

Towards a typology of urban transition and non-transition pathways

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Prepared for JPI Urban Europe 'Urban Transitions Pathways Symposium' 27 October 2016

Abstract

The concept of urban transition pathways is useful to support visioning processes during or before urban experimenting and policy development, especially the light of a range of sustainability issues that urban areas face. The concept of urban transition pathways however suffers from two (related) weaknesses: it is unclear what types of urban pathways exist and in which cases we should speak of 'transition' pathways and when of pathways of 'incremental' or other types of change.

There have been earlier typologies of transition pathways but these have not been tailored to the urban level. Although many conceptual elements of these studies are beneficial for understanding urban transition, this paper offers a typology urban transition and non-transition pathways based on the level of upscaling and level of disruption of niches. Within the space that these two dimensions map out, we describe five generic pathways, each with an historical example of urban change or stability.

This paper is divided in two parts. This first discusses my view of the common ground in studies on the role of Living Labs in urban sustainability. The second part integrates concepts from transition studies and urban Living Lab studies to work towards a typology of urban transition and non-transition pathways.

Common ground in urban Living Labs for sustainability

To address climate change, many European cities explore new opportunities to lower their carbon footprint (Castan Broto & Bulkeley, 2013). An important avenue is the 'smart city', where widespread implementation of 'smart', often ICT-supported energy and transport technologies results in improved energy and resource efficiency. The current view is that efficient and successful implementation of these technologies requires 'smart governance': the inclusion of not only industry, researchers and urban decision makers in the innovation process, but also citizens with their needs, priorities, preferences and experiences (Healey, 2007). Useful elements appear to be experimentation and attention to contextual conditions, both as opportunities and possible sources of resistance to change. A promising approach is the 'Smart City Living Lab' (SCLL), a forum to integrate these actors in exploring and testing new solutions in real-life contexts (EC, 2009; Tironi, 2013). The claim is that, for innovations produced by Smart City Living Labs, nobody will have to ask "But will it work in reality?", because "it is already taking place in reality".

The current approach of Living Labs to technologies, however, is focused on small-scale performance tests and technology-user interactions, largely ignoring the larger social-institutional context (Karvonen & van Heur, 2014; Karvonen et al., 2014). In order to deliver some meaningful contribution to sustainability indicators at urban level, the impact of the LL project need to go beyond the level of a building, a street or small district. Since urban Living Labs are widely viewed as an instrument to address sustainability challenges that urban areas face, the work of a (successful) Living Lab project should be scaled up.

Upscaling is not just a matter of the local development of meso-level structures that outlast the niche experiments. Upscaling is also related to knowledge transfer in the sense that knowledge travels between locations and that experimental knowledge work in a Living Lab can benefit both from localized learning processes and from experiments in other places (that are close in terms of content, topic). This refers to a complex debate on the possibility of knowledge transfer that we visualize in the following table:

Table 1 Views on the transferability of knowledge and relation to upscaling

View on knowledge transfer	Knowledge is contextual	Knowledge is partly contextual	Knowledge is not contextual
Upscaling, replication or growth	replicating Labs (only)	upscaling as emergence of new practices	growth of use (only), including accumulation

On the one hand there are arguments that knowledge and learning is so contextual that solutions developed in one place and among a certain group of actors cannot be implemented in other places (see Flyvbjerg 2006, or Coenen et al. 2010). In this case the only thing that can be scaled up is the number of LL's itself. Every street should experiment itself, to put it to the extreme. On the other hand there are arguments and empirical evidence that geographic proximity is not a necessary condition for learning to take place (e.g. Boschma 2005). With reference to innovations like smartphones or TomTom, which are successful in many different places, proponents of this view would argue that once a successful solution is created in one Lab somewhere, it is a matter of diffusion and adoption at other places. My view of upscaling takes broadly the middle ground between these two views (also see Karvonen and van Heur 2014). This implies that solutions co-created in one Lab somewhere can therefore have impact beyond its particular place, or, the other way around: effective Lab's anticipate upscaling their impact beyond their particular place and group of participants in the trial. Upscaling as emergence of new practices is of a different kind, although it may involve Lab replication and diffusion of use. It is the emergence of a set of new practices (such as new governance practices or mobility practices), learned from practical experiments, in which the innovative practices (i.e. new or at least not widely established ones) expand and gain a level of stability and affect established regimes (broadly in line with Van den Bosch 2010). So they trigger institutional change.

In order to be effective, a Lab needs to anticipate such impact as much as possible: participants need to co-create vision for how the Living lab can relate to broader socio-technical transformation. This visioning process and the related understanding of socio-technical transformation can benefit from transition studies.

Since the middle of the 1990s a socio-technical transition perspective was developed by combining a socio-technical perspective with elements of evolutionary economics (Rip and Kemp, 1998; Hoogma et al., 2002; Geels, 2002, 2005; Geels and Schot, 2007). The common ground seems that transition studies have highlighted more than previous studies the patterns in which established technologies are sometimes abandoned and overthrown by emerging niches. Transitions are considered societal processes of fundamental change not only entailing new technologies but also changes in markets, user practices, infrastructures, cultural discourses, policies and governing institutions. Between these elements, there are continuous dynamic interactions and coevolutionary processes between different structures and practices of the system and its subsystems (Kemp, 1994; Geels and Schot, 2007). Transitions are long-term processes (often referred to as 'generations'). Research on transitions offers insights about processes, events and agents and their role in influencing or building-up on a transition as well as how processes, events and agents interact throughout a transition.

The transition perspective is applied to explain dynamic *stability* and incremental change on the one hand, and radical innovations and system *change* on the other. To explain stability, the notion of sociotechnical regime plays an important role. It refers to the socio-technical system that has grown between the hardware, user perspectives and practices (reflecting their preferences and endorsed social connotations), producer capabilities, business models and production technologies,

regulations, and supporting institutions, etc. Regimes are socio-technical *ensembles* that have been aligned and, over time, reproduce the conditions for their own continuation. For example, for the practice of travelling the prevailing automotive regime is based on private vehicles with internal combustion engines, an example of a socio-technical system in which dynamic stability is obtained through economies of scale and scope, sunk costs (in production tools, infrastructures etc.) and social expectations and learning (in travel times, cost and convenience etc.). Although alternative regimes can be contemplated, they are not easily realized because they would have to go through a process of emergent realignment during which they must compete against well-developed alternatives.

To explain change, transition studies use concepts such as 'niches', which are protected spaces where potentially radical innovations emerge, and 'socio-technical landscape', which are external developments that can create pressure on existing regimes. The key idea is that regime shift (i.e. transition) emerges from the interactions between niche, regime and landscape dynamics. These interactions can proceed in various forms, but one pattern has received most attention in early transition studies (Geels, 2002), comprising of three interrelated processes: (1) niche innovations build up internal momentum over time, (2) landscape changes put the regime 'under pressure', and (3) regime destabilization offers windows of opportunity for niche innovations to be scaled up, displace the old and establish a new regime.

Outside the field of transition studies – in studies of socio-technical change and urban studies- a similar notion as regime (stability) have been labelled obduracy (Hommels 2005).

Beyond the state of the art: toward a typology of urban transition pathways

In studies of transition (especially those from a multi-level perspective) there is an often an implicit emphasis on national or sectoral scale transitions, neglecting other spatial scales. In cities, for instance, there is a meta-regime for urban planning and governance that tries to coordinate the spatial interaction and competition of sectoral regimes (mobility, energy, housing, water, industry etc.) (Raven, 2016). Transitions approaches have said little about cities and what the multi-level perspective on systemic transitions can contribute to understanding urban social-technical transitions.

Nevertheless, various scholars have applied the concept of social-technical transition to promote sustainability in practice (also including urban practice). Approaches such as strategic niche management (SNM) and transition management, address how policy and governance can shape the multi-level dynamics. The first process, niches building up momentum, has received most consideration. Kemp et al. (1998) described how niche innovations can gain momentum through the building of social networks around a new practice in which more and more diverse actors become enrolled, and through collective learning processes. Through practical experiments – for instance, the introduction of 350 lightweight electric vehicles for everyday use in Mendrisio, Switzerland, in the 1990s (Hoogma et al. 2002) – niche actors learn about technical design, production, infrastructures, markets, cultural meaning and regulation and policy-making. Policymakers should act as enablers and catalyst rather than regulators or technology sponsors. Price incentives have a role to play in transitions, but are insufficient to trigger them. Transition management (TM) has a broader scope than strategic niche management, applying the transition concept to promote sustainability initiatives, policy and activism. It tries to empower and mobilize the undercurrent of sustainable development by offering a framework and language for systemic change (Loorbach,

2007), such as long-term thinking, multiple domains and actors, learning, system innovation and maintaining a wide playing field (Rotmans et al., 2001)¹.

In the socio-technical transition perspective fundamental change and stability is explained through protected niches that either are or are not scaled up through wider adoption, or by multiplying and eventually coalescing. As Evans & Karvonen (2011) note, Living Labs constitute classic niches for innovation in this sense, as arrangements 'built between actors to support the innovation in very specific time and space contexts' (Berge and Guy: 675) that shelter it from wider political and economic pressures. As in SNM and transition management approaches, LL's are explicitly experimental, but this is different from niches described in various historic transition studies in which there was usually no deliberate strategy to create spaces for experimentation.

How will new urban experiments and Living Labs, viewed as socio-technical niches, co-evolve with the established, the urban regime – so what may be knock-on effects of the niche scaling up? Geels and Schot (2007) have proposed a typology of transition pathways (i.e. of multi-level interaction patterns). Interpreting their typology with the Regime Evolution Framework (Dijk et al. 2015) we can sketch six different stylized urban pathways (see **Figure 1**):

Pathway 1: Stable, but minor add-on. In this pathway, the niche scales-up but stays relatively small, co-existing with the (sub)regime(s) in a neutral way. The niche simply forms an additional practice in the sector. An example is the introduction of Park & Ride facilities in Utrecht, as in many cities.

Pathway 2: Niche dies soon. After some growth of the niche based on initial enthusiasm, challenging the regime, upscaling stalls and success is regarded unlikely when facing the regime, causing disappointment and implosion of the niche practice. An example is Aramis, a Personal Rapid Transit system in Paris in the 1970s.

Pathway 3: Stable, but minor regime innovation. In this pathway, the niche grows but within the regime, and stays small. An example is the introduction of bus lanes in many cities.

Pathway 4: Battle towards regime incorporation. The niche continues to scale up but triggers acceleration of innovation in the regime as well. Innovation momentum alternates between niche and regime, with symbiotic relations between niche and regime elements occurring. In the end regime elements benefit most from the symbiosis, and the regime stays in place although in a reorganized way (with many niche elements incorporated; i.e. hybridisation). An example is the introduction of a metro system in Stockholm amidst a composite regime of car, bicycle and tram/bus mobility 1950-1980).

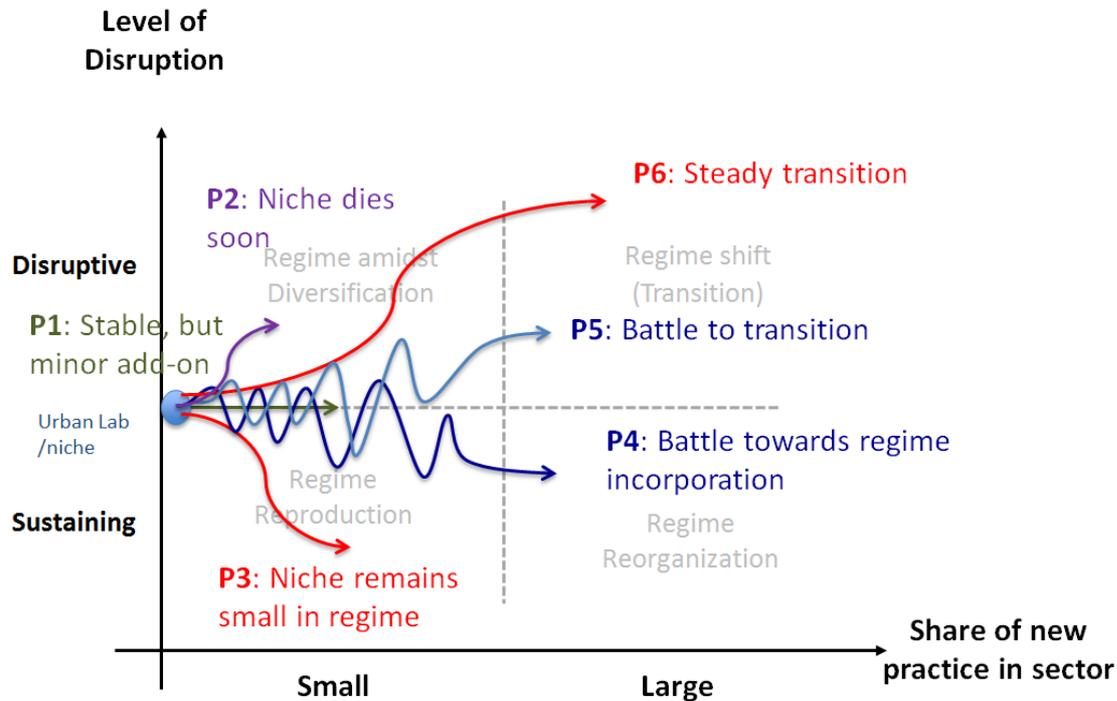
Pathway 5: Battle to transition. The niche continues to scale up but triggers acceleration of innovation in the regime as well. Innovation momentum alternates between niche and regime, with symbiotic relations between niche and regime elements occurring. In the end niche elements benefit most from the symbiosis, and a new order in the sector based on the niche practice emerges (with many old regime elements having a role in the new order). An example is the transition from horse-drawn mobility to automobiles in US cities (1880-1930).

Pathways 6: Steady transition. The niche continues to scale up but triggers no acceleration of innovation in the regime. A new order in the sector based on the niche practice emerges (with hardly any old regime elements having a role in the new order). An example is the transition in

¹ TM has been employed in a range of contexts in practice, but this was practically always as an additional project to the established policy cycle, so contrary to the philosophy of TM as meta-governance (see e.g. Kemp et al, 2011). Nevens et al (2013) have proposed to apply TM at urban level, relabelling some of the elements (e.g transition arena as 'urban transition lab'), but the merits of this are only expected over the next years when the planned experiments will be evaluated.

urban planning in cities in Eastern Europe (1990-2000) amidst the shift of national context from socialism to liberal-capitalism.

Figure 1: Six stylized urban pathways



In future Living Lab projects, this typology may support the visioning process.

Barriers to and strategies for upscaling

As Figure 1 indicates, upscaling is a key mechanism for a pathway to unfold. An important question is what are barriers to upscaling and how may these be anticipated? Vreugdenhil et al. (2010) discuss constraints on the effectiveness of pilot projects (in many ways very similar to LL projects), in the sense of factors that limit upscaling one or more dimensions of the project into the policy process and or repetition of the project on a comparative scale. They group constraints in five categories. The first is *limited representativeness*, which implies that the design, conditions and results of pilot projects are of only limited applicability to new projects and so the usefulness of the pilot projects in new situations is subject to doubt (Martin and Sanderson 1999, Hoogma et al. 2002). In addition to the general issue of the contextual dependency of knowledge (Flyvbjerg 2006), reasons for the limited representativeness lie in the specific conditions and design of the pilot project. By using confined scales that reduce uncertainties and risks or by enhancing the availability of resources, the representativeness of pilot projects for standard projects is reduced. Scaling up from the pilot project conditions implies that the complexity of the problem increases (e.g. Mitleton-Kelly 2003, Collins and Ison 2006). Strategies to reduce or cope with this hurdle include the provision of explanations about the contextual dependency of the knowledge. The particulars of the context help to determine what is transferable and what is not. Additionally, the inclusion of future users through open governance styles and co-financing arrangements increases their commitment. At the same time, the innovation can be tailor-made for further implementation, because users are involved in the design process.

The second constraint on upscaling, *limited learning*, implies that the different types of knowledge developed within the pilot are not transferred to future users. Reasons include the low quality and short duration of monitoring; problems with attributing change to specific factors (Martin and Sanderson 1999); a lack of comprehensive knowledge, that is, no single actor has an overview of all the options, mechanisms and impacts; and the limited impact of information on decision making in contrast to ideology and interest (Weiss 1980). Knowledge of a soft or tacit nature is particularly difficult to transfer. Pilot initiators indicated that they developed enthusiasm during the pilot project, but were not able to influence users positively afterwards. Social learning and its associated open governance style can function as a means to reduce or prevent such a hurdle from arising in the actor network (Muro and Jeffrey 2008). By stimulating social learning in the pilot project, more actors will understand the pilot and their dependencies upon other actors and the level to which they feel ownership over the pilot will increase.

Thirdly, *lack of institutionalization* can limit effective upscaling, which implies that the innovation has not been internalized as an option on the list of options of a future user. Many users, particularly governmental bodies, are restricted to choosing from an approved list of options. If the innovation has not yet received an official stamp of approval, it may not represent a feasible option for such a user. Strategies to reduce this hurdle include the early identification of potential future users or application sites and of the nature of what ought to be diffused, such as an artefact or soft knowledge. These users can then become familiar with the pilot project and can indicate their requirements for institutionalization. Additionally, the development of multiple successful pilots means that the successful innovative practices have become common practice. Moreover, despite the idea of tolerating failure so as to encourage learning, successful implementation of an innovation is needed for diffusion. Failures are difficult to sell.

A fourth possible constraint, *poor timing*, implies that by the time the pilot is finished, the policy climate no longer supports the adoption of the innovation, because the policy climate has changed during the course of the pilot (Liebowitz and Margolis 1995, Morris and Chiu 2001, Cabinet Office 2003). More generally, the market is lacking. This is also reflected in a lack of urgency to change existing practices. A potential strategy to deal with this hurdle is to maintain flexibility in the pilot so that it can be adjusted to developments that may arise.

Fifth and final constraint is a *wait-and-see attitude*. In many of the pilot projects, a wait-and-see attitude to diffusion occurs. Either diffusion is expected to occur by itself or strategies to enhance the diffusion of knowledge and learning are put in place after the pilot ended. Reasons included: (1) it is common practice to consider knowledge dissemination only after a project is concluded, (2) diffusion goals are not explicitly included in the pilot and so no budget is made available for achieving them, and (3) pilot projects are approached as routine projects that can be closed after pilot implementation and monitoring ends and participants return to their daily work. Accordingly, the overarching strategy related to this hurdle is a meta-strategy with two components, namely: (1) to include diffusion strategies within the pilot and (2) to put them in place at an early stage, because many of the strategies need time to become effective.

In future Living Lab projects, these five constraints should be examined for each of the city cases, reflecting which constraint is most applicable, and how it can be anticipated.

In summary, this short paper has sketched some common ground on the role of Living Labs in urban sustainability. Urban experimenting is widely seen as necessary to 'rediscover' pathways to urban sustainability. My contribution is a typology of urban transition pathways with 'level of upscaling' and 'level of disruptiveness' as key dimensions. In my view transition should not be an aim (of experiments) in itself. Reorganization of existing urban regimes may lead to sustainability too. Upscaling from experiment scale to urban scale is significant in order reach sufficient sustainability impact. This is not diffusion of the solution, but involves socio-technical change. This should thus be an aim. Key question therefore should be: what are barriers in upscaling of (successful) experiments

of sustainable practices to urban level? How can we anticipate barriers in upscaling during (design of) the experiment?

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