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Mapping Collaborative Methods and Tools for Promoting Urban Transitions in the Öresund Region

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UT CoMeT Report #1: Mapping Collaborative Methods and Tools for Promoting Urban Transitions in the Øresund Region

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Executive Summary

This report is produced within the *Urban Transition Øresund* (UT) project (2011–2014), and it is part of the subtask *Collaborative Methods and Tools for Urban Transitions* (UT CoMeT). The goal of the UT project is to promote sustainable growth and advance sustainable urban transformation in the Øresund region by gathering municipalities, universities and businesses in cross-border cooperation. The subtask UT CoMeT has a special focus on tools and methods for working that allow and promote greater collaboration between various actors in a transition process towards sustainability.

The initial phase of the UT CoMeT activity consists of mapping existing experiences of forms of collaboration and cross-boundary working formats in urban transition processes. This includes examples of methods and tools utilised within the Øresund region, but also beyond, on international areas, focusing on Europe. The mapping process takes its point of departure in results from earlier reports, and it was completed in two steps: (I) mapping of methods and tools currently used by the UT project partners in the Øresund region; and (II) mapping of international cases and examples in Europe.

Step I was conducted in collaboration with the five municipalities participating in the UT project. On the question *what* collaborative methods and tools that the municipalities currently utilise in their everyday practice, a long list of more or less traditional, digital or analogue examples were mentioned by the respondents, everything from traditional meetings and study trips, to online activities, social media, and drama actions in public space. The respondents also expressed a wish to continue to develop their methodological toolbox for collaborative work. Based on the outcome of this mapping a selection of topics that could be subjects for further development are:
- Social media tools in urban planning processes,
- Methods for facilitating dialogues and meetings with developers, builders, citizens, and politicians, but also colleagues,
- Methods for facilitating, and running dynamic, open planning processes,
- Visualisation of scenarios, occurrences and long term effects of investments,
- Value systems measuring "soft" values (the social), and
- Methods for "prototyping the city", small scale testing, design thinking in urban planning processes.

To create a richer picture of some of the methods and tools currently used in the Øresund region, a set of innovative urban planning actions was selected and further described and discussed in the report. These featured key examples from different municipalities including: the Climate Butler project in Ballerup (*Klima-butler*), a Game supporting Collaborative Innovation in the Public Sector in Copenhagen (*CO-CREATOR*), the Sustainable Building Program in Lund (*Miljöbyggprogram Syd*), the Creative Dialogue in Malmö (*Det Goda Samtalet*), and Planning on Demand in Roskilde.

The mapping of international cases, step II was completed in collaboration with international Master students at International Institute for Industrial Environmental Economics (IIIEE), Lund University. The first theme explored the role of collaboration in governing sustainable urban transformation. An emphasis was placed on the need for greater civil society involvement in sustainable urban development processes. The study was based on data sources from the ICLEI (Local Governments for Sustainability) database, as well as a theoretical framework provided by the DISCUS (Developing Institutional and Social Capacity for Sustainable Development) project. The second theme explored potentials of the Living Lab approach to achieve urban transitions towards sustainability through the engagement of key stakeholders.

The outcome of this regional and international mapping process serves as a starting point for six upcoming thematic workshops organised in the next phase of the UT CoMeT activity. At these workshops, UT project partners will meet for further sharing of insights and experimentation with new kinds of methods, tools, and settings for urban transformation processes. The workshop themes are currently being developed by the CoMeT group. Topics that have been discussed as potential workshop themes are, among others: "Mobile/smart phone video and streaming technologies in urban planning", "Urban games, and game development in urban planning", "Prototyping the city", "Facilitating open planning", "Urban living labs", "The art of hosting creative dialogues", "Soft values – handling the 'social' in urban transitions", and "Negotiating and visualising long term effects of investments".

Based on the conclusions and learning gained from this mapping process, the subtask UT CoMeT will aim for the following over the remainder of the UT project:
- a deeper understanding of how different urban sub-systems, such as the physical as well as the socio-cultural and the economic, overlap or are played out against each other,
- composite media and new vocabularies in order to be able to handle and reconfigure these relationships and inter-linkages,
- new approaches, platforms and mind-sets for creative policy-making and transitional action,
- solutions for prototyping, exploring and testing of new ideas,
- professional, yet case sensitive and transparent methods, tools and instruments, including sophisticated urban indicators, composite mapping procedures, participatory modelling and simulation tools, and interactive forms for data management, and
- forms for debate, reflexion and accumulation of results, findings and conclusions, locally, regionally and on an international level, in order to raise awareness and stimulate further change, that is, forms for critically reviewing and evaluating not only results but also forms of organisation and programming, modes of operation and ways of implementation.

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1. Urban Transition Øresund

The Øresund region aims to be a regional powerhouse for sustainability, innovation and green growth in Europe and to become CO2 neutral within 15−20 years[1]. A number of municipalities have, separately and from different perspectives, been engaged in developing and implementing strategies and plans to this end. Furthermore, the Øresund University Network brings together 8 leading universities in the Øresund region, which encompass 165 000 students, 10 000 researchers and 6 000 doctoral students. This makes the Øresund region a stronghold for education and research with significant activities around sustainable urban transformation and climate change[2].

The goal of the *Urban Transition Øresund* (UT) project (2011−2014) is to promote sustainable growth and advance sustainable urban transformation in the Øresund region by gathering municipalities, universities and businesses across the Øresund region in cross-border cooperation. This includes working with adaptation and mitigation and enhancing resilience in response to climate change and sustainability challenges. The partners in the project include both academic institutions (Aalborg University, Lund University, Malmö University, Roskilde University, and the Swedish Agricultural University) and municipalities (Ballerup, Copenhagen, Lund, Malmö, and Roskilde). Businesses will be engaged during the project.

The working approach in the UT project is a multi-level exchange of experience. The basis is the analysis of strategic case studies including existing and planned buildings and districts in the Øresund region. The case studies level in the project is complemented with a comprehensive level for the further development of models and tools for collaboration on sustainable urban transformation, one of which is the special subtask on collaborative methods and tools.
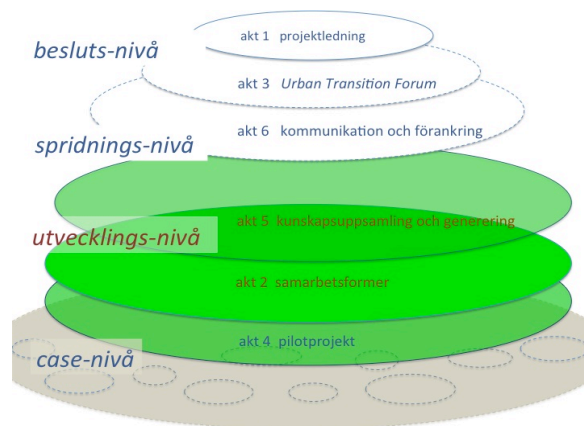
Figure 1: A visualization of the UT project structure with the different subtasks and their interrelations (UT CoMeT is "akt 2").

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[1] See City of Copenhagen (2009). *Copenhagen Climate Plan – The Short Version*. City of Copenhagen, Technical and Environmental Administration. Copenhagen, Denmark, http://www.kk.dk/sitecore/content/Subsites/Klima/SubsiteFrontpage/~/media/12E701459AD14B7C81F CD6D33F2EC9CF.ashx. Download date 2012-03-31.
In the environmental program for Malmö Municipality, Miljöprogram för Malmö stad 2009-2020, rather than CO2 neutrality, the goal is set to a reduction of greenhouse gases with 20% for year 2020. See http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=2277313&fileOId=2277325. Download date 2012-03-31.
[2] http://www.uni.oresund.org

2. Collaborative Methods and Tools for Urban Transitions

One of the main objectives of UT is to contribute to the development of new methods of working that allow for greater collaboration between various actors in a transition process towards sustainability. The subtask *Collaborative Methods and Tools for Urban Transition* (UT CoMeT), therefore plays an important role for the overall project.

The main initial question in this subtask is how to facilitate the development of cross-boundary knowledge or knowledge integrating different forms of experience and know-how. As has been indicated in many urban generation contexts (Pohl 2008; Raynolds and Keith 2008; Nolmark 2009; Lindberg 2009), there is a "research implementation gap" or a gap between what we know and what we do. This gap is often due to a general deficiency in communication or – which is the point of departure for the work of UT CoMeT – caused by a lack of attention to the forms and tools for collaboration and experiential exchange employed in transformation processes and processes of knowledge transference or dissemination.

2.1 Exploring Urban Transitions: Site-specific and Context-dependent

The importance of cities is generally expected to increase due to the role of metropolitan areas as growth centres of the emerging globalising service economy. For this reason, policies formulated by international bodies and national governments need to be implemented at the community and city level. The local level has therefore been identified as a key for sustainable development and there is a general agreement that effective and integrated solutions can only be found and efficiently implemented at the local level. Furthermore, the concentration of population, activities and resource use in cities bring potentials for important efficiency increases as well as for multi-purpose solutions combining different sustainability goals.

The specific complication at hand is that not only is systemic transition generally speaking very difficult – the prefix "urban" also implies yet another level of complication. It is therefore especially important to consider what is specific to urban transitions as opposed to transitions in general. How do we approach the specific complexity of urban environments and the diverse social, cultural and political dimensions that we associate with urban life? What are the special requirements in urban contexts in order for "transitions" to take place?

These difficulties have, however, already generated a considerable amount of methods-oriented experimentation and innovation. Yet, the know-how in this field is still scattered and difficult to retrieve. To a certain extent, this depends on the fact that "transition know-how" to a large extent is site-specific, or context-dependent; conditioned by the very environment and situation where it is developed. Despite this fact, or perhaps precisely because of this, there is a need for the gathering of good examples and practices rather than models, before further development can take place.

2.2 Emerging Technologies and Tools

The emergence of new technologies, new tools for visualising scenarios and occurrences, alternative channels for networking, participation, and sharing has changed the conditions for collaboration and knowledge transfer (Jenkins, 2006), not only in everyday life but also in urban planning processes. Accordingly, one working hypothesis is that the operational modes in planning and urban development today are converging with modes currently used in other fields, preferably fields where composite communication is a major issue.

Planning practice and urban development processes are today increasingly informed by methods used in media laboratories and various types of studio environments for innovative, often expressly practice-based research and development. Characteristic for these environments is that they are thematic rather than directly problems-oriented. Furthermore, they are often based on a strong common commitment, yet combined with a flexible structure, as such allowing the adaptation to specific, local and timely circumstances, to the crossing of boundaries between different expert fields, and to the bridging of gaps between experts and locally informed and experienced laymen.

The question is if there are examples of development that could be specifically relevant to processes of urban transitions? What we initially ask is therefore how the need for cross-fertilisation of ideas and know-how is handled in practice, primarily on the municipal level. What "forms" of collaboration, what kind of meeting culture, is currently employed? How are different experts and stakeholders with different forms of know-how brought together? How are the issues of differences in language and terminology addressed? And how are conflicts of interest negotiated, including the tendency to see your own perspective as equal with the general view?

2.3 Mapping Experiences of Forms of Collaboration

The initial phase of UT CoMeT consists of mapping existing experiences of forms of collaboration and cross-boundary working formats in urban transition processes. This includes examples and methods utilised within the Øresund region, but also beyond, on international areas, focusing on Europe. The mapping process takes its point of departure in results from earlier reports. These include: the Interactive Institute Space and Virtuality Studio, *Design Spaces* (Binder and Hellström, 2005); COST Action C20, *Urban Knowledge Arenas – Re-thinking Urban Knowledge and Innovation* (Nolmark, 2009); *Rehearsing the Future* (Halse et al., 2010) presenting experiences from the Design Anthropological Innovation Model (DAIM); and the forthcoming report of the MEDEA Living Labs experiences, *Future Making Futures: Marginal notes on Innovation, Design and Democracy* (Ehn et al., forthcoming).

The results presented in these and other reports emphasize the need to materialize and stage collaboration in new ways, that is, to develop new objects around which to gather, objects that could complement models, plans and documents and facilitate collaboration. "Let people make systems when they need them" has emerged as one leading principle (Binder and Hellström, 2005), thus suggesting the need for less explicit governing and a larger degree of consideration of local situations. The COST Action C20 report (Nolmark, 2009) builds on a large number of case studies throughout Europe and interestingly points to the need of developing what is referred to as new "urban knowledge arenas" – new cross-sector and multi-professional spaces and formats for the sharing and developing of specific urban knowledge. In many cases, these formats need to allow for open contestation or relying on "alternative" or "artistic" practice (Nolmark, 2009), and in most cases explicitly filling out what could be seen as "gaps", middle grounds or in-betweens in the development process.

Using these reports as the guiding framework, the mapping process was completed in two steps: (I) mapping of methods and tools currently used by the UT project partners in the Øresund region; and (II) mapping of international cases and examples, focusing on Europe. None of these mapping exercises make claims to being comprehensive. Yet, through strategic selection, they serve as a starting point for six upcoming thematic workshops to be organised within the UT project. During these workshops, UT project partners will meet for further sharing of insights and experimentation with new kinds of methods, tools, and settings for urban transformation processes.

3. Mapping the Øresund Region

3.1 Method and Process

The mapping of methods and tools used in the Øresund region was conducted in collaboration with the five municipalities participating in the UT project. The data serving as input to the process was generated during study visits to each of the municipalities, and at the UT forum meetings. Also, two respondents were interviewed, and three respondents shared their insights via e-mail. The generated data was transcribed, analysed, and categorised. One example from each of the five municipalities are featured to create a richer picture of some of the methods and tools used in the region. It is obviously an impossible task to present an exhaustive map of methods and tools employed in urban transition processes in the region. This is why the following overview should be seen as a collection of examples.

3.2 Findings

Existing Methods and Tools

On the question *what* collaborative methods and tools that the municipalities currently utilise in their everyday practice, a long range of more or less traditional, digital or analogue examples were mentioned by the respondents. Examples of methods and tools used for collaborating were separated into three distinct groups – colleagues, external partners and the public or local citizens.

Colleagues: Traditional meetings (sitting around a table in a conference room with a whiteboard, and/or projector); shared digital calendars; e-mail; information sharing/transfer via intranet and the Internet; steering documents (e.g. *Miljöbyggprogram, Översiktsplan, Trafikmiljöprogram, Handlingsplan för klimatanpassning*); and mixed teams/competences (from different departments) for joint development of policies.

External partners: Traditional meetings; e-mail; visual material, PowerPoint presentations, photos, statistics to present scenarios and future trends; workshops; joint study trips for building common knowledge foundations; knowledge transfer through seminars and lectures; set of "best-practices" to exemplify/communicate/state good examples; collaboration with academia to develop e.g. certification systems; document/data sharing via FTP-server; rapid prototyping, small scale testing before implementing on a large scale, temporary solutions; using test cases; sustainability parameters/programs (e. g. *Miljöbyggprogram Syd, Bæredyktighetsverktyget, Miljø i Byggeri & Anlæg*); online certification system; "score system" for fulfilling environmental goals; and "ambition contracts".

Local citizens: Public meetings with focused target groups (e.g. children, elderly, people living in a certain area); printed material: flyers, postcards, posters; digital channels: web sites, Facebook, YouTube; exhibitions; street meetings; festivals; drama and theatre; storytelling; "Friday café"; "Det goda samtalet"; "Klima-butler"; online CO2 guide; forming reference groups; planning-on-demand, start with a vision plan, master plan kept open; collaborative open planning processes; and temporary solutions to test/prototype.

The respondents referred to some of these methods and tools as *more successful*, such as inviting external partners to inspiring lectures and workshops, organising joint study trips, models for facilitating dialogues with developers and builders, prototyping of test cases creating temporary solutions, public meetings using drama and theatre, organising small scale public meetings by visiting people's homes.

Examples referred to as *less successful*, and subjects for development were methods for facilitating "traditional" kinds of meetings, clarifying objectives, and hosting meaningful conversations. How to avoid too long, not enough structured meetings with unclear goals? Not only a need for developing methods for internal meetings was expressed, but also methods of facilitating meaningful dialogues and meetings with local citizens.

A challenge put forward by several of the respondents was how to balance environmental factors with economic factors when negotiating with developers as well as politicians. How to create a system for measuring "soft" values that are difficult to evaluate in a short-term perspective? Another complicated aspect mentioned was the communication, and collaboration with politicians and decision-makers regarding the use of creative formats for open planning processes. How to work with open processes in political contexts more or less conditioned by hierarchical power structures? How to communicate and anchor new forms of open and dynamic planning processes to people in power used to navigating in more controlled and predictable systems?

Another obstacle referred to was the limited amount of time and resources dedicated to the development of new methods and tools for collaboration, for example developing sustainability parameters, and certification systems. Quite a few of the ideas mentioned by the respondents have not really been implemented and developed, and this is due to time limitations and lack of resources.

Subjects for Development

The respondents were asked to come up with ideas on actions that they would initiate if they had access to necessary resources and time. One wish was to spend more time "on the streets" communicating and collaborating with the citizens in their own space, instead of having them coming to them. Other wishes concerned the developing of new methods for facilitating collaboration between partners with many different backgrounds, communication styles, and agendas. How to facilitate meetings between professionals and non-professionals? What methods can be developed to make such meetings inspiring, and up-lifting instead of bureaucratic? Also mentioned was the wish to continue to work on developing methods for running dynamic dialogues with developers and builders, but also with citizens and politicians. A suggestion connected to this was the idea of creating a catalogue of best practice to highlight good examples, and long-term effects of investing in sustainable solutions.

The majority of the respondents also expressed a wish to start experimenting with social media tools, and further explore in what ways these kinds of communicative and collaborative tools could play a role in urban planning processes. One concrete example mentioned was the wish to further explore the possibilities of integrating social media tools in existing web-based eco-building certification systems, and developed online tools for visualising long term effects of investments.

To summarise, a selection of topics that according to the respondents could be subjects for further development are:
- Social media tools in urban planning processes,
- Methods for facilitating dialogues and meetings with developers, builders, citizens, and politicians, but also colleagues,
- Methods for facilitating, and running dynamic, open planning processes,
- Visualisation of scenarios, occurrences and long term effects of investments
- Value systems measuring "soft" values (the social),
- Methods for "prototyping the city", small scale testing, design thinking in urban planning processes.

Key Examples

The following examples present a set of innovative urban planning actions currently taking place in the Øresund region.

The Climate Butler project, Ballerup

How can you inspire citizens to take small steps towards developing more climate friendly habits in their everyday lives? What is more – how can you motivate them to take somewhat bigger steps and take active part in urban regeneration projects aimed at reducing CO_2 emissions from private households and creating a more sustainable urban environment? These are the issues, which the Climate Butler project (*Klima-butler*) in Ballerup is designed to address. The project is a part of the municipality's communication strategy and aims at creating a direct dialogue as a starting point for a planning process in which the citizens see themselves as important contributors.

It is estimated that private households are responsible for approximately 19% of the total CO_2 emissions in the Ballerup municipality[3]. As part of its participation in the Green Cities network (which is a collaboration between municipalities that want to make a long term contribution to developing sustainable local communities) the municipality aims at reducing that share by 15% before 2015. That goal cannot be reached by the municipal administration alone but implies developing focus areas in close cooperation with local citizens.

The ambition is mirrored in the preparation of a new development plan for the residential area Egebjerggård where sustainable renovation and densification of the urban fabric are focus areas. As part of the planning process it is the intention that the residents will take part in working groups and come up with wishes and ideas for regeneration. In order to engage more citizens in participating, the municipality will use the Climate Butler project as a starting point for the process.

The Climate Butler project is a new concept, which is designed to address people living in rented housing. In order to make climate issues meaningful for local residents, it is important that the climate butlers have a talent for engaging residents, using everyday language rather than using the 'lingo' of their specific educational background. The climate butlers visit people in their homes and hand out free energy saving power devices and a cookbook concentrating on climate-friendly dishes. They also carry with them baskets with technical samples demonstrating the issues they are talking about – for instance electricity meters, LED light bulbs, washing powder for cold water, and air humidity meters.

Before the climate butlers go knocking on doors, the project leader contacts the boards of local housing associations to inform them about the project. Their participation in the project is an important prerequisite for making any further steps. Then a pre-study of the local area is carried out and information on the apartments is retrieved through dialogue with the superintendents. The residents are invited to a climate-dinner where they cook together with the climate butlers and get introduced to the concept and their coming visits. All these activities are designed to ensure that the dialogue will be focused on specific areas and that a broad interest among residents is attained. Some weeks after the visits, evaluation forms are handed out and the residents are invited to a climate-friendly bingo event. The responses are presented at the bingo event where the residents can further elaborate on their thoughts.

In the end of 2011 the Municipality of Ballerup carried out a pilot study on the project involving two residential areas containing 820 tenancies. It is the experience of the municipality that the project is considered both motivating and pertinent. The residents have expressed that they also gain a greater interest for more extensive solutions. During the

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[3] Ballerup Kommunes Klimaplan 2010,
http://www.ballerup.dk/sites/default/files/klimaplan_ballerup_web.pdf

evaluation several residents asked when this project would lead to initiatives in their housing blocks and outdoor areas.

One of the strengths of the Climate Butler project is that it focuses on sparking motivation among residents through low cost solutions in their homes, thus fertilizing the ground so that residents have a greater interest in being involved in more extensive climate-friendly renovation projects. Doing it the other way around could be rather de-motivating as the projects become too confused. Quite often the attitude seems to be "what good is it if I take action and my neighbour does not do anything?" The project for regenerating Egebjerggård is in the 'pipeline' just now. The visits by Climate Butlers will begin in late 2012 and shall lead to the setting up of working groups.

A Game supporting Collaborative Innovation in the Public Sector, Copenhagen
CO-CREATOR is a process/learning game developed as part of CLIPS, a four-year Danish research project, including partners from all major universities as well as a number of public partners.[4] CLIPS stands for Collaborative Innovation in the Public Sector and focuses on identifying drivers and barriers to public sector innovation and on developing methods and tools for organizing and managing collaborative innovation processes. One of the topics explored within CLIPS is the potential of using games as a tool to support innovation processes and facilitate dialogues and decision-making processes. A result of this exploration is the process/learning game CO-CREATOR, which was developed in collaboration with the learning games company Gametools based in Copenhagen.

CO-CREATOR is designed to facilitate and spark discussions and give the participants a collaborative learning experience and common grounds for decision-making. The game leads the participants through a contra factual innovation case, designed so that it showcases the innovation model, developed by CLIPS. Along the way participants are faced with a number of challenges and dilemmas, forcing them to reach common decisions in order to proceed. Through this process, barriers and opportunities emerge and can be acted upon. The game lasts two hours and it is being used for training purposes, for innovation related seminars and in relation to concrete projects – for instance when the next steps in a project are discussed and planned or in the beginning of a project as a way to get to know the other project members and create a common understanding of visions and goals.

Figure 2: CO-CREATOR gaming sessions. Source: www.gametools.dk.

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[4] For more information about CO-CREATOR and CLIPS see www.gametoools.dk**.**

A Sustainable Building Program, Lund

Miljöbyggprogram Syd (Sustainable Building Program Southern Sweden) is a web-based program that is directed primarily to developers who want to build on municipal land[5]. It only applies to construction of new residential and commercial buildings in the cities of Malmö and Lund. The overall aim is to support collaboration and negotiation between municipalities, developers and construction companies, inspire them to invest in, and implement ecologically sustainable and resource efficient solutions, and thereby reduce the negative impact on the environment in general. All developers and builders collaborating with the municipalities in Lund and Malmö, are required to follow the program throughout the entire building cycle, from planning until the construction is completed and contracts are fulfilled.

The program is developed in collaboration between Lund Municipality, Lund University, and Malmö Municipality. The program currently includes four core areas: energy; indoor environmental quality, including comfort and well-being; control of construction moisture and dampness; and urban biodiversity. Additional core areas will be included in the upgraded version of the program. Some suggested themes are building acoustics, building materials, traffic and waste.

When entering the program the developers are presented with concrete action plans that they can choose from, or sometimes are required to integrate in their building plans. In the initial building phase the program is intended as a tool in dialogue and negotiation between the various parties involved, who can be driven by different agendas and ambitions. The action plans that the developers choose to include in their plans are measured against a value system consisting of three ambition levels (*miljöklasser*): A (best option), B (good option), and C (basic option). Developers are required to accomplish the basic option C, but they are encouraged to choose higher options. All ambition levels, including the basic option C, are well above the standards that are set by the Swedish National Board of Housing, Building and Planning.

In the negotiating process, a special contract referred to as "ambition contract" is signed between the developers and the municipalities. Reporting, editing of "ambition contracts", and protocols are completed online. The developers input data to the web-based system to generate a visual representation in the form of a "rose" that indicates the level of ambition, that is, their endeavour to implement ecologically sustainable solutions. These visual representations are made available to the public, and can be used by the developers in marketing campaigns.
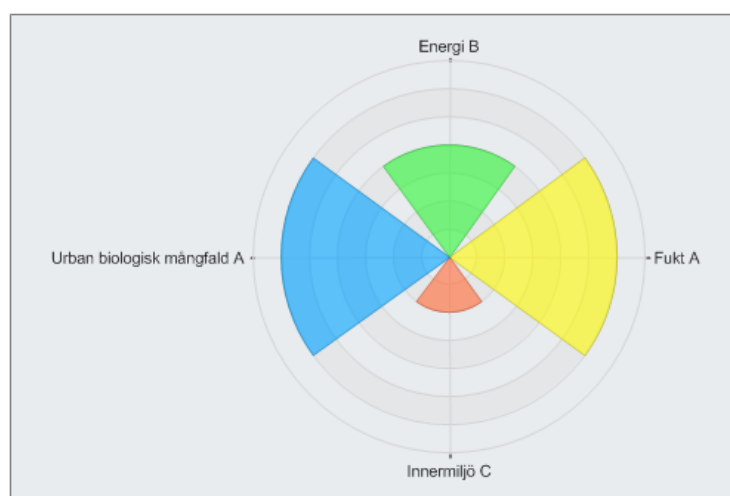

Figure 3: Visual representation of developer ambition level. Blue: urban bio-diversity; green: energy consumption; yellow: moisture; red: interior climate. Source: www.miljobyggprogramsyd.se.

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[5] For more information about *Miljöbyggprogram Syd* see www.miljobyggprogramsyd.se.

A Creative Dialogue, Malmö

Det Goda Samtalet (The Creative Dialouge) is a dialogue tool and method developed to support collaboration and communication between the different actors and stakeholders engaged in planning processes, in particular between civil servants, citizens, and developers, but also developer to developer.[6] The method is based on what is referred to as *generative*, or *communicative* planning with a focus on dialogue, knowledge transfer, and learning. The basic assumption is that improved communication and dialogue between the many actors involved can improve the quality of the final result, cut costs and shorten the production phases between planning, implementation and construction.

A planning process involves a wide range of actors with different agendas, missions and goals, which might be seen as a counteracting barrier, but not necessarily. The idea behind *Det Goda Samtalet* is to facilitate constructive dialogues between these actors, and encourage them to go beyond the assertion of specific interests towards a view where their differences instead are seen as a resource. The focus is not set on the minimising of differences, but on the handling of these differences constructively and creatively, as to contribute to a better result from a holistic point of view. By building trust in an open dialogue the actors will be enabled to sharing knowledge and resources, which in turn will lower production costs, develop sustainable solutions in a joint effort, and udertake common marketing campaigns, purchases, and construction work to mention a few examples.

In planning processes of more traditional kinds the different phases, from planning, to implementation, and construction normally follow a linear procedure. When applying the methodology behind the *Det Goda Samtalet* these phases are intertwined, following an iterative process and integrated approach. The basic condition is *continuity*. In the *Det Goda Samtalet* experts meet with stakeholders every other week over a longer period of time, up to two years. Instead of facilitating discussions, negotiations, and argumentation, the conversations between the actors take the form of dialogues with the focus on openness and mutual understanding.

Figure 4: Flagghusen in West Harbour, Malmö, where the Det Goda Samtalet was used as a successful tool in the planning process. Source: www.malmo.se.

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[6] Ranger, Anna (2006). *Det goda samtalet i Västra hamnen. En metodik värd att utveckla.* Malmö: Malmö Högskola, Teknik och samhälle. See www.boverket.se. Download date 2012-03-31.

Planning on Demand, Roskilde

The development of *Musicon* exemplifies an open ended planning process where the goal is to develop an old industrial site into a lively city quarter[7]. Put simply, there is no masterplan. Instead a creative guide has been designed to work as a tool for dialogue with developers and temporary activities initiated by entrepreneurs and project developers have been established as a basic principle of developing the area.

Formerly the Musicon area was the location for production of different manufactured goods based on concrete. The area located south to the centre of Roskilde covers 25 hectares and it is owned by the Roskilde Municipality. The vision for the area is that musical activities in a broad conception should frame the development of the new city area which should be composed of cultural businesses, shops, housing, cultural and recreational activities. The municipality of Roskilde has the responsibility for this new part of town, however Musicon is not primarily a municipal project. The city council has stated that Musicon should have the possibility to take rapid actions, because this will give room for more dynamic and non-traditional solutions. So the day-to-day operation of Musicon lies in the hands of a project office located in the area. The office is responsible for all contacts and it is active in shaping and facilitating various processes. Consequently, it also engages in programming plans and projects and negotiating with interested parties and investors.

The Musicon project aims to develop over time through catalysing projects carried out by creative entrepreneurs locating their activities in the area. The development work pursues the principle of "planning as little as possible". The grounds consist of large open areas and several large buildings that will be used for temporary activities. This transitory aspect can be used to examine the possibilities, attractions and vitality of the place. In doing so, you get insights to possible options. Thus the temporary events become a method of creating permanent activities and physical structures, for instance by developing the existing factory halls. New players and projects are required to present their ideas when they apply for tenancy at the Musicon office. Important criteria for evaluation are the degree of diversity added to the area through the new activity and the ability to participate in the organizing of events. Once located in the area the active involvement and formation of networks are central to a sustained dialogue among the creative entrepreneurs and the project office.

Along with the temporary activities, more permanent building structures are to be developed in the area. To clarify how the vision of Musicon is part of the project development it is specified in a creative guide presenting five key parameters in relation to which specific building propositions should be measured. In that way the creative guide functions as a point of departure for the process of dialogue with developers. The parameters are:
- A musical and creative city quarter,
- Liveability before the city – and the liveable city,
- Experimental architecture and industrial traces,
- A lab for sustainable transports, and
- An environmentally friendly city.

There is no expectation that a specific project will meet all the goals expressed in the parameters in an equal manner. One project could express very high standards for sustainable transport whereas it could put less effort in experimental architecture. When actors come up with building proposals they are informed of the vision and way of running projects at Musicon and the project office engages in a dialogue to inspire and guide the actors to meet the ambitions expressed in the vision. If project ideas are considered suitable the actors will enter into a cooperation agreement with Roskilde Municipality on the overall concept. Before a final agreement on realization of the project is reached it is concretized

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[7] For more information see www.musicon.dk.

through dialogue with the project office and communal administration and further elaborated through consultation with the public. To qualify the dialogue a series of supporting questions have been generated. In relation to the goal of sustainability for instance the developers are requested to argue for how their projects experiment to reduce the use of energy and resources. Other instruments used by the municipality and project office to guide dialogue are possible snapshots of the development process at different stages and visionary representations of different sub-areas in Musicon[8].

4. Mapping International Cases

Cities in Europe (and around the world) are facing a major challenge in terms of sustainability. To meet this challenge, transformations will be required in the way cities are developed, managed, governed, and lived in by individuals and communities. This section addresses two inter-connected themes. *First*, there is growing consensus among both the academic and policy-making community that in order to bring about such transformations there needs to be a shift in the way cities are governed. In particular, emphasis has been placed on collaboration and the need for greater civil society involvement in sustainable urban development processes. *Second*, it is argued that the traditional paradigm of planning cities for a predictable future is not able to bring about urban transitions towards sustainability. In order to realise sustainable cities, innovative and creative solutions that address social, environmental and economic issues, all whilst engaging key stakeholders, are required. An approach that may be able to achieve such objectives is the concept of *Living Labs.*

It is important to note that the mapping of international cases will be an on-going process throughout the duration of the UT project. This section utilises contributions from international Masters candidates at the IIIEE (International Institute Industrial Environmental Economics). It is expected that there will be further involvement from international Masters candidates, particularly in their thesis research that can feed into the UT project. This section therefore represents the foundations for continued research in international activities in the area of sustainable urban transformation.

4.1 Investigating the Role of Collaboration in Governing Sustainable Urban Transformation

Summary of paper written by Rachel Armstead, IIIEE. Full paper see Appendix A.

Problem Definition and Research Question
The challenges of urban sustainability and climate change require significant transformations in the infrastructure as well as the "culture" of European cities. In this paper, culture refers to the norms and behaviour patterns in both the political and social sphere. To execute such transformations will require local government to engage in a new mode of governing characterized by increasing collaboration between government and civil society actors in policy-making and projects. However, there still remains much uncertainty as to how collaboration should be employed in the governing of sustainable urban transformation. The task now for local governments and the organisations supporting them, is to engage in an active learning process. Innovation, experimentation and knowledge sharing in the field of collaborative governance are required if cities are to develop the capacities needed for sustainable urban transformations. The primary research question for this paper is therefore

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[8] For specific reading of the creative guide used for dialogue with developers see
http://www.roskilde.dk/everest/tmp/110513092014/Kreativ_projektguide_Musicon_net.pdf.

as follows: How is collaboration contributing to projects and activities promoting sustainable urban transformation in European cities?

Research Methodology and Theoretical Background
This paper is based on two (primary and secondary) data sources – a literature review and ten case studies from the Local Governments for Sustainability (ICLEI) database. ICLEI is an international association of local governments as well as national and regional local government organizations who are committed to sustainable development. First, a literature review was carried out which included academic papers on the role of collaboration in facilitating sustainable urban transformation and the mechanisms through which collaboration can assist such processes. The literature review also covered policy documents and publications by leading organisations in the field of urban sustainability to provide an overview and analysis of tools and resources available to support local governments. Second, an analysis was carried out on ten ICLEI case studies of successful urban sustainability projects in Europe using a self-developed matrix based on the theoretical framework provided by the DISCUS (Developing Institutional and Social Capacity for Sustainable Development) project. The matrix uses the indicators of institutional and social capacity, and the capacity building devices and tools identified by the DISCUS project as contributing to successful urban sustainability projects (see Table 1).

	High institutional capacity for sustainable development	Low institutional capacity for sustainable development
High social capacity for sustainable development	*1 Dynamic governing* Active sustainability capacity-building High possibility for sustainability policy achievement	*4 Voluntary governing* Voluntary sustainable development capacity-building Low possibility for sustainability policy outcomes
Low social capacity for sustainable development	*2 Active government* Medium sustainable development capacity-building Medium or fairly high possibility for sustainability policy outcomes	*3 Passive government* Low or no sustainable development capacity-building Sustainability policy failure

Table 1: Classification of modes of governing.

Key Conclusions and Further Research
Local government has been identified as a key leverage point in terms of implementing sustainable urban transformations. This paper maps out the actors and flows of capacity building occurring in examples of collaboration provided by ten ICELI case studies. This is combined with an overview of the EU support available for such projects. Four main trends are identified in this paper and act as a summary of the findings.

Firstly, looking at the ICLEI case studies one can see that collaboration plays an important role in most of the cases, although it is employed differently in each situation. The development of formal administrative structures by local government for facilitating collaboration appears to be an important factor in generating a robust and long-term relationship between local government and civil society.

Secondly, the role of local government as coordinator appears to be very significant. The observation made from the ICLEI case studies as well as the focus areas of EU programmes support the assertion in the literature, that high levels of institutional capital – in other words,

a strong and vibrant local government – is a crucial element in driving sustainable urban transformation.

Thirdly, although collaborations with universities were not particularly common in the cases studied the EU appears to be targeting funding strongly at research and acknowledging that providing support for implementation before learning activities have been launched will not be effective or efficient. It is likely that collaborations between local governments and universities will become increasingly prominent.

Fourthly, the analysis of the ICLEI case studies suggests it is difficult to talk about collaboration at the local level in isolation from the wider context. International and regional networks play an invaluable role in providing resources and platforms for knowledge sharing and successful collaborative projects appear to involve both local or regional level collaboration and supra-local collaborations, which links into the concept of multi-level governance.
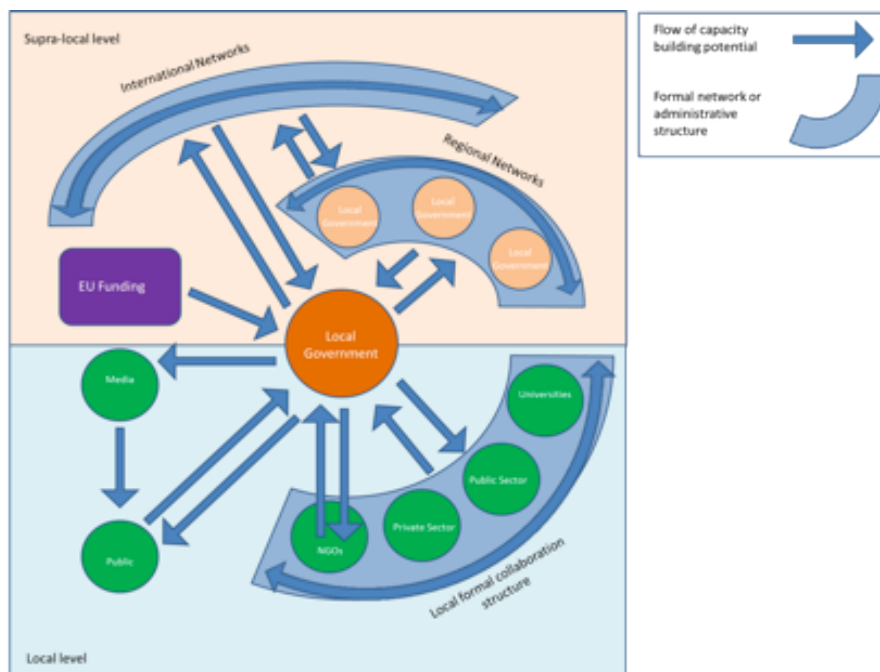
Figure 5: Map of the possible collaborative relationships.

Finally, this paper proposes that further research into the drivers and barriers associated with successful collaboration (in the context of multi-level governance) would be an important next step. Collaborative governance is still quite nascent as a movement and thus there is the need for further research and learning on how best to implement collaborative relationships within the governing process and how this collaboration can contribute to better policies for sustainable urban transformation.

4.2 Exploring Living Labs and Advancing Sustainable Urban Transformation

Summary of paper written by Nicholas Arsenault, IIIEE. Full paper see Appendix B.

Problem Definition and Research Question
It is imperative to begin re-thinking and re-purposing the cities of today and of the future. The traditional paradigm of planning cities for a predictable future is not only insufficient but also potentially destructive. At present cities and their planning processes do not adequately reflect the necessity for urban transitions towards sustainability in practice. The answer to

this problem possibly lies at the research, approach and design process levels. In order to successfully plan for sustainable cities, design professionals must engage in innovative and creative solutions that address social, environmental and economic issues, all whilst engaging key stakeholders. One such creative and innovative solution or approach may be through Living Labs focused on urban transitions. A Living Lab can be considered as an emerging institution that is driven by two main ideas: a) a user-based innovation process, and b) real world experimentation that aims to provide structure in the user-based and participatory innovation process. This paper explores the concept of using Living Labs as a participatory experimentation ground for advancing transitions towards sustainable cities. Underlying this broader objective lies the explicit investigation of how the functions and workings of a Living Lab can support processes of urban transformation.

Research Methodology and Theoretical Background
This exploration of Living Labs and urban transformations was conducted through a literature review, case study research, and structured interviews. The literature review conducted focused primarily on two subject areas. The first was in the area of sustainable cities and sustainable design processes. The second was on the theory behind the Living Lab methodology. The case study research undertaken was in regards to actual Living Labs addressing issues in the realm of urban sustainability. The central resource for discovering and sorting through Living Labs was the European Network of Living Labs (ENoLL), which eventually led to the analysis of three Living Labs – the Urban Living Lab in France, the Flemish Living Lab Platform in Belgium, and the Coventry City Lab in the UK (see Table 2). Two interviews were conducted as a result of the search for Living Labs within ENoLL. Esteve Almirall, who is a member of the ENoLL council and present in the literature regarding Living Labs, was interviewed as well as Mark De Colvenaer of the Flemish Living Lab Platform. Overall, this paper provides a theoretical overview of the Living Labs concept.

	Urban Living Lab (ULL)	**Flemish Living Lab Platform (FLLP)**	**Coventry City Lab (CCL)**
Location	Saint-Qeuntin-en-Yvelines and Versailles, FRANCE	Mechelen, BELGIUM	Coventry, UK
Mission	To support the transition to low carbon cities and a high quality of life.	To optimize and boost value creation in information, communication and entertainment.	To improve quality of life for urban citizens and create an exemplary low carbon community.
Interests	Energy efficiency Mobility Nutrition Education Transportation Telemedicine Personal services	Smart Grids Smart Media Smart Cities	Green Buildings Smart Buildings Smart Cities Low carbon economy Low carbon transportation Traffic systems
Function	ULL is a network of interested collaborators that can link into the ULL ecosystem to test and be supported in various projects relating to low carbon communities.	FLLP sets up infrastructure, tests user panels, provides services, mobilizes stakeholders and acquires projects. It is open to any collaborations.	CCL provides a test bed, incubation hub, and access to researchers and industrial bodies. It is a strategic partnership between the city and municipality.
Users	An ecosystem of innovation involving students, residents, local communities, associations and companies.	It is currently connected with 250 households (or 600 people). Another panel is on the way with 2000	The University of Coventry and University Technology Park are user labs with direct access to citizens

		users.	and other user groups.

Table 2: Overview of Living Labs.

Key Conclusions and Further Research

The starting point for this paper was to better understand the concept of Living Labs. There is no absolute definition of a Living Lab. The label can be found all over the world, in different platforms and focused on various contexts specific objectives. Although there is quite a significant variance of how Living Labs exist, function and interact with society, most of them will fall somewhere within the spectrum of the commonly accepted theory underpinning Living Labs. A Living Lab can be considered as a methodology founded in three main points: a) cooperation with users, b) participatory approach in real life scenarios, and c) the inclusion of all major institutions (such as universities, governments, users, and companies). These three points are the underlying foundation of a Living Lab and can be observed on a whole, or in part, in most Living Labs.

Cooperation with users: One of the pillars of Living Labs is the intentional and strategic cooperating with users. Although this is not necessarily different from other innovation processes or approaches, it is certainly essential to the Living Lab methodology. Through the lens of urban transformations, this approach is clearly beneficial. If urban infrastructure were the body of our urban areas, then users or humans would be the blood that gives life and constantly nourishes this body. It is the users that provide our urban landscape with a pulse. Many methodologies engage the user, what differs, however, from other such processes is the iterative approach and the long-term involvement of end users in Living Labs. The idea of involving users in experimentation or research aligns well with urban transitions towards sustainability – in that projects and activities are embedded in the 'real' world. In this approach, Living Labs can accomplish an in-depth and realistic understanding of how people live, interact with, and evolve within an urban setting.

Participatory approach in real life scenarios: The participatory approach employed by Living Labs essentially takes people in real life scenarios and records their responses and usage of a given technology or infrastructure and uses that to inspire designers or further research. Technologies, services, products, and ideas are deployed in scenarios with the challenges and idiosyncrasies that come with real world use. The obvious and overarching benefit of this approach in urban transitions is that these urban areas that are to be built, re-planned, re-tooled or re-thought, are all going to eventually become the 'real world' with 'real users'. Regardless of what is being explored, the relationship with the user provides real-time, poignant, and otherwise untapped domain-based and tacit knowledge, which contributes to urban transitions, as it is ultimately the users in these explorations that will become the users of a transformed urban landscape.

Inclusion of all major institutions: The multi-stakeholder approach is not a new idea when it comes to design processes or urban transformation. In fact, any significant problem addressing urban issues inherently involves many stakeholders. There are several reasons why Living Labs offer a different approach and potentially better outcomes than traditional approaches to urban transformations. Living Labs are framed as a laboratory for user-based experimentation, which allows the various stakeholders to put their 'guard' down in terms of their specific objectives, perceived contradictions, relational histories, and traditional barriers to collaboration. Living Labs also promote real-time collaboration and experimentation, which allows for synergies to reveal themselves, refinements to be made and innovation to occur. This way, human interactions and experiences can help design the 'urban' world that humans live in, rather than having design dictate how humans interact and experience urban environments. Put simply, the Living Lab approach not only provides for multi-stakeholder design activities, but it also becomes a venue for a multi-stakeholder innovation and research processes.

There are identified barriers to the use and successful implementation of Living Labs. First, there exist cognitive barriers and motivational barriers to any collaborative methodology. Cognitive barriers emerge when parties from different backgrounds communicate because communication can be difficult and knowledge asymmetries create a dominant 'expert' voice. Motivational barriers exist when stakeholders have different motivations that may be or perceived to be contradictory. Second, a further barrier is the inherent need to identify stakeholders that could work together to produce innovation in a joint problem solving effort. Identifying the 'right' stakeholders, and not just the interested stakeholders, to collaborate is essential. In the same realm can be the difficulty in motivating organisations to collaborate, as it often represents a step towards uncertainty or dependency. And finally, another barrier or issue is the ethical involvement of users. Although the idea of Living Labs is to involve users to tap into their knowledge, rather than using them as objects in research, there are some inherent ethical issues when considering the users. These issues can emerge in the areas of informed consent, the use of data, and the potential 'invasive' perception of the research.

5. Conclusions: From Tools to Situations

Although the research conducted and presented in this report is by no means exhaustive, some guiding patterns can be distinguished, such as, that urban transition processes are dependent upon creative communication between many different stakeholders, and continuous representation and mediation of complex "data" or "knowledge". What is also possible to trace throughout the examples is the need for non-confrontational situations or platforms where long term collaborative learning processes can take place. Although in several of the examples this is articulated in terms of "the developing of tools" it is generally very difficult to pinpoint exactly what these tools look like or how they work. Instead, one can trace the tendency of a shift from regulated or tool-based processes to situation-based processes, with clear links to the sites of implementation.

Having this as a background, the subtask UT CoMeT can aim for the following over the remainder of the UT project:
- a deeper understanding of how different urban sub-systems, such as the physical as well as the socio-cultural and the economic, overlap or are played out against each other,
- composite media and new vocabularies in order to be able to handle and reconfigure these relationships and inter-linkages,
- new approaches, platforms and mind-sets for creative policy-making and transitional action,
- solutions for the prototyping, exploring and testing of new ideas,
- professional, yet case sensitive and transparent methods, tools and instruments, including sophisticated urban indicators, composite mapping procedures, participatory modelling and simulation tools, and interactive forms for data management, and
- forms for debate, reflexion and accumulation of results, findings and conclusions, locally, regionally and on an international level, in order to raise awareness and stimulate further change, that is, forms for critically reviewing and evaluating not only results but also forms of organisation and programming, modes of operation and ways of implementation.

As mentioned, the results of the mapping process serve as a starting point for six upcoming thematic workshops to be organised in the next step of the UT CoMeT activity. At these workshops UT project partners will meet for further sharing of insights and experimentation with new kinds of methods, tools, and settings for urban transformation processes. The workshop themes are currently being developed by the CoMeT group, but some topics that

have been discussed as potential workshop themes are, among others: "Mobile/smart phone video, and streaming technologies in urban planning", "Urban games, and game development in urban planning", "Prototyping the city", "Open planning facilitation", "Urban living labs", "The art of hosting creative dialogues", "Soft values – handling the 'social' in urban planning", and "Negotiating and visualising long term effects of investments in urban planning". The methodologies and tools presented at these up-coming workshops, and the learning and experiences gained will provide input the future reports produced as a result of the UT CoMeT project activities.

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Appendix A

Investigating the Role of Collaboration in Governing Sustainable Urban Transformation

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Introduction and Context

Europe is experiencing a clear trend towards urbanisation, with projections suggesting that by 2020 over 80% of Europeans will be living in urban areas (Ellen, 2010). Cities have always brought with them a unique set of challenges. The infrastructure required to meet the needs of such large and dense populations is extensive. Devising strategies for securing energy and water supplies, providing transportation and food, and safely disposing of the collective waste of large numbers of people has been an on-going process for municipalities (RFSC, 2012). However, despite the challenges of urban growth, European cities have been quite successful in developing complex and extensive systems to provide a high quality of life to residents (RFSC, 2012).

The increasing prominence of sustainable development discourse in the global agenda has introduced a new dimension to the challenge of managing the urban environment. In Europe cities are now a major source of pollution, and have significant ecological footprints (Evans, 2005). Global sustainability issues have also become salient. As the dominant arena of human life in Europe, and a leading producer of greenhouse gases, the urban environment will necessarily be the site of the majority of action in the realm of climate change mitigation and adaption (Rydin & Goodier, 2010). Although much of climate change policy comes from the national and international level, the action required to meet the targets of these policies will need to take place at the local level. What were previously predominantly challenges of providing infrastructure and services now begin to encompass issues such as consumption patterns, biodiversity conservation, climate change and environmental justice with which many local governments lack experience (RFSC, 2012).

Alongside these challenges, cities also present a set of unique opportunities. Cities function as the centres for economic, social and spatial development; they are cultural, knowledge and political hubs within Europe (Varol, Ercoskun & Gurer, 2011). The influence and embeddedness of cities in European society makes them 'a locus for change and innovation' (Evans, 2005 , p. 1). Cities, while presenting an immense sustainability challenge also present a powerful leverage point for catalysing shifts towards a more sustainable society. Despite awareness of these challenges and opportunities there remains a lack of powerful initiatives that decisively shift urban development in a sustainable direction – there is a need for transformative action (CSUT, 2009). Municipalities must now consider how to exploit these opportunities to ensure that the needs of current populations are met in a way that does not jeopardize the ability of future generations to meet their own needs (Zeren & Zavrl, 2010).

The issue of sustainable urban development was brought to the fore by Agenda 21 which was agreed at the Earth Summit in 1992. Agenda 21 calls on authorities to develop a Local Agenda 21 (LA21) involving community participation. The premise of LA21 is that the transformations required to achieve sustainable development are such that governments will not be able to provide them if acting alone (Evans, Joas, Sundback & Theobald, 2006). 'It will be necessary to mobilize the energies and initiative of citizens, interest organizations and stakeholders – 'local communities' – if changes in attitudes, values and behaviour are to be secured' (Evans et al., 2006, p. 849). Such sentiments illustrate a growing need for a new more participatory form of governing often referred to as 'governance' (Bulkeley & Betsill, 2005; Murphy, 2000; Varol et al., 2011).

LA21 suggests that local governments and civil society are the significant actors in the design of policies for sustainable urban development (Varol, Ercoskun & Gurer, 2011). Local government is in a privileged position in that it has traditionally controlled decisions over local planning and development and it has existing capacities for this task but also it is the level of government with the most direct access to citizens. Policies set by national governments will ultimately be felt by civil society at the local level in their daily lives, and thus local government has been identified as a key 'arena' in which policies for change can

be developed and implemented, and in which public support for these transformations can be nurtured (Evans, 2005).

One of the key elements of governance is the mechanism often referred to interchangeably as collaboration, partnerships, participation or cooperation. The process of collaboration, as the term is being employed in this paper, involves the establishment of a relationship between local government and one or several sectors of civil society with the aim of furthering the objectives of urban sustainability in a way that results in mutual benefit. This paper uses the definition of civil society provided by Evans (2005 , p. 14) which states that civil society is 'all social, economic and political activities that take place outside of local government' and this includes the general public, business and industry, NGOs, the media and universities.

Although incorporated into urban sustainability discourse as routine, the beneficial impacts of collaboration have been largely based on intuitive assumptions with little empirical evidence supporting the claims (Evans, 2005). In response to this knowledge gap the DISCUS (Developing Institutional and Social Capacity for Sustainable Development) project was launched. DISCUS took place between 2001-2004 and involved an analysis of 40 European local urban sustainability projects with the aim to identify the institutional and social factors that contribute to the success (or failure) of sustainability policies in Europe.

The main output of DISCUS was guidelines that outline the factors and conditions crucial for developing the capacity needed for the successful governance of sustainable urban transformation. DISCUS also developed a theoretical framework for understanding the success factors in the governing of local sustainable development. Crucially the results of DISCUS largely supported the assumption that successful sustainability strategies do involve collaboration between local government and civil society.

The EU, in line with their Thematic Strategy on the Urban Environment (TSUE), have made available a number of funding streams to help local governments develop their capacities both for collaborative governance and for sustainable transformation. Alongside this funding, several guidelines, tools, networks and organisations have emerged which attempt to support local government in their new role by providing information sharing, tools and resources. Most notable of which is ICLEI or Local Governments for Sustainability, which has over 1200 local government members and hosts several sub-networks some of which overlap with EU programmes. Many European municipalities do not yet have the capacities to execute this new form of governing (Evans & Theobald, 2003). Thus there is a need for experimentation, demonstration and learning in terms of how local government can best govern for sustainable urban transformations.

Problem definition

The challenges of urban sustainability and climate change require significant transformations in the infrastructure as well as the 'culture' of European cities. In this paper, culture refers to the norms and behaviour patterns in both the political and social sphere. To execute such transformations will require local government to engage in a new mode of governing characterized by increasing collaboration between government and civil society actors in policy-making and projects. However, there still remains much uncertainty as to how collaboration should be employed in the governing of sustainable urban transformation. The task now for local governments and the organisations supporting them, is to engage in an active learning process. Innovation, experimentation and knowledge sharing in the field of collaborative governance are required if cities are to develop the capacities needed for sustainable urban transformations.

Research question
The primary research question for this paper is as follows: How is collaboration contributing to projects and activities promoting sustainable urban transformation in European cities?

Method
This paper is based on two data sources:

1) A literature review was carried out which included academic papers on the role of collaboration in facilitating sustainable urban transformations and the mechanism through which collaboration can assist this process. The literature review also covered policy documents and publications by leading organisations in the field of urban sustainability to provide an overview and analysis of tools and resources available to support local governments.

2) An analysis was carried out on ten ICLEI case studies of successful urban sustainability projects in Europe using a self-developed matrix based on the theoretical framework provided by the DISCUS project (Evans, 2005). The matrix uses the indicators of institutional and social capacity, and the capacity building devices and tools identified by the DISCUS project as contributing to successful urban sustainability projects. The details of the case studies were fed into the matrix to build a 'picture' of how each project makes use of and develops the capacities of the actors involved, and to explore if and how the mechanism of collaboration is used to contribute to these processes.

Limitation and scope
Although urban sustainability is a global issue this paper focuses only on the role of collaboration in the context of Europe. European cities share certain characteristics, such as robust democratic processes, existing high quality of life, and significant knowledge and financial resources compared to cities in other regions of the world. These factors will shape the transformations that are needed and the methods by which they are delivered. Focusing only on Europe enables different modes of governing to be identified and compared without having to take significant differences in the context into account.

Analysis of case studies will be limited to the available ICLEI database of case studies taking place in Europe from 2005. Only cases after 2005 were used as these were carried out after the publication of the DISCUS results and should have allowed for the results to be taken into consideration. As the leading organisation for sustainable urban development in Europe the ICLEI database was deemed an appropriate and reliable source. However, the small sample limits the ability to generalise conclusions beyond the scope of this paper.

Theoretical Background

The need for good governance
Sustainable urban transformation, as the phrase suggests, requires significant changes in practice from all sectors of society and thus requires the support and cooperation of civil society. Traditionally, the realm of policy-making and decision-making in urban management has been dominated by local government in a 'top-down' structure. However, unidirectional decision-making is no longer seen to be sufficient to meet the challenges of sustainable urban development. The need for 'governance' as opposed to 'government' crops up repeatedly in academic literature on urban sustainability (Bulkeley & Betsill, 2005; Murphy, 2000; Varol et al., 2011). It is also incorporated into the principles of numerous policy documents such as Agenda 21, the Aarhus Convention, the EU TSUE, as well as in the programme mission statements of organizations, such as UN-Habitat and the OECD (Evans, 2005; OECD, 2002; UN-Habitat, 2002). When it comes to sustainable development traditional government is no longer deemed as 'good governance' (Evans, 2005).

In many respects changes in the mode of governing are seen as a cornerstone in the sustainable development process. This sentiment is exemplified by statements such as the following from the UN-Habitat programme which proposes that 'there is an emerging consensus that good governance is the sine qua non for sustainable human and settlements development' (UN-Habitat, 2002, p.4). But what is 'good governance'? In this context governance is used normatively to describe the form of governing in which the government and civil society actors enter into dialogue during policy-making and planning processes (Evans, 2005). Governance is intended to be more democratic and incorporate greater stakeholder involvement with the aim of generating decisions that are mutually acceptable and beneficial. Governance can also imply a higher level of civil society engagement and the power of civil society to self-organize in a 'bottom-up' grassroots political model (Evans, 2005).

Evans (2005) places emphasis on the term 'governing' as opposed to 'governance' in order to reject the assumption made by some in the political science community that what is needed is a shift along a continuum away from government towards governance (Goss, 2001; John, 2001). Governing for Evans (2005) describes the interaction between the processes of government institutions and the sphere of public debate and dialogue that is governance, and highlights the necessity for government and governance rather than a shift from one to the other. The relationship between government, governance and governing is illustrated in Figure 1. For the purpose of this paper, collaboration functions as a mechanism for governance, which is considered a mode of governing.

How collaboration generates value

Collaboration is one term alongside many such as 'partnership' and 'cooperation' used to describe the interaction between government and civil society that occurs as part of the governance process. Collaboration can be seen as a mechanism for governance. While governance remains a rather ambiguous term, collaboration can be more precisely defined. For the purpose of this paper collaboration will be used to describe the establishment of a relationship between local government and civil society actors, which has the aim of contributing to the achievement of urban sustainability goals. These relationships fall on a spectrum from formal to informal, long-term to short-term and can involve just a few actors or many actors.

Figure 1 – Illustration of the relationship between governing, governance, government and civil society
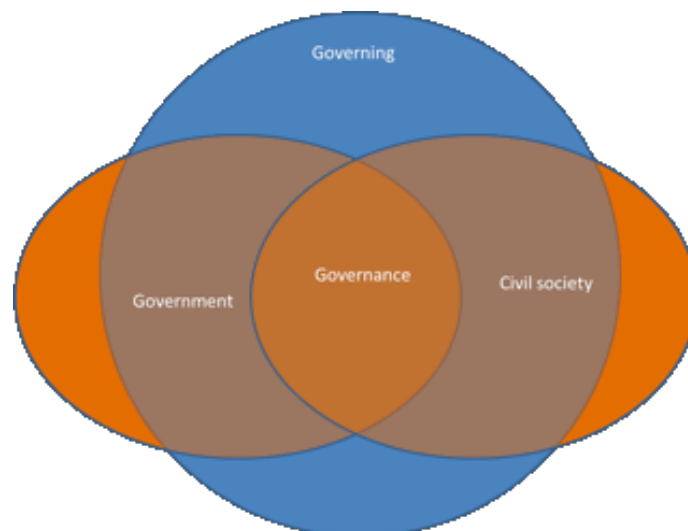
Increasingly, it is being assumed that involving civil society in decisions through collaborations, partnerships and public participation will positively contribute to the outcomes of sustainable urban development projects and policies. This is evident in the objectives of LA21 as well as in the mission statements of various urban sustainability networks and the tools and guidelines for governance that they provide. But it is important to ask the question of why this is the case? The value intuitively bestowed upon 'collaboration' in sustainable development discourse is derived from the concept of social capital (Evans, 2005). Although there are varying definitions, most generally refer to social capital as the value of social networks in developing the capacity of a group to promote their needs, giving a name to the advantages that can be gained through relations between different groups of actors (Evans, 2005).

The DISCUS framework builds on social research into different forms of capital. The DISCUS framework discusses two main bodies of capital in the context of sustainable urban transformation – institutional capital and social capital. Institutional capital refers to the 'internal patterns of behaviour and ways of working, as well as the collective values, knowledge and relationships' that exist within the institution of local government – and the capacities for sustainable urban transformation that they foster (Evans, 2005 , p. 21). Social capital refers to the level of organization and engagement in local issues that exists within civil society. This can be seen in the existence of community groups and social cohesion. The two forms of capital are not static but can be enhanced through capacity building which often involves an interaction or the development of a relationship between government institutions and civil society and between different sectors of civil society. The relationship between institutional capital and social capital and how these concepts 'fit' into the wider concept of governance is depicted in Figure 2.

The original proposal by Putnam (2000) was that there are two forms of social capital that can be used to develop the capacities of social groups – 'bonding capital' which is concerned with developing links within a group, and 'bridging capital' which is concerned with developing horizontal links between similar groups. Both of these forms can be applied to the development of institutional and social capital. In additional to the above forms of capital, Rydin & Holman (2004) discuss the concept of 'bracing capital' which is concerned with developing links between different groups in a strategic and formalized manner, often making vertical as well as horizontal links between different sectors of society (Rydin & Holman, 2004). Bracing capital is described as social 'scaffolding' and is of particular relevance to this paper, which predominantly describes collaboration as a vertical interaction between government and civil society or an interaction between different civil society actors who do not traditionally share interests (e.g. between industry and NGOs).

Figure 2 – *Illustration of the relationship between governance, collaboration and capital*
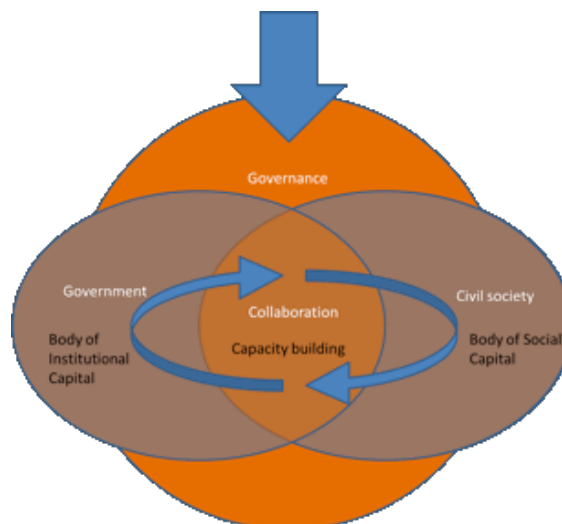
The DISCUS framework identifies four categories of governing with varying capacity for success in terms of achieving sustainability policy goals (see Table 1). The ideal mode of governing for the attainment of sustainable urban transformations is, according to Evans (2005), a situation in which the institutional capacity of government and the social capacity of civil society are both high and there is a high level of interaction between the two sectors; this is classified as 'dynamic governing'. This works as a mutually reinforcing loop with both parties supporting and building the capabilities of the other. In developing this framework, Evans (2005) outlines a number of key indicators for institutional and social capacity, and capacity building. These indicators form the basis of the matrix used in this paper to analyse the ICLEI case studies.

Successful sustainability policies are reliant on the presence of high levels of institutional and social capacity but if there is no relationship between government and civil society actors these capacities will not be fully realized. In the case of 'voluntary governing' a robust and engaged civil society can be a significant driver of change (Scott, 2010). However, it will ultimately lack the power of influence unless local government has the willingness and capacities to involve the sector in decision-making (Maloney, Smith, & Stoker, 2000). Within this framework, collaboration acts as a mechanism through which institutional and social capital can be developed and realized.

Table 1 – Classification of modes of governing

|	**High institutional capacity for sustainable development**	**Low institutional capacity for sustainable development**
High social capacity for sustainable development	*1 Dynamic governing* Active sustainability capacity-building High possibility for sustainability policy achievement	*4 Voluntary governing* Voluntary sustainable development capacity-building Low possibility for sustainability policy outcomes
Low social capacity for sustainable development	*2 Active government* Medium sustainable development capacity-building Medium or fairly high possibility for sustainability policy outcomes	*3 Passive government* Low or no sustainable development capacity-building Sustainability policy failure

Source: Evans et al., 2006

Analysis

EU Programmes

Within Europe, two of the major supporting bodies for city level sustainability are ICLEI and the EU, both of which oversee many subsidiary (and overlapping) organisations and programmes. These, as well as other sources, provide networking, information sharing, tools and resources, and financial support for urban sustainability projects. There are numerous organisations which address specific issues of urban sustainability, such as transport and energy, however this paper looks at organisations, policy frameworks and funding, which specifically address governance and collaboration in urban sustainability. The main support framework available for collaborative urban sustainability projects in Europe is mapped out in Figure 3.

Figure 3 – Resources and support for urban sustainability projects in Europe
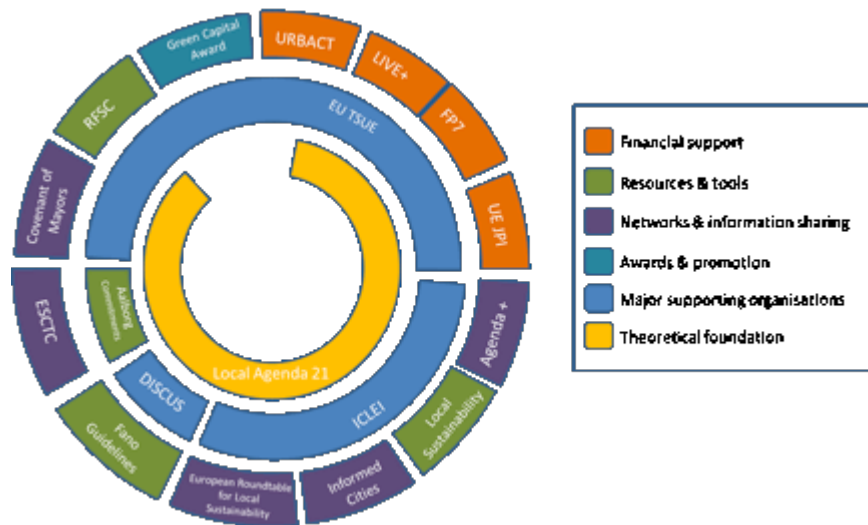
The proposals for the LIFE+ programme for 2014-2020 suggest a greater emphasis on governance (for example *Governance and Information* replaces *Information and Communication* as a component) and positions local government in a strong role with regards to delivery of projects (European Commission, 2011a). An important note is the statement that the LIFE+ programme will see a shift from a 'pure bottom-up approach' to a 'flexible top-down approach' (European Commission, 2011a, p. 3). This will see greater co-ordination of projects in line with EU objectives and shows a desire to strengthen the link between different levels of government and engage civil society actors, such as businesses and NGOs, who are requesting funding.

The EU has established the Urban Europe Joint Programming Initiative (UE JPI) aimed at coordinating research on sustainable urban transformations between European countries. The vision is to create attractive, sustainable and economically viable urban areas, in which European citizens, communities and their surroundings can thrive (JPI, 2011). The UE JPI is the only funding stream directly set up to promote urban sustainability research. It is social science driven rather than technology driven and aims to stimulate radical innovations in technology and policy by facilitating relations between researchers, policy-makers, business and civil society. This focus should make it a strong support for collaborative projects on urban sustainability.

Within the Seventh Framework Programme (FP7) there is funding under the 'Cooperation' theme for innovative research collaborations in the fields relevant to sustainable urban transformations, including energy, environment and climate change, and transport. The FP7 aims to link public authorities, research institutes, industry and universities, however the focus within the 'Cooperation' theme is on promoting trans-national collaborations and networks rather than municipal scale collaborations, but these are not excluded. Established in 2002, URBACT is a European exchange and learning programme promoting sustainable urban development. It enables cities to work together to develop 'solutions' to major urban challenges. There are over 300 cities, 29 countries and 5,000 active participants in URBACT (URBACT, 2012). In addition, URBACT is specifically aimed at collaborative projects involving several municipalities (or other partners) and promotes international partnerships as well as local and regional ones (URBACT, 2012). Overall, URBACT helps cities and local governments to share 'good' practices and lessons learned and access financing for projects.

ICLEI Cases

Involvement in collaboration
Looking at the ICLEI database of European case studies from 2005 onwards, all but two of the ten case studies make use of collaboration with civil society actors in some form to further the goals of their project (see Figure 4). As one can see from the data in Appendix A, in the cases in which collaboration was not employed (Zurich and Heidelburg) high levels of existing institutional capital within the local government, such as mainstreaming of sustainability into working practices and strong political could be noted. Within the DISCUS framework these can be considered examples of 'active government'. The institutional capital of the local governments in these cases was also developed by their involvement in international networks like ICLEI, which provided tools, such as the eco-budget framework in the case of Heidelburg. In this sense, the local governments were acting in collaboration but with exogenous organisations rather than with local civil society.

Collaboration with business was the most common partnership featured in the ICLEI case studies (see Figure 5). The private sector tends to be quite powerful and their actions can have a large impact on sustainability thus it makes strategic sense for local governments to form strong alliances with this sector. Also, relationships between business and government have a longer history than partnerships with universities for example. Even though the focus – sustainability – may be new, the networks being drawn upon can be quite established. It is also important to note the diversity of actors involved in collaborations with local governments.

Collaboration with universities was not a common feature and only occurred in the Växjö and Porto cases in a substantial way, although research institutes were involved in the development of sustainable building materials as part of the Zurich project. However, in terms of EU support there is a heavy emphasis on encouraging these partnerships for research. In fact, there is growing financial support from the EU to focus on developing collaborations with universities and research institutes.

Figure 4 – Number of civil society actors collaborating in the cases
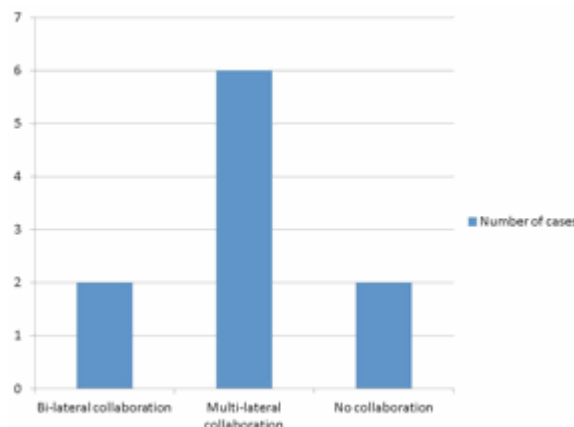
Collaboration with NGOs was also not so common. NGOs involvement took place in projects where formal, long-term participation structures already existed, such as the Porto case. NGOs tended to be included as one of several stakeholders consulted rather than being involved in a direct relationship with local government. The exception to this is in the case of Växjö where a three year collaboration between the City of Växjö and the Swedish Society for Nature Conservation (SSNC) was the driving force for the development of the Fossil Fuel Free Växjö strategy.

In terms of collaboration with the public sector the case of Barcelona is a good example of capacity building where local government actively develops the capacity of public sector institutions – in this case the education system – so that their goals are coordinated. Here almost all the institutional capacity indicators provided by the DISCUS framework are met by the programme. This has provided the institution with the capabilities to work independently from local government, contributing to the same sustainability objectives through its education programme and in house activities even after the collaboration becomes less active.

Citizens were directly involved in projects in three cases, meaning that their input was incorporated into decision-making processes or they were the direct target of capacity building. However, indirect involvement could be said to have occurred in all cases as every project was aiming to have an impact on the citizens of the local region and was aiming to do so in a way in which citizens felt was positive. Experience from Växjö suggests that it is easier to include citizens as part of an organisation (e.g. as part of NGOs) rather than as individuals. Växjö held public meetings as part of their LA21 strategy but found that participation was low and thus the expected value was not being generated. In response the municipality in Vajxo shifted their focus to involving citizens by capacity building through awareness raising campaigns and promotion of behaviour change.

Figure 5 – Number of cases with collaboration between local government and civil society actors
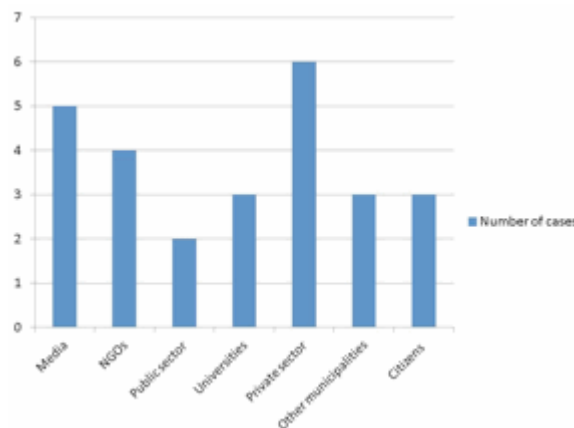
The media played a significant role in five of the cases. Although there was no formal collaboration with the media, the development of a good relationship between local government and local media helped raise awareness surrounding the environmental values of government sustainability strategies and contributed to the positive public perception of projects and where relevant public involvement.

Types of collaboration
The various actors involved in the ICLEI case studies and the possible relationships between them are depicted in Figure 6. The arrows indicate the potential flow of capacity building. Relationships where capacity-building flows in both directions, can be considered collaborative. Both the local level and the supra-local level (including international and regional networks as well as EU funding) are important in this respect.

The strongest case study in terms of its adherence to the DISCUS framework and the closest to the ideal of dynamic governing set out in that framework is that of Växjö. In this case, collaboration with the aim of developing institutional and social capacities is a stated goal of the project. This has led to the development of a robust network of relations between several civil society actors and the local government which has then been drawn upon to execute several different projects related to urban sustainability. Porto also deals directly with governance. This case involves collaboration between several regional municipalities as

well as between civil society and local government. Porto also established a formal coordination group made up of members from the municipalities as well as several different civil society actors.

These are in contrast to the example from Milan where the collaboration between government and industry was short-term and project specific. While still successful in achieving its outcomes such a model does not provide the same 'scaffolding' as cases in which more permanent structures are established. The Milan Municipality developed a relationship with two actors within industry but have not developed a channel of communication and cooperation with local industry as a whole and thus in the case of new projects involving different industry actors the process of relationship and capacity building would have to be started from scratch. Involvement of industry as a stakeholder of course requires the sector to be organised (in other words it requires a certain level of social capital) such as the existence of a local chamber of commerce as in the Freiburg case. Once a level of social capital is established the integration of a stakeholder into a formalised collaboration structure can increase the capacity of both government and industry for successful collaboration.

Figure 6 – Map of the possible collaborative relationships
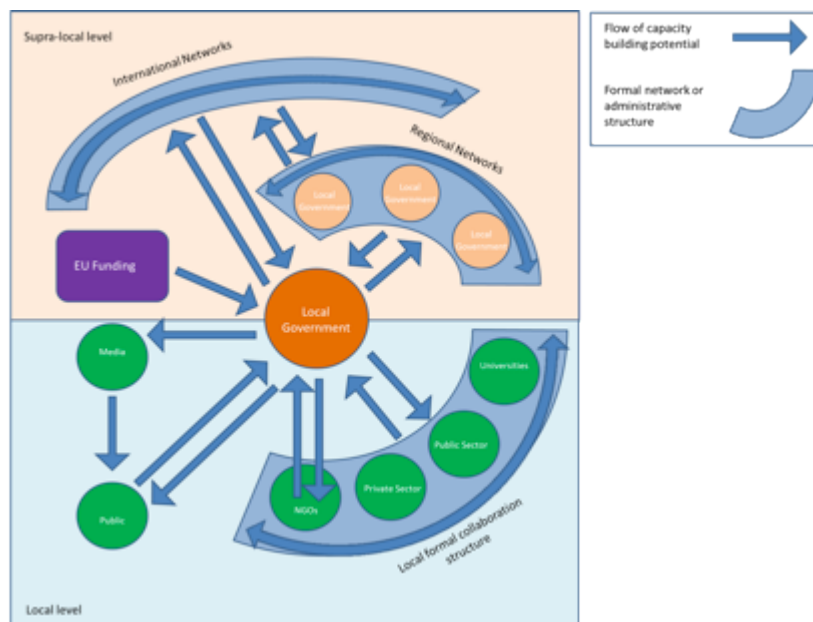
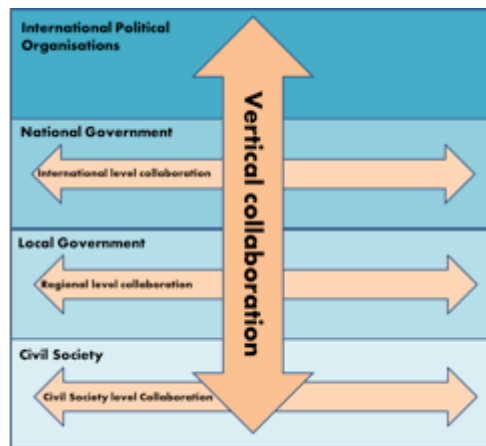

Trends in collaboration
The major trend to observe is that collaboration played a role in the majority of cases studied. Collaborative relationships are strongly encouraged by both independent organizations, such as ICLEI, as well as by EU programmes. While the actors involved and the roles they play vary between cases one constant is the coordinating role of local government. The literature and trends in EU resource allocation appear to support the assumption that local government is the 'locus' for change. Civil society and national government are essential actors but local government is the one coordinating local collaborations, connecting with regional and international networks, and it is often the actor requesting and managing funding. The local government is also the one taking political responsibility for projects in the eyes of the public.

In the ICLEI cases, local governments also used collaboration with other municipalities in their region to develop coordinated sustainability strategies and share knowledge. This model may be particularly useful where the actions of the city will impact upon smaller surrounding municipalities (and vice versa), such as in the case of Porto. Involvement in

international networks appears to also be very important in supporting local governments. In the case studies international networks played a number of roles. From providing tools in a largely passive manner, such as the eco-budget framework used by Heidelburg, to active involvement in events and discussions, such as in the case of Kalithea. Networks are invaluable in promoting learning by providing a platform for knowledge sharing. The support of a network can also give a project legitimacy.

Here the concept of multi-level governance becomes salient. Multi-level governance is a concept increasingly widely used by a range of organizations and it provides a conceptual framework for understanding the relationships between local, regional and national government and civil society actors (Corfee-Morlot, 2009). The horizontal and vertical collaboration between actors that defines multi-level governance is depicted in Figure 7. It is important to note here that multi-level governance is not describing a hierarchy of political process. It is possible, for example for international institutions to collaborate with local government without going through the chain of nation and regional government (Bache, 2004). All cases studied in this paper employed a form of multi-level governance.

Figure 7 – Horizontal and vertical collaboration in the multi-level governance

Discussion

While the original focus of this paper was on collaborative relationships taking place between local government and civil society at the local level, upon analysis of the case studies and support framework it became clear that local level collaboration cannot be viewed in isolation. It is difficult to discuss collaboration at the local level without acknowledging the role of collaboration between local government and regional, national and international governments and organizations. In all cases local collaborations were carried out in collaboration with international or regional networks (or both), and EU support was very much targeted at encouraging these supra-local collaborations.

Local collaboration is often reliant on knowledge, finances and political support exogenous to the city. While at the same time the achievement of international and national policy outcomes relies on the action of local government and civil society. In the same way that a mutually reinforcing loop exists within the governance of urban areas so does a mutually reinforcing loop exist between local government and higher level institutions, with both parties supporting and building the capabilities of the other. In order to capture this complexity it was necessary to employ a model of multi-level governance in describing the process of collaboration.

The results of this paper are very specific to the European context. This context is characterised by the existence of the EU and its particular international relations and policy framework, as well as certain minimum levels of existing infrastructure and democratic processes. The sample of case studies is relatively small and it is certainly not representative of the full spectrum of collaborative relations being employed in European cities. However, despite this limitation the findings should be reliable enough to generalise to the European context. Many European cities not studied will have similar actors and similar potential for capacity building at their disposal, with the concept of institutional and social capacity being applicable everywhere.

This paper has taken a very descriptive approach looking only at what is happening now in terms of the use of collaboration in projects and activities promoting sustainable urban transformations in Europe. This paper does not delve into the processes of implementing a collaborative strategy. It does not answer the questions of why collaboration is used in some cases and not others, nor why particular forms of collaboration are used in each case. Identification of drivers and barriers to the implementation of collaborative forms of governance in the urban sustainability context was outside of the scope of this paper. An important point of departure for further research would be an exploration into what factors are driving the forms of collaborative governance being observed in the context of sustainable urban transformation and what barriers or constraints are being experienced.

Conclusions

Significant transformations in the infrastructure and 'culture' of European cities are required if they are to meet the challenges of urban sustainability and climate change. Such transformations will require a shift in the way in which cities are governed. An important element of this new form of governing is greater involvement of civil society actors in policy making and projects – this is referred to as governance. Collaboration acts as a key mechanism in the governance process and contributes to the governing of urban sustainability by helping to develop the institutional and social capital of the parties involved. Through collaboration a mutually reinforcing loop can be created whereby both parties contribute to the capacity building of the other, while simultaneously also contributing to the shared goal of urban sustainability.

The research question of this paper asked how collaboration is contributing to projects and activities promoting sustainable urban transformation in European cities. The aim of the paper was to provide a picture of the different ways in which collaboration is being employed in the context of urban sustainability projects, and outline the political, financial and informational support available for local governments seeking to make use of collaboration in their governing. The framework of social and institutional capacity building provided by the DISCUS project was used to offer an understanding of how collaboration contributed to the projects. This paper also sought to offer some indication of trends in the modes of governing being employed and supported in the arena of urban sustainability.

The four main trends act as a summary of the findings. Firstly, looking at the ICLEI case studies one can see that collaboration plays an important role in most of cases although it is employed differently in each situation. The development of formal administrative structures by local government for facilitating collaboration appears to be an important factor in generating a robust and long-term relationship between local government and civil society. Secondly, the role of local government as coordinator appears to be very significant. The observation made from the ICLEI case studies as well as the focus areas of EU programmes support the assertion made by Evans (2005), that high levels of institutional capital – a strong local government – is a crucial element in driving sustainable urban transformation.

Thirdly, although collaborations with universities were not particularly common in the cases studied the EU appears to be targeting funding strongly at research and acknowledging that providing support for implementation before learning activities have been launched will not be effective or efficient. With the introduction of the UE JPI it is likely that collaborations between local governments and universities will become increasingly prominent. Fourthly, the concept of multi-level governance appears to very salient when looking at collaboration. From analysis of the ICLEI case studies it is clear that one cannot talk about collaboration at the local level in isolation from the wider context. International and regional networks play an invaluable role in providing resources and platforms for knowledge sharing and successful collaboration projects appear to involve both local level collaboration and supra-local collaborations. The EU programmes also place a strong emphasis on national and international collaboration between municipalities.

Finally, this paper proposes that further research into the drivers and barriers associated with successful collaboration would be an important next step. Collaborative governance is still quite nascent as a movement and thus there is the need for further research and learning on how best to implement collaborative relationships within the governing process and how this collaboration can contribute to better policies for sustainable urban transformation.

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Appendix B

Exploring Living Labs and Advancing Sustainable Urban Transformation

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Introduction

Context

The effects of our changing climate have been well documented as posing a threat to global ecosystems and humans. The Intergovernmental Panel of Climate Change (IPCC) reports with a high degree of confidence that climate change is strongly affecting terrestrial, marine and freshwater biological systems, which in turn adversely affect global food supplies, human health, industry, settlements, and ultimately society as a whole (Pachauri & Reisinger, 2007). It is also evident that climate change is very likely due to an increase of greenhouse gas (GHG) emissions caused by human activities, the burning of fossil fuels and deforestation (Van Ypersele, 2009).

Cities have become a focal point for the mitigation of, and adaptation to, climate change because urban populations, infrastructure, and activities are responsible for the majority of resource consumption, which ultimately leads to GHG emissions. These are primarily caused by energy use in buildings, increased infrastructure, and fuels for transportation. Cities are not only responsible for 60-80% of global carbon dioxide (CO_2) emissions (OECD, 2012) and between 30-70% of GHG emissions, depending on the method of calculation used (Satterthwaite, 2008), but they are also where the majority of the potentially affected human populations now live. Furthermore, rural populations are moving to cities at an astonishing rate of almost 200,000 people per week (UN Habitat, 2010) and thus cities are growing rapidly.

Urban populations may be threatened by the changing climate on several fronts. First off, there can be an increase in drastic weather events, such as floods and heat waves in urban centers. Secondly, an increasing temperature will disproportionately affect cities because of the urban heat island effect (UHI), which occurs when urban areas have a warmer micro-climate due to the storage and release of heat by buildings, roads and other urban infrastructures (OECD, 2010). With increasing urban temperatures comes an increase in concentrations of human threatening air pollutants, such as ozone, acid aerosols and allergens (Aron & Patz, 2001).

Beyond the threats of and contributions to climate change, cities face many other challenges now and in the future. Cities are drawing on rural areas for social capacity in order to supply the labour market created by the centralized nature of consumption in cities. This in turn creates problems of income and labour distribution, housing, transportation and many other intangibles. Ecologically, cities inherently destroy habitat, draw on natural resources and affect rural land-use planning, amongst other negative outcomes (Stilwell, 2000). Cities are increasingly becoming socially, ecologically and economically 'tumultuous'. The implications of this are widespread and even unknown. It is becoming imperative for every aspect of cities, including land-use, air management, housing, labour, water, and more, to be managed and governed through the lens of sustainable development (Bulkely & Betsill, 2005).

Research Problem

With GHG emissions largely originating from cities, and increasing temperatures posing a serious threat to urban populations, it is imperative to begin re-thinking and re-purposing the cities of today and of the future. As Ernstson et al. (2010) maintain, the traditional paradigm of planning cities for a predictable future is not only insufficient but also potentially destructive. At present cities and their planning processes do not adequately reflect the necessity for urban transitions towards sustainability in practice. Bulkeley and Betsill (2005, p.42) assert "despite this near universal recognition that sustainable cities and sustainable communities are a desirable policy goal, there is less certainty about what this might mean in practice".

Cities are dynamic and almost living entities in their own right. It is not easy to understand how cities will develop; they seemingly take on a life of their own. Traditional planning and design processes lack a substantive linkage between theory and practice, which would enable the establishment of more sustainable cities. Coutts et al. (2009, p. 28) assert that "outcomes and knowledge from research that can potentially improve local climates and the comfort and well-being of urban residents are scarcely used in the planning process, for reasons such as communication problems, conflicting interests, economic costs or lack of knowledge". The design and planning process for an urban transition towards a sustainable city must therefore reflect the nature of the city itself and mimic their dynamics.

This, therefore, reveals the problem of how to transition from our current cities and urban planning processes to cities that consider a wider range of climate change related effects, causes and mitigation strategies. The answer to this problem possibly lies at the research, approach and design process levels. In order to successfully plan for sustainable cities, design professionals must engage in innovative and creative solutions that address social, environmental and economic issues, all whilst engaging key stakeholders (Cooper et al, 2009). One such creative and innovative solution or approach may be through a Living Laboratory or Living Lab focused on urban transitions. A Living Lab is presented in Almirall & Wareham (2008) as an emerging institution that is driven by two main ideas: a) a user based innovation process, and b) real world experimentation aiming to provide structure in the user-based and participatory innovation process

Research question

Living Labs – grounded in innovative solutions, user-based experimentation, and a participatory approach – might be an ideal venue through which to address the dynamics and complexities of cities and to effectively advance urban transitions in practice. In regard to the problem presented above, this paper intends to explore the concept of using Living Labs as a participatory experimentation ground for advancing transitions towards sustainable cities. Underlying this broader objective lies the explicit investigation of how the functions and workings of the Living Lab concept can support processes of urban transformation. Because Living Labs are not being widely used in their current applications to explore urban transformations, the specific research question that this paper intends to explore is as follows: How can the concept of Living Labs aid in advancing sustainable urban transformations?

Methodology

This exploration of Living Labs and urban transformations was conducted through a literature review, case study research, and structured interviews. The literature review conducted focused primarily on two subject areas. The first was in the area of sustainable cities and sustainable design processes. The second was on the theory behind the Living Lab methodology. The case study research undertaken was in regards to actual Living Labs addressing issues in the realm of urban sustainability. The central resource for discovering and sorting through Living Labs was the European Network of Living Labs (ENoLL), which eventually led to exploration of three Living Labs.

The interviews conducted were a result of the search for Living Labs within ENoLL. Key Living Labs were identified and contacted. Also, the interview with Esteve Almirall was targeted as he was not only a member of the ENoLL council, but he was also very present in the literature regarding Living Labs, even though he is not involved with urban sustainability, his expertise on Living Lab theory is significant. Mark De Colvenaer of the Flemish Living Lab Platform was also willing to do an interview within the timeframe of this investigation. There were other relevant individuals also willing to be interviewed, however they could only be conducted in the weeks after submission. The interviews were structured around the following four questions, which triggered many insights beyond these specific questions.

- Can you tell me, in your interpretation, what a Living Lab is?
- How does a Living Lab function or achieve a given objective differently from other traditional methods?
- Have you seen any successes in the realm of urban sustainability within any Living Lab? If so, what lead to the successes?
- In your opinion, how are we going to assess or substantiate whether Living Labs are aiding the advancement of urban transformations?

Limitation and scope

One limitation of this paper is to objectively understand the concept of Living Labs. There are many Living Labs addressing many different problems, issues and processes. It is not clear if there is a definite common thread amongst Living Labs beyond the 'label'. One can speculate that Living Labs are themselves 'living' and constantly evolving along with that which they are addressing. Therefore, it is difficult to properly define Living Labs in a manner that will consistently represent their existence, functions, and objectives.

Although the majority of the work represented in this paper is based in Europe, a limitation of this paper is the lack of a specific geographical context. Addressing urban transitions will often need to be framed in the specific geographical context as every urban area has their own specific dynamics and challenges. Therefore, analyzing how Living Labs can help advance urban transitions may not be applicable in all geographical locations.

The scope of this paper is geographically wide, as it considers Living Labs throughout Europe. Within the subject area and case studies, however, the scope is fairly small in that it only considers three Living Labs working on urban sustainability issues. The exploration of Living Lab theory is also fairly narrow in that the theory is quite specific and directed at Living Labs, of which there is relatively limited literature.

Theoretical Overview

There is no absolute definition of a Living Lab. The 'label' Living Lab can be found all over the world, in various platforms and focused on various contexts specific objectives. Although there is quite a significant variance of how Living Labs exist, function and interact with society, most of them will fall somewhere within the spectrum of the commonly accepted theory underpinning Living Labs. This section intends to provide an overview of the broad theory behind Living Labs by reviewing the literature and drawing from interviews carried out with those involved in Living Labs. It must be noted that much of the current literature or 'buzz' regarding Living Labs focuses on ICT (Information and Communication Technologies), which can be associated with current economic trends and societal concentration on ICT, but the application of Living Labs is certainly much broader than just within ICT.

Definition and Origins of Living Labs

According to Mark De Colvenaer, a Living Lab is an open innovation ecosystem where partners or stakeholders from different backgrounds can work together to find solutions to a given challenge (personal communication, February 23rd, 2012). Esteve Almirall expands on this idea of a Living Lab by suggesting that it is a methodology founded in three main points: a) cooperation with users, b) participatory approach in real life scenarios, and c) the inclusions of all major institutions (research institutions, universities, governments, users, companies, etc.) (personal communication, February 28th, 2012). These three points are the underlying foundation of a Living Lab and can be observed on a whole, or in part, in most Living Labs. This methodology certainly differs in its application, but is generally applied in the R&D phase of technologies and innovations as a user-centric methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts (Eriksson et al., 2005).

The origins of the Living Lab concept can be credited to Professor Mitchell at MIT School of Architecture and City Planning (Eriksson et al, 2005; Dutilleul et al., 2010). Professor Mitchell recognized that with an increase in information technology, computing and sensing technology there was an opportunity to move innovation from an 'in vitro' setting into an 'in vivo' setting in order to allow researchers to observe users and test hypotheses in a real world setting (Dutilleul et al., 2010). The interesting aspects about the work when considering urban transformation is that the initial ideas for Living Labs was in the realm urban planning and the use of smart/future homes. Since then, however, especially in the European context, urban planning has not been a central focus of Living Labs, rather they were further developed to bridge the gap between successful R&D and the poor commercial success of products in the area of ICT (Almirall & Wareham, 2008).

Emergence and Development of Living Labs

Living Labs emerged, as mentioned, with the vision of Professor Mitchell to research from an 'in vivo' user-based approach. This certainly remains a pillar of Living Labs, however there are other factors that contributed to the popularization of Living Labs today. One such factor is the opportunity to create a platform and methodology to help incorporate innovation into systems and policies, which is missing in the traditional R&D approach to innovation (Almirall, 2008). As Higgins & Klein (2011) suggest, the traditional approach to understanding users' response to innovation by employing focus groups and usability studies lack insight into the wider social dynamics of using a given innovation. They go on to demonstrate how it is ultimately this gap in understanding that Living Labs addresses. Living Labs move away from the traditional controlled laboratory to provide real-word experimentation, rather than a real world controlled setting. The 'in vivo' methodology of Living Labs offers insights into the dynamic, unpredictable, and idiosyncratic nature of real world environments. Furthermore, it allows an opportunity beyond observation for real-time reaction, development and refinement (Higgins & Klein, 2011).

There is another inherent problem in innovation that Living Labs help mitigate and it was ultimately another reason for their emergence. The problem is the adversarial relationship often built on mistrust between the various stakeholders. Governments, companies, researchers, and users do not always see 'eye to eye' and they are often suspicious or have seemingly contradictory motivations to innovate or are engaged in a 'race' towards innovation. Living Labs help settle this feeling by framing innovation in an experimental manner, breaking down traditional hierarchical and competitive approaches to innovation (Higgins & Klein, 2011). In the European context, Living Labs have emerged to help European countries deal with the difficulty of bridging the gap between strong research initiatives and commercial or market-based success. Again, this is framed in the development of a commercial product, but can certainly be framed in any number of categories, including the implementation of ideas involving urban transitions. As Esteve Almirall would argue, commercialization actually happens as a secondary effect because of the involvement of governments and companies in real life environments (personal communication, February 28th, 2012).

Background

Living Labs in the European context are essentially connected to the European Network of Living Labs (ENoLL). Living Labs emerged in Europe as a series of regional, bottom-up initiatives, mostly located in the northern European countries, where innovation, advanced infrastructure, participatory approaches, and accessibility to citizens was all either present or easily accomplished. ENoLL was established by the European Union in 2006 it was supported in part by existing Living Labs in Europe (European Communities, 2008). The network originally included 19 Living Labs and has subsequently grown to almost 250

members (ENoLL, 2012) in 5 waves of admittance, which have spread across western, eastern and southern Europe.

ENoLL is a community of Living Labs with an overarching objective to contribute to the creation of a future European innovation system by enhancing systematic innovation. Within ENoLL there are several categories of Living Labs working in various innovation areas. There are corporate Livings Labs for product and service development, rural Living Labs for rural development, and regional Living Labs that intend to improve local and regional services. As an umbrella organization, ENoLL facilitates cooperation and identifying synergies between the various Living Labs. Amongst other things, ENoLL does this by networking, sharing best practices, providing tools and services, and accessing different user communities (European Communities, 2008).

Case Studies
Within ENoLL and throughout the world, Living Labs have become a methodology to focus on any number of categories or subject areas. The majority of Living Labs in Europe are focusing on the commercialization of various technologies or services. However, Living Labs were founded as a methodology to consider future/smart houses in the realm of urban infrastructure. The paper focuses on three cases of Living Labs within the European context that are revisiting the origins of the Living Lab methodology and considering innovations within urban infrastructures and ultimately intending to contribute to urban transformations.

Table 1 – Overview of Living Labs

	Urban Living Lab (ULL)	Flemish Living Lab Platform (FLLP)	Coventry City Lab (CCL)
Location	Saint-Qeuntin-en-Yvelines and Versailles, FRANCE	Mechelen, BELGIUM	Coventry, UK
Mission	To support thetransition tolow carbon cities and a high quality of life.	To optimize and boost value creation in information, communication and entertainment.	To improve quality of life for urban citizens and create an exemplary low carbon community.
Interests	Energy efficiency Mobility Nutrition Education Transportation Telemedicine Personal services	Smart Grids Smart Media Smart Cities	Green Buildings Smart Buildings Smart Cities Low carbon economy Low carbon transportation Traffic systems
Function	ULL is a network of interested collaborators that can link into the ULL ecosystem to test and be supported in various projects relating to low carbon communities.	FLLP sets up infrastructure, tests user panels, provides services, mobilizes stakeholders and acquires projects. It is open to any collaborations.	CCL provides a test bed, incubation hub, and access to researchers and industrial bodies. It is a strategic partnership between the city and municipality.
Users	An ecosystem of innovation involving students, residents, local communities, associations and companies.	It is currently connected with 250 households (or 600 people). Another panel is on the way with 2000 users.	The University of Coventry and University Technology Park are user labs with direct access to citizens and other user groups.

Urban Living Lab: France
Urban Living Labs (ULL) considers itself an innovation ecosystem involving students, residents, local government, and business on an eco-campus in Saint-Qeuntin-en-Yvelines and Versailles in France. It is a multi-stakeholder Living Lab involved in innovation in the field of education, sustainable development and regional economic strengthening with an ultimate goal to support the transition to low carbon cities and promote a high quality of life. ULL funds and implements demonstration projects, actively engages in awareness and the dissemination of knowledge though the collective intelligence of communities, universities, citizens, associations, and companies under the umbrella of co-construction (ULL, 2012).

Flemish Living Lab Platform: Belgium
The Flemish Living Lab Platform (FLLP) is a venue open for collaboration with any party involved in developing new technologies, products or services in the digital and interactive environment within the realm of Smart Grids, Smart Media and Smart Cities. FLLP helps employee a Living Lab methodology in an environment where users can test a new technology, product or services in a 'real-world' setting. Simultaneously researchers from two Belgian universities monitor and gather data. Currently FLLP has several projects on the go, including a community based urban project focused on reducing CO2 emissions as well as supporting senior citizens and local retailers (FLLP, 2012).

Coventry City Lab: UK
The Coventry City Lab (CCL) is a partnership with the Coventry City Council and Coventry University. The CCL will be centred at the Coventry University Technology Park and already has several projects and programmes underway in the realm of transportation energy management. The CCL will be a real-life testing bed for low carbon innovations with an objective to strengthen the city and university green agenda whilst improving the quality of life for urban citizens and creating an exemplary low carbon community. The Living Lab status was sought in order to attract interested partnerships for open innovation (Coventry University, 2012).

Comparative Overview
Based on the Living Labs presented (see Table 1), it is clear that there are Living Labs not only working on urban transitions or aspects of urban transition, but also progressing their urban areas towards sustainability. Although each Living Lab has a particular context and a unique set of focal challenges, they are all contributing to the transition towards urban sustainability and improving the lives of urban populations. All these Living Labs have a diverse group of partners ranging from corporations to municipal governments to academic institutions. With these partnerships in place and the willingness to collaborate in an open environment all these Living Labs are well poised to deal with the multi-faceted issues that arise when considering the dynamic challenges of urban transitions.

It becomes clear when 'digging' into any of the three Living Labs presented here that they all act as hubs or gateways for technologies, products and services that can aid in urban transitions. A relationship of particular and strategic importance that these Living Labs have is with the users. Whether it is an industrial complex, university campus or private homes, these relationships are at the core of what allows the Living Labs to become a hub for open-innovation and experimentation. It is, after all, the users that make up and contribute to a more sustainable society, and so the implications of all Living Labs can be felt as wide as the users will take them.

Analysis and Discussion

Living Labs were founded on the idea of using 'in vivo' situations to research and innovate within homes to help in the transition for homes and cities of the future. In recent years, however, they have moved on and have focused more closely on ICT and the commercialization of ICT products and services. Having said that, there are still an increasing number of Living Labs focused on urban transitions, as demonstrated in the case studies presented in this paper. This section will look at the main points of the Living Lab methodology through the lens of urban transitions and analyze how Living Labs in theory (and practice) can help in the transition towards more sustainable cities.

Cooperation with users

One of the pillars of Living Labs is the intentional and strategic cooperating with users. Although this is not necessarily different from other innovation processes or approaches, it is certainly essential to the Living Lab methodology. Through the lens of urban transformations, this approach is clearly beneficial. If urban infrastructure were the body of our urban areas, then users or humans would be the blood that gives life and constantly nourishes this body. It is the users that provide our urban landscape with a pulse.

Many methodologies engage the user, what differs, however, from other such processes is the iterative approach and the long-term involvement of end users employed by Living Labs (Almirall, personal communication, February 28th, 2012). The long-term involvement of users is important because the notion of behaviour change and domestication require embedding new innovations and ideas into the daily lives of the user in order to extract valuable information from their use (De Colvenaer, personal communication, February 23rd, 2012). Urban areas are not short-term projects. On the contrary, we live within their designs, intentions, outcomes, and services for decades, if not centuries. As Stilwell (2000) points out, a central problem of our social and economic systems is the implicit 'live now, let others pay later' approach.

As far as building urban areas or transforming urban areas, it is not enough to look at the 'now' for how things should be designed, built and considered, rather we must consider the future. Corfee-Morlot et al. (2009) suggest that it is urban planning that will shape future trends, population, socio-economic activity, poverty, infrastructure and vulnerability to increased climate hazards. Once planning decisions are made and infrastructure is built, it is not necessarily easy to correct or change in an efficient manner or period of time. For this reason, the long-term approach employed by Living Labs provides a more realistic and beneficial data set and insights into how we live within and interact with our urban areas.

As such, user involvement is of great importance, as most ventures in R&D consider users as an object rather than an actual source for innovation and innovative ideas (Eriksson et al., 2005). In this way, the user becomes an essential ally and source of crucial information throughout the Living Lab methodology. The cooperation with users is evident in the Living Lab methodology in that it focuses on people, on challenges and on societal issues as a starting point, once the information is gathered from the users, you then seek solutions, rather than pushing technologies or solutions to the market before understanding the actual challenges (De Colvenaer, personal communication, February 23rd, 2012). Technologies must be able to address a problem together with the human aspect and interaction of that problem. This is extremely relevant to urban transitions, as it is important to understand the human interaction with technologies in order to understand how technologies will address urban challenges.

As Mark De Colvenaer points out, it is necessary to understand how technologies will be embedded in the lives of people, domestication processes and behaviour are essential to understand in the success of any innovation (personal communication, February 23rd, 2012). The Living Lab methodology inherently allows for exploration into the human and technological aspect of innovation over a long-term and in a realistic setting, which can provide a more balanced and understanding of future possibilities. Furthermore, Mulder & Velthausz (2006) maintain that cooperation with users, coupled with the proper technologies, allows for data to be collected unobtrusively in any setting without the inefficient and interfering presence of a researcher. This also allows for users to present their knowledge and experience as data without the interpretation or biases of researchers (Dutilleul et al., 2010).

Participatory approach in real life scenarios

Intille et al. (2005) suggest that the 'in vivo' participatory approach employed by Living Labs essentially takes real humans in real life scenarios and records their responses and usage of a given technology or infrastructure and uses that to inspire designers or further research. Technologies, services, products, and ideas are deployed in real life scenarios with the challenges and idiosyncrasies that come with real world use. The obvious and overarching benefit of this approach in urban transitions is that these urban areas that are to be built, re-planned, re-tooled or re-thought, are all going to eventually become the 'real world' with 'real users'. So, testing and researching in a 'real world' environment, not just 'real users' in a controlled setting, is of great relevance now and more importantly for the future generation of users.

This approach allows for a capturing of implicit knowledge held exclusively by the user. This knowledge presents in two forms, the first is *domain-based knowledge* and the second is *tacit knowledge*. Domain-based knowledge is knowledge that is not in the public domain, but is explicit to an individual or group, but not commonly known. For example, a nurse might be well positioned to understand how the implementation of a new device in the emergency room might work because they understands the shift schedule, the needs of the hospital, patient demographics, bottlenecks and much more. This would give the nurse explicit, domain-based, knowledge of how this new device might affect the emergency room in practicality (Almirall, personal communication, February 28th, 2012). Domain based knowledge allows researchers and institutions to understand the practicalities of implementation through the experiences and particular knowledge of a user in the real world, rather than in a controlled setting.

Tacit knowledge is much the same, where it is the users that hold the particular knowledge, but whereas domain-based knowledge is explicit and easily understood, tacit knowledge is often difficult to verbalize or understand, but it remains very valuable knowledge. Keeping with the emergency room example, one could imagine that a nurse has tacit knowledge about the device just by putting their hands on it and understanding how it feels, how it might be advantageous or restricting (Almirall, personal communication, February 28th, 2012). This tacit knowledge is equally valuable in understanding acceptance and the human relationship to a given product or technology.

In the context of urban transitions, domain-based and tacit knowledge allow designers or planners access to otherwise untapped knowledge that is not often considered in the design process. This allows for designers to address the challenges and create solutions for problems that exist, based on user knowledge, rather than trying to address problems that they subjectively perceive or problems that are institutionally perceived. This is especially poignant when addressing urban transitions, because these transitions may take decades, so being able to constantly refresh and tweak solution based on on-going user information is extremely valuable. This allows for the design process to be dynamic, rather than static.

Further understanding the users interaction with innovations in a real world setting allows the institutions involved to actually focus on real needed solutions, rather than trying to develop solutions to problems that do not actually exist. This way, innovations can make their way into the real-world quicker and with more precision in addressing the challenges on hand (De Colvenaer, personal communication, February 23rd, 2012). By using an 'in-vivo' testing ground in an urban setting, it encourages designers and planners to be inspired by the human experience, rather than try to create the human experience through design and planning. Thus, the infrastructure, products, services or innovations are tested in the real world, with real users and real outcomes, before the long-term commitment of through the implementation of infrastructure.

Inclusion of all major institutions

It is an essential part of living Labs to include all major institutions, including governments, researchers, universities, companies and users. This multi-disciplinary collaboration allows the different interest groups an opportunity to understand each other better, and breakdown and halt the preconceived notions and relational histories between stakeholder groups. Furthermore, a Living Lab is a venue for multiple outcomes, including the policy and regulatory environment, market context, existing knowledge and understanding the user needs (Higgins & Klein, 2011). All the while, adjustments along the way can be made and thought through 'in vivo' by all stakeholders, rather than in a traditional linear and hierarchical fashion. A multi-stakeholder approach is not a novel idea when it comes to urban transition or building urban infrastructures. What is unique, however, in the Living Lab approach is that it does not only provide for a multi-stakeholder design process, but they also become a venue for a multi-stakeholder innovation and research processes.

As an open and neutral research based environment, Living Labs bridge the real world and users with the institutions and stakeholders that ultimately make the decision about what gets implemented into society or released onto the market (De Colvenaer, personal communication, February 23rd, 2012). One of the great challenges in urban transformation projects is the complexity of the stakeholder model, where citizens, municipalities, governments, companies, professionals, and institutions all have their different objectives, different stakes, and one way or another you have to align them (De Colvenaer, personal communication, February 23rd, 2012). The neutrality and inclusionary aspect of the Living Labs allows for various stakeholders to better work together in a non-adversarial environment.

There are seemingly endless benefits of working in such an environment, obviously these are subjective and context specific. Kviselius et. al. (2008) highlights two benefits of working in multi-stakeholder environments. First is the cost efficiency by spreading the various costs amongst the stakeholders and second resource efficiency by allowing stakeholders to be efficient by the sharing of complementary resources. In regards to urban transitions, this is particularly relevant, because stakeholders will often exhaust resources in acquiring similar information and infrastructure. Furthermore, urban transition projects are often long-term and demanding of resources and logistics, and wherever there are synergies there is certainly efficiencies. Dutilleul et al. (2010) suggests that the allowance for and encouragement of concurrent engineering and enterprising is another reason for the multi-stakeholder approach. Hölttä et al. (2009) see this as the benefits of early supplier involvement, Eriksson et al. (2005) presents this as the facilitation of cooperation between technology and application providers, and finally, Tan et al. (2006) put forth that dealing with a collective problem from multiple perspectives and facilitating consultation, business and interorganizational network re-engineering, is a benefit of this approach.

Traditional design and implementation processes have many stakeholders bring their ideas and processes to the table at the design phase, Living Labs allow for a multi-stakeholder approach right from the research or conceptualization phase. Because the research is 'in vivo', the various stakeholders can tweak, redefine and balance their various aspects in real

time and collaboratively. This is best demonstrated in the ability for concurrent engineering, design and enterprising in the Living Lab methodology. Stakeholders do not bring their static agenda to a design or transformation process as a singular entity, rather they are able to concurrently design and innovate based on the needs of a particular project and based on the strengths and weaknesses of the various stakeholders. Furthermore, with projects that are often large in scale and time, the Living Lab approach, allows for early and lengthy relationships that lead to the identification of synergies, networking and cost efficiencies

Barriers to the Living Lab methodology

Living Labs are a fairly digestible and practical methodology in theory, but that does not mean that there are not certain identified barriers to their use or successful implementation. According to Birrer (2001) there exist cognitive barriers and motivational barriers to any collaborative methodology. Cognitive barriers emerge when parties from different cognitive backgrounds communicate because communication can be difficult and knowledge asymmetries create a dominant 'expert' voice. Motivational barriers exist when stakeholders have different motivations that may be or perceived to be contradictory. These barriers can inspire a disengagement from the collaborative process (as cited in Dutilleul et al., 2010).

Beyond these barriers that can occur in any collaborative process, Living Labs face yet another barrier according to Dutilleul et al. (2010). This barrier is the inherent need to identify stakeholders that could work together to produce innovation in a joint problem solving effort. Identifying the rights stakeholders, and not just the interested stakeholders, to collaborate is essential. In the same realm is the difficulty in motivating business' to collaborate, as collaboration often represents a step towards uncertainty or dependency, which business' inherently try to avoid (Dutilleul et al., 2010).

Dutilleul et al. (2010) bring up another barrier or issue that has not received much attention in the literature, which is the issue of the ethical involvement of the users. Although the idea of Living Labs is to involve users to tap into their knowledge, rather than using them as objects in research, there are some inherent ethical issues when considering the users. These issues can emerge in the areas of informed consent, the use of data, the potential 'invasive' perception of 'in vivo' research, and implementation of non-confined and open research. There are certainly other ethical and user issues that might emerge depending on the specifics of the research and the context of the Living Lab.

Conclusions and Reflections

When considering the question of how can the concept of Living Labs aid in advancing sustainable urban transformations, it has become clear through this research that there are several tangible and likely intangible ways in which Living Lab can contribute to sustainable urban transformations. The Living Lab methodology will never be solely responsible for sustainable urban transformation, but it can certainly be used as a tool in larger processes or to achieve a specific objective. As a tool, it can be applied differently to specific contexts and objectives, and can be used as a central or peripheral methodology in a larger scheme.

It is clear that the theory underpinning the Living Lab methodology revealed in this research applies well to sustainable urban transformations. The idea of involving users for long-term 'in vivo' experimentation or research aligns well with urban transitions in that it mimics the real world and the idiosyncratic dynamics of the real world. In this approach, Living Labs can accomplish an in-depth and realistic understanding of how people live, interact with, and evolve within an urban setting. This can be within the context of a new technology, an innovative idea or a service, regardless of what is being explored, the relationship with the user provides real-time, poignant, and otherwise untapped domain-based and tacit

knowledge, which contributes to urban transitions, as it is ultimately the users in these explorations that will become the users of a transformed urban landscape.

The multi-stakeholder approach is not a new idea when it comes to design processes or urban transformation. In fact, any large problem addressing urban issues inherently involves many stakeholders. There are several reasons why Living Labs offer a different approach and potentially better outcomes than traditional approaches to urban transformations. Living Labs are framed as a laboratory for user-based experimentation, which allows the various stakeholders to put their guard down in terms of their specific objectives, perceived contradictions, relational histories, and traditional barriers to collaboration. Living Labs promote real-time collaboration and experimentation 'in vivo', which allows for synergies to reveal themselves, refinements to be made and innovation to occur, long before the commitment to urban infrastructure is made, without having to engage in costly post-infrastructure correction measures. This way, human interactions and human experiences help design the world that humans live in, rather than having design dictate how humans interact and experience the world.

Living Labs ultimately allow further understanding into the human experience to help shape whatever the subject matter. Urban areas are where over half the human population experiences and interact with the world and each other. As humans and cities evolve together, it is essential that human experiences help define and design this mutual evolution. Living Labs can provide a tool, a venue, and a methodology to harness human experiences within the urban setting to aid in the advancement of sustainable urban transformations.

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