Proceedings of 7th Transport Research Arena TRA 2018, April 16-19, 2018, Vienna, Austria

Innovation Milieus for Mobility – Analysis of Innovation Lab Approaches for the Establishment of Urban Mobility Labs in Austria

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Abstract

The initiative „Urban Mobility Labs“ (UML), promoted by the Austrian Ministry of Transport, Innovation and Technology, was initiated to support the setup of innovative and experimental environments for research, testing, implementation and transfer of mobility solutions. This should happen by incorporating the scientific community, citizens and stakeholders in politics and administration as well as other groups. The emerging structural frame shall enhance the efficiency and effectivity of the innovation process. This paper gives insights and in-depth analysis of the approaches and experiences gained in the eight UML exploratory projects. These projects were analysed, systematized and enriched with further considerations. Furthermore, knowledge growth about user-centred innovation environments was documented during the exploratory phase.

Keywords: Urban Mobility Lab; Open Innovation; Living Lab; Real-Life Experiments; Innovation Lab

1. Introduction

Despite numerous societal challenges regarding transport and mobility, the diffusion of live practise and applications for innovative mobility solutions which are subject of FTI activities, is too slow at present (Geibler et al., 2013). Technological and social innovations are only successful when they engage with each other. The effects of accompanying emerging Innovation Labs with user centred innovation setting are described in the present study and the gained insights were evaluated and documented (Schneidewind, 2014). Mobility laboratories in Austria address the gap between the research results of the rigid environment of a laboratory and live practice.

Eight UML projects (located in Vienna, Graz, Leoben/Bruck and Steyr) had the purpose of designing, preparing and verifying the feasibility of suitable laboratory environments. The study is generating knowledge on three levels:

1. Knowledge on objectives and processes: e.g. what are the objectives of the mobility labs? What is the content of the labs? What can be learned from the exploratory processes? Can external implementation obstacles and resistances be identified? Which groups of actors can be mobilized, who is resistant?
2. Knowledge on implementation and transformation: e.g. can real and / or laboratory experiments be planned? What methods and instruments can be used? Are strategies for the transfer of mobility innovations pursued? Which business models can be discussed?
3. System knowledge: e.g. do UML contribute to system innovations? How can systemic change in the mobility sector be triggered, accompanied and explored, for example by raising awareness among different actors?

The study focused mainly on the innovation processes and mutual learning processes during the entire explanatory project. The key question of the present paper is: How can an Urban Mobility Lab be set up? Furthermore transferable "best practices" and framework conditions such as success factors and restraining factors should be identified.
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2. Research Background

Despite intensive research and innovation impulses mobility innovations take too long to be effective in the real live. In urban mobility a gap between research and everyday practice can be determined. There are many reasons for this gap between research and practice: Lack of trust and cooperation between relevant actors from research, companies, politics etc. or the low involvement of (end-) users in the research process. An essential consequence of this is the lack of acceptance of new mobility solutions. "Lab" approaches offer opportunities to close this gap and can help to accelerate the market diffusion of mobility innovations. The term "real-life laboratory" is closely linked to sustainability-oriented transformation research (sustainable transition management) and research policy (Schneidewind, 2014; Schneidewind et al, 2013; WBGU, 2011). Following this trend Urban Mobility Laboratories are oriented towards this concept and are moving toward of Real-life Labs and Living Labs. These Real-life Labs can clearly focus on neighbourhoods, urban quarters or districts, cities or regions and offer stakeholder real contexts and situations in which mobility innovations can be developed and tested (Berger et. al., 2017). They put research projects on the ground and therefore helping to bridge the gap between research and mobility routines. In addition, learning and adaptation processes can also be triggered (Bauknecht et al., 2015)

The Living Lab approach has been used as a scientific basis for the present study due to the involvement of all key players (public authorities, companies, research institutions and citizens) in form of a public-private-people-partnership (4P). This research environment is proved to be a sound basis for mobility innovations. Schaffers et al. (2007) highlights the importance and potential of early and continuous involvement of (end-) users in the development process in the form of a collaborative co-creation with the developers.

Since Living Lab organizations are complex units, Schuurman (2015) proposes a distinction between activities in the Living Lab. The theoretical and practical model is designed to help define and classify the various Living Lab activities. The three levels can be distinguished as follows:

- On a **"macro level"**, a Living Lab is a public-privat-people partnership consisting of different stake-holders, organized to carry out Living Lab research and Living Lab projects.
- The different innovation projects, which are carried out in a Living Lab environment and are processed with selected methods and tools, can be found in the **"meso level"**.
- The various research steps and activities (know-how, skills and resources of the LivingLab) carried out within the framework of Living Lab projects can be summarized in the **"micro-level"**.

3. Methodology

In the current study a method mix of qualitative and quantitative survey methods has been used. Personal interviews based on guidelines pursued the goal of deepening information - in particular on the success and constraint factors. The focus of the quantitative survey was to obtain quantifiable statements on all survey topics. Representatives of the various UML were interviewed in qualitative face-to-face interviews in order to gain insight into the alignment, objectives and processes within the UML. The qualitative interviews were designed as expert interviews (Bogner et al., 2014; Gläser & Laundel, 2009; Mayer, 2008), which is according to Mayer, a special form of the guideline-based interview.
The interviews are characterized by the expectation that "in the relatively open design of the interview situation, the views of the interviewee are more effective than in standardized interviews or questionnaires" (Flick, 2007). At the same time, the guide ensures that "comparability with other interviews based on the same guide is possible" (Matrotzki, 2015). "The expert interview refers to a clearly defined reality. In addition, the interviewee is not included as an individual, but as a representative of a group" (Mayer, 2008). The interviews lasted about 60 minutes on average and were electronically recorded with consent of the interviewees.

The quantitative online survey took place between the middle of July and the end of August 2015 and March /

April 2016. In the first questionnaire, 52 complete questionnaires were obtained. This corresponds to a return rate of 76%. The second questionnaire had a lower response rate with 37 completed questionnaires, justified by changes within the project teams of the various UML.

Interviews were evaluated through qualitative content analysis by analysing the conversation logs systematically and categorizing the answers. As a result, the designated material could be filtered out, summarized and worked up. The textual evaluation of the interviews was subsequently supplemented with the results of the quantitative survey in the sense of the recession model (Mayring, 2001). For this study the quantitative questionnaire was analysed descriptively.

4. Findings and Results

Based on the survey results, five key elements were derived for the successful establishment of an urban mobility laboratory.

- *Vision, Objectives & Alignments:* Needs to be developed together with all involved stakeholders and agreed on spatial challenges and objectives. Main goal: To create an experimental field for mobility innovations.
- *Actors, Network & Competences*: Identify, select, involve and motivate stakeholders. Main goal: Define roles and tasks and distribute them in a balanced way.
- *Interaction, Processes & Openness:* An UML must be visible and accessible. Define an adaptive and flexible Open Innovation process and focus on a high level of openness (Open Data, Open Access).
- *Business Model & Organisation:* A viable business model needs to be developed (operators, partners, value proposition, financing and customer segments) including an appropriate organizational structure.
- *Methods & Tools*: Define a differentiated (Open Innovation) method repertoire, including methods for impact assessment, main focus should be on real-life experiments.

Further explanations are focused on to two key elements “Actors, Network & Competences and “Business Model & Organization” due to the fact that these two are most relevant for the early steps of establishing an UML according to Schaffers et al. (2007). For the UML operations phase and the scaling and commercialization phase the remaining key elements needs to be considered in detail.

4.1. Actors, Network & Competences

Due to current societal challenges (e.g. in the field of mobility and transport), there is a need for an increased transdisciplinary orientation of research and development. The integration of different disciplines (interdisciplinary) and stakeholders (stakeholders and general public) with comprehensive, multi-faceted everyday experiences at the same level (transdisciplinary) enables environmentally-friendly and resource-conserving mobility innovations to be put into practice more quickly and effectively. The increased orientation to the real world of the users increases the acceptance and thus the dissemination of mobility innovations, which support a social transformation in the area of mobility and transport (WBGU, 2011).

In order to ensure a balanced distribution of roles within the UML network, different stakeholder groups and general public must be activated. The network can be assigned to different spatial levels (e.g. state, provinces, city regions, municipalities, etc.) as well as different fields of innovation (e.g. social innovations, technical innovations). The distinction between active (customers, decision-makers) and passive stakeholder groups ("affected parties") is helpful. From the specific competences of the stakeholder groups, tasks can be derived. A special role in the UML network belongs to politics and administration. A political decision in support of the future UML should be sought. Concrete possibilities of support are seen above all in the area of co-financing, political commitment and also in the creation of certain framework conditions (e.g. providing local institutional structure). This could also bring together political stakeholders and thus facilitate internal communication.

Key actors who are cross-linked with many other people and who have different roles are of crucial importance in the UML network. Typical tasks are: motivating and convincing other actors, coordinating information, coordinating UML activities, etc. A variety of roles in the trans-disciplinary UML network has a positive effect

on the success of the UML. Other rather passive potential roles are, for example, informants or testers. Facilitators, lobbyists, marketers etc. are examples of possible roles which are relevant to stakeholders.

In the sense of Open Innovation or co-creation, citizens need to be actively involved in the UML as co-creators. Based on different intensities of the integration of the population into the innovation process, different roles can be derived. A role is an expected behaviour of a person who takes a position within a UML (Leminen et al., 2012) The online survey shows that the structure of the UML networks is very broad and encompasses a variety of different areas. For a clearer representation, individual actors were grouped into common categories on the basis of their content, see Fig. 1.

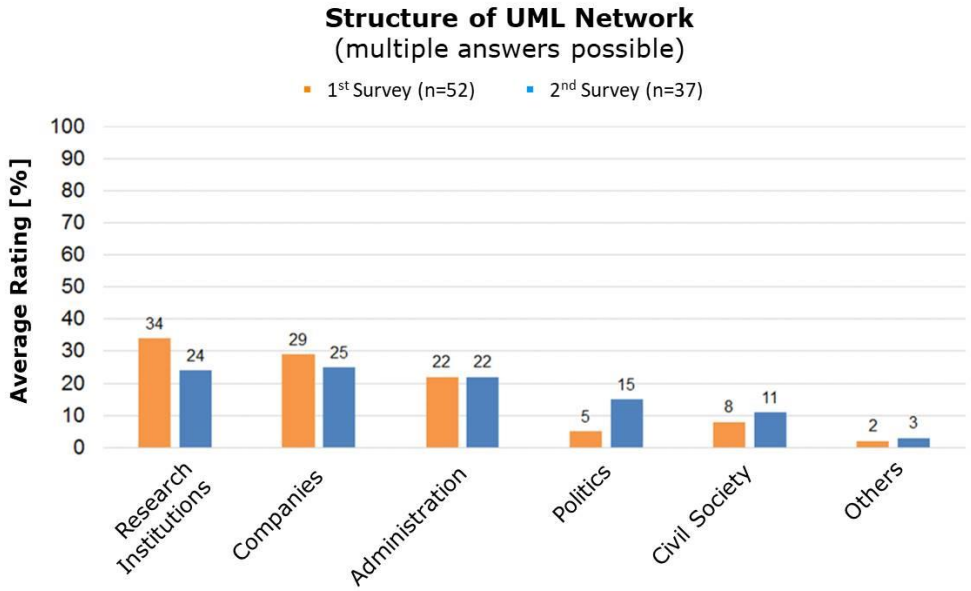

Fig. 1: Combination of UML Network

The results of the quantitative survey show that UML's partner network is most concentrated in the business companies and research institutions (traffic planning, social sciences, etc.). However, certain institutions in the administrative sector (22%) also play a significant role in UML's network of partners. Other areas such as politics or civil society play a subordinate role in the current UML network. The following networks were also mentioned: cluster organization, mobility services providers and district management.

One of the most important aspects in order to motivate stakeholders in the long term is to promote the (long-term) benefit to each individual. A common content and organizational orientation must be developed, which is shared by all stakeholders and to which all stakeholders can make an individual and incremental contribution. In order to stimulate further stakeholders in the area of mobility and transport, the following aspects are important: awareness-raising, a clear concept and well-prepared content, which encourage discussion. Further catalysts for participation are emotions, enthusiasm, storytelling and a novel character.
However, in relation to the citizens, it is evident that the main motivation results of the active co-operation process. Through the introduction of innovative and new ideas, stakeholders are expected to be taken seriously. Involvement in testing and implementation of new solutions are thus defined as clear benefits arising from the participation in UML projects.

In the first survey, the UML's representatives were only vague with regard to the competencies and services of the future UML, according to them it was “too early” to make detailed definitions. After the second survey there was a clearer picture on competencies and services recognizable. The thematic focus did not change.

- The services to be offered by the future UML are for example, providing contacts, networking, consultancy and information services. Terms that have been mentioned in this context are UML can act

as a "turntable", "platform" and "door opener". By exchanging and cross-linking it is possible to avoid double work (for example, simultaneous processing of a theme by different stakeholders).

- Furthermore, the services of a UML are seen in concept development, marketing and project support activities.
- Some respondents also emphasize the function of a UML as a space for novel thoughts and experiments, offering time and space for creativity.
- Research can be carried out directly by involvement of the user (close to practice) and through involvement of the community a broader range of ideas can be stimulated. Company partners can establish new business areas and find a "test pool".
- Through the combination of an experimental field and an institutional framework including local conditions, research projects can be implemented at lower cost, faster and more practically.

4.2. Business Model & Organizational Structure

A business model describes the way in which organizations or companies create, communicate and capture values (Osterwalder & Pigneur, 2011). The description of mobility laboratories in the form of business models is intended to help understand, analyse and communicate the key factors of the organization. According to Gassmann (2013) business models can be characterized on four dimensions:

1. The customer – who are the target customers of the UML? These are dependent on the spatial location and the thematic focus of the laboratory e.g. urban facilities such as public transport companies or administrative units in the transport sector, companies, etc.
2. The value proposition – what does UML offer to customers? The value proposition describes all UML services that are beneficial to the customer. It is important to work on an "Unique Selling Proposition" (USP) for each customer group. The added value of the UML should be visible for each customer group.
3. The value chain – how does the UML provide the services? Which stakeholders are involved? How are the processes be defined and what methods are used?
4. The revenue model – how can revenue be created? As financing of the public sector will be a maximum of 50%, it is important from beginning on to develop additional sources of revenue, for example pay-per-service (customers pay for each offered services), membership fees or rental of exhibition space, etc.

Since an urban mobility laboratory differs from a conventional company due to its multi-stakeholder structure (research facilities, private companies, politics, administration and citizens) and methods (open innovation / co-creation approach), the development of a business model is a complex activity. In order to develop an UML business model, it is recommended to consider 3 development phases (Schaffers et al., 2007):

- Preparation and initialization phase: This phase is focusing on the establishment and creation of a stable partner network. A creation of an UML business plan is highly recommended. The foundations for future business developments are laid in this phase..
- UML operation: Main focus in this phase is the execution of the offered innovative value proposition (services). With the expansion of the network in this phase, the scaling of services, the expansion of the user community and the development of complementary services should be tackled.
- Scaling and commercialization: This phase includes the integrating of the UML into the regional innovation system, opening new customer segments (markets) and possible additional revenue sources.

Concerning the organizational structure of the UML, different development depths can be identified. Beside a few UML which did already detailed considerations, in most of the UML the discussions about the organizational structure still persist. Some of the interviewees seriously consider docking existing institutions; others consider the establishment of an independent organization. The majority currently evaluate and asses different scenarios and additional legal information regarding the advantages and disadvantages of certain company forms.

The main tasks of a UML operator can be seen in the following areas:

1) Management (coordination, organisation, administration)
2) Active networking, acting as a communication interface, and establishment of a user or test population
3) Project development
4) Practice-oriented transfer of knowledge and mobility solutions

In terms of organization, respondents mainly distinguish between UML management (back office, front office, administration, project development, research) as well as an advisory body (advisory board, think tank). Some of the respondents consider introducing a decision making or steering group (steering committee, executive management, political body) as central decision makers. In addition, a comprehensive network of different stakeholders and partners is available, which can be linked to the project. An example on a possible organizational structure is shown in Fig. 2.

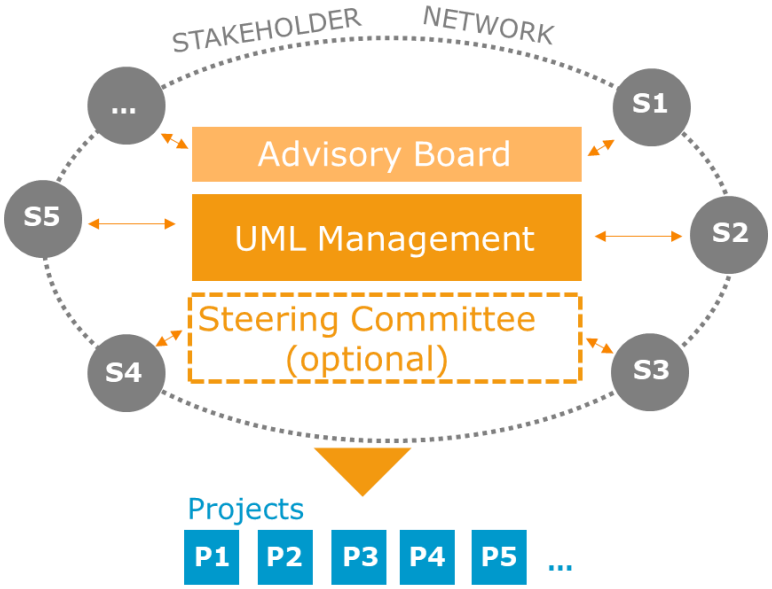

Fig. 2 Example of UML Organizational Structure

Some projects deliberately consider a small organization (core team) in order to react quick and flexible. Regarding partner structure in a future implementation project, the majority advocates a continuation of the existing cooperation from the exploratory project.
Some respondents consider research facilities play an important role in a future UML (as neutral actors, for evaluation and valid policy advice), since the representation of scientific independence could be attractive for projects. Most interviewees see research facilities as potential drivers but also as operators. Advantages are seen in the fact that there is relatively easy access to specialist personnel and knowledge resources. It could be a disadvantage that the UML is perceived "from the outside" as university research and would compete with other research projects ("one project out of many").
Local authorities, such as regional management, are also regarded as potential operators, as they are anchored in the region. They have an overall view, and are politically linked well. The disadvantage of this operational construction is that the regional management handles many different projects in parallel and is exposed to political tensions.

With regard to financing, the future UMLs relies on a 50% funding (FFG funding instrument “Innovation Laboratories”) in connection with the establishment and operation of the laboratory for the operator organization. In the course of the qualitative interviews, almost all respondents considered co-financing (raise of remaining 50%) as a major hurdle in the implementation phase.

Conclusion and Further Research

Generally it turned out that establishing an UML is a complex process and requires a lot of time and resources. First and foremost a common understanding about the vision and missions should be formulated, followed by setting up a multi-disciplinary partner network. An important step is the development of a viable business model and an organizational structure. Due to the multi-stakeholder structure the possible tension between economic interests and societal policy objectives must be overcome. Significant obstacles to build an UML are on the one hand the permanent commitment of the stakeholders and on the other hand (co-) financing. Openness and transparency are the basic pillars for setting up an Urban Mobility Lab.

Five UML implementation projects (in Graz, Linz/Steyr, Salzburg and two in Vienna) which started operation in early 2017, are being further scientifically supported in order to verify and improve the results of the present study.

Acknowledgements

The research based on this paper has received funding from the program “Mobility of the future” (4th tender) provided by the Austrian Ministry of Transport, Innovation and Technology and from COMET (Competence Centers for Excellent Technologies) program both operated by the Austrian Research Funding Agency FFG.

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