Urban Transition Labs: co-creating transformative action for sustainable cities

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Frank Nevens [a],[*], Niki Frantzeskaki [b], Leen Gorissen [a], Derk Loorbach [b]

[a] VITO (Flemish Research Institute for Technological Research), Mol 2400, Belgium
[b] DRIFT (Dutch Research Institute for Transitions), Rotterdam, The Netherlands

ABSTRACT

In a general mindset of 'local elaboration' of sustainable development, cities are logical loci for action: they do not only concentrate (future) consumption and production — and are hence at the origin of unsustainability 'symptoms'-, they simultaneously are the operational units in which concrete actions can be envisaged, designed, (politically) facilitated and effectively rolled out. Whenever cities engage in this innovative, ambitious and responsible task of change for integrated sustainability, an undoubtedly major amount of learning emerges; and vice versa, sound knowledge/best practices on how to proceed with local sustainability oriented change processes could be a firm support for local actors in their quest for effective and efficient action. In this paper, we present 'Urban Transition Labs' (UTL) as settings in which real life trajectories of sustainable development in cities are deployed and at the same time carefully observed; in a co-creative collaboration between actors and researchers (transdisciplinary research). Thereby, a transition management approach is applied, resulting in a cycle of five distinct phases: (a) process design and system analysis, (b) problem structuring and envisioning, (c) back casting, determining major pathways and agenda setting, (d) experimenting and (e) monitoring and evaluation. The process is guided by a 'Transition-team' that co-designs the process and feeds in relevant information to the city transition 'arenas'. These arenas are the actual initial incubators of change; they are crewed by local frontrunners that are considered as engaged visionary people with diverse backgrounds. The findings of arenas feed a further participatory process to engage the relevant city stakeholders into action. In this paper, we want to present the UTL as a potentially valuable concept to support a 'walking-the-talk' of sustainable development by cities; and we share the first impressions on specific barriers and enablers that could determine the effectiveness of the envisaged approach.

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1. Introduction

1.1. Cities as loci for addressing (un)sustainability

In 2008, humanity crossed a milestone when the global urban population exceeded the rural population for the first time in history (Seto et al., 2010); since than more than half of the world's population lives in cities (Crossette, 2010). In Europe, this was already the case since the 1950s, in 2009 the urban population was already about 70% (DESA, 2009). As a consequence of the urbanization trend, energy demands, buildings, waste and water services, industrial processes are centred in and around cities. Madlener and Sunak (2011) state that —worldwide-cities are responsible for almost 75% of the global resource consumption. A logical consequence is their high attributed proportion of environmental impacts (e.g. by undesirable emissions). In that sense, urban areas in the developed world are the primary source of GHG emissions (Grimm et al., 2008), accounting for more than 70 per cent of energy-related global greenhouse gases from a production-based allocation viewpoint. From a consumption-oriented perspective (where emissions are allocated to the persons whose consumption caused the emissions), total GHG emissions shares would even be higher (Hoornweg et al., 2011). As such, cities are the locations where most of the (un)sustainability issues find their origin.

At the same time, cities are the basic units for policies that have significant environmentally beneficial consequences (both local and global), including those that shape individual environmental behaviour such as garbage collection, water and sewer treatment. Moreover, city managers have great purchasing power as they are making decisions on a daily basis on issues such as building

infrastructure facilities, transportation systems, purchasing politics. Some cities even own (or steer) key industries relevant to GHG emissions or other environmental impacts (Bai, 2007). Recently, the issue of climate change (mitigation as well as adaptation) has reinforced the recognition of the urban environments as critical arenas for addressing sustainability issues (Bulkeley et al., 2011); cities can even be considered as potential 'motors' for sustainable development (Rotmans et al., 2000) or 'hubs' for extreme innovation (Ernstson et al., 2010a; Bulkeley and Broto, 2012). While municipalities were once viewed simply as providers of services such as waste collection and utility provision, a shift has occurred in which the municipalities act as leaders on sustainability issues (Burstrom and Korhonen, 2001); and hence the urban sphere is increasingly considered as a potentially effective leverage point for action with regards to major challenges such as climate change (Betsill, 2001). And although they might not be the exclusive loci to advance sustainability and sustainability transitions, cities can at least play two important roles: as actors with regards to local transport, waste and water systems; and as providers of location to low carbon innovations (Geels, 2011). Moreover, local communities are the scale at which the behaviour of individuals can most directly be influenced (Bulkeley and Betsill, 2005). There seems to be a growing consensus on the critical role of cities in advancing the necessary transformations towards 'Green Growth' (Hammer et al., 2011) or climate action (ICLEI, 2010).

However, despite the necessity, potential and effectiveness of addressing global issues at the city level, there are obstacles to bringing solutions for global issues to the local level. Although cities might be obvious loci for (e.g.) climate change related action, a number of (often interwoven) barriers exist and hence create inertia. Addressing sustainability in the city level does not reduce the generic complexity neither the uncertainty that comes along the multiple actors, interests, interactions, processes involved in it (Ernstson et al., 2010b). Complexity and persistence of challenges are also pervasive and severe at a city level. In order to contribute to solving major issues, cities need to transcend the (perceptive) barriers of spatial scale (global issues do not relate to action 'not on my turf'; national governments should tackle them), temporal scale ('not in my term'; global issues go beyond classic terms of local policy cycles) and institutional scale ('not my business', local autonomy is to restricted to act effectively) (Bai, 2007).

At the same time, sustainability of a city or in a city bring forward its contested nature: the place manifests with different meanings of sustainability; entailing that sustainability as a target contains different meanings and aspirations for every city, making it even more challenging to search for governance actions and mechanisms to achieve it. Thereby, local authorities might be moving away from a strictly regulatory or service provision role to one of enabling action on environmental and sustainability-related major issues (Bulkeley and Betsill, 2005). According to Seto et al. (2010), the ongoing worldwide rapid urbanization can actually accelerate a transition to sustainability owing to forces of agglomeration, increased innovation and increased wealth. However, urban growth needs good governance structures in order to achieve this. Global or overarching definitions of sustainable cities converge to icons of self-sufficient cities, a goal that seems rather utopian (Roy, 2009). Therefore, the term 'sustainable urban development' seems to fit better to this methodological approach as it strongly refers to the process towards the achievement of the goals set (Theodoridou et al., 2012).

1.2. Transition studies

Transitions are considered as societal processes of fundamental change in culture, structure and practices (Frantzeskaki and de Haan, 2009). Where examples of historical transitions often boil down to radical and structural change processes without a well-defined and pre-set objective (Geels and Schot, 2007), the contemporary notion is explicitly connected with a specific objective of sustainable development (Grin et al., 2010). Transitions deal with systemic innovations, not only entailing new technologies but also with changes in markets, user practices, infrastructures, cultural discourses, policies and governing institutions. Between these elements, there are continuous dynamic interactions and co-evolutionary processes between different structures and practices of the system and its subsystems (Kemp, 1994; Geels and Schot, 2007). Owing to these characteristics, transitions are long-term processes (transitions approach thinks in 'generations'), guided by inspiring visions on desirable, sustainable system configurations.

Recent research on historical transitions shows how people's ideals catalysed transitions (e.g. the role of Mansholt's ideals and ideas in the agriculture transition in the Netherlands, Grin, 2012) and how technological inventions stimulated broader socio-political (Tabara and Ilhan, 2008), infrastructural (automobile transition, Nykvist and Whitmarsh, 2008; aviation transition, Kivits et al., 2010) and environmental transformations. 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. Van Buuren and Loorbach (2009) argue that pilot projects can act as seeds of transformation in a policy context when their benefits and outcomes are well shared and communicated and when they yield innovations that are aligned with future policy interests. These elements are seen as the fundamentals for inspiring action to influence, initiate or stimulate processes and conditions that can steer on-going or new developments towards a sustainable pathway. Transition management is a process-oriented framework that builds on these elements.

The transition management approach tries to empower and mobilize the undercurrent of sustainable development by offering a coherent framework for systemic change (Loorbach, 2007). It is characterized by long-term thinking, considers multiple domains and different actors, focuses on learning and on system innovation while maintaining a wide playing field (Rotmans et al., 2001). Initially, the transition (management) approach was mainly deployed in research and empirical experience at national levels and mainly sectoral policy transformations (e.g. energy, water, mobility, building and living, material use).

1.3. Urban sustainability transitions: an intersection to investigate

Transition studies had focused on system transformations such as energy systems or mobility systems with an increasing number of publications (Markard et al., 2012) and a book series depicting the founding empirical grounds of transition studies (Grin et al., 2010; Verbong and Loorbach, 2012). Over the past few years, the application at regional and urban level is being explored (Frantzeskaki et al., 2011, 2012; Jefferies and Duffy, 2011; Loorbach, 2009; Vergragt and Szeijnwald Brown, 2010). This evolution aligns with the growing emphasis on the critical importance of local action for major sustainability related issues such as climate change; and a concurrent need for cities (e.g.) for sound scientific knowledge on how to take effective and efficient decisions related to combating climate change (Rosenzweig et al., 2011). Thereby, not only content-related matters are crucial (technology deployment, behavioural change incentives), although equivalently process-related essentials (governance, participation/co-creation, collaboration) are part of the innovative approaches. Recently, the aspect of space has been introduced as a new empirical ground to transition studies. The recent scholarship on urban transitions, has mainly

argued for the meaningful application of transition conceptual models in urban context.

Following this, exploring transitions at urban context brings forward a number of opportunities as denoted by the scholars who pioneered in investigating this intersection. Amongst the opportunities for understanding urban transformations when adopting a transitions approach we include the following:

- a focus on processes that can/may have the potential to radically change the urban fabric and practices even when these processes are novel and/or spatially segmented (*the niche perspective*)
- a holistic understanding of the multiple phases and the associated dynamics that a transition process has (*the multi-phase perspective*)
- the conceptual tools to unravel what contributes to transformations that happen over a long time period in incremental way (*the co-evolution perspective*)
- the different patterns of processes in which transitions can unravel looking into policy, institutions, technology and agency dynamics (*the multi-pattern perspective*)

In this spatial delineation, the level of complexity is elevated to multiple systems and multiple actors at various governance levels altogether; rather than the sector (system) focus that unavoidably positions other systems at the periphery or, at the boundary. Even though the opportunities of investigating transitions in urban context or bringing in the spatial element in transition studies are arguably relevant and valuable both socially and for policy (Coenen et al., 2012), thus far an analytical rather than an action focus dominates the urban transition scholarship. More specifically, scholars from urban studies have applied or criticized conceptual models from transition studies such as the multi-level perspective (Coenen et al., 2012; Hodson and Marvin, 2012; Maassen, 2012; Spath and Rohracher, 2012), technological innovation studies' approach (Dewald and Truffer, 2012) and the concept of co-evolution in transitions (Carvalho et al., 2012; Rauws and de Roo, 2011) when exploring urban transformations. The different conceptual models of transition studies were picked as new descriptive tools whereas process tools (such as strategic niche management, transition scenarios, transition management/arenas) have not yet been experimentally applied in urban contexts.

Considering this emergent scholarship of urban sustainability transitions, we present a number of challenges to be considered by transition studies when exploring urban transformations. These include *conceptual challenges* that require new theoretical tools and approaches within transition studies and *application challenges* that refer to existing knowledge, tools and concepts of transition studies and their adaptations to urban pathologies and context. A review of the emerging literature of urban transitions informs the following couples of conceptual and application challenges that specifically relate to the dynamics of scale in urban sustainability transitions:

The multi-scale challenge:

- In the urban context, politics and governance dynamics are complex and transcend system (or sectoral) boundaries. Accordingly, dynamics of urban sustainability transitions need to be investigated in multiple scales in order to understand the embeddedness of transformation processes in space (referring for example to reconfiguration, destabilisation, acceleration dynamics as well as to power dynamics and relational dynamics e.g. niche-regime) (Rauws and de Roo, 2011, p.274; Coenen and Truffer, 2012, p.369; Truffer and Coenen, 2012, p.9; Coenen et al., 2012, p. 973; Spath and Rohracher, 2012, p.476) (*conceptual challenge*)

- In view of this, can conceptual tools from transition studies such as the multilevel perspective (Geels and Schot, 2007) be adapted or serve as the basis for analytical tools to investigate multi-scalar dynamics that are produced by nested systems at an urban context? (*application challenge*)

The innovation scaling-up challenge:

- Urban unsustainability requires innovative ways to deal with it. Seeking innovation potential, the challenge becomes to recognise, empower and scale-up (social, economic, technological and ecological) innovations that emerge at an urban context (also addressed as experiments in Maassen, 2012, p.447; Bulkeley and Broto, 2012). That requires an understanding of the processes of empowerment and scaling-up of urban experimentation beyond 'juxtaposing' or 'devising' technological diffusion patterns (Spath and Rohracher, 2012, p.465) given the broader focus of urban experimentation (*conceptual challenge*)
- In view of this, what are the governance mechanisms that can enable the scaling-up and empowerment of urban innovations for sustainability? Can existing tools such as strategic niche management or transition management apply for, or inform governance mechanisms for empowerment of sustainable innovations at the urban context? (*application challenge*)

The cross-scale and time-scale challenge:

- The urban unsustainability requires short- and medium-term actions that are tailored and effective in a specific context whereas relating to sustainability for avoiding lock-in trajectories. That requires a translation of successful practices from national level to urban context and the localisation of visions without losing the inspiring and pioneering abilities these imaginaries bring forward (Hodson and Marvin, 2012) (*conceptual challenge*)
- In view of this, can transition management {and the transition arena as a process tool} be applied to localise and translate national practices and imaginaries to urban context and to create new visions connecting to them so as to guide short, medium and long-term action? (*application challenge*)

In this paper we seek to investigate these challenges from a transdisciplinary research perspective. We present the application of an existing process management tool of transition studies, the transition management and specifically the transition arena in cities (Loorbach, 2010; Frantzeskaki et al., 2012). In this paper we present a new form of the transition arena — named Urban Transition Labs- as adapted for urban context. In what follows, we reflect on the UTL approach and its promises, resulting from the first practical experience in the five cities of the EU MUSIC project (www.themusicproject.eu; see Section 3.1.).

The remaining of the paper is structured as follows: In Section 2 we present the process steps of Transition Management. Section 3 elaborates on the urban-tailored transition management tool that is the Urban Transition Labs. Section 4 concludes the paper and adds to the discussion of urban sustainability transition (management), its governance attempts and its promises with regards to the mentioned challenges of urban transformation for sustainability.

2. Transition management in a nutshell

Transitions are societal processes of fundamental change in culture, structure and practices. In that context, transition management is a governance approach that includes a portfolio of

tools that have as a common objective to enable change in practices and structures (institutions) directed towards sustainable development targets (Frantzeskaki et al., 2012). Transition management can be described as a deliberative process to influence governing activities in such a way that they enable societal processes of change towards sustainability (Loorbach, 2007). It is thus defined as a new process-based technique that raises the following issue: how do we coordinate, bring together and influence actors and their activities in such a way that they reinforce each other to such an extent that they can compete with dominant actors and practices (Frantzeskaki et al., 2011). Transition Management process methodology includes a combination of a number of mutually reinforcing steps and associated activities (Fig. 1):

2.1. Analysing the system

A first step in changing a system is getting to know it; a systems analysis is a method to attain an overview and integrated perspective of the system under study. Determining the relevant players and their interrelations, the key system functions, formal and informal institutions are the elements of a comprehensive system description and outline. A balanced mix of quantitative data (statistics, historical data) and qualitative information (about values and norms, stakeholders, interrelations, routines, power and empowerment) are needed for a comprehensive understanding of the considered system. An instrumental system analysis stimulates an integral (holistic) thinking and a long-term perspective. It provides actors with a systematic mapping of the situation and problem that can enable them to look beyond their own expertise and perspectives and to understand the interconnectedness of the system(s).

2.2. Envisioning

A change trajectory towards a more sustainable society can be initiated by an appealing and inspiring vision. A vision entails images and a narrative of desirable systems based on shared principles of sustainable development. Coherent visions provide long-term orientation and guidance (Quist, 2007; Farley and

Costanza, 2002), mobilize support and enrol resources for the subsequent phases of a transition management cycle (Helm van der, 2009; Smith and Stirling, 2008). A vision connects and commits actors with different backgrounds and stakes (Smith et al., 2005). A process of imaginary scenario building (envisioning) is employed to create a vision by engaging community and local change agents (Newman and Jennings, 2008, p.4–5; Nevens et al., 2008).

2.3. Exploring pathways

Starting from an inspiring vision, different strategies on how to realise the desired future situation can be outlined. This backcasting exercise (Lovins, 1976; Robinson et al., 2011; Dreborg, 1996) results in different strategic transition pathways that include the actions that will progressively build-up in pursuing the desired vision. Backcasting breaks down the long-term sense of direction into mid- and short-term targets and actions. In this way, backcasting allows negotiations and sharing of prioritization of the pathways in a participative way (Holmberg, 1998; Kanyama et al., 2007).

2.4. Experimenting

Defined as 'practical experiments with a high level of risk (in terms of failure) that can make potentially large contribution to a transition process' (Rotmans, 2005), transition-experiments are real-life developments of drastically alternative ways of working and/or thinking, fitting into envisaged new system approaches. Such experiments link an established future vision with action potential and hence can me major triggers to enable take-off and acceleration of transition. Through a series of 'transition experiments' in different niches, social innovations can be improved and eventually replace dominant practices (Raven et al., 2010). Transition experiments are characterised by (a) their connection to a societal challenge, (b) illustrating a radical change of practices and/or culture and/or structures and (c) their inherent relation to learning (as an interactive process of obtaining new knowledge, competences or norms and values) (Van den Bosch, 2010; Van
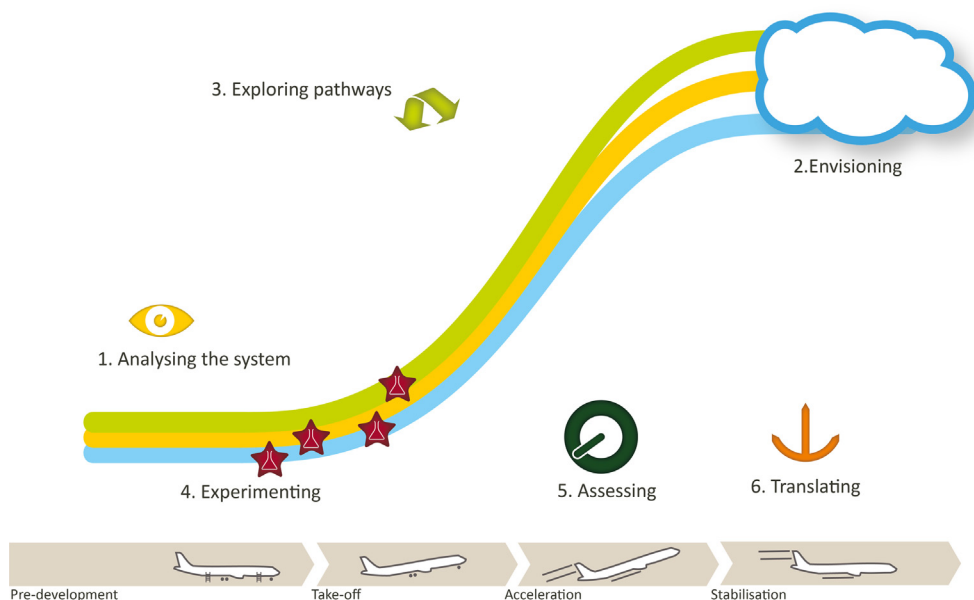

Fig. 1. Transitions to sustainable development: A logical combination of reinforcing steps and associated activities.

Buuren and Loorbach, 2009). Vreugdenhil et al. (2012) argue that transition experiments are designed to be and deliver innovative practices, have a strong knowledge orientation (produce knowledge and assist learning), require an open and inclusive governance context to be initiated and can be employed to provide feedback to policy-making and to an innovation process. Genuine transition experiments are conducted in a real-life societal context and involve multi-actor alliances (including private or public organisations, end-users, researchers, government, consultants, etc.).

2.5. Assessing

During the course of the different trajectories towards the envisaged future system, instruments can be designed for an effective follow-up of actions that are undertaken. These instruments can and should be based on the same principles that were employed to envision the future. Products, processes, and technologies can all be the subject of different types of monitoring and assessment, examining their compliance with the diverse sustainability criteria of the new systems. Methods based on indicators (whether or not merged into an index), cycle assessments, multi-criteria analyses can all fit into assessment toolboxes. Also in a city context, assessment tools enable comparison of municipalities and urban areas, and supports decision-making processes (Tanguay et al., 2010). Therefore, just as important as the tools themselves, is their effective use; monitoring instruments are not designed to 'measure' but to trigger action, to enhance system change in a desired direction. This type of transition monitoring focuses on the transition process itself and involves measuring the modulation of slow macro-level changes up to faster micro-level changes, from niche emergence to regime resilience (Grin et al., 2010). A key question is the final interest of assessing and certifying tools: genuine interest in sustainable urban development or mere profiling and benefiting ('Green washing') (Haapio, 2012).

A second aspect is the monitoring of the transition management process, involving the follow-up and reflection on all actions, events, policies and strategies that influence the transition in question; and hence feed a process of social learning, which is a prerequisite for eventual success.

2.6. Translating

In order to actually initiate system change, experiences from the different typical transition activities have to be incorporated and multiplied in actions of the relevant system stakeholders, varying from policy and legal changes to new corporate strategies, citizen behaviour. In that way, the lessons learnt from experiments, backcasting or scenario and envisioning efforts result in an effective dynamic process of change. Thereby, 'stakeholders' includes governments, industry, consumers, researchers, entrepreneurs, and the more. By translating the lessons learnt into change-inducing actions, the whole system is incrementally displaced ('transitionised' or transformed), closer to a dynamic sustainable equilibrium (Nevens et al., 2012).

3. Urban Transition Labs: tailoring transition management to the urban context

3.1. Urban Transition Labs

The experiences with transition management in different contexts (Loorbach and Rotmans, 2010) underlined the need and added value of creating space for facilitating social learning processes. As argued before, the urban context seems both in terms of scale and coherence, as in terms of a locus of problems and

innovations, a logical starting point. As in other complex persistent problems, the transition management approach can be used to systematically develop an innovation network with a shared discourse, agenda and strategy as means to influence emerging transitions. As opposed to sectoral transitions however, multiple transitions converge, interact and co-evolve in an urban context. This implies working across different dimensions as well as on different levels simultaneously. As such, the concept of Urban Transition Labs emerged out of the combination of different empirical cases where different elements of transition management started to come together as well as the theoretical need to develop integrated transition strategies involving multiple systems and experiments.

The Urban Transition Lab is inspired by the 'living lab' concept, which is considered as a user-centred, open-innovation ecosystem (Von Hippel, 1986; Chesbrough, 2003). Often such labs operate in a territorial context (e.g. city, agglomeration, region) where they integrate concurrent research and innovation processes (Bilgram et al., 2008) within a public-private-people partnership (Pallot, 2009). They typically integrate research and innovation processes through a systematic co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases. Such use of cases involves user communities ('participation'), not only as observed subjects or stakeholders that are enabled to have a say in the matters, but also as a source of creation.

In line with this inspirational ground, we concur with Healey's (2006, p.305) framing of arenas or Urban Transition Labs in our conceptualisation, as "institutional sites" where an episode of transformation is realised and as such, Urban Transition Labs are facilitated sites for creating (social) innovation and within which social change agents can initiate or inflict urban sustainability transitions Box I.

Box I. Urban Transition Labs

We consider an Urban Transition Lab as the locus within a city where (global) persistent problems are translated to the specific characteristics of the city and where multiple transitions interact across domains, shift scales of operation and impact multiple domains simultaneously (e.g. energy, mobility, built environment, food, ecosystems). It is a hybrid, flexible and transdisciplinary platform that provides space and time for learning, reflection and development of alternative solutions that are not self-evident in a regime context. The platform brings together innovative 'regime' actors and frontrunners from 'niche' contexts.

In UTLs, transition knowledge is tailored to the local urban setting:

- different future visions or already ongoing transition initiatives across domains or sectors are brought together for consideration, integration and re-scaling;
- learning points on how multiple visions and experiments reinforce (synergies) or counteract (trade-offs) their ambitions are identified and captured;
- windows of opportunity for complementation and synergies are explored;
- potential barriers and tensions and how to overcome them are investigated.

Because of the various problems that cities face, they need to find smarter and more sustainable ways to navigate their future development and at the same time deal with

changing societal dynamics. The UTL concept meets this need via the creation of a learning environment, which focuses on building reflexive, and entrepreneurial capacity as well as structuring knowledge for action. The main task of the transition team is to facilitate the interaction, to unveil lock-ins, to discover innovation opportunities, to assure transparency and to nurture the social learning environment. For this reason, transition team members require specific skills next to topic expertise. The UTL adds an extra dimension to the local urban governance approach but does not replace it. It aims to work as an incubator of transformative urban innovation in a setting that is less prone to lock-in in unsustainable systems through vested interests or silo thinking. An UTL is thus prone to the risk of failure in the sense that it cannot deliver actual transformation. Even so, valuable lessons can be gained and documented. This will be one of the main tasks of the T-team and requires a clear mandate from the city to do so.

In the following sections, we describe the way in which we have translated the essential elements of transition management in the context of cities (an overview is given in Table 1) and have build the envisaged crucial ingredients for what we considered a hands-on workable effective format for practising urban transitions. Thereby, a certain emphasis is put on climate change challenge and the associated target of low-carbon society, as a result of the actual problem and policy contexts in which the UTL concept was developed at its first experimentation: the project EU FP7 'MUSIC '(Mitigation in Urban areas: Solutions for Innovative Cities) is a cooperation project between European cities and research

institutes in Northwest Europe. MUSIC aims to reduce CO_2 emissions with 50% in the partner cities Aberdeen, Montreuil, Gent, Ludwigsburg and Rotterdam in 2030 (MUSIC, 2011a, Fig. 2). For this specific project, an 'Urban Transition Management Manual' was developed, as an initial 'blueprint' for initiating and facilitating urban transition processes, the onset for guidance for transition practitioners in cities (MUSIC, 2011b). Through the first experiences from the application in the case study cities (actual meetings, workshops, conferences, evaluations...), a number of insights enriched the conceptual approach ('learning by doing') and hence the UTL description co-evolved. In the subsequent sections, we describe the UTL conceptual framework 'as is', acknowledging its status of still being continuously 'under construction'. We successively describe the different actions that are envisaged to be essential for the UTL, their respective expected outcomes, the type of actors involved, a number of existing tools and methodologies to implement (summarised in Table 1) and the relations with the mentioned urban sustainability challenges. *Moreover, we highlight a number of barriers and enablers that were encountered in the actual trajectories and hence immediately confront the envisaged 'ideal' (descriptive) UTL elements with its real life deployment.*

3.2. Setting the stage: preparation and organisation

In this preparation and exploration phase, a *transition team* ('T-team') is established, which is considered as the ultimate driver of the UTL-process. The team composition reflects a strategic and content-based mix of employees of the initiating organization (in the cases thus far a city administration department), experts in the field under study (e.g. energy policy and technology experts),

Table 1
An overview of the structural elements of an Urban Transition Lab, with the envisaged specific outcomes, actors and methods.

Key outcomes	Involved actors	Deployed methods/approaches
Setting the stage		
A comfort zone for co-design	City administrators	Consultation and communication
The T-team	Specific content experts (e.g. energy)	Brainstorming
A flexible process design/plan	Transition management experts	Actor mapping tools
Actor overview and analysis	Process facilitators	Transition management framework
System analysis	Experts, data-owners, stakeholders	Soft-system methodology
		Semi-structured interviewing
		Desk top data collection
		Sounding board sessions
Problem structuring and envisioning		
Transition arena	Frontrunners (visionaries)	Arena meetings
Participatory problem structuring	Creative individuals (artists, designers..)	Brainstorm/scenario workshops
Key priorities		Artistic conceptualization
Guiding principles		Participatory
Exploring pathways and building an agenda		
Major systemic turns to be realised	Frontrunners	Participatory back casting
Desired and feasible roadmaps	Action-oriented networks	Model-based scenario's
Targets and milestones	Pathway-specific actors (experts, industry,	(Facilitation of) networking
Knowledge on barriers and enablers for pathways	government, civil society, citizens...)	Business models
(Inter) active thematic networks		Cost/benefit analysis
Experimenting and implementing		
'New' transition experiments aligning with	Actors	Brainstorming
(one or more) specific pathways	Financers	Fund raising
Existing experimental settings/initiatives linked	Managers	Project planning
to the transition process	Clients	Project management
Demonstrators for the transition process	Citizens	Fund raising
Monitoring and evaluation		
Adaptation of the strategic approach	T-team	Interviews
Adaptation of the generic transition	Action researchers	Reflective sessions
management framework	Actors	Action research
Harvest of lessons learnt		
Sharing and availability of knowledge		

Fig. 2. 'MUSIC': five European cities experimenting with the UTL approach.

transition management experts and process facilitators. The transition team functions as an intermediary between the participants of the UTL and policy officers (or simply, local policy space).

A major task of the transition team is the set up and management of a 'governance niche': creating the necessary time and space for the aspired innovative setting for a genuine transition process; that at least initially can function in a 'governance'-mode (i.e. out of a command-and-control 'government' approach) (Tukker and Butter, 2007). The ultimate aim is to create a certain 'safe space' in which the transition actions and strategies can be discussed and co-designed without immediate 'control' of regime actors that may have dominantly business-as-usual conceptions on expected (hard) results, fixed time frames, political or other stakes. While it is impossible and perhaps even undesirable to exclude conflicts within the transition process, the goal is to create insight into the variety of perspectives and values involved in a complex issue and try to create an equal basis for debate and solution formulation by establishing a common broader context to which everyone can relate (e.g. a joint transition). The transition team proactively identifies possible conflicts and tensions and seeks ways to elucidate underlying motives and interests as well as ways to moderate them.

The T-team and its members are the initial architects that design and prepare both the organization and content of the arena sessions, elaborate the outcomes and reflect on them, in order to further develop the logic of the next steps; they establish and continuously adapt the *process design*. Their application of the ideal urban transition manual, the process 'plan', is an adaptable guide for the aspired trajectory.

The T-team is also the first locus that identifies the relevant actors that should be involved in the co-creative transition process and to understand their inter-relationships. Starting from a long list of relevant actors, actors can be mapped with regards to their backgrounds, competences (process/substance), interests and power (informative, transformative, reinforcive, systemic) (Avelino, 2011). This kind of instrumental 'actor analysis' (Reed et al., 2009) should further be deployed to inform on the different types of actors that are envisaged as crucial for the reinforcement of the subsequent steps in the transition process. In first instance, 'frontrunners' are selected for the arena-meetings (see 3.3).

The actor analysis is also an aspect of the 'system analysis' that should provide an overview and integrated perspective of the city under study. Having such an overview of the city-system is essential to identify its main properties, interactions, persistent problems and challenges for the future. In particular, more than being exhaustive, the system analysis should stimulate a systemic way of thinking; and hence tackle the multi-scale challenges of urban sustainability transitions. By its construction and language, a system analysis should enable actors to look beyond their own expertise and current perspectives to understand the abundant interconnections in the system. Essential elements of such a system analysis are the definition of the boundaries (in space, time and themes), a comprehensive yet understandable structure, an overview of the relevant stocks and flows (e.g. labour force, air

quality, housing stock) and the data/indicators that illustrate them. Quantitative approaches (numerical data) should be combined with quantitative aspects (interpretations, viewpoints of actors). A system analysis reflects the current dominant culture, structure and practices (regime), as well as emerging alternatives (niches and experiments; cf. the innovation scaling-up challenge) and major landscape pressures (and hence projects the city in a multi-level perspective). In urban systems, the physical and institutional contexts play a very important role. More than in sectoral or regional transition processes, in urban systems the physical infrastructure and space determine the possibilities for development, as well as the institutional context (Knox and Marston, 2004).

With these specific tasks in mind, it is clear that the T-team activities go beyond a mere 'organisation'-level and hence are time-consuming. Of course, the T-team should not be considered as a stand-alone. It can delegate some of its tasks to (external) executive parties, meeting moderators, experts, etc. A small group of policy actors (i.e. public administrators and officials) can support the transition team, for example with their expertise, time-investment, communication channels and contacts.

In comparison to the usual and often comforting 'project' approaches, the UTL introduces a radically new setting, which is confronted with the dominant paradigms and mental frames of a city administration and its surroundings. Specifically the following barriers have to be overcome in order to give the UTL the space and manoeuvrability it needs:

- *the typical 'command and control' attitude from politics and administrations; urban transition trajectories are all about empowerment and a high degree of setting free;*
- *the strong fixation on a unambiguous planning towards concrete (sometimes almost predictable) outcomes and communication; the UTL process has a high degree of emergence and serendipity;*
- *the often strictly imposed planning that leave few or no space for (at first sight unproductive) reflection, re-consideration and learning;*
- *the introduction of 'soft' elements (often coinciding with 'immeasurable') in integrated approaches (e.g. system analysis);*
- *the gradual build up of non-tangible results such as trust and empowerment of participants.*
- *the mediation between established (policy) institutions and policies and the developing transition projects, policies and networks.*

3.3. Envisioning the future

Based on the actor analysis, an initial group of 'frontrunners' is selected for the first 'arena'-meetings. Frontrunners are defined as visionary people (having a bond with the city in question) that are able and willing to engage in a creative process of out-of-the-box thinking with regards to a desirable long-term future for a sustainable city (cf. the urban sustainability time-scale challenge). Frontrunners are not only out-of-regime pioneers, but also change-inclined regime agents (Loorbach, 2007; Rotmans and Loorbach, 2009). It is thus important to note that frontrunners are conceived as those individuals (and organisations) that have an explicit ambition for sustainable innovations. These can be either regime-based or typical niche-actors. They are engaged in the transition process initially as individuals instead of representatives. As the transition processes are designed for social learning and empowerment, they can only be effective through individuals developing an intrinsic commitment to over-all sustainability agendas and goals, and being able to translate these into very concrete actions within their daily environment.

In the setting of a city transition arena (with typically 15 to 20 participants), the frontrunners work autonomously or 'protected' from the regime, in mutual trust and at an initially low visibility for the outside world. This setting of trust and sharing a common 'mission' takes time and can be build up during a number of meetings that deal with specific topics that co-create a genuine 'vision' (Collins and Porras, 1996):

- making explicit a shared perception and structuring of the problems/challenges of the city, guided by the initial results of the system analysis;
- expressing the key priorities (including values and norms) and guiding principles that are considered as the baseline conditions that the future urban system (and the diversity of its sub-configurations) should comply with;
- establishing clear and vivid images (mainly in the form of narratives) of the desirable sustainable future of the city; this vision is meant to have a mobilising and guiding function and to contain 'living' material that can trigger a shift in mind-set.

In the context of envisioning, the process is just as important as the vision itself since it contributes to a positive group dynamic and alignment of perspectives. The frontrunners are not only expected to be the creative designers of the vision, but also to initiate the diffusion in their own networks and later by other people in broader circuits (Loorbach, 2002; Rotmans, 2003). Therefore crucial is the internalisation of the basic transition narrative developed in the arena: not only an ambitious goal (like an energy neutral built environment in 2030), but also the understanding that this requires fundamental changes (a transition), what the potential for this transition is, and that it can only be realized in an experimental and organic manner through broad engagement and inclusive processes.

Envisioning exercises ask for an explicit setting of creative and daring engagement. A number of barriers can hinder this challenge:

- *selecting genuine frontrunners (identifying them and actually getting them engaged) is a not obvious; the specific personal ability to think out-of-the-box is important, but also the ability to function in a group, being talkative... are supporting competencies;*
- *identifying those arena members that do not contribute to the envisaged front-running function (or even explicitly hinder it) and how to tactically 'remove' them;*
- *working for a certain time without very tangible results (building on a common understanding and mission, building trust and 'chemistry'...) and nevertheless keeping the interest and voluntary engagement of the arena members;*
- *overcoming dominance of 'stakes' and 'representation' and creating a mind-set of personal engagement for a broader objective in which all stakes ultimately benefit, be it in a possibly changed configuration.*

3.4. Developing pathways and building a transition agenda

Based on the shared problem definition and the sustainability vision developed earlier on, an exercise is to be initiated in which a back casting analysis emerges the necessary transition pathways. This step can be considered as the first towards an actual operationalisation of the broader concepts included in the vision and its underlying principles. Therefore, in this stage the UTL activities break out of the limited setting of the arena: multiple thematic network players are expected to get involved in the development of major strategic headlines and the assessment of their actual potential to co-establish the desirable future city. The logical

linking of the future vision with present action is being established (cf. time-scale challenge); only in that way, the vision can actually inspire and mobilise. Critical issues that ought to be considered in this step are:

- defining the major turns that are needed to reach the envisioned future and hence shape a specific transition pathway; from a technological, cultural/behavioural and structural organisational point of view;
- assessing long- and short-term feasibility of envisaged pathways (e.g. by model based scenario's);
- determining the specific drivers and stepping stones that are supportive for each of the envisaged pathways;
- identifying the relevant collaborations and the already or not-yet-involved stakeholders and leverage points (city-'owned', regional, national or supra-national levels) that are needed to support and/or realize the developed transition strategies;
- explicating the actions to be taken in the short- and mid-term by the supportive parties and collaborations.

In this way, a 'transition agenda' is established (Loorbach, 2007), which also makes the concrete interests, motives, and policy of the various actors involved come out into the open. Typically, different sub-groups emerge or are called upon; each of them focussed on specific strategies and involving all kinds of pathway-specific relevant actors (technological experts, industrial players, government (-linked) departments, citizens and public society organisations). Full process-facilitation or active involvement by the transition team becomes less important, since the aim is a number of emerging self-organizational processes; which require patience and trust in the process. The transition agenda therewith provides a broader set of transition inspiration and activation means, including strategies, pathways, goals, conditions and narratives, to which all sorts of actors can relate and by which their actions can be guided indirectly.

Pathways and transition agendas operationalize the envisaged sustainable future of a city. However, they should not be considered as 'the transition blueprint', covering all the necessary strategies and actions, with respective timelines of milestones and/or measurable objectives. Therefore a number of potential impediments need to be taken into account:

- *finding a workable equilibrium between strategies/actions that can be 'planned/scheduled' and others that might need to be developed further on but for which there no readily available data, technology, space;*
- *going beyond contemporary mindsets that hinder genuinely innovative strategies and actions, asking for new types of business models, collaborations;*
- *overcoming discussions on 'feasibility' based on currently existing barriers embedded in legislation, economic performance indicators;*
- *demonstrating the actual added value of envisaged strategies/ actions; in comparison to the rather setting in the envisioning arena, now the focus-item becomes more and more "what's in it for me?"*

3.5. Experimenting and moving towards taking action

A further operational step in the transition management approach are the city transition experiments, as real-life scale realisations that illustrate the envisaged transition pathways and the way they link with the envisaged desirable future images. In this stage, even more involvement and autonomy is expected from actors 'on the field', in the city. New kinds of collaborations should be installed and encouraged to come up with actual initiative to design, assess and finally realise experimental settings. Experiments might start up following the formulation of the transition agenda or even already in parallel to the arena. Moreover, not only 'new' experiments are to be looked after or installed; a challenge is to appreciatively connect ongoing initiatives (not necessarily set up within the explicit context of the transition process) with the broader narrative of the transition. From such an appreciative enquiry (Cooperrider and Whitney, 2005), the transition lab is even more broken open and connects to a larger (partly autonomous) dynamic of change, centred around a common and shared narrative. A challenge is to connect the different ongoing and newly established experiments into the broader narrative of the sustainable/low-carbon city. Important here is that the transition experiments are explicitly linked to the broader transition agenda and set-up in such a way that through involvement of different types of actors and by addressing different sets of (transition-related) questions, the experiments themselves become instrumental in changing existing 'unsustainable' regime structures (cf. cross-scale challenge). Examples are floating pavilions in the city of Rotterdam, which relate to the vision of 'a floating city' and led to changes in spatial policies (identifying parts of the harbour area as spaces for building on water), economic instruments (new taxing schemes) and was used to analyse citizen attitudes towards living on water. In this way, an initially technological experiment was used to analyse and change the socio-institutional context therewith creating space for up-scaling of the experiment and further steps on the transition path towards a floating city.

Real life transition experiments are the most tangible results from an (urban) transition trajectory; and therefore probably the most difficult ones, since they ask for actual 'on the field' engagement, investment of actors (time and money). Since they are genuine 'experiments', they carry a degree of possible failure and hence risks for those actors who actually engage in them. Not surprisingly, there are a number of barriers to overcome:

- *getting people involved to engage in significantly new settings, in which they are aware of the fact that they are the first to try it and in which they bear a significant amount of uncertainty and risk;*
- *at the end of the day, a major barrier is finding the necessary financial means to support an experiment, without asking too much effort from one or a few partners;*
- *the connection of an experiment with the broader transition context (the coherent narrative of vision, pathways and actions) should be kept in mind and made explicit;*
- *transition experiments have a high level of uncertainty and are focused on new combinations and insights. Transition experiments accommodate searching and learning processes (doing by learning and learning by doing). Therefore, 'failure' of experiments should be considered/allowed as part of the game. An 'experiment' only fails when nothing has been learnt from it.*

3.6. Monitoring and evaluation of the transition management process

An essential element in transition process is learning. Therefore, a consequent attitude of reflectivity and reflexivity should be incorporated in an urban transition process. In fact, this learning aspect is not merely 'a phase' in the trajectory but a continuous aspect; as a cyclical and constant structural flow of the process design as well as substance. Meetings, paths, experiments, visions and arenas should continuously be prone to monitoring and evaluation and −when necessary or favourable − adjustment at any time. Transition monitoring is defined as observing the transition

activities to obtain more insight into the complex dynamics of the transition process, with the intention of influencing the transition in a more effective manner (Grin et al., 2010). Parts of these monitoring and evaluation methods are participatory (e.g. by interviewing frontrunners, actors, public administration) and others are performed by the transition team. A major aspect that is entailed by the explicit focus on 'learning' is the fact that failure is accepted or can only be considered as failure when no lessons were learnt from that very failure. Moreover, not only 'first order' learning is envisaged (new insights with regards to options in the case of a given problem and a given context), but also higher order learning (new insights at a level with regard to problem definitions, norms, values, goals and convictions of actors, and approaches how to the problem (Quist, 2007).

A major recognizable barrier with regards to the monitoring of and learning from a transition process 'management process' is the fewer availability of resources (time and money) to actually have a process of social or higher order learning in a systematic manner; which is an important barrier for scaling up learning experiences (Grin et al., 2010).

Additionally, a reflexive monitoring also entails a continuous willingness to re-orient, re-consider and re-design, which is not evident in settings of a 'project' with a plan and expected outcomes, well within fixed time frames. In that context, it should gradually become clear that transition management − and hence Urban Transition Labs- is not merely a 'method' that can be applied in a specific context; it entails a be-the-change-you-want-to-see-attitude. Consistent refection helps to pay attention to this prerequisite but may at the same time be confronting, as it may question the safety of established dominant routines and mental frameworks;

4. Discussion and conclusions

4.1. Urban Transition Labs: learning on new governance structures for sustainable cities

"We have now entered the century of the city" (Seto et al., 2010). There is growing acknowledgement that cities can actually accelerate transitions to sustainability, "provided that new governance structures emerge to achieve this". From the (reflection on) experiences thus far, a number of overarching findings can be distilled that inspire the potential contribution of UTL in that context of driving the motor of sustainable change.

Within a context and semantics of transition management, the UTL approach can be considered as a city governance niche or experiment. We believe that it can be applied I urban context and its adaptations require careful consideration. It is a typical platform that has to find and safeguard a certain protected comfort zone in which it can operate: it needs the necessary space, time and empowerment to develop its different essentials. Finding this 'license to operate' in an urban policy environment is challenging since there is no guarantee for success; the approach cannot yet fall back on a 'proof of concept' or predictable desirable results. A major part of the outcomes have a high degree of emergence, which is readily interpreted as risky or 'soft' in settings that remain dominated by discourses focussed on 'planning' in a mode of command-and-control. Therefore, a potentially major UTL-asset is its attempt to connect those kinds of approaches that deal with the more conceptual, visionary and long-term aspects with elements of quick wins and visible results (and achievements). In fact, the UTL approach entails both aspects in its design since it builds on a framework of mutually reinforcing elements, varying from long-term envisioning up to on-the-field experimenting.

Applying transition management in a city policy environment is a transition in itself. It asks all kinds of local actors to show openness for different approaches and attitudes. Local authorities are expected to strongly involve stakeholders and their multiple experiences in a co-creative process without a single 'silver bullet' outcome; and without a permanent 'control' on the matters. Such aspects require them to adapt to new kinds of roles (such as facilitator, enabler and connector) and to show an empowering attitude, based on mutual trust. It also entails a high degree of willingness to reconsider and reorient when the process and its (shared) outcomes urge for that. In that context, adopting transition-like approaches initially urges for a drastic change in mindset (it happens 'between the ears' first) and therefore it takes time before the coherence, the sense and the significance of a UTL setting can become clear. Without any doubt, there is a (future) role for 'transition coaches' that − at least at the start − can facilitate transition trajectories; in a sense of indicating the meaning, place and role of specific activities and outcomes and keeping the overarching story of the process continuously to the attention. This kind of approach also entails a degree of intimacy or tailor-made conception which aligns with the fact that due o differences in city structures, economic development, administrative structures etc., urban policy implications and management of urbanization have to be adapted to the different urban conditions and situations (Madlener and Sunak, 2011).

A specific asset of a transition management approach is its shift from sustainability as not being presented as an obligation but a something positive, desirable and potentially even cost-cutting; 'have to' is giving way to 'want to', also in urban design and planning (Meijer et al., 2011).

Owing to its specific elements such as system analysis and envisioning, urban transition processes have the potential to open up discussions on (e.g.) climate change and carbon-neutrality to a broader sustainability transition; and hence tackle the inherently multidimensional character of the major and interdependent sustainability challenges, that ask for drastic change. Sustainability oriented policy measures have to be multi-dimensional and multi-sectoral (Madlener and Sunak, 2011). In that context, UTLs can contribute to shape a radically new and different future and deliver a new 'sense of place' for a specific city and prepare it to (being able to) cater for the various needs of existing residents and newcomers (Deakin, 2012).

"Cities are not actors; they are places where people and economic activities are concentrated; complex social, economic and physical systems" (Otto-Zimmermann, 2011). But in the end, it's up to the people that have some kind of connectedness with a specific city and that each have a specific experience to take concerted action for a sustainable future of the urban environment they want to feel comfortable in. Urban Transition Labs have the ambition to contribute to the actual connection of these stakeholders in a setting that allows them to co-design such a sustainable future and actually realise it. It is a well-considered conceptual approach; however with an honest modesty of 'to be proven' by actual experimenting.

In general, there seems to be very limited understanding of the dynamic interactions in urban areas (Seto et al., 2010). In that respect, many things are still open for further learning. The UTL explicitly has the aspiration of being a node and platform for such learning: about the role of processes of governance and innovation, about interacting institutions and change agents and about the way all of them synergistically can (co-)evolve over time. Knowledge from this kind of research on transitions can help understanding how transitions unfold and develop; and how they can be facilitated or accelerated in their being instrumental for sustainable urban development. In this context of a learning

hotspot, also the position and mode of science and researches is under review.

4.2. Urban Transition Labs: more than promises?

As mentioned earlier in this paper, the emerging literature of urban transitions informs a number of conceptual and application challenges that specifically relate to the inherent dynamics of scale in urban sustainability transitions: multi-scale, innovation scaling-up, cross-scale and time-scale. In our description of and reflection on the UTL approach, we indicated the characteristic assets, attitudes and tools that should contribute to making the approach an effective one for genuine sustainability transformations in cities. Thereby, two major considerations should be kept in mind:

- The UTL and its underlying transition management approach should not be viewed as a 'method' to 'steer', 'manage' and/or 'control' major societal changes. Such a (perceived) technocratic nature of deliberate intervention has more than once been the object of criticism with regards to transition management (e.g. Shove and Walker, 2007). However, the conception of the UTL is more about the exploration of a new city governance approach for the co-creation of innovative pathways and processes in a strongly reflexive manner. UTLs are not 'run' by transition managers, in a top-down command-and-control style. The experiences thus far indicate that the intended activities are undertaken by the envisaged variety of actors, participating in negotiation processes without a clear hierarchy nor demarcation of who is in or out of the city system. Moreover, the UTL is considered as a setting that is open for diversity, emergence of ideas/actions and linkages with ongoing 'external' initiatives.
- Whether transition management (and in this case its specific out roll in a city context) 'works' has not been 'proven' yet. However, in a paradigm of 'learning by doing', the first UTL experiences show the potential for systems thinking, drastic innovations, new city governance settings, dispersing actor engagement, and long-term considerations. These are elements that are considered necessary to initiate, ignite and speeding up of the major societal changes towards sustainability. In a general realm, (scientific) paradigms can best be examined by applying them to their own sphere of action. In that, the first actual UTL initiatives can be considered as 'experiments' that explore a specific pathway towards sustainable cities of the future. Explicit reflection on this UTL (like the one presented here), inspired by close monitoring can further help to revise the initial vision on its onset and eventually demonstrate its potential (whether or not) with regards to the assumed promises for genuine sustainability progress.

4.3. Urban transitions research: work in progress

Future research on urban transitions has to consider a number of aspects when adopting a transitions approach to investigate geographies of transitions and scalar transition dynamics. In addition to future research for the three coupled challenges that relate to scalar dynamics of sustainability transitions presented in the introduction of the paper, we suggest the following future research directions based on our experience with Urban Transition Labs:

- new engagement and planning tools to enable and steer urban transitions towards multiple sustainabilities. How can we ensure that urban transitions are directed to pursue multiple sustainability goals (social sustainability, economic

sustainability, environmental sustainability) to bridge divides (urban segregation) and to avoid creating new ones? (see Hodson and Marvin, 2012, p. 435)
- monitoring and evaluating urban transition processes (either emergent processes or enabled processes with Urban Transition Labs or other process-oriented platforms) against sustainability criteria rather than city-led targets that frequently relate to city-marketing or promoting agendas
- explore the role of agency dynamics in urban sustainability transitions in terms of politics, power and seizing or seeking opportunities. The role of political agency in coupling innovations, in strategically delaying take-up of innovations and in allowing (transition) discourses to incept policy dialogues requires careful investigation.

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