REGULATION AND GOVERNANCE SUPPORTING SYSTEMIC MAAS INNOVATIONS

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ABSTRACT

Mobility-as-a-Service (MaaS) is an example of a systemic innovation, where mobility services addressing different customers' transportation needs are integrated with real-time traveler information, ticketing, and payment services. This paper examines how the differences in institutional setup, stakeholder processes and viewpoints, and technological development have resulted in different approaches to regional governance when supporting systemic innovations in transportation. Two European regions with established collaboration networks in transportation and spatial planning are compared. These regions are the Growth Corridor Finland and the Basel metropolitan area in Switzerland. During August 2017, an invitation to online questionnaire was sent to 410 stakeholders, who had been participating in different stakeholder processes, such as pilot projects, strategy development groups, academic projects, and infrastructure projects in the field of mobility and commuting. With 99 completed questionnaires, the overall response rate was 24.1%. The answers were analyzed to collect stakeholder experiences from previous collaboration efforts, to assess the importance of transportation innovations to the work of these stakeholders, and to get insights about current barriers and supporting factors when developing these systemic innovations. As a result, managerial implications are discussed for these formal collaboration networks in their aspiration to support new mobility innovations.

Keywords: Governance, Stakeholders, Transportation, Collaboration networks, Mobility-as-a-Service, MaaS

1. INTRODUCTION

Both the notion of the need to own a car and the role of public transport in daily mobility are undergoing a transition. Especially the development of open data and mobile information platforms are changing consumer perceptions of public transport services (ITF, 2015). For example, the rising popularity of car-sharing (Shaheen & Cohen, 2016) in Europe has added real options for customers in supplementing mass transit services. These new mobility solutions are enabled and powered by a variety of societal, economic, technological, and consumer-related trends, such as urbanization, congestion in large cities, and environmental issues of traffic (e.g., Tinnilä & Kallio, 2015).

The roles of regulation and governance are also viewed differently in this transition. Some viewpoints emphasize the policy objectives of public transport authorities (e.g., Hoadley, 2017; Pangbourne et al., 2018) such as security, space optimization, aesthetic impacts, congestion, social inclusion, and citizen well-being. Others see new mobility services supplementing public transportation as a vital part of accessibility and connectivity (e.g., Polzin, 2016; MaaS Alliance, 2017) and call for less regulation to enable these solutions to emerge in differing contexts. According to Smith et al. (2018), there needs to be a sweet spot in regulation since too much regulation might impede the private sector's ability to participate and innovate and too little regulation might lead to solutions that do not serve the public interest.

Mobility-as-a-Service (MaaS) is one example of these emerging solutions (see Utriainen & Pöllänen, in press, for literature review). MaaS in this paper is used to describe the change from mobility as self-service

and from the independent development of different transportation modes to genuinely integrated mobility made possible by new digital services. Currently, private MaaS operators are starting new service offerings in urban areas with larger customer bases, but private demand-responsive transport can also be seen as one of the key options to meet transport challenges in rural areas (ITF, 2015; Hazan et al., 2016). Regions and countries with strong natural transportation monopolies have witnessed a similar increase in on-demand mobility services, but they are often part of the service offering of these natural monopolies (e.g. Müggler, 2017). A third way of thinking about the organization of integrated and demand responsive mobility is public-private-partnerships (Ekhardt & Aapaoja, 2016), where risks and responsibilities are shared between the private and public sector. Regardless of the way these new services are organized, public transport is the backbone of an integrated mobility solution and broad stakeholder participation in the development of the transportation system is needed.

As a part of a research project looking into the mobility needs and mobility behavior of mobile workers and commuters, an online questionnaire was sent to 410 stakeholders active in the field of mobility and commuting. The aim of this questionnaire was to assess the importance of transportation innovations to the work of these stakeholders and get insights about current barriers and supporting factors when developing these systemic innovations. This paper reports the questionnaire results regarding one of the transportation innovations presented in the questionnaire – Mobility-as-a-Service – and aims to analyze the possibilities of formal collaboration networks in helping to align the different stakeholder objectives, to make cross-regional mobility solutions possible, and to promote smart and sustainable mobility innovations.

Towards this aim of the paper, two European regions with established collaboration networks in transportation and spatial planning are compared in this paper. The collaboration networks in these regions (such as the Trinationaler Eurodistrict Basel and the Growth Corridor Finland) share the principles of openness and inclusivity, meaning that they are open to all transportation actors and inclusive for all kinds of users. These networks have a history in spatial planning, transportation system development and ensuring the economic vitality of the region, but there are definite indications that supporting innovations in these thematic areas are becoming an essential task of these networks. There are, however, apparent differences in institutional setup and stakeholder processes in these regions and these have resulted in different approaches in supporting these innovations. In this paper, the sociotechnical analysis is used to contrast the context of these transportation innovations. The analysis of the sociotechnical regimes in Finland and Switzerland are discussed in Chapter 3. The stakeholder questionnaire is presented in Chapter 4 and the results of the questionnaire are discussed in Chapter 5. The paper ends with managerial implications of our analysis (Chapter 6) and contributions to scholarly knowledge (Chapter 7).

2. THEORETICAL BACKGROUND

Institutional change and socio-technical regimes

MaaS is an example of an institutional and systemic change in mobility, potentially transforming both customer experience and utilization of physical resources. The use of the word institutional signifies that it requires changes in institutions, which “are the rules of the game in society, or more formally, are the

humanly devised constraints that shape human interaction" (North, 1990). Systemic refers to a paradigm shift, with an emphasis on the interrelationships and interdependencies among the parts of the system.

To understand the underlying changing factors in institutional change, Kingston and Caballero (2009) compared a variety of theoretical approaches to conceptualize institutional change. One of the identified factors affecting change is politics and collective action, which makes their work essential for this empirical paper. Kingston and Caballero (2009) also list exogenous (formal or informal) influences, endogenous processes, path dependence, the pace of change, and bounded rationality of the actors as influencing factors. In this paper, the socio-technical system (Geels, 2004) is used to illustrate the exogenous forces operating in the system, the path dependence of institutional change, and the pace of change. With this distinction, it has been possible to focus the stakeholder survey on the endogenous processes such as politics and collective action and the bounded rationality of actors due to communication challenges.

The role of collaboration networks

Empirical evidence demonstrates the importance of stakeholder participation when implementing systemic innovations in different contexts. For instance, Schaffers and Turkama (2012) explore the transferability of systemic innovations in home care and independent living, energy efficiency, manufacturing networks, and citizen participation. According to their findings, a living lab approach can be used for cases that call for user-behavior transformation or business-model innovation. Living labs are by nature local, addressing the needs of specific demographics and developing suitable solutions to these needs. While different MaaS offerings have so far been local, or at most connecting separated islands of urban mobility (cities) to the same offering, Kulmala and Tuominen (2015) point out that an efficient and productive transportation system is an essential part of larger regional competitiveness, the overall economy and people's quality of life. This viewpoint expands both the context and stakeholder network of sustainable mobility services beyond the scope of living labs.

On the level of single transportation services, such as car sharing services, established global car rental and car manufacturing companies are already examining the broader context (Schmidt et al., 2018). In addition to the closed ecosystems of these global giants, interest groups such as MaaS Alliance aim to develop standards, shared principles, and a European-wide approach to MaaS that is open to all transportation actors (MaaS Alliance, 2018). While the first nationwide MaaS offering may be operational in year 2018 in Switzerland (PostBus, 2017), the following question remains: what is the best way to align the different interests and ensure transparent stakeholder participation in the regional and national level?

One of the reasons for the importance of this question is that accessibility and connectivity in these regions need to take place in an environment that is fragmented and hostile to innovation. The governance styles and transportation subsidies in different independent municipalities do not allow market players to compete and establish business models that bring demand and supply into a natural balance. Thus, according to Van Audenhove et al. (2014) a regional-level collaboration between all stakeholders of the mobility ecosystem is needed to support innovative and integrated business models. Examination of the relatively isolated MaaS pilots of today indicates a clear need for new forms of collaboration that help to connect different regional mobility systems and ensure that new solutions developed elsewhere can be adapted to local contexts.

3. SOCIO-TECHNICAL REGIMES

In this paper, a case comparison between different concrete contexts of action and the experiences and interests of stakeholders involved describes the environments where new mobility solutions are developed. Specifically, in our analysis the impact of legislation, governance styles, and technology development on different systemic innovations in these two countries has been estimated.

Finland

Finland has two levels of administration: national and municipal and, in contrast to Switzerland, the legislation is the same throughout the country. As parliament and town councils change every four years after the elections, different topics in transportation become prominent. On the other hand, many issues and decisions in transportation become topical because of European Union (EU) directives and their preparation. Currently, several overlapping policies and changes in legislation influence the Finnish transport sector. The most influential policy regarding MaaS is the climate strategy. Finland aims to reduce greenhouse gas emissions of the transportation sector by at least 80% of the 1990 levels by 2050. The role of the transport sector in reducing emissions is highlighted in the new the National Energy and Climate Strategy (Huttunen, 2017) as road transport produces 90% of the greenhouse gas emissions of domestic transport and reducing emissions in other sectors are relatively complicated. According to the strategy, Finland will achieve this reduction in emissions through the proliferation of electric cars, biofuels, and sustainable MaaS solutions. The on-going legislation reforms are supposed to progress, regardless of the power balance changes in parliament, and guide the development of the transport sector during forth-coming years. The new transport code (in act 1.7.2018) aims to better respond to the needs of transport users through enabling digitalization and new transport services. The objective of this reform is to promote the creation of new service models, ease market entrance, dismantle national regulation that limits competition, and reduce the level of public guidance. For more detailed analysis on governance in the capital area of Finland, see Audouin & Finger (in press).

The major players in transportation on the national level are the Ministry of Transports and Communications and the Finnish Transport Agency. The Ministry of Transport and Communications is in charge of implementing the intelligent transport strategy and is responsible for allocating sufficient resources to it within the transport administration sector. The Finnish Transport Agency ensures the availability of public transportation in major urban areas, continuity across administrative boundaries, and is responsible for the overall intelligent transport architecture. On a local level, the actual organization of public transport services is the responsibility of cities and municipalities. However, only specific school and social welfare transport services are legally mandated to be organized throughout the country. In practice, only the most significant cities have excellent public transport services while the service level in rural areas is not at the same standard and private motor vehicles are the most common mode of transport. This polarization furthermore makes larger cities the drivers for most of the development in public transportation, as smaller municipalities have inadequate resources.

Growth Corridor Finland (GCF)

As a geographical area, the Growth Corridor Finland stretches from Helsinki to Hämeenlinna, Tampere and Seinäjoki region as a string of cities. Economically, it forms the forefront basis of national competitiveness;

more than 50% of Finland's GDP is produced in this area (Growth Corridor Finland, 2018). Growth Corridor Finland is moreover the largest workforce pool in Finland with more than 350 000 daily commuters and 45% of all Finns living in the area. The distances between the urban areas are long and compared to urban areas in central Europe the population density is low outside the capital region of Finland (Figure 1). As a collaboration network, the Growth Corridor Finland comprises of more than 20 cities and municipalities of the region, three regional councils, four chambers of commerce, four Finnish ministries, and the Federation of Finnish Enterprises.

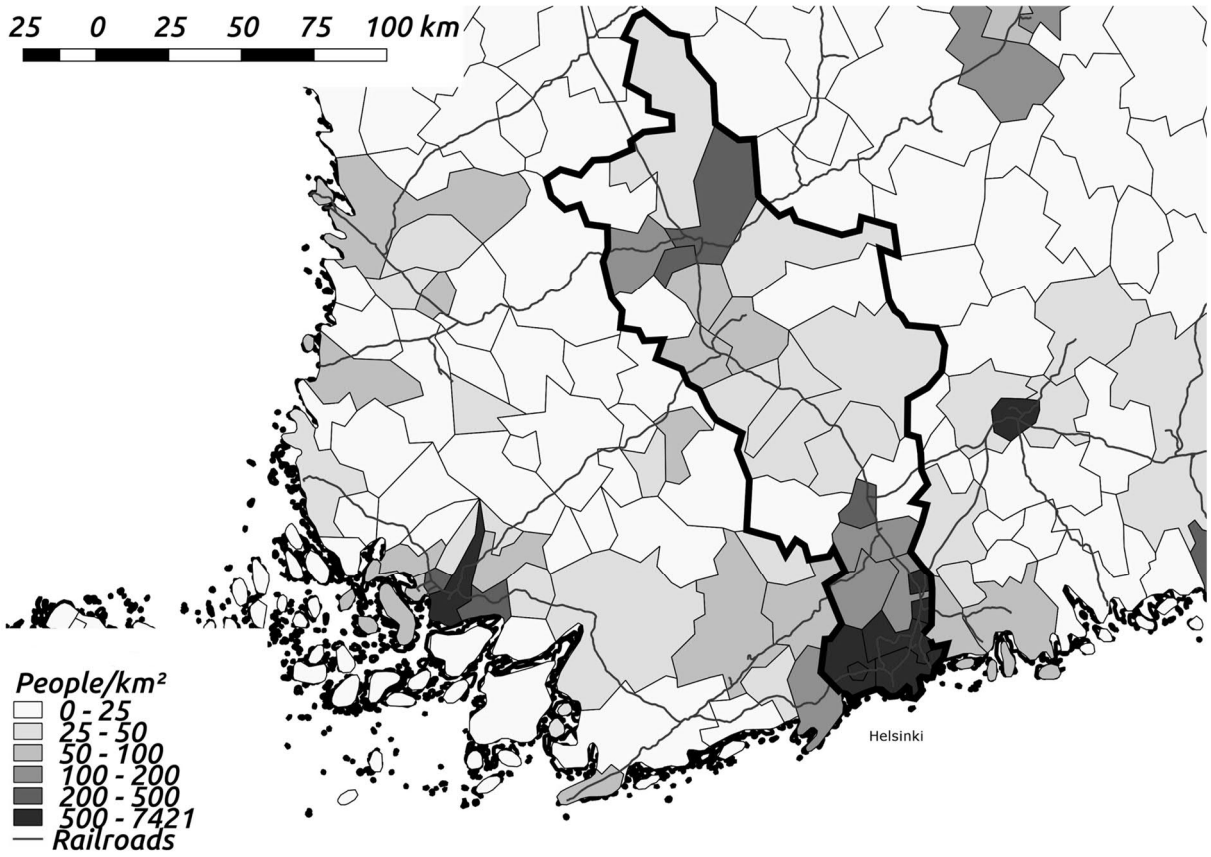

Figure 1: Population density and railway lines in southern Finland (the geographical area of Growth Corridor Finland highlighted). Picture © Aalto University. The data source for population density: Official Statistics of Finland, 2017. Map data © OpenStreetMap contributors, used under CC BY-SA (OpenStreetMap contributors, 2017).

On a national level, the Ministry of Transport and Communications in Finland has pointed out in its press release (Ministry of Transport and Communications, 2017) that Finland´s most significant opportunities lie in the quick and comprehensive adoption of technological solutions being created globally. For GCF, these solutions are also an essential part of the accessibility, attractiveness, and vitality of the region and towards these aims they promote experiments and introduce new services and practices with the help of external partners. In the field of mobility, GCF aims to become the leading region in EU for piloting new, smart, and sustainable mobility solutions.

Switzerland

Switzerland's history and the system of government differ from other western countries, as it is a confederation, where cantons, districts, and municipalities have relatively more power in contrast to the Federal Government of Switzerland. Tasks that do not expressly fall within the responsibilities of the

Federal Government are handled at the next level, i.e., by the cantons. Therefore, different kinds of transport services may be allowed or prohibited in various parts of the country. Moreover, since Switzerland is not part of the European Union, it also has more leeway in legislation. One of the seven departments of Federal Government is the Federal Department of Environment Transport, Energy, and Communications (DETEC). The Federal Government has set DETEC the primary task to "assure the sustainable provision of primary services in Switzerland … to meet present requirements for infrastructures and at the same time to secure for future generations the chances of an intact environment" (DETEC, 2018). While cantons have most of the legal power in transportation, DETEC, by its decisions and support to natural monopolies in Switzerland (e.g., Swiss Federal Railways and PostBus), has had an influential role in the development of the Swiss public transport.

Traditionally, Switzerland has invested consistently into a high-quality railroad service, and as a result, the number of kilometers traveled per inhabitant in a year on rails – around 2 500 km – is highest in the World. The total length of the railway network is more than 5 000 km, and the highway network is significant with more than 1 800 km of highways. Given the population (8.5 million) and the area (41 000 km^2) of the country, these transport infrastructure numbers are impressive. Approximately five million Swiss live in the five most significant city regions: Zurich, Geneva, Basel, Bern, and Lausanne. These city regions have high-quality public transport systems with undergrounds, trams, buses, and local trains as well as several different last-mile mobility solutions including different car sharing services, city bike services, and bike-and-ride facilities. Outside these city regions, Swiss Federal Railways and PostBus manage the long-distance transportation and accessibility of rural areas. These two transportation companies connect the entire country with a 'clock face' timetable approach. This approach means that every public transport subsystem and service is synchronized according to the railway schedules – and works like a Swiss watch.

As a subsidiary of the Swiss Post, PostBus operates 2 243 buses and have more than 150 million domestic passengers in Switzerland. Currently, the company is actively developing or acquiring new types of services into its portfolio. In 2016, the company launched a new smartphone application that tested the combination of different public transport operator offerings in the Basel region to the same service (Swiss Post, 2016). During 2018, this functionality will be added to the standard PostBus application, thus creating a countrywide multi-modal route planner. In addition to public transport, the transportation modalities featured in the route planner will be taxi services, bicycle and walking routes, private transport, and vehicle sharing services (PostBus, 2017). Thus, despite largely independent cantons in Switzerland, public transportation is primarily developed under a strong national planning paradigm, with national transportation monopolies setting the pace and more dynamic last-mile solutions serving the regional and local needs. Opinions have been raised that transport provision could be offered more cost-effectively in Switzerland and this is primarily because these natural monopolies are not transparent regarding their use of resources. Thus, there is considerable path-dependency in the development of Swiss public transportation, such as the timetable approach mentioned above, and different bottom-up social innovations have been primarily witnessed within single cantons, such as in Basel-Stadt.

Trinational Eurodistrict Basel (TEB)

One of the collaboration networks in Basel-travel-to-work area is the Trinational Eurodistrict Basel (TEB), which is a joint spatial and transportation system planning organization consisting of many of the

municipalities, cities, and regional authorities in the region (Figure 2). The population density, the size of municipalities around Basel city, and the network of railway lines differ significantly from the situation in the GCF. Although some people commute across country borders on their way to Basel, designing efficient transportation infrastructure in and around a dense metropolitan area is a more straightforward task than in the GCF. However, since Switzerland is not part of the EU and it does not have the same rules regarding public procurement, the development and operation of public transportation in this whole region require a shared vision and collaboration organizations such as TEB.

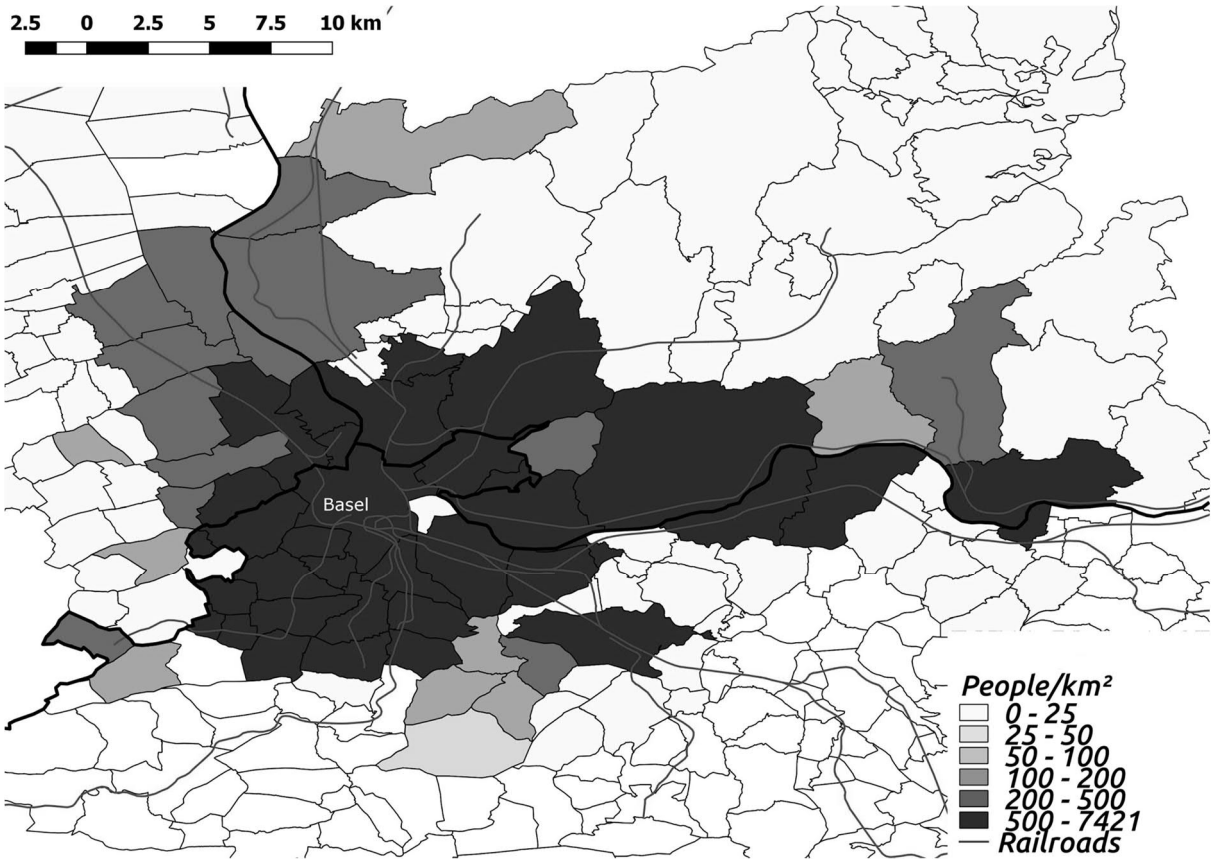

Figure 2: The population density of TEB members (municipalities not participating in TEB are white) and railway lines in Basel travel-to-work area. Thickened lines are the country (France - Germany - Switzerland) borders in the region. Picture © Aalto University. The data source for population density: GeoRhena, INSEE, BFS, and STALA (data dumb 7.4.2017). Map data © OpenStreetMap contributors, used under CC BY-SA (OpenStreetMap contributors, 2017).

In the subject area of transportation, TEB has improved cross-border public transportation in the region resulting in the expansion plan for the Trinational S-Bahn network and a common ticket system for the cross-border public transportation (Regio Verkehrsverbund Lörrach & Tarifverbund Nordwestschweiz, 2018). One of the tools also used in this collaboration is the ”Pendlerfonds”, which supports measures also from TEB that make it easier for commuters to change from cars to public transport or bicycle. The funds of this tool originate from the gross income from commuter and visitor parking tickets in the Basel city and the amount of funds granted depends on the benefit of the individual projects for the city of Basel. The fact that these funds are also directed to projects situating in the neighboring communities is unique in Switzerland and a good example of cooperation possibilities across the city, cantonal, and national borders.

4. QUESTIONNAIRE METHODOLOGY

The perceptions of different stakeholders were surveyed in both of the study areas to deepen the understanding of the transformation potential of mobility innovations. The online questionnaire with different language options (English, Finnish, French, German) was launched in August 2017. With 99 completed questionnaires (63 from Growth Corridor Finland and 36 from Basel travel-to-work area), the overall response rate was 24.1%. Whereas the samples do not claim to be representative for quantitative evidence, the survey still indicates differences in perceptions and attitudes according to stakeholder groups as well as to the two different sociotechnical contexts.

Before the survey, various stakeholder categories (Table 1) were identified by analyzing the stakeholders in the Basel metropolitan area. These stakeholder categories were formed by identifying and categorizing the participants of 61 different stakeholder processes, such as pilot projects, strategy development groups, academic projects, and infrastructure projects in the field of mobility and commuting. A total of 268 stakeholders were identified this way (of which 210 could be contacted directly for the survey).

Table 1: Stakeholder categories used in the survey analysis.

Category (analysis)	Sub-Category (survey)	Description
Administration	Public administration	Four different sub-levels were distinguished: ● National ● Canton/Bundesland/Département/County ● Regional ● Municipal
	Regional cooperation network	Publicly funded networks/organizations that focus on cooperation on a regional level (e.g., TEB, GCF)
Association & NGO	Chamber of Commerce	Chambers of commerce as representatives of businesses
	Citizen group	Interest groups representing citizens, often based in a particular city quarter
	NGO and lobby	Non-governmental organizations and lobbying groups, often legal associations or foundations, who promote and support specific development directions
Industry	Company/industry	Industry representatives or companies that do not offer mobility services (see “Transport company” below)
Planning & Research	Consulting and planning	Private research, engineering, consulting, and planning offices
	Research institution	Public research institutes (e.g., universities)
Political party	Political party	Political parties
Transport company	Public transport company local	Local providers of public transport
	Public transport company national	Providers of public transport on a national level, e.g., national railway companies

	Public transport company regional	Providers of public transport on a regional level
	Transport association	Consortiums of different public transport operators providing homogenous services
	Transport company (other)	Commercial providers of transportation services such as taxi, car sharing, and bike sharing services.

The Finnish sample was collected similarly with 130 stakeholder representatives identified from the participants of public stakeholder processes, such as pilot projects, strategy development groups, and infrastructure projects completed in the Growth Corridor Finland region during the past five years. These 130 representatives were supplemented with 70 stakeholders active in mobility and commuting on a national level to get survey responses from all the identified stakeholder categories also from Finland.

Before the questionnaire, we conducted expert workshops to identify successful cooperation strategies, challenges, and best practices in stakeholder processes related to mobility innovations, and this way provide a foundation for the different parts of the survey. These workshops were mainly targeted at the members of project's external advisory board, which consists of experts – practitioners as well as researchers – from the field of mobility and the representatives of the implementation partners of our project. The resulted questionnaire contained four themes, which were operationalized through a set of 31 questions (Table 2).

Table 2: Questionnaire themes and questions.

Questionnaire theme	Questionnaire question
Stakeholders' general attitudes towards certain mobility trends and innovations in the context of their activities	Do the following developments/trends require an adaptation or change in your organization's strategies and work in the field of commuting? (Slider: No change/Moderate adoption/Fundamental change) • Increasing intermodality of journeys • Increasing average distance of work commuting trips • Increasing road congestion • Population and employment growth in the surroundings of mid-sized and large cities • Increasing number of car sharing users
	What is your organization's attitude towards the following innovations? (Slider: Oppose/Disapprove/Neutral/Approve/Actively support) • Privately owned autonomous cars • Shared autonomous vehicles • Car sharing systems • Mobility-as-a-Service (MaaS) offers • Congestion charges / city tolls
Stakeholder experiences in cooperation processes	In which of the following contexts has your organization been concerned with the topic of commuting? (Multiple choices)
	What kinds of positive experiences have you gained during these activities concerning the cooperation with others? (Open text field)
	What kinds of negative experiences have you had during these activities concerning the cooperation with others?

	(Open text field)
Stakeholder perceptions of the supporting factors and challenges/barriers when implementing mobility innovations	How do you rate the following supporting factors for implementing innovations in commuting? (Slider: Not supporting/Strongly supporting) • Easy use of technology • Successful implementation cases and proof of market-readiness • Supportive policy, administration and legal framework • High economic viability • Constructive and transparent collaboration with other stakeholders • Decision-makers' motivation for innovation and change • Other supporting factors (open text field)
	How do you rate the following challenges for implementing innovations in commuting? (Slider: No challenge/Big challenge) • Technological complexity • Missing proof-of-concept • Obstructive policy, administration and legal framework • Low economic viability • Difficult collaboration and communication with other stakeholders • Decision-makers' anxiety for too extensive changes • Other challenges (open text field)
Stakeholders' potential active roles in the ongoing development and implementation of MaaS offerings	How do you personally rate the relevance of MaaS for shaping future commuting? (Slider: Not relevant/Very relevant)
	How do you rate the relevance of MaaS for your organization's activities in commuting? (Slider: Not relevant/Very relevant)
	Which factors would motivate you for contributing to an implementation of MaaS in your region? (Multiple choices)
	Which active role can you imagine for yourself in the implementation of MaaS? (Multiple choices)

5. FINDINGS AND DISCUSSION

Stakeholder attitudes towards MaaS

As a part of the first section of the survey, respondents were asked about the general attitude of the stakeholder they are representing towards MaaS. As the respondents were not necessarily familiar with the concept, we provided our definition of MaaS in the start of this section. What became apparent is that all stakeholders without any exceptions see MaaS concepts either neutral or as a positive development in transportation. In Finland, more than half of all stakeholders state that they actively support MaaS (Figure 3), around 30% approve it, and approximately 10% are neutral towards this new concept in mobility. In Switzerland, the attitude towards MaaS is also favorable, yet less enthusiastic than in Finland: around 30% of Swiss stakeholders are actively in favor of MaaS, approximately 40% approve it, and around 30% are neutral. Comparison between responses in stakeholder categories indicates further differentiation. Especially "Industry" representatives demonstrate a significant acceptance of MaaS. This opinion may be the result of innovations creating new markets and facilitating new business models from which these

industry-actors would benefit even though they do not offer transportation services themselves. In contrast, stakeholders in the category ”Administration“ and ”Associations and NGOs“ demonstrate below-average enthusiasm compared to other stakeholders.

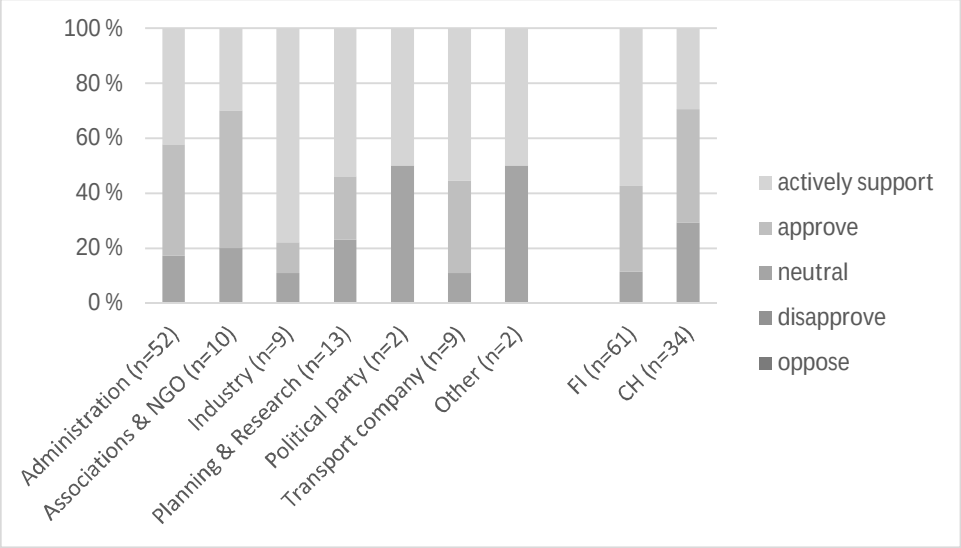

Figure 3: Stakeholders' attitudes towards MaaS according to stakeholder category and country.

The respondents were furthermore asked about their opinion regarding two specific aspects of MaaS introduction. First, they were asked whether they see MaaS as an important development in transportation for their own activities, and second, whether they see MaaS relevant for the future of commuting and mobility in general. It became apparent that the overall positive attitude and openness towards MaaS persists in these situations, especially regarding stakeholders' opinion that MaaS will be relevant for future commuting schemes (Figure 4). The results are somewhat similar in Switzerland and Finland, and in both countries over 35% of stakeholder consider MaaS highly relevant for future commuting schemes. In contrast, the estimations regarding the relevance for stakeholder activities differ between the two countries. In Switzerland, a higher share of stakeholders (around 33%, see Figure 4) considers MaaS significantly relevant to their own activities. In Finland, this share is lower (14.5%). However, over 40% of the Finnish stakeholders state that MaaS is “rather relevant” for them. Only 18.2% chose this category in Switzerland.

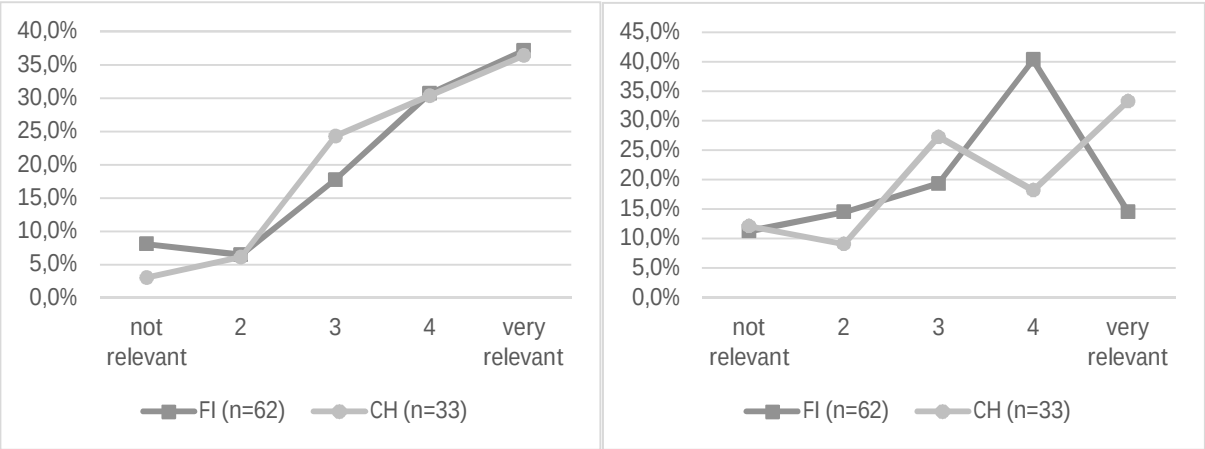

Figure 4: Relevance of MaaS for future commuting schemes in general (left) and stakeholders' activities (right).

When presenting these two factors in one diagram (Figure 5), it becomes apparent that Finnish stakeholders rate MaaS more relevant for future commuting schemes than for their activities in commuting. In Switzerland, the results are more evenly distributed: the stakeholders that consider MaaS important for commuting also see it also more critical for their activities and vice-versa. This result could indicate that Finnish stakeholder opinions are based more on the promotion of systemic innovations than on their immediate interests.

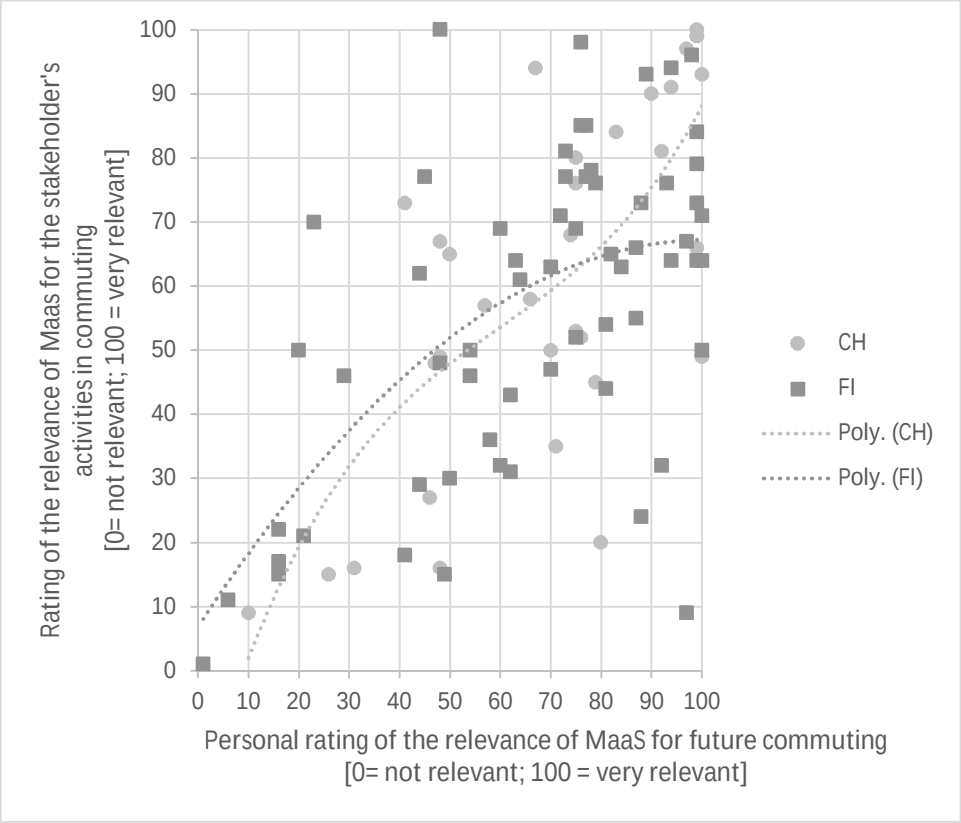

Figure 5: Perceived relevance of MaaS for future commuting and stakeholder activities in commuting.

Supporting factors and barriers

Extensive knowledge regarding the frame conditions that could support or hinder a technological implementation is essential when supporting innovations. Therefore, the survey respondents were asked to indicate to what extent they consider certain frame conditions to be supportive factors for the implementation of technological innovations in commuting. At the same time, they had to evaluate, whether these conditions are still challenges. These results are evaluated together in one diagram (Figure 6). The consolidated analysis reveals that stakeholders consider especially the factor “state of technology development” an essential part of implementing new technologies. If the technology is not developed sufficiently, the innovation cannot be fully exploited. Furthermore, stakeholders consider a working proof of concept as an influential supporting factor. Interestingly, stakeholders consider “economic viability” as the least supportive factor when implementing new technological solutions. This result may be an indication that these stakeholders could envision making investments in new technologies, even if they are not yet sure regarding the return on investment.

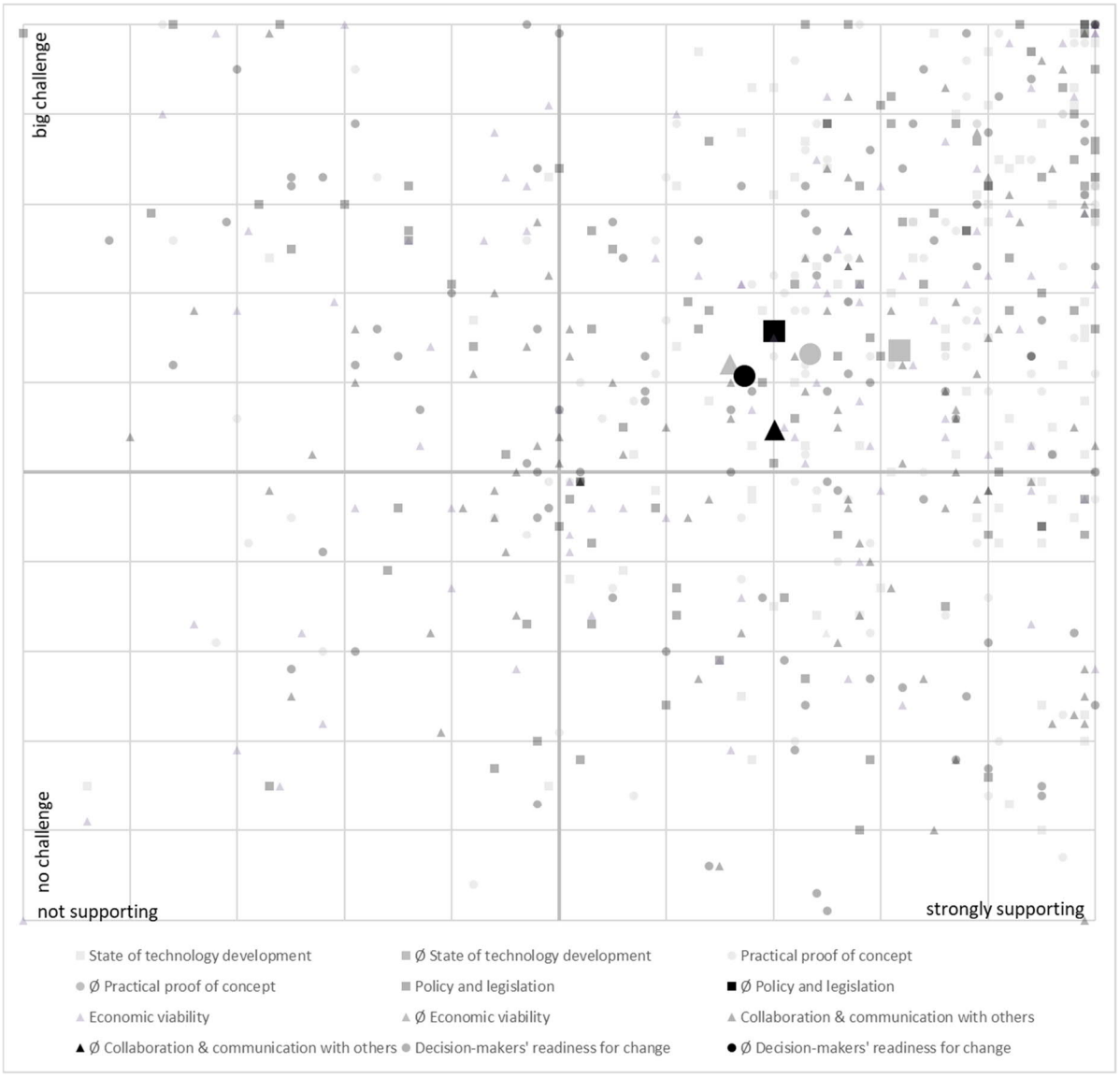

Figure 6: The comparison of different frame conditions regarding their potential for supporting new technology implementations (x-axis) and the level of challenge they pose to the development (y-axis) according to the stakeholders.

Currently, the respondents are considering all queried factors as challenges, however, generally on a low level. The factor “policy and legislation” is rated as the most significant barrier to implementing new technological solutions. The stakeholders furthermore state that the collaboration and communication with other stakeholders do not present a considerable challenge. This viewpoint may arise because stakeholders could imagine implementing innovations on their own, or because they expect a collaboration between stakeholders to be easy. To further explore the latter aspect, the respondents were asked to relate positive and negative experiences from this stakeholder collaboration using open text fields.

Positive and negative experiences from collaboration

The significant finding in the Finnish survey data is the enthusiasm for new mobility solutions and cooperation. This enthusiasm was the most common description that respondents gave as an answer to the open question regarding their positive experiences during the collaboration process. The respondents also stated that Finland is a relatively small country where different stakeholders know each other. Common to most of the Finnish stakeholders is their willingness to cooperate, and they perceive that

essential themes and development activities have been recognized during these collaboration activities. They moreover consider that this shared vision creates a good starting point for the forthcoming change. The cooperation experiences between different Finnish stakeholders are mostly positive.

However, Finnish respondents indicate that certain changes are implemented slowly. Some actors are seen as more conservative, and the respondents consider the difference between forerunners and laggards to be significant. For example, some of the stakeholders state that cooperation with Finnish natural monopolies in transport is not sufficiently fluent. Overall, according to the survey answers, various opinions and ideological differences exist regarding the role of the public sector in this paradigm change. Furthermore, it seems that the interests and needs of the large cities and smaller municipalities are not fully aligned.

According to stakeholders in the Basel region, the interest in new mobility solutions and cooperation has increased significantly. Most stakeholders understand the need for change and the attitudes are in favor of more environmentally friendly alternatives. As a positive result of collaboration, the respondents state the increase in the quality of life, and especially appreciated is the promotion of active modes of transport (e.g., riding a bike or walking). A further positive experience mentioned was the fact that stakeholders and companies from different modes of transport want to cooperate, share knowledge, and learn from each other. In Switzerland, even the most significant natural monopoly companies, such as Swiss Federal Railways (SBB), have also demonstrated their commitment to knowledge sharing and cooperation.

Stakeholders from Switzerland mentioned some particular challenges and negative experiences in the Basel region. For example, some influential lobbyists (e.g., automotive associations) are very much focused on sustaining their power and are somewhat conservative regarding new mobility innovations. Furthermore, and perhaps typical for the Basel region only, considerable differences exist between the development cultures in different countries. Some actors in the metropolitan Basel region are more cautious and slower to adapt and implement new ideas. For example, attitude towards (organizational) mobility management is not so positive in some of the countries in the region, according to the participants.

Means for motivating stakeholders to participate in MaaS

The third section of the survey asked the stakeholders about the motivating factors that could encourage them to participate in the development and implementation of MaaS offerings. Finnish stakeholders see more factors that are possible as motivating them than the Swiss counterparts do (Figure 7). This raises the question of whether stakeholders in Finland are more motivated and open to the possibility to be actively involved in the development of MaaS offering. The only aspects that are considered more motivating by Swiss stakeholders are “environmental benefits” (highest share of all items over both countries) and “market-readiness.”

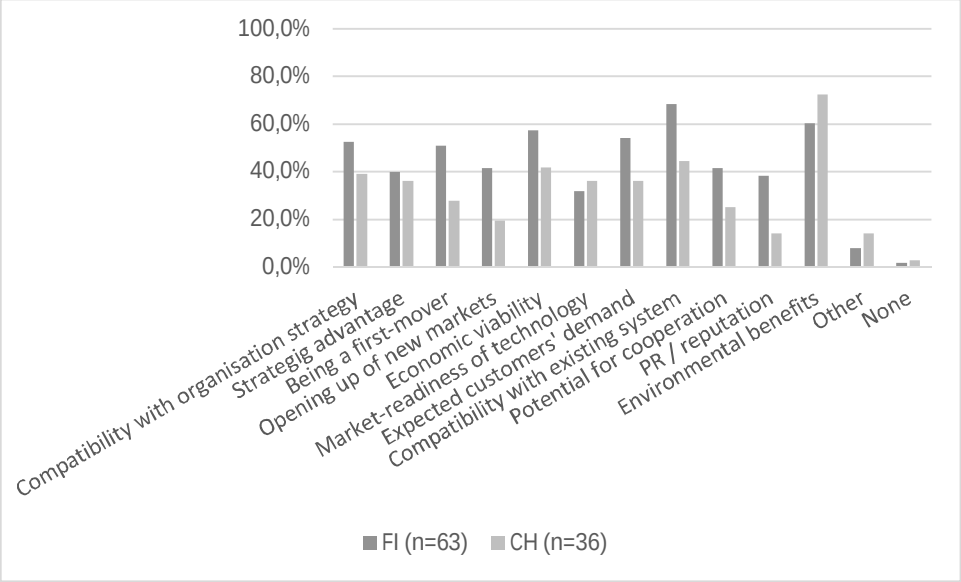

Figure 7: The share of stakeholders who consider this factor as a motivation to participate in MaaS development.

This result supports the earlier argument that Swiss stakeholders are more conservative than the Finnish stakeholders are and/or that MaaS is not seen as a separate offering from the well-developed public transportation in Switzerland. Overall, essential motivations for stakeholders are compatibility with their strategies and with the existing mobility offers. Economic considerations appear to be significant, especially the possibility to gain new customers and to be a first mover – however, only when the commercial viability is a given. This result is somewhat unusual, as the aspect of economic feasibility was not afforded much consideration in the previous section of the survey. Therefore, it can be concluded that stakeholder viewpoints are contradictory and some aspects become relevant only when own interests are on the line.

Another goal of the stakeholder survey was to determine the active roles that the stakeholders could imagine for themselves in MaaS implementation. In the country comparison, the same is valid as for the motivating factors: the share of stakeholders who can imagine a role for themselves in the implementation of a MaaS offering is considerably higher for the Finnish sample. Furthermore, the percentage of "None" is double the size in Switzerland than in Finland (Figure 8). Even in Switzerland, more than 80% of all stakeholders could imagine an active role. This result reveals the potential regarding the resources that stakeholders are theoretically willing to provide for the implementation of MaaS – under certain conditions. The only active role that more Swiss stakeholders could imagine for themselves compared to Finnish counterparts is lobbying. This supports the argument that Swiss stakeholders are more conservative, only prepare for disruptive innovations, and they do not support radical innovations through becoming genuinely active themselves. However, the share of those who can imagine themselves as service providers within a MaaS ecosystem is equal between Switzerland and Finland. Further analysis of stakeholder categories revealed that especially public transport companies could imagine that role in both countries.

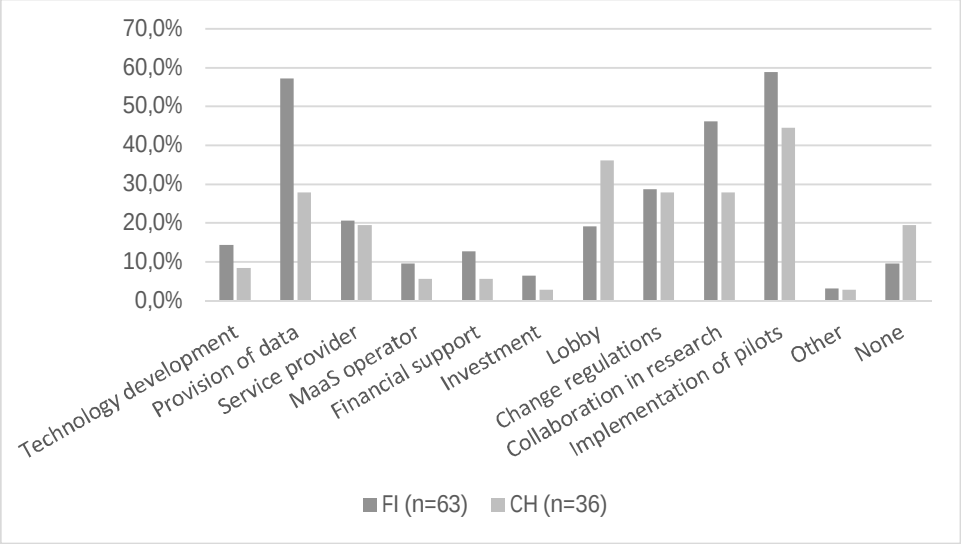

Figure 8: Share of stakeholders who can consider this role for themselves in MaaS development.

6. IMPLICATIONS FOR MANAGERIAL PRACTICE

The results of the survey reveal that one of the pre-conditions for a successful MaaS implementation seems to be fulfilled already: the general acceptance of this systemic innovation is highly favorable among decision makers and market actors. In addition, the stakeholders in the sample assume that MaaS will play an essential role in future mobility systems. However, considerable differences in the stakeholder processes stem from the cultural and legislative contexts of the regions and the historical development of the collaboration networks in these two countries.

From the perspective of new transportation services, the Swiss approach to organizing public transportation is a double-edged sword. It is relatively easy to conduct different short-term demonstrations as most of the 26 cantons have resources and the willingness to try various new services. However, any countrywide solution requires many resources, especially for small startups, when they need to analyze all the different rules and negotiate contracts with each of the cantons. In addition, changes in legislation in one single canton can endanger the countrywide service promise. However, the single most significant challenge for new transportation service providers to establish themselves in Switzerland is the subsidized and already existing high-quality public transport. This is also shown in the questionnaire results, as Swiss stakeholders have less motivating factors for supporting new mobility solutions, such as MaaS, than Finnish stakeholders. Cooperation with different stakeholders is challenging, as the federal and local natural monopolies are able to restrict the use of their resources (e.g., infrastructure, timetables, booking systems, IT). As a result, a pragmatic method to establish a new transport service in Switzerland is to a) sell the concept to some of the large cities (for city-related services) or b) to cooperate with either Swiss Federal Railways or PostBus, and hope that these companies incorporate the service as a part of their countrywide service portfolio.

On the other hand, Finland has chosen to deregulate the industry and utilize the emerging new businesses and business models fully to make transport provision more efficient with increased flexibility and competition. Finnish ministries and regional authorities are making valiant efforts to provide equal opportunities for all the actors and to ensure compatibility of the mobility offers. This motivation and

enthusiasm among stakeholders can be seen from the questionnaire results as well – even though the economic viability is not always clear. This fast-paced development in Finland has resulted in a somewhat fragmented situation with many of the companies doing overlapping work when trying to serve the mobility needs of the few genuinely urban areas in Finland. With so many different public authorities tendering or organizing local public transportation, the result has been that transport operators and companies in Finland have incompatible IT systems. Finnish Transport Agency has opened all the data it produces (FTA, 2018), and the new transport code includes measures for supporting the use of open data and IT system interoperability. These steps include making the IT system interoperability through application programming interfaces an important selection criterion in public procurements. However, before all these legislative changes are in effect, organizing public transportation especially in rural areas remains to be a challenge with continuously diminishing population and passenger numbers, and with challenges in combining the legally mandatory transport services into one sustainable offering.

7. CONTRIBUTION TO SCHOLARLY KNOWLEDGE

The regional exogenous influences, endogenous political processes, path dependence, the pace of change, and the bounded rationality of the actors are observable in the study. For example, influential stakeholders tend to be conservative when their interests are challenged or when their interests in the transition are not yet clear. This is the case with automotive associations in Switzerland or the national railway company in Finland facing deregulation and the opening of both freight and person transportation on the railway to competition. In contrast, the Federal Railway Company in Switzerland embraces the change as a part of countrywide service provision, and in other parts of Europe, automotive companies and associations drive the transition to new mobility services. In the survey, when comparing the results from the two case study areas, stakeholders considered “economic viability” to be less supportive compared to e.g. “state of technology development” for implementation processes. When asked, however, which factors would motivate them to contribute to a MaaS implementation, the respondents stated that economic viability is a quite important factor for their commitment. This demonstrates that stakeholder attitudes are contradictory and this needs to be considered when designing the research methodology and analyzing the results.

From the methodological point of view, it was decided to cover the exogenous influences (such as legislation in each country) and the path dependence in development activities with sociotechnical analysis. This analysis is based on topic expert workshops in Switzerland and topic expert interviews in Finland (Haahtela et al., 2018). This approach facilitated focusing the survey on endogenous (political) processes and stakeholder viewpoints on the pace of change and the relevance of that change. Although this methodological triangulation was not used to strengthen the analysis of specific sub-topic, it was possible to mitigate the weaknesses of a single method in this study by focusing the methods on surveying the sub-topics that these methods were most suited to. Furthermore, by combining the results of these two analyses, it was possible to gain insights into the bounded rationality of the stakeholders discussed in this paper.

This paper supports the current understanding of the institutional change as conceptualized by Kingston and Caballero (2009). On the other hand, the premise of this paper derives from the more extensive research tradition of innovation diffusion, and it especially builds on the ideas of Stone (1999) regarding

the possibilities and obstacles in transferring policies related to these innovations. A significant contribution of this paper is that it defines the challenges that regional innovation systems (Cooke et al., 1997) face in their systemic innovation processes when addressing systemic innovations – regardless of the nature of the innovation system. Both regional innovation networks in the study have adequate financial resources to support different mobility solutions in their region and are open to different transportation actors, but they are considerably different with regard to productive culture. The difference in cultural aspects opens up further research possibilities on the role of these aspects on innovation diffusion once the results of these two different approaches in GCF and TEB are more evident.

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