural population – a potentially important contextual factor influencing the type and evolution of NBS projects. Four NBS projects in Genk were examined: Heem Park; Schansbroek Park; Labiomista and Kolenspoor (Figure 1).

The first observation on the mapping of NBS projects in Genk to the TIS framework is that two out of the four projects *do not* have many TIS-like features. All four projects are public amenity projects involving the regeneration of publicly owned space and involved significant consultation with local communities and locally defined objectives, but just two of these addressed a "wicked problem", involved a temporary coalition of heterogeneous actors, tentative governance and evidence of the exchange of diverse perspectives leading to real innovation (Mode 2 knowledge production). One of these, "Labiomista", is a controversial development of a former zoo into a culture park to celebrate and educate citizens on the value and vulnerability of biodiversity and the other, "Kolenspoor" did not get funding in the end due to lack of support from the local council. It is worth noting that in the two TIS-like projects there was evidence of a wicked problem being addressed. It is also interesting to note that in all of the projects, the presence of a locally defined objective was observed or partially evident – perhaps, symptomatic of the local government's orientation towards citizen engagement in Genk and related to the issue of managing in a diverse, multi-cultural population.

Nature-based solution projects in Glasgow, Scotland (UK)

Glasgow is the largest city in Scotland and the third-largest city in the UK. Since its establishment in 1998, the powers of the Scottish Parliament have increased significantly, particularly in the area of taxation and welfare. Nevertheless, the Scottish political and public administration system retains many of the characteristics of the UK system it has been a part of since the eighteenth century, featuring highly centralised decision-making and control at the national level and a commitment to the culture of managerialism and performance management in the delivery of public services. Four NBS projects in Glasgow were examined by the Connecting Nature team as part of the baseline study. These were: Stalled Spaces; Easterhouse; Pollock Park and Kelvingrove Bandstand (Figure 2).

Overall, projects in Glasgow contained even fewer TIS elements than those in Genk. In particular – and in contrast with Genk – there was minimal local objective setting (other than in Stalled Spaces) and even, in this case, the overall project was a city-led project, with local communities/groups invited to submit proposals that were evaluated by a city-wide panel of experts. The lack of locally specified objectives is consistent with the overall approach to governance in the UK – in spite of rhetoric of seeking to "activate" local communities, governance is largely a top-down affair. The other difference between Genk and Glasgow's suite of projects was the presence of one city-wide project (Stalled Spaces) in Glasgow and none in Genk. Having noted this, there is currently a project being undertaken

Figure 1.
Overview of TIS features by NBS case (Genk)

in Glasgow that has a large geographical footprint in the city, so this difference is likely due to sampling, not to differences in city ambition.

The evaluation panel in the Stalled Spaces project was considered to be a possible example of a "transaction consultant" as described in Rhodes and Donnelly-Cox (2019) as it was established to evaluate projects from a diverse set of perspectives. Albeit for a quite different purpose (evaluative as opposed to formative) than found in the SIB case, the Stalled Spaces panel aligns with the definition of an entity that provides a "translation service between stakeholders from diverse backgrounds", holding different assumptions about the context and speaking in different institutional "languages" and "helping to clarify risks and returns in the project". Nevertheless, the original specification of transaction consultants in the context of SIBs had a quite different manifestation – largely relating to firms or organisations involved in structuring the financial and legal aspects of contracts between stakeholders.

Nature-based solution projects in Poznan, Poland

Unlike Glasgow and Genk, Poznan is an affluent city with a highly developed service economy, a strong entrepreneurial culture and low levels of unemployment. Poland is similar to Scotland from a historical perspective in that it also faced the challenge of setting up a new system of public administration in a relatively short period of time – in Poznan's case beginning in the 1990s following the fall of communism. In general, public sector administration across Poland is characterised by high levels of bureaucracy and a strong emphasis on adherence to legal requirements, rules and regulations. Public consultation is limited but citizen budgets are one measure that has proved popular (Figure 3).

In Poznan, there were just two projects examined: City Beaches and the Social Garden. Neither of these exhibited a majority of TIS-like features although both projects had elements of "tentative governance" largely relating to the orientation of the public sector to outsourcing the ongoing management of the NBS to private and NGO actors. For example, in the Social Garden project, an NGO played an active role in mobilising a mix of community and government actors to build, finance and maintain the garden. In the City Beaches project, the local authority puts out a call for proposals on an annual basis for the private sector to run concessions. However, the cases do not exhibit the full or even a majority of the features of the TIS framework. The highly centralised nature of city government in Poland may be a factor in this.

Figure 2.
Overview of TIS features by NBS case (Glasgow)

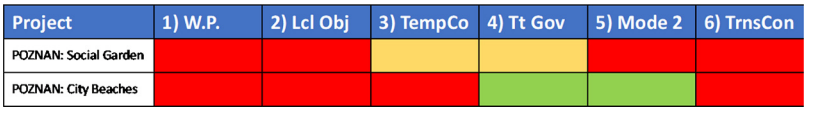

Figure 3.
Overview of TIS features by NBS case (Poznan)

Discussion

From the analysis above, it appears that NBS does not routinely exhibit the features of TISs. In our sample of 10 cases, only 3 (Labiomista; Kolenspoor and Stalled Spaces) were considered to be largely consistent with the TIS framework proposed. Furthermore, the projects do not generally address wicked problems – although those that do address this type of problem are more likely to exhibit TIS-like features than the others. For example, in the case of Labiomista in Genk, the project addresses a wicked problem and does exhibit a majority of TIS features, as did Kolenspoor and Stalled Spaces in Glasgow (albeit somewhat less convincingly). However, the Easterhouse project in Glasgow is aimed at persistent deprivation (a wicked problem) but has little in the way of TIS features. Digging more deeply into this case, however, reveals that persistent flooding in the area and the opportunity to create land suitable for development may have been the more important objective (from the council's point of view) – generally considered a non-wicked, traditional urban redevelopment objective.

Indeed, one of the challenges for the research team in mapping the NBS cases to the TIS framework was coming to a shared determination regarding the "wickedness" of the problem being addressed by the NBS project. At one level all NBS projects are, by definition, wicked problems given their assumed contribution to increased social and environmental resilience in face of climate change. However, the lack of any stated aims in this regard across the majority of the projects examined compelled us to question if every NBS could really be considered to be explicitly or otherwise tackling a wicked problem. Indeed, the whole exercise suggested to us that classifying project aims using the "wicked problem" concept is problematic – a conclusion shared by Peters (2017) and Termeer *et al.* (2019).

Wicked problems or not, it would still be reasonable to come to the conclusion from the projects examined here that NBS does not generally display the characteristics of a TIS as defined by Rhodes and Donnelly-Cox (2018, 2019) and presented above. To the extent that NBS are seen as examples of social innovations (as we argued above), this suggests that the TISs framework is not generally applicable to all social innovations, but, perhaps, only to those that have an expressly stated wicked problem to be addressed. Thus, if the framework is useful at all, it is likely only to be in a relatively small subset of social innovations; but, perhaps, those most in need and worthy of extraordinary measures to maximise the likelihood of success.

This brings us to the three NBS projects that exhibited a majority of TIS-like features: *Labiomista* and *Kolenspoor* in Genk and *Stalled Spaces* in Glasgow. Each of these projects had (nearly) the full range of TIS features: addressing a "wicked problem" (biodiversity in Labiomista, social cohesion in Kolenspoor and community development in Stalled Spaces); locally defined objectives (creating an educational park in Labiomista, local community enhancement in Kolenspoor and a range of locally defined uses for derelict space in Glasgow); a temporary coalition of heterogeneous actors (artist, citizens, government, businesses, NGOs); tentative governance involving ongoing negotiations, informal agreements and multi-actor contracts; "Mode 2 Knowledge Exchange" (diverse perspectives interacting to produce unanticipated outcomes) and a form of "translation consultant" focussing largely on facilitating interactions amongst stakeholders.

Interestingly, only two of the three would be deemed successful by both the proponents and arms-length evaluations. The Labiomista project is underway and has attracted high levels of financial support – spanning public and private investors and funders and the Stalled Spaces project is an award-winning project in urban transformation. However, the third project, Kolenspoor, failed to gain support from the mayor and local council and so did not go ahead. This suggests that a TIS approach is not – of itself – a guarantee of successful

innovation – although this would require more focussed research and experimentation before any conclusions in relation to the presence of TIS features and project success could be drawn.

This is not to say that there are no issues and controversies surrounding the successful projects. There was some disquiet amongst community groups and the local council in Glasgow around the more "arty" Stalled Spaces projects (e.g. pop-up one-day temporary art exhibitions) which were deemed to be less beneficial to the wider community than other, more "practical" uses of derelict space (e.g. for community growing projects) and the Labiomista project generated significant controversy in the local community about ownership of the land and community employment benefits. It is not unusual that significant change brings controversy and resistance and the presence of these; even when the projects are largely deemed successful; suggests that they did, indeed, bring significant change. If so, this would be consistent with the context imagined by Frenken in his original proposal for TIS – which was about the conditions that might enable "radical innovation".

We might also consider what these cases tell us about the role of a "locally-defined objective". We note that in the case of the Genk projects, all four had this feature, but only two projects had any of the other TIS features. We also noted that Genk's public management approach overall was oriented towards citizen involvement and consultation arising from the Belgian approach to public sector reform. Genk is one of the most multi-cultural cities in Belgium and the city places great emphasis on engaging all communities in urban planning to mitigate against social cohesion issues that bedevil other cities in Belgium. Hence, its adoption of citizen engagement and participation approaches to an extent not seen elsewhere. More data and – if possible – experimentation are indicated to assess the extent to which locally defined objectives are critical contributors to the establishment of a TIS.

In relation to the "translation consultant" role linked to the TIS framework in previous studies of a SIB, the evidence from this study is less compelling but also suggests a broader definition of the role. The translation consultant in SIBs takes the form of a specialised merchant banking service: bringing the parties together, pricing the risk, finding and/or defining the market and assisting in the clarification required to put the legal contracts in place. Given the public sector-led nature of the NBS cases examined here, this largely financial/legal sort of market-making function appears unnecessary. Nevertheless, in the three cases in which there was a preponderance of TIS-like features identified, there did appear to be specialised roles needed to bring the various stakeholders together in unique ways. In the case of the Labiomista project, this ended up being configured as a type of public-private partnership (PPPs) deal between the city and the private/community interests promoted by the artist. This PPP required the negotiation of multiple contracts between the city and the artist. Given the complexity, a specialised project manager was recruited to manage the process – a version of the transaction consultant role. In the case of Stalled Spaces, there was no need for specialised financial/legal services, but there was a need to set up an "evaluation panel" to assess applications for seed funding from NGOs and community groups. What made this panel a kind of "translation consultant" is: it was configured to ensure that different voices were heard in the decision process, involving city government, a housing NGO and an art association [4] and its role was as an evaluator of risks and possible (social) returns in relation to all stakeholders. Finally, in the case of Kolenspoor, the local University of Hasselt acted as a design and facilitation actor to bring communities, NGOs and local government together to develop local objectives and plans.

These cases suggest the need for an "arms-length" entity to foster interactions between heterogenous actors and assist in translating the needs and various perspectives on

innovation amongst stakeholders. The need for a specialist actor to assess risks and returns for stakeholders was not as obvious in the NBS projects as in the SIB case; which is consistent with the fact that these projects are not as financially complicated as are SIBs.

Whilst recognising the more limited role the translation consultant plays in the NBS cases examined here, we also observed that new actors entered the TIS stage in the form of an artist/entrepreneur in Labiomista; a local university in Kolenspoor; and the NGO "Creative Scotland" in Glasgow. This suggests that for NBS projects an artistic/cultural/intellectual sensibility is likely to be involved in feature elements of TIS. This may be a particular kind of expression of the "temporary coalition of heterogenous actors" and/or "Mode 2 knowledge production" features of TIS and deserves some further exploration to assess the prevalence of this sensibility in TIS examples and whether its presence is a leading or following factor in the establishment of same.

Conclusion

The goal of this study was to further explore whether the TIS framework contributes to greater understanding the evolution of social innovation projects and/or the potential for more consciously designed and facilitated social innovation with the potential for large-scale, long-term impact.

An examination of the 10 NBS projects in three European cities and mapping of these against the six features of our TISs framework has led us to conclude that TIS may not be relevant to NBS-type social innovations in general. However, in some cases – i.e. those that may be expected to generate the radical innovation required to address wicked problems – there is evidence that the TIS-like features emerge and that these co-exist with controversy, new and heterogenous actors and complexity. Where there were wicked problems to be solved – including loss of biodiversity, lack of social cohesion and community activation – we observed a preponderance of TIS features. When the objectives were more traditional urban development ones, there was little evidence of the features of the TIS framework. The third general observation we made with respect to the TIS framework is that its presence did not ensure a successful outcome as demonstrated by the Kolenspoor case in Genk – which suggests that relevance to policy and practice will need to be more carefully examined and tested.

In relation to specific components of the TIS and NBS-type social innovation projects, we noted that the presence of "local objectives" and community involvement in project initiation and development did not appear to result in or require other TIS features, suggesting that – even at the "higher" rung of Arnstein's (1969) citizen participation ladder – citizen involvement may not automatically lead to a significant increase in complexity. We also observed that the "translation consultant" role suggested by the previous SIB case analysis (Rhodes and Donnelly-Cox, 2019) did appear in all three cases where TIS features were predominant, reinforcing its inclusion in the framework overall. The role took various forms: a specialised project manager for the PPP in Genk; a multi-disciplinary evaluation panel for project proposals in Glasgow and a university whose role was to bring communities, NGOs and local government together to develop local objectives and plans in Genk. We did not observe this role appearing in any of the non-TIS projects.

We also noted that in these three projects artistic and cultural actors played key roles – again in various guises: as entrepreneurs; evaluators and engagement advisors. It is not clear if this is specific to NBS projects or more generally in community-based social innovations, but we have flagged this for further research.

Finally, in relation to NBS specifically, we would draw attention to what we see as a "dominant" public management approach to conceiving and implementing these, at least in so far as these 10 cases are concerned. It is apparent that the majority are public sector-led

and funded and might also be considered examples of "typical" urban regeneration with regard to the public's access to green space. They have fairly long lead times and typically are not subject to rigorous outcomes measurement. Whilst there is a sprinkling of "new public management" governance features (Hood, 1991) such as citizen engagement, private sector involvement and outsourcing, these do not appear to represent any pattern specific to the NBS projects, but are rather reflections of the public management approach that dominates in the host city.

The examination of NBS projects through the "lens" of a TIS has reinforced our view that social innovations targeting wicked problems will exhibit many of the features of a TIS. The presence of these features, however, does not guarantee success – but expecting a 100% success rate for innovation projects would be optimistic in the extreme. The question is, does the presence of TIS features change the likelihood of success or, indeed, any other outcome of "radical" social innovation? This question will require more research, but what we can say is that the "translation consultant" actor – one of the six features of a TIS – does appear to be an important player on the pitch in cases of innovation addressing wicked problems and involving a range of stakeholders with differing attitudes and perspectives.

Notes

1. Trinity Centre for Social Innovation, Trinity Business School, Trinity College Dublin, Ireland.
2. EU Grant number: 730222 – https://connectingnature.eu/
3. See: https://ec.europa.eu/research/environment/index.cfm?pg=nbs for more information on NBS in Europe.
4. The panel members were: Glasgow City Council and Glasgow Housing Association and Creative Scotland – "a diverse group of people looking at proposals and making a decision on which projects to support (quote from case)".

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Appendix 1

Project	Wkd Pb?	Local Obj	Temp Coaltn	Tent. Gov	Mode 2 Knwl	Trans Cons	Outcome
Heem Park [public good] Conservation park preserving traditional natural farming methods leading to increased biodiversity and contributing to environmental education.	No – but part of a broad awareness of climate change	Yes – local community wanted park for education about nature (and as a local amenity)	Low – citizens lobbied and govt. responded – although current 'structure' facilitates involvement of multiple actors	MIXED – govt. appointed park 'officer' and community created VZW group to engage / manage volunteers. Initially, however, it was citizen-led	No - "We have limited cooperation with other stakeholders in the business model. There's no real business model because it's the city who is financing it" KVDS.	No	Heem Park set an early precedent for citizen-led engagement in environmental initiatives in Genk. But volunteering is declining, threatening the long-standing *collaborative governance model.*
Schansbroek Park [public good] - Neighbourhood park and cycle path through nature reserve addressing use of derelict land and localised flooding issues. Contributing to community health and citizen engagement in community gardens	No	Yes(ish) – project part of wider regional development plan with 'exemplary' consultation process with citizens.	Low - Appears to have been largely led by Pub. Sector	No – "Decisions made at government level: Elected politicians at regional level (Flemish ministry) and at city level (City of Genk)"	No – no evidence of this?	No	Project completed and regarded widely as a success. Stakeholder involvement was an issue during development. Not an issue now.
Labiomista [toll/public good] innovative cultural biodiversity park addressing economic, social and environmental challenges	Yes – biodiversity & Social Cohesion	Sort-of: local artist driven with supportive mayor who wanted to do something with the space; not all locals in support of plan	Moderate – largely between artist-entrepreneur & city (mayor). Some involvement with charitable foundations, local businesses	Yes – multiple contracts and negotiations between local artist (and neighbourhood group?) and city. 'on a case-by-case basis'	Yes – "Labiomista was quite a radical departure for the city of Genk in terms of public-private collaboration."	Yes – independent consultant to help negotiate / translate btw. city & artist	Project going ahead with multi-source investment of €20.6m: (private 8; city 8; 4.6 grants); but controversial ... Opened July 2019
Kolenspoor [public good] Linear park built along former rail-line connecting communities and featuring 'station houses' supporting local economic clusters	Yes – Social Cohesion	MIXED– led by government to create "district-connecting landscape park" – But Univ outreach work to engage with local community	Yes - University looked to build local temporary coalitions of citizens	Yes - Informal interactions at planning stage and "Formal rules at provincial/ municipality levels: multiple agreements among stakeholders	MIXED – University, citizens, local football org. and NGO perspectives	University acted to inspire local communities , but never got to 'transaction' stage	Stalled at planning stage – insufficient support from political representatives and city management.
Social Garden [Public good] Community-led development of vacant space into community garden contributing to increased biodiversity, social cohesion, citizen healt and well-being	No (evolved to social cohesion?)	No – led by govt. / NGO to make better use of derelict land and improve citizen perceptions	Med – "NGO played an active role in mobilising community and government actors."	City contracted PM who works with NGO	No	No, but there were 'Subcontractors hired to maintain and animate' social garden	Completed and opened successfully. But concerns around "lack of success of other social gardens due to lack of ongoing government investment and dwindling community interest."
City Beaches [public good] Designed to re-connect citizens with the river Warta (blue infrastructure), these temporary beaches have transitioned from city led to private sector management	No	No – led by govt	Low – some involvement from private sector towards the end	Yes – after initial development by city, beaches are now leased annually to private firms that commit to providing social value (alongside profit making)	Yes – in terms of the way the asset is managed via ongoing engagement with Private Sector to maximise social as well as economic gain	No	Access to city beaches is improved and citizens view of 'attractiveness' of city is increased. For the city the evolution of this project over time from top-down to business-led collaborative governance was quite innovative. Still regarded as a major success story by citizens and city alike.
Stalled Spaces [CPR / Public good]	No & Yes Use of derelict	Yes (and no)– government initiated, but	High – range of actors across different	Yes(ish) – governance appears to be up to the proposers of the	Maybe? – new legislation was passed to 'ensure	Sort of – involves the panel	Project has been running for 11 years. "In 2013, Stalled Spaces gained global

(*continued*)

Figure A1.
Analysis of 10 NBS cases (colour-coded table)

City programme for community-led development of vacant and derelict land. Aim to provide economic uplift; impact on the communities health & wellbeing; create social cohesion and by default have a positive benefit biodiversity / ecosystems.	space (no); community activation (yes)	local communities – often working with NGOs - propose projects for their space. 'Locally led'	projects: "most recipients of Stalled Space funding have been registered charitable organisations, social enterprises, voluntary bodies or housing associations"	project with limited reqts imposed by govt and projects are often 'temporary'	more democratic and transparent land governance'; involvement from 'Creative Scotland'? "about 40% were growing projects, 30% were landscaping projects and the rest were art, architecture from the creative industry"	deciding on which projects count? "a diverse group of people looking at proposals and making a decision on which projects to support"	recognition by winning the City to City Barcelona FAD (Fostering Arts and Design) Award for its contribution towards urban transformation. Recognition has also come through a national roll-out of the programme – led by Architecture and Design Scotland – which involves working with seven local authorities to support the development of 30 new sites". Interesting backlash to more innovative 'arty' projects, which were seen as not benefiting community as much as 'green' projects.
The Greater Easterhouse Green Infrastructure project (public good) creates high quality open space in a highly deprived area through an integrated green and blue network transforming 29ha of vacant and derelict sites into a connected and accessible green spaces simultaneously addressing flooding issues.	Yes & no: deprivation (yes); flooding (no).	No – led by government to address flooding and create more land for building.	Low – range of government actors, but no community, NGO or private sector	Not really there are internal discussions across govt. depts. But will still be following public governance norms.	No	No	Completed successfully. But still low level of community involvement.
Pollock Park [toll/public good] 46 hectare country park and cultural centre aiming to engage communities in major redevelopment aimed at improving economic sustainability	No	No – led by city govt. with community 'friends of' programme	Low	No – "Parks Dept are limited in scope by legal acts." "Planners and funders decide: planners can reject application for new development on legal grounds or taking into account community reaction."	No	No	Apparently the goal is to have 'community-led park development'. ... no clear outcome as yet
Kelvingrove Bandstand [private & public good] controversial development of open-air events venue on historic site situated in the affluent West End of the city in Kelvingrove Park.	No	No – led by city to redevelop bandstand & surrounding park	Low	No	No	No	Complete and considered successful – but: "despite opposition from some local community groups the Council made the decision to commercially develop the project under pressure from politicians who wanted the site developed in time for hosting of Commonwealth Games."

Figure A1.

Appendix 2. Characteristics of "wicked problems" and "super-wicked problems"

The 10 characteristics of wicked problems (Rittel and Webber, 1973) (with thanks to Stoneybrook university: https://www.stonybrook.edu/commcms/wicked-problem/about/what-is-a-wicked-problem)

(1) They do not have a definitive formulation.

(2) They do not have a "stopping rule". In other words, these problems lack an inherent logic that signals when they are solved.

(3) Their solutions are not true or false, only good or bad.

(4) There is no way to test the solution to a wicked problem.

(5) They cannot be studied through trial and error. Their solutions are irreversible so, as Rittel and Webber put it, "every trial counts".
(6) Wicked problems have no clear solution or even a set of possible solutions.
(7) Every wicked problem is essentially unique.
(8) Wicked problems are often a symptom of other problems.
(9) There are multiple explanations for any given wicked problem.
(10) Planners (policymakers; social entrepreneurs) – that is those who present solutions to these problems – have no right to be wrong. Unlike mathematicians, "planners are liable for the consequences of the solutions they generate; the effects can matter a great deal to the people who are touched by those actions".

Additional 4 characteristics of "super-wicked problems" (Peters, 2017)

(1) Time is running out.
(2) There is no central or ultimate single or set of authorities responsible for managing the problem.
(3) The actors causing the problem are also the actors needed to solve it.
(4) Future states are discounted so radically as to make current solutions appear to have little value.

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