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Good Practices for Advancing Urban Mobility Innovation: A Case Study of One-Way Carsharing

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Good Practices for Local Governments and Private Companies Driving Change Together in Urban Mobility

Lessons Learned from One-Way Carsharing

Abstract

Transforming urban mobility requires integrating public with private services into a single transportation system. Local governments and private companies face the challenge of how to coordinate themselves. An emblematic example is one-way carsharing (shared use of a fleet of vehicles that are typically free-floating throughout an urban area).

Surprisingly, good practices for public and private players driving this change remain relatively undocumented. This paper proposes a systematic and balanced public-private approach to foster transportation innovation management. We review both public policy and business management literature and build a framework to help local governments and companies innovate together (organizational structures, project management processes, and profitability assessment tools).

We use this framework to examine both public and private experiences through a case study analysis with five one-way carsharing services in Europe (Paris, Munich) and the United-States (San Francisco, Portland, Seattle). For each we conducted expert interviews with the local government and the private operator. This paper provides recommendations for both sectors. First, public and private players should have specific organizations, separated from the core business. Second, they should co-manage innovation since pilot projects lack certainty and require risk management. Third, a new approach that emphasizes value in the role of pilot project learning and capability building.

Key words: public-private partnerships; innovation management; urban mobility; one-way carsharing

Introduction

For decades, experts have emphasized the need for a more sustainable urban transportation system. However, figures have pointed in a contrary direction. In 2011, the International Transport Forum forecasted that the number of cars worldwide would triple from 850 million to 2.5 billion by 2050 (OECD/ITF, 2011). As a result, electric mobility, shared, connected, and automated innovations have been emerging for decades. Carsharing is a good example. It draws on modern technology to enable access to auto-based mobility without the consumer owning the physical asset (a car) (ACEA, 2014). Consumers can rent cars on a short-term, as-needed basis, paying only for the time they use the car and the mileage they drive. Despite optimistic forecasts, carsharing remains a niche market at the global scale. The University of California, Berkeley's Transportation Sustainability Research Center found in fall 2014 that the global market for carsharing was 4.8 million members and 104,125 vehicles (Shaheen and Cohen, 2015)[1].

Technological advancements are accelerating the transition toward sustainable mobility. For example, the automated vehicle is becoming a reality. As of mid-June 2015, 77 vehicles from eight manufacturers have been issued autonomous testing permits by the California Department of Motor Vehicles (Harris, 2015). Governments and companies have started operating pilot projects integrating automated driving within public space. EasyMile is partnering with the Contra Costa Transportation Authority on a pilot project in San Ramon, California. A fleet of self-driving buses will shuttle workers around a sprawling East Bay office park starting in 2016. CityMobil2 implemented its first automated road transportation system demonstration in Torregrande in Italy from July to September 2014. These projects are characterized by a strong cooperation between public and private players. In Torregrande, MLab coordinated the activities for the demonstration; the Comune di Oristano provided the infrastructure adjustments and customer services, while the local transport operator, Trasporti Regionali della Sardegna, installed the stops and shelters and provided the on-board supervisors needed to comply with the requirements of the Italian Ministry of Transport.

Game-changing innovations in passenger transport require effective public-private collaboration (Osei – Kyei and Chan, 2015, Dowling and Kent, 2015). On one side, many cities aim to foster car-free areas as a step toward their smart city strategy. But getting rid of cars requires them to provide citizens with access to reliable and dense transportation networks. On the other side, private companies (e.g., OEMs, service providers, startups) aim to bring innovative transportation products and services to market. But, most of the

[1] Worldwide member-vehicle numbers are collected through expert estimates and industry benchmarking through national and regional carsharing associations. In select circumstances, the authors augment data provided by national associations with data from large, nonmember operators to obtain a more accurate estimate. In North America and in smaller markets with a limited number of operators, the authors collect member/vehicle data from each organization.

time, they fail to reach mainstream customers. How can public and private players successfully manage change together in urban mobility? Driving change requires new organizations, processes, and tools. This paper explores good practices for both local governments and companies.

The public policy literature explains that governments can protect innovations through public procurement rules, tax incentives, or subsidies (Kemp et al., 1998; Smith and Raven, 2012). Local governments can shape carsharing services through parking regulation (e.g., allocation of parking spaces for carsharing vehicles) (Dowling and Kent, 2015). The success of carsharing services results from partnership arrangements between private carsharing companies and the local government. Studies on public-private partnerships have highlighted critical success factors for their implementation and operations (Osei – Kyei and Chan, 2015). One key success factor is a stable and enduring public-private relationship (over 10 years). The public policy literature has also explained that a multi-modal transportation system integrating public transport with innovate private modes has the potential to reduce car ownership and increase the use of public transit (Shared-Use Mobility Center, 2016). However, the public policy literature leaves relatively unanswered how concretely local governments adapt themselves and build long-term relationship with private players.

The business management literature has focused on management practices (organizational structures, project management processes, and profitability assessment tools) to help private companies scale up their innovations. The so-called "ambidexterity" literature (theory focused on growing current businesses, while launching breakthrough innovations) suggests incumbents should detach innovation structurally from the core business (Christensen, 1997; Danneels, 2004; Benner and Tushman, 2003). Innovation projects are important drivers in building new competencies, capabilities, and assets (Maniak et al., 2013; Teece, Pisano and Shuen, 1997). Key performance indicators have therefore shifted from cost control to a deeper understanding of the strategic value generated (Brady and Davies, 2004; Shenhar and Dvir, 2007). However, not much has been written about how companies collaborate with public players to roll out transportation innovations in public space.

In this paper, we focus on one-way carsharing. One-way carsharing does not require its users to return the vehicle to the same location from which it was accessed, and it allows for self-service vehicle access on a 24-hour basis for short trips. As a result, one-way carsharing companies and local governments have to collaborate on access to public space and parking. Transportation studies have made a significant contribution on optimizing service operations and quantifying their environmental impacts so far (Shaheen et al., 2015). However, recommendations on how local governments and private players organize themselves and collaborate to launch a one-way carsharing service are needed. To explore this empirically, we rely on both

public and private experiences of five one-way carsharing cities in Europe (Paris, Munich) and the United-States (San Francisco, Portland, Seattle). For each service, we analyzed secondary data and conducted expert interviews with the local government and the private operator. Our objective is to understand how local governments organize themselves and collaborate with private players to advance change in urban mobility. Before discussing the case studies, results, and their implications, we first present our synthesis of the public policy and the business management literature. Next, we describe our methods and data collection.

Literature Review

The transportation literature has explained how to optimize service operations and quantify environmental impacts. To help us address the issue of how public and private players can foster urban mobility together, we review both public policy and business management literature and identify key success factors. The public policy literature has focused on the definition of public policies, management of public-private partnerships, and the integration of public and private transportation modes. The business management literature suggests management practices to help companies bring innovations to market. We integrate both areas of the literature into a single framework that consists of three dimensions: organizational structure, project management processes, and profitability assessment tools.

Transportation literature

One-way carsharing is a rapidly-emerging model with unique operational challenges. Research in the field has contributed to optimizing service operations and quantifying environmental impacts.

At present, there are several carsharing models (Shaheen et al., 2015): 1) roundtrip carsharing (vehicles are accessed and returned to the same location), 2) peer-to-peer carsharing (shared use of privately owned vehicles operated by a third-party organization), and 3) one-way carsharing. There are two one-way carsharing approaches: free-floating and station-based. Free-floating allows vehicles to be picked up and left anywhere within a designated operating area, while station-based requires users to return vehicles to an available station. Today, there are an estimated 17 operators with one-way carsharing services launched in 10 countries (Shaheen et al., 2015).

The flexibility offered by one-way carsharing makes its management particularly complex. Studies have suggested simulation models as key success factor for optimizing service operations. These models aim to assist decision makers and minimize costs while maintaining member satisfaction. One-way carsharing

presents unique challenges, such as vehicle rebalancing and parking management. The natural imbalance of vehicle stocks is caused by the uneven pattern of trips during the course of the day. In classic transport systems, the directional capacity is offered to clients irrespective of the existing demand. In one-way carsharing, demand can completely change the system's supply in ways that are hard to predict (Jorge and Correia, 2013). The need to guarantee a level of vehicle availability coupled with an imbalance between stations could lead to an oversized fleet and underused vehicles (Firnkorn, 2012). According to Nakayama et al. (2002), one-way systems need around twice as many reserved parking spaces as vehicles to function optimally. Models have been developed to determine the: 1) optimum fleet size, station location, size, and number (Cepolina and Farina, 2012; Correia and Antunes, 2012); 2) best strategy when demand changes (Fassi et al., 2012); 3) most efficient vehicle relocation systems (Jorge, Correia and Barnhart, 2014); and 4) trip pricing strategy (Jorge, Molnar and de Almeida Correia, 2015).

Studies have quantified environmental impacts of sustainable transportation. One North American study of 9,500 people who participated in roundtrip carsharing programs in the US and Canada documented numerous impacts (Shaheen and Chan, 2015). In aggregate, 25% of members sold a vehicle due to carsharing, and another 25% postponed purchasing a vehicle, leading to one carsharing vehicle replacing nine to 13 vehicles among carsharing members (on average) due to personal vehicles sold or postponed vehicle purchases. This reduction in vehicles also resulted in notable reductions in vehicle miles traveled (27% to 43%) and in greenhouse gas (GHG) emissions (a 34% to 41% decline in GHG emissions or an average reduction of 0.58 to 0.84 metric tons/household) on average across the programs studied in North America (aggregate-level findings). More research is needed on the specific carsharing models and disaggregated results (e.g., by region, city).

Public policy literature

The public policy literature has highlighted major elements in understanding how public and private players manage change to advance urban mobility. The public policy literature explains how federal and local public policies can promote a more sustainable future. Studies have analyzed technological transitions to understand the role of governments in driving behavioral change (Geels, 2002). Governments can protect innovations in their early stages through public procurement rules, tax incentives, or subsidies (Kemp et al., 1998; Smith and Raven, 2012). Tax incentives can also influence customer buying behavior (Smith and Raven, 2012). They can especially motivate customers to adopt innovations that are beneficial for societal well-being (van Bree et al., 2010). Kemp et al. (1998) insist that it is important to share technological progress and developments in the

institutional framework to ensure the economic success of innovative technologies. Policies should not just aim to change the structure of incentives and constraints but also focus on learning and coordination to bring together different parties (companies, universities, and research institutes). Not surprisingly, they also note the role of unclear governmental policy and inflexible regulatory frameworks as barriers to innovation. Dowling and Kent (2015) insist on the key role played by local governments to drive behavioral change. In Sydney, the local government directly promoted carsharing to residents by providing brochures explaining its benefits. Furthermore, local governments have shaped carsharing services through parking regulation. They helped carsharing companies develop their services in Sydney by implementing practice-based interventions (e.g. allocation of parking spaces for carsharing vehicles). The success of carsharing services is often contingent on partnership arrangements between private carsharing companies and the local government. Effective public-private partnerships are needed in advancing shared mobility.

Studies have highlighted critical success factors for implementing and managing public-private partnerships (Osei – Kyei and Chan, 2015). Through these schemes, the private sector's skill and management expertise is leveraged to deliver public infrastructure projects. A top success factor is appropriate risk allocation and sharing. Risk allocation involves identifying risks and appropriately sharing them among parties (public and private sectors). During negotiations, risks are clearly defined and allocated to the party that has the best mitigation techniques. A suitable mechanism must be developed to allocate the risks effectively. Governments have to refrain from the idea of transferring all project risks to the private sector as this could affect the progress or future participation of private investors in public-private projects. Successful risk allocation and sharing requires a stable and enduring public-private relationship (over 10 years) (Middleton, 1999).

Studies have examined the relationship of public transport to innovative private modes (e.g. bikesharing, carsharing, ridesourcing). They explain that an integrated multi-modal transportation system has the potential to reduce car ownership and increase the use of public transit (Shared-Use Mobility Center, 2016). Huwer (2004) shows the benefits of integrating carsharing services with public transport systems and highlights key components of public-private cooperation (e.g. seamless transfers, integrated fare payment methods, and improved information). However, given recent development, it is not always clear whether or not innovative private modes complement or compete with public transit (Rayle et al., 2016).

Business management literature

The business management literature has provided private companies with best practices to set up the right organization, streamline their processes, and define effective tools to develop and assess innovations. Organization-focused business studies have intensively described how companies can design organizations to develop innovations and bring them to market. Guidelines have crystalized around the "ambidexterity" school of thought (Christensen, 1997; Danneels, 2004; Benner and Tushman, 2003). These studies aim to set up a structure that will allow a company to both grow its current businesses (exploitation) and launch breakthrough innovations (exploration). The studies suggest that established companies should detach innovation structurally from the core business and set up a separated business unit. This allows companies to allocate resources without the common profitability requirements and thus cross-subsidize technologies that have not yet become profitable by themselves (Danneels, 2004). Empirical studies have confirmed this theory. They underline the need to articulate these exploration units with the core business units. O'Reilly and Tushman (2004) insist on the need for top-management support. Maniak et al. (2013) investigate more integrated processes. Over the past 15 years in the automotive industry, they explain that the Advanced Engineering departments have played a key role in transferring innovations to the core business units.

Process-oriented business studies have focused on how various players and business units can coordinate themselves on a given timeframe to optimize their costs and lead times, as well as improve their products and service quality. The pioneering literature has suggested implementing a project management strategy involving a result-oriented management philosophy (Midler, 1995; Clark and Fujimoto, 1991). Given the increasing innovation-based competition, project management attention has shifted from research and development projects to exploration projects (Maniak et al., 2013). Research projects aim to create new knowledge that will be used afterwards. Development projects on using existing knowledge to create new products. Exploration projects target these two objectives in parallel and are continuously creating new assets and embedding them in products in a way that is hardly predictable (Lenfle, 2008). These innovation projects are important drivers in creating new business opportunities. A firm can build on its first innovation project to launch others, eventually creating a new successful concept and/or segment that can completely transform the firm's identity (Maniak and Midler, 2014). Innovation is increasingly generated in collaboration with external firms that may provide a valuable contribution to new product development. They provide access to external knowledge that complements the firm's internal knowledge base (Petersen, Handfield and Ragatz, 2005).

Profitability-oriented business studies have designed tools to assess the profitability of innovation projects. Innovation projects allow companies to develop more innovative products and create new competencies, capabilities, and assets (Maniak et al., 2013). The rational approach to profitability management has imported tools from the finance industry to optimize the value creation process: return on investment (ROI), internal rate of return (IRR), and net present value (NPV). These rational profitability assessment tools are likely to kill innovations (Christensen et al., 2008). A rational finance-based approach causes managers to factor short-term profitability over the creation of capabilities and learning capacity. Key performance indicators (KPIs) for innovation projects have therefore shifted from cost control to a deeper understanding of the strategic value generated (Brady and Davies, 2004; Shenhar and Dvir, 2007). An innovation project can fail to reach its initial objectives but, nevertheless, produce an important concept and/or capability, which will prove to be very useful for future projects and/or the firm (Keil et al., 2009). Studies have adopted a capability building approach to value management (Lenfle, 2008; Loch et al., 2006) that emphasizes the crucial role of inter-project learning, capability building, and business opportunities.

Bridging the gap between the public policy and the business management literatures

Many local governments and private companies aim to drive change together in urban mobility. McGuirk and Dowling (2009) suggest that public and private spaces are not pre-constituted categories: classification is produced and re-produced through practice. Public organizations can and do carry out activities in the private interest and vice versa. Dowling and Kent (2015) state that carsharing requires complex negotiations between public and private actors. In the following section, we bridge the gap between the business management literature and the public policy literature on three dimensions: organizations, project management processes, and profitability assessment tools.

Implementing the right organization is a key success factor to develop innovations and bring them to market. The public policy literature explains how public policies can drive behavioral change (e.g. tax incentives, subsidies, institutional framework, etc.). Studies also explain local governments can implement practice-based mechanisms to shape sustainable innovations (e.g., allocation of parking spots for carsharing vehicles). However, only a few studies have explained how local governments adapt their organizations to meet these challenges. Organization-focused business studies, especially the “ambidexterity” theory, can help local governments adapt their organizations.

The success of carsharing services therefore results from partnership arrangements between private carsharing companies and the local government. The public policy literature has highlighted key success factors for public-private partnerships. Studies underline that a stable and enduring long-term public-private relationship is required for successful operations. However, they do not explain how long-term relationships are built, how they evolve over time, and why they enable public and private players to drive change together. Process-oriented business studies explain that project management attention has shifted from research and development projects to exploration projects. These studies can help to advance understanding on why long-term public-private relationships are needed to drive change. A competition-based environment requires time for public and private players to manage uncertainty, co-develop innovations, and launch them together.

The ability of public players to integrate innovate private modes into a transportation portfolio seems a key success factor to drive change in urban mobility. The public policy literature has explained that an integrated multi-modal transportation system has the potential to reduce car ownership and increase the use of public transit. Given their recent development, it is not always clear whether or not innovative modes complement or compete with public transit (Rayle et al., 2016). However, studies do not address the question of the strategic value generated. According to profitability-oriented business studies, an innovation project can fail to reach its initial objectives but, nevertheless, produce an important concept and/or capability, which will prove to be very useful for future projects and/or the firm. These studies can help governments manage transition toward more sustainable urban mobility by suggesting new tools to assess value.

Reviewing the public policy and the business management literature has allowed us to refine our research question and build a framework for data collection and analysis. We started with a broad research question of how local governments organize themselves and interact with private players to drive change in urban mobility. We also want to investigate how public and private players organize themselves to launch innovations; how they co-develop innovations together; and how they assess the marketing, economic, environmental, and social value of their innovations. We have also defined a relevant strategic timeframe of 10 years from pilot project definition to service roll-out. Some studies have already bridged the public and private worlds (Geels, 2004; Markard and Truffer, 2008; Hekkert et al., 2007). However, they have not investigated organizational structures deeply, project management processes, and profitability assessment tools for both local governments and companies. Further, both public policy and business management studies have mostly adopted a static approach and have not explored in parallel the process of building long-term strategies and synergistic collaborations among players. In order to fill this gap, we propose a systematic

and balanced approach to developing supportive public-private partnerships to foster transportation innovation management.

Methodology

In this section, we provide a brief methodological discussion including our case study choice, data collection, and analysis. We also examine study limitations along with steps taken to improve our approach.

Case study choice

In our study, we focused on one-way carsharing for three reasons. First, carsharing remains today a niche market despite optimistic growth forecasts. In 2010, carsharing membership was expected to reach 4.4 million in North America by 2016 (Zhao, 2010). As of January 2015, 45 carsharing operators claimed 1.5 million members and shared 22,134 vehicles in the Americas (Shaheen and Cohen, 2015). Second, carsharing is recognized in the literature as an observable innovation in understanding public-private dynamics. Carsharing provides a unique opportunity to study the intertwining of public and private interests in transport policy (Dowling and Kent, 2015; Huwer, 2004). Third, transportation studies have primarily focused on improving service operations and quantifying environmental impacts (Shaheen et al., 2015). Insights into organizational structures, project management, and profitability assessment for local governments and companies on one-way carsharing services are lacking.

Data collection and analysis

Through a case study analysis, we examine public and private experiences with five one-way carsharing services in Europe (France, Germany) and the United-States (San Francisco, Portland, Seattle). We chose a qualitative longitudinal approach (Eisenhardt, 1989) to develop an understanding of how and why systems evolve over time (van de Ven, 1992). Data collection consisted of nine interviews with the private carsharing operators of one-way carsharing services. We also interviewed local government staff in San Francisco, Munich, and Paris. A semi-structured interview guide was used in our conversations with representatives of both the public and private sectors. Most of the interviews were conducted over the phone. All interviewees were asked to review the final case write-up for correctness. Primary data were complemented through documentation provided to us by the interviewees and publicly available material, including press reports and press releases.

We employed a multi-city case study approach in examining five cities with one-way carsharing in North America to gather evidence about three dimensions (organization, processes, and tools) that local governments and companies used to launch the service. We supplemented this analysis with data provided by our interviews. This dual approach (Yin, 2009) penetrated beyond each organization's formal wording to study the actual processes involved (van de Ven, 1992). This represents a triangulation method that consists of studying an emerging phenomenon using two intertwined approaches that, in combination, mutually reinforce the validity of each inductive method (Yin, 1993). We created categories and identified recurring themes through theoretical saturation that signals the point at which theorizing the events under investigation is considered to have come to a sufficiently comprehensive end. Our three research categories are: 1) organizational structures, 2) project management processes, and 3) profitability assessment tools.

Data collection and analysis

As mentioned above, we conducted a total of nine interviews with public and private sector representatives involved in one-way carsharing in Munich and Paris in Europe and San Francisco, Seattle, and Portland in the United States (see Table 1). The interviews were conducted between July and November 2015 for 1 to 1.5 hours. No incentives were provided for participation.

Table 1: List of interviewees

Title/Position	Sector	Topic of conversation	Location	Date	Duration
Urban Planning and Mobility Manager	Public	DriveNow	Munich	Oct 28, 2015	1.5 hours
Head of Corporate Development and Strategy	Private	DriveNow	Munich	Jul 21, 2015 Sep 29, 2015	1 hour 1 hour
Director of Strategic Planning	Public	DriveNow	San Francisco	July 13, 2015	1 hour
Business Development and Sales Manager	Private	DriveNow	San Francisco	Oct 16, 2015	1 hour
Business Development Manager	Private	car2go	Seattle & Portland	Nov 18, 2015	1 hour
Director of Strategic Development	Private	car2go	Seattle & Portland	Nov 18, 2015	1 hour
Head of Services and Innovation	Public	Autolib'	Paris	Nov 23, 2015	1 hour
Partner/CTO IT and Innovation	Private	Autolib'	Paris	Nov 24, 2015	1 hour

Case study companies

In Table 2 below, we provide a comparison of the three one-way carsharing companies we studied with respect to key characteristics including: operational model, launch date, parent company, operational approach, vehicle types, and global operations.

Table 2: Characteristics of private companies involved in the case studies

	DriveNow	Autolib'	Car2go
Carsharing model	•One-way carsharing: free-floating	•One way-carsharing: station-based	•One way-carsharing: free-floating
Launch date	•June 2011	•December 2011	•October 2008
Organization	•Carsharing joint-venture by BMW Group and Sixt AG	•Société Autolib' is a subsidiary of Bolloré Group	•Wholly-owned subsidiary of Daimler
Operations	•BMW Group contributes the vehicles and the automotive technology •Sixt AG provides the premium services, the rental expertise, the IT systems, and an extensive network of stations for customer registration	•Société Autolib' received a Public Service Delegation allowing a private company to receive public subsidies •The Bolloré Group provides electric cars, IT systems, on board electronics, station terminals, and charging poles	•Car2go operates the carsharing service •Daimler contributes the vehicles and the automobile technology
Vehicle types	•MINI (Clubman, 3-Door, 5-Door, Convertible) •BMW ActiveE •BMW i3 •BMW Active Tourer •BMW 1 Series •BMW X1	•Bluecars •Utilib' (light commercial vehicles)	•Smart fortwo (thermic and electric)
City	•9 cities: Europe (Munich, Berlin, Düsseldorf, Cologne, Hamburg, Vienna, London, Copenhagen, and Stockholm) •In San Francisco, the service was suspended in November 2015 • Launched in Seattle in April 2016, rebranded as ReachNow	•Autolib' is available in 86 member cities in greater Paris •The Bolloré Group is expanding in Lyon (Bluely, 2013), Bordeaux (Bluecub, 2014), Indianapolis (Blueindy, 2015), and soon London (Bluecity)	•30 cities: United-States (Arlington, Austin, Columbus, Denver, Twin Cities, New York City, Portland, San Diego, Seattle, Washington D.C.), Canada (Calgary, Montreal, Toronto, Vancouver), Europe (Amsterdam, Berlin, Düsseldorf, Florence-Prato, Frankfurt, Hamburg, Cologne, Madrid, Milan, Munich, Rhineland, Rome, Stockholm, Stuttgart, Turin, Vienna) •Car2go withdrew from London in May 2014

Introduction to the cities

In this section, we provide an overview of the case study cities for comparison. Table 3 provides population and density statistics and a list of shared mobility operators by business model.

Table 3: Characteristics of cities involved in the case studies

	Population[2]	Roundtrip carsharing	Peer-to-peer carsharing	One-Way carsharing	Ridesourcing	Bikesharing	Others
San Francisco	•City: 852,469 •Density: 17,179/sq mi	•Zipcar •City CarShare	•Getaround •Turo	/	•Lyft •Uber	•Bay Area Bike Share	•Scootsharing: Scoot Networks
Seattle	•City: 668,342 •Density: 7,251/sq mi	•Zipcar (merged with Flexcar in 2007)	•Turo	•Car2go •ReachNow	•Lyft •Uber	•Pronto	/
Portland	•City: 619,360 •Density: 4,375/sq mi	•Zipcar	•Getaround •Turo	•Car2go	•Lyft •Uber	•Biketown	/
Munich	•City: 1.4m •Density: 7,500/km² (2,896/sq mi)	•Flinkster •Stattauto •ZebraMobil (shut down)	•Drivy	•DriveNow •Car2go	•Uber	•Next Bike	/
Paris	•City: 2.3m •Density: 21,258/km² (8,208/sq mi)	•Zipcar	•Drivy •Koolikar •Ouicar •Deways	•Autolib'	•Uber •Snapcar •Allocab •Chauffeur privé	•Velib'	/

[2] Sources: US Census Bureau, Munich Metropolitan Region, INSEE

In the next section, we review the case studies for each company.

DriveNow Munich (Start of operations: June 2011)

DriveNow chose Munich to launch its first free-floating carsharing service for two main reasons. First, Munich was close to headquarters and had a high score on their scoring model that assesses European city carsharing attractiveness. Second, Munich and BMW had been collaborating together in the context of the Inzell-Initiative to solve traffic problems together since 1995 (Mailer et al., 2014). In 2007, Christian Ude, the former Lord Mayor of Munich, and BMW decided to create a platform to discuss the challenges and opportunities of the future of mobility. The forum "Future of mobility in the region of Munich" was born. All players involved in transportation issues (politics, industry, science, and the public sector) were invited to join.

When DriveNow launched its operations, two roundtrip carsharing companies were already operating in Munich: ZebraMobil and Flinkster, the carsharing system of Deutsche Bahn. However, both DriveNow and the city of Munich had very limited experience with free-floating carsharing in 2011. The city of Munich was eager to try innovative transportation services to enhance its innovative image and meet its political agenda even if environmental and social benefits were not clear. In 2011, the city of Munich had no specific regulation regarding free-floating carsharing and no business unit in charge on innovative transportation services.
DriveNow's objectives were to become profitable after 36 months and gain a customer base of around 60,000. At the beginning of the project, the DriveNow team was composed of two previous BMW and four previous Sixt employees. As a joint venture of BMW and Sixt, DriveNow works independently but leverages the resources and established processes of the mother companies. In early 2011, Marting Hauschild, Head of Traffic Technology and Traffic Management at the BMW Group, introduced the topic to the representatives of the city of Munich. Dr. Thomas Becker, Vice President of Governmental and External Affairs at the BMW Group supported the negotiations regarding parking permits and regulations. As free-floating carsharing was a new concept, alignments among Road Administration, Public Order, Security, Traffic Planning, and Transport Departments at the city of Munich were needed to launch the project. The city of Munich and DriveNow agreed on a pilot project of 300 vehicles maximum as a first step to get familiar with the concept of free-floating. The official launch took place on June 9, 2011 (DriveNow, 2013).

Munich provided the parking permit, but it did not allow parking in purely residential areas around the main train station and the old city area. Furthermore, the city allocated €80,000 for a research study to assess the

service impacts. DriveNow allowed the city of Munich to have access to the parking monitoring tool that the company developed. This was helpful to investigate the free-floating carsharing impacts, as the city could know where cars were parked and for how long. The first survey results were released in December 2015. According to the first pre-results and another study (WiMobil), free-floating carsharing reduces car ownership (DriveNow, 2016). DriveNow could reduce private cars with a ratio of one to three and reduce traffic (i.e., for every DriveNow vehicle a private car is either sold or suppressed). As a result, the city of Munich is evaluating better conditions for carsharing companies. DriveNow and the city of Munich are discussing how to remove the cap of 500 carsharing vehicles. The city is considering allowing parking in residential areas and freeing up to 1,500 new spaces for carsharing cars. The city is also thinking about lowering the price of the parking permit (€900 instead of €1,800 for free-floating cars, starting April 1, 2016).

The coalition between the Social Democrats and the Green Party has led the transition toward a sustainable transportation system in Munich from 1997 to 2014. A coalition between the social democrats and the conservatives was elected in 2014. As a result, departments of the city of Munich have been reorganized. A new team from the Urban Planning Department has taken over the carsharing project.

Summary: DriveNow leveraged its mother companies' resources and built on the Inzell-Initiative to launch its carsharing service in Munich. Six months were needed to start operations.

Autolib' Paris (Start of operations: December 2011)

The Autolib' Project was unveiled by Bertrand Delanoë in January 2008, two months before his re-election as Mayor of Paris. The deployment of an electric carsharing service had been added on his political agenda since the launch in 2007 of the bikesharing program, Velib'. Autolib' was a response to France's commitment to reducing carbon emissions by 20% by 2020. The project was supported by Deputy Mayor Anne Hidalgo in charge of Urbanism and Architecture (today Mayor of Paris) and Deputy Mayor Annick Lepetit in charge of Transportation. Autolib' benefited from regulations following previous pilot projects, such as the electric carsharing project, Liselec, in La Rochelle in 1999. Liselec was the first prototype of a one-way self-service carsharing system in France, leading to the design and implementation of key regulations integrating the service with public space. In June 2008, Paris offered 80 neighbor cities the opportunity to become partners of the Autolib' Project (Autolib', 2012). In July 2009, the Syndicat Mixte Autolib' (SMA, today called Autolib' Métropole), an inter-communal cooperation entity, was created with 19 cities to enable a collective approach to the Paris region (Autolib' Métropole, 2016). SMA was a direct result of lessons learned with Velib' (bikesharing), which was legally constrained to be operated in Paris and within a 1.5 km radius only around

the city. As part of the Velib', project managers integrated the SMA to ensure knowledge continuity and Annick Lepetit was appointed President. In December 2009, SMA and a total of 41 member cities launched a public procurement for Autolib'.

In the 2000s, the Bolloré Group developed a solid state Lithium Metal Polymer (LMP®) battery technology for mobile and stationary applications. The Bluecar was born in 2008, mostly as an LMP technological demonstrator available for private purchase. Despite its limited experience in mobility services, the Bolloré Group won the bid in December 2010 due to: 1) an in-house strategy; 2) accepted liabilities of up to 60 million euros in losses (L'Obs, 2011); 3) a planned investment of 50 million euros; 4) best expected profitability and satisfying pricing; and 5) a customer-driven approach based on ambassadors deployed on the field. In February 2011, Société Autolib', a subsidiary of Bolloré Group, was created and was allocated a Public Service Delegation by the SMA. The Bolloré Group primarily relied on two existing subsidiaries to push the Autolib' application: IER, its infrastructure electronics subsidiary, and Havas, its marketing subsidiary. Instead of relying on its own IT capabilities, the Bolloré Group chose in 2011 to trust Polyconseil, a small IT company that the group had acquired recently. Polyconseil led the development of Autolib's IT services and operational software, the core of Autolib'. Autolib' was launched on December 5, 2011, with 254 cars and 256 stations deployed in 41 member cities.

Synergies between Autolib' Métropole and the Bolloré Group, as well as "commando spirit" agility and the strong involvement of Vincent Bolloré, CEO of Bolloré Group, resulted in the rapid deployment of Autolib'. Société Autolib' and SMA leaders communicate through regular meetings of SMA's Monitoring committee. Société Autolib', the delegate, produced an Annual Report for the SMA including a financial report and a service quality report. Sustainability, image, and political goals are the member cities' main drivers. To Bolloré Group, Autolib' is above all the flagship and renown application of its LMP battery technology. Batteries from Bluecar that are near their end-of-life can then be reused by Bolloré Group's less demanding stationary battery solutions. Société Autolib' is expected to reach breakeven in 2015. It is also a client of IER, Polyconseil, Blue Solutions and other Bolloré Group subsidiaries. Profitability for the whole group is to be assessed in a broad sense, including intangible revenues and value creation. Beyond the one-shot Autolib' project, the city of Paris has ordered several 100% electric Bolloré Bluebuses to electrify public transportation.

Summary: Paris built on existing bikesharing and carsharing experiences to establish the legal conditions for the deployment of Autolib'. Two years were needed from procurement to official launch.

Car2go Portland (Start of operations: April 2012)

Initial discussions between car2go and the City or Portland started in spring 2011. Key reasons for choosing Portland were the city's progressive urban growth policies and experience in alternative transportation solutions and more specifically carsharing. In 1973, the state of Oregon adopted strong urban planning requirements, including the requirement of an urban growth boundary. Portland's urban containment policies have targeted densification and the transfer of travel demand from cars to public transit for nearly four decades. As a result, Portland has set up a regulatory framework to foster the development of alternative transportation modes, like carsharing. CarSharing Portland was created in 1998 as the outgrowth of a feasibility study co-sponsored by the Oregon Department of Environmental Quality (DEQ) and the Portland Office of Transportation (PDOT) suggesting carsharing would work in Portland. In 2000, Flexcar, a Seattle-based carsharing company, became the successor to CarSharing Portland. In June 2004, PDOT and Flexcar entered into a one-year carsharing pilot program, with the objective to provide public support and policy to support carsharing in Portland (Portland Office of Transportation, 2005). In 2006, the city designated Option Zones for on-street carsharing parking via orange poles on parking (Shaheen et al., 2010).

However one-way carsharing was a fairly new model in 2011. Car2go had launched three cities before: Austin, Vancouver BC, and San Diego. Car2go leveraged its three previous experiences and shared data with the city regarding one-way impacts, including how the members used the cars and the parking use. Portland considered the pilot project to be an opportunity to assess how one-way carsharing can help the city match its urban objectives. A minimum scale was needed to show all the benefits carsharing would bring. Car2go and the city of Portland agreed to launch a 200-car pilot project.

Official launch of the pilot project took place on April, 12012 (Portlandoregon.gov, 2012). Along with the roundtrip carsharing company, Zipcar, and peer-to-peer carsharing via Getaround, Car2Go's launch provided Portlanders with three distinct carsharing services. Car2go did not need to interact with the City Council and directly worked with the Departments. It took six months for car2go and the city of Portland to agree on a parking permit. Several city departments were involved in the process: PDOT, Revenue, Parking Enforcement, and the police. Three to four governmental agencies per department had to coordinate the draft of regulation regarding the permit. In addition, city attorneys had to provide their approval. Internal processes and coordination of schedules slowed down the approval. Car2go provided an internal report six months after the launch of the service. The company also shared data with the city to explain how people are using the service.

Summary: Car2go built on Portland's previous carsharing experience and benefited from existing regulations to convince the city into launching a 200-car pilot project. Nine months were needed to obtain the parking permit and start operations.

DriveNow San Francisco (Start of operations: June 2012)

After constructing a program in San Francisco almost entirely on its own over three years, DriveNow announced in October 2015 that the service would be suspended on November 2, 2015 (Bmwcarsharing.com, 2015). The service was initially launched in June 2012 with 70 ActiveE vehicles and eight dedicated stations in the city. San Francisco Mayor Ed Lee and BMW Group board member, Dr. Ian Robertson, provided details about DriveNow during a public announcement. DriveNow considered San Francisco to check all the boxes for carsharing: high density, scarce parking, high rates of public transit usage, and a tech-savvy population. Because DriveNow had 50 different chargers for its all-electric vehicle fleet, the company decided to launch a one-way carsharing service that would combine both free-floating and station-based models. When DriveNow contacted San Francisco in May 2012, the city was supporting roundtrip carsharing through a limited on-street pilot program with City CarShare and by offering garage spaces through SFpark (its dynamic parking system). In September 2012, DriveNow had 2,000 customers using its service. DriveNow focused on expanding its customer base by launching corporate partnerships and expanding the pilot project with the city of San Francisco. In September 2013, San Francisco launched a request for proposal (RFP) regarding a parking program that would reserve on-street parking spaces for carsharing vehicles. Locations would be allocated through an application process that included an engineering review, community outreach, and, ultimately, approval by the San Francisco Municipal Transportation Agency (SFMTA). From the beginning, SFMTA announced that these spaces could be used for roundtrip carsharing only, not one-way carsharing (San Francisco Municipal Transportation Agency, 2013). SFMTA did not have proof that flexible carsharing would provide positive social and environmental impacts. DriveNow did not have data on a scale that was large enough to convince the city. In April 2014, the SFMTA announced that as many as 900 street parking spaces would be reserved for roundtrip carsharing vehicles and leased at discounted rates beginning in summer 2014. The SFMTA selected two roundtrip carsharing companies (Zipcar and City CarShare) and one peer-to-peer carsharing company (Getaround) (San Francisco Municipal Transportation Agency, 2014). During this time, DriveNow realized that its fleet vehicles could access half of San Francisco's streets without a parking permit from the SFMTA. Interestingly, these streets were located in five San Francisco neighborhoods that appeared to be in the least densely-populated areas. DriveNow launched a pilot (employing off-street parking) in May 2014.

Originally a team of five employees from BMW of North America were chosen to launch the DriveNow service in San Francisco. The team grew to over 10 people in 2015 with a partnership with an external contractor that could recruit employees with fleet operations experience to roll out the service. DriveNow added 80 electric BMW ActiveE vehicles to the existing fleet, increasing the total number of ActiveE vehicles in the San Francisco Bay Area to 150. In addition to the streets of San Francisco, cars were available at 17 DriveNow locations around the San Francisco Bay Area, including Palo Alto, the San Francisco International Airport, and Oakland International Airport (BMW Group, 2014). DriveNow aimed to persuade the city of San Francisco to offer them a parking permit that would eventually allow users to park anywhere in the city. DriveNow surveyed its members in San Francisco to present results regarding trip destinations, user' profiles, and motivations to the SFMTA. DriveNow also shared data with the city regarding its operations in Munich and Berlin. Elected supervisors of districts, a Bay Area Rapid Transit (BART) District director, and the Office of Mayor Ed Lee offered their support to DriveNow by authoring letters of recommendation to the SFMTA Director. DriveNow, in partnership with a business development firm, lobbied to highlight benefits of its flexible one-way carsharing service from October 2014 to March 2015. BMW also launched a change.org campaign, which earned more than 1,000 signatures from interested citizens. In March 2015, DriveNow asked for some concrete next steps from the SFMTA. However, San Francisco announced that it could not support DriveNow in the pilot effort because it was preparing to reform the residential parking program.

Summary: DriveNow did not receive a pilot proposal from the city because its business model was not consistent with the parking and carsharing regulations in San Francisco. The company decided to launch operations in another city and cease their program in San Francisco.

Car2go Seattle (Start of operations: December 2012)

As soon as early 2011, car2go explored the launch of its carsharing service with the city of Seattle. Two carsharing companies were already operating: Zipcar (roundtrip carsharing) and Turo (formerly, RelayRides, peer-to-peer carsharing). However, car2go was the first free-floating service. In December 2012, the Seattle City Council unanimously adopted legislation to authorize a free-floating carsharing pilot program. Vehicles could park within a defined geographic area in the rights-of-way rather than in an assigned space. The pilot program began operations introducing a network of 330 vehicles (car2go, 2012). First, Seattle provided car2go with 330 parking permits to use curb space throughout the city. Each permit is priced at US$1,330, which includes US$1,030 toward the cost of parking in paid areas, US$200 toward the cost of parking in Restricted Parking Zones (RPZs), and a US$100 administrative fee. Second, the operator was required to report regularly on curb space use and to prepare a report to the Seattle Department of Transportation (SDOT) summarizing

findings from their annual membership survey. This report includes that data, as well as additional information from local community feedbacks.

It took one year and a half to reach an agreement because car2go had to negotiate with the City Council of Seattle to establish the right regulatory conditions for the pilot program. Car2go and SDOT needed to identify the pieces of code that had to be changed and to draft the new regulations, including residential requirements for acquiring Residential Parking Zone permits and exemptions from parking time limits. The Transportation Committee in the City Council had to give their approval and then submit the change to the full Council. Car2go benefited from the support of the Committee Chair who took the lead and introduced the bill to have the legislation changes implemented. Car2go engaged a governmental affairs firm to help with the City discussions. The consultants facilitated discussions and helped car2go become more familiar with the city's processes. The city of Seattle asked car2go to carry out community outreach programs with community groups and local business associations to explain how the one-way carsharing service would operate.

SDOT released a report on the pilot program in May 2014 (The Seattle Department of Transportation, 2014). According to this report, the number of daily free-floating carsharing rentals had increased to a daily average of approximately five rentals per vehicle each day throughout the first year of operations. The report underlined it was unclear how free-floating carsharing was affecting broader transportation choices throughout the city. In January 2015, the Seattle City Council approved new legislation[3] to allow up to four free-floating car sharing pilot programs, like car2go, in the city. The pilot phase is now over, and car2go has been operating a full service since spring 2015.

Summary: In order to operate its service, car2go had to understand how to work with the city's processes to change regulation. Car2go relied on strong support from a Council member and a governmental affairs firm. One year and a half was needed to reach an agreement to launch the pilot project.

[3] An ordinance relating to the Traffic Code of the Seattle Municipal Code, amending sections 11.23.150 and 11.23.160 to expand the free-floating carsharing pilot program to allow a greater number of free-floating carsharing operators and vehicles.

Summary of the case study cities

In Table 4 below, we provide a summary of the case study cities. The table contrasts each of the cities along our three key research analysis areas: 1) organizational structures, 2) project management processes, and 3) profitability assessment tools. We also provide details for each city on launch and program status at the end of 2015.

Table 4: Summary of the case studies

Case Study City	Organizational Structures	Project Management Processes	Profitability Assessment Tools
DriveNow Munich 6 months needed to start operations Launch status: • 300 vehicles max. • Date: Jun 2011 Nov 2015 status: • Munich is evaluating better conditions for carsharing.	• 2011: Munich had no business unit in charge of innovative transportation services. • 2011: DriveNow team was composed of two previous BMW and four previous Sixt employees. • 2011: DriveNow works independently but leverages the resources and established processes of the mother companies. • 2014: Departments of the city of Munich were reorganized. A new team from the Urban Planning Department took over the project.	• 2011: Dr. Thomas Becker, Vice President of Governmental and External Affairs at the BMW Group, supported the negotiations regarding parking permits and regulations. • 2011: Free-floating carsharing was a new concept. Alignments among Road Administration, Public Order, Security, Traffic Planning, and Transport Departments at the city of Munich were needed for project launch. • 2015: Munich reconsidering cap of fleet vehicles, parking spots modalities, and the price of the parking permit.	• 2011: Munich allocated €80,000 for a research study to assess one-way carsharing service impacts. • 2011: DriveNow allowed Munich to access the parking monitoring tool that the company developed. • 2015: According to the first pre-results and another study (WiMobil), free-floating carsharing reduces car ownership.
Autolib' Paris 2 years from procurement to official launch Launch status: • 254 Bluecars. • 256 stations • Date: Dec 2011 Nov 2015 status: breakeven (exp.).	• July 2009: the Syndicat Mixte Autolib' (SMA, today called Autolib' Métropole), an inter-communal cooperation entity, was created with 19 cities to enable a collective approach to the Paris region. Part of the Velib' project managers integrated the SMA. • February 2011: Société Autolib', a subsidiary of Bolloré Group, was created and was allocated a Public Service Delegation by the SMA. The Bolloré Group relies on three existing subsidiaries: IER, Havas, and Polyconseil.	• January 2008: Autolib' was unveiled by Bertrand Delanoë. Autolib' benefited from regulations following previous carsharing pilot projects and Velib'. • December 2009: SMA and a total of 41 member cities launched a public procurement for Autolib'. • December 2010: Bolloré won the bid. • Société Autolib' and SMA leaders communicate through regular meetings. Société Autolib' produces an Annual Report for the SMA.	• To Bolloré Group, Autolib' is the flagship and renown application of its LMP battery technology. • Société Autolib' is expected to reach breakeven in 2015. It is also a client of IER, Polyconseil, Blue Solutions, and other Bolloré Group subsidiaries. Profitability for the whole group will be assessed in a broad sense.
Car2go Portland 9 months needed to start operations Launch status: • 200 vehicles • Date: Apr 2012 Nov 2015 status: 530 cars	• Spring 2011: initial discussions between car2go and Portland. Key reasons for choosing Portland were the city's urban containment policies and experience in alternative transportation solutions and more specifically carsharing.	• 2012: Car2go did not need to interact with the City Council and directly worked with the Departments. Several city departments were involved in the process: PDOT, Revenue, Parking Enforcement, and the police. Three to four governmental agencies per department coordinated the draft of regulation regarding the permit. City attorneys gave their approval.	• 2011: Car2go leveraged its carsharing experiences and shared data with the city. • Early 2012: Portland considered the pilot project to be an opportunity to assess one-way carsharing impacts. • Fall 2012: Car2go provided an internal report six months after the launch of the service. Car2go shared data with the city to explain how people use the service.
DriveNow San Francisco Shut down of the service after 3 years of operations Launch status: • 70 vehicles • 8 stations • Date: Jun 2012 Nov 2015 status: service was shut down	• Originally a team of five employees from BMW of North America were chosen to launch the DriveNow service in San Francisco. The team grew to over 10 people in 2015 through a partnership with an external contractor that could recruit employees with fleet operations experience to roll out the service.	• May 2012: San Francisco was supporting roundtrip carsharing through a limited on-street pilot program and by offering garage spaces through SFpark. • April 2014: SFMTA announced that as many as 900 street parking spaces would be reserved for carsharing vehicles and leased at discounted rates beginning in summer 2014. Zipcar, City CarShare, and Getaround were selected. • May 2014: DriveNow launched a street-based pilot. • March 2015: San Francisco announced that it could not support DriveNow's on-street parking request because it was preparing to reform the residential parking program.	• SFMTA had no proof that flexible carsharing would also provide positive social and environmental impacts. • DriveNow surveyed its members in San Francisco to present results regarding trip destinations, user' profiles, and motivations to the SFMTA. • DriveNow shared data with the city regarding operations in Munich and Berlin. • DriveNow lobbied to highlight benefits of its flexible one-way carsharing service from October 2014 to March 2015. BMW also launched a change.org campaign, which earned more than 1,000 signatures from interested citizens.

Car2go Seattle 1 year and a half needed to start operations Launch status: • 330 vehicles • Date: Dec 2012 Nov 2015 status: car2go is operating a full service.	• 2011: Car2go had to negotiate with the City Council of Seattle to establish supportive regulatory conditions for the pilot program. • Car2go and the SDOT had to draft the new regulations. • Car2go benefited from the support of the Committee Chair. • Car2go engaged a governmental affairs firm to help with the city discussions. The consultants facilitated discussions and helped car2go become more familiar with the city's processes.	• Early 2011: car2go started discussions with Seattle. • December 2012: The Seattle City Council unanimously adopted legislation to authorize a free-floating carsharing pilot program. Vehicles could park within a defined geographic area in the rights-of-way rather than in an assigned space. • In January 2015, the Seattle City Council approved new legislation that allowed up to four free-floating carsharing pilot programs. Car2go has been operating a full service since spring 2015.	• Before launch: Seattle asked car2go to conduct community outreach programs with community groups and local business associations. • After launch: car2go was required to report regularly on curb space use and to prepare a report to SDOT summarizing findings from their annual membership survey. • May 2014: SDOT released a report on the pilot program. It underlined it was unclear how free-floating carsharing was affecting broader transportation choices.

Discussion

Transforming urban mobility requires integrating public with private services into a single transportation system. Local governments and private companies have to adapt their organization, processes, and tools and improve how they collaborate to drive this change. We focused on one-way carsharing services to address our interest in innovation management. The case studies allowed us to identify lessons learned and suggest a systematic and balanced approach to public-private partnerships to support transportation innovation: 1) organizational structures, 2) project management processes, and 3) profitability assessment tools.

Public-Private Organizational Structures to Deploy A One-Way Carsharing Service

The case studies demonstrate that carsharing projects have disrupted both public and private existing organizations. We also observed that they allowed public and private players to build up specific competencies.

The case studies demonstrate how the three private players (BMW, Bolloré Group, Daimler) established specific organizational structures from the beginning. Neither BMW, nor Bolloré Group, nor Daimler directly operated the carsharing service. DriveNow is a joint-venture between BMW and Sixt. Autolib' is a subsidiary of the Bolloré Group. Car2go is wholly-owned subsidiary of Daimler North America. These organizational structures benefited not only from a high degree of freedom, but also from BMW's, Sixt's, Bolloré Group's, and Daimler's top management support and resources. DriveNow, Autolib', and car2go mostly leveraged a network of political and lobbyist support to launch their services. This approach is in line with the ambidexterity model (O'Reilly and Tushman, 2004). DriveNow, Autolib', and car2go are business units with specific processes, structures, and cultures. At the same time, they maintain tight links with their mother companies at the senior executive level. The case studies reveal how they evolved their teams by hiring people with complementary skills from outside their mother companies.

The case studies also show that public players needed to adapt their organizations to meet the challenges of one-way carsharing. The studies primarily revealed how each carsharing project involved many players who were not used to collaborating before. In Seattle, the Transportation Committee in the City Council had to give their approval regarding regulations and then submit the change to the full Council. In Munich, alignments among Road Administration, Public Order, Security, Traffic Planning, and Transport Departments were needed to launch the project. In the Paris region, 19 cities started collaborating under the framework of the Syndicat Mixte Autolib', which was created on July 9, 2009. Obtaining approvals slowed down the launch of each carsharing service. In Seattle, one year and a half was needed to reach an agreement to launch the pilot project. In Munich, six months were needed to start operations. In Paris, two years were required from the call for procurement up to the official launch. Public players also had to develop new competencies to operate their carsharing services. Not surprisingly, the city of Paris capitalized on the Velib' bikesharing experience to launch the carsharing service. For example, the Vélib associate project manager at the city of Paris joined Autolib' Métropole.

The Autolib' case study illustrates that one-way carsharing can eventually lead to the creation of new organizational structures. Autolib' Métropole is a public meta-organization representing all city members. Committee members, representing each city, gather every two months to discuss budget, expansion strategies, and agreement approvals. Autolib' Métropole gave Société Autolib' the status of Public Service Delegation. As a result, Autolib' Métropole manages allocation of cash flows between the member cities and Autolib'. Autolib' Métropole can be described as a public-private interface.

The case studies suggest that carsharing projects disrupted both public and private existing organizational structures. Accordingly, private players established new organizations. City departments and City Councils had to collaborate and reach approvals, which slowed the decision-making process. Under Autolib', a new hybrid organization, Autolib' Métropole, was created to bridge the public and private sectors. This result resembles many of the new types of public-private partnerships that have emerged to launch public bikesharing services, leading to hybrid public-private business models (Shaheen et al., 2012).

Public-Private Project Management Processes to Roll-Out A One-Way Carsharing Service

The case studies demonstrate that private and public players have built on each city's carsharing experience to drive change. Private players have continually improved their service operations to enter new markets. Public players have progressively adapted their regulations to better match each city's carsharing requirements.

DriveNow started in Munich in 2011 with 200 cars. Key objectives included getting to a proof of concept of a free-floating carsharing model and to eventually expand into new cities. DriveNow started in Munich because of its high ranking on their scoring model and also because Munich is close to BMW's headquarters. Their existing collaboration with the city also played a key role. Next, DriveNow opened Berlin (September 2011), Düsseldorf (January 2012), Cologne (September 2012), and San Francisco (June 2012). DriveNow considered San Francisco to be a great city for carsharing. However, DriveNow announced in October 2015 that the company would close the service in San Francisco starting on November 2, 2015. This experience helped DriveNow understand how to collaborate better with US cities operating a carsharing service. DriveNow (rebranded as ReachNow in North America) has now identified other partner cities in North America. Four years after launching its first service in Munich, ReachNow has started to enter new North American cities in 2016. This result builds upon the idea that an innovation project can fail to reach its initial objectives, but nevertheless, it can produce an important capability, which will prove very useful for future projects and/or the firm (Keil et al., 2009).

On the public side, the case studies demonstrate that each innovative mobility service has helped cities build a broader strategy on sustainable transportation. Smart cities have increasingly become a hot topic. However, turning them into reality is challenging as cities need to find the private players to create the right regulatory environment. In Seattle, car2go was required to report regularly on curb space use and to prepare a report to the Seattle Department of Transportation (SDOT) summarizing findings from their annual membership survey. In January 2015, the Seattle City Council approved new legislation that will allow up to four free-floating carsharing pilot programs, like car2go, in the city. In July 2009, the Syndicat Mixte Autolib' (SMA) was created with 19 cities. SMA was a direct result of lessons learned with Velib'. SMA fulfilled the need of a collective territory approach by enabling the expansion of the Autolib' service perimeter to urban poles across the entire Paris region. The city of Munich viewed the partnership with DriveNow as an opportunity to assess the benefits of a free-floating carsharing service. In 2015, the initial study results appeared to be positive. As a result, the cap on the number of cars in the fleet was suspended. The city is also considering adapting its parking regulation for carsharing (e.g., freeing up to 1,500 new spaces for carsharing vehicles and lowering the parking permit price). This is aligned with the public policy literature that emphasizes the need to recognize changes in institutional framework to ensure economic success of the new technologies (Kemp et al., 1998).

The case studies also suggest that a fruitful pilot project can lead to other sustainable transportation projects. This is closely aligned with innovation trajectories (Maniak and Midler, 2014). An organization builds on its first innovation project to launch others, eventually creating a new successful concept and completely transforming the organization's identity. As noted earlier, in July 2007, the city of Paris launched Velib', and

the “lib’” concept was born. Autolib' is a follow-up to the success of Velib'. CarSharing Portland was created in 1998 as the outgrowth of a feasibility study co-sponsored by the Oregon Department of Environmental Quality (DEQ) and the Portland Office of Transportation (PDOT) suggesting carsharing would work in Portland. In 2000, Flexcar, a Seattle-based carsharing company, became the successor to CarSharing Portland. In June 2004, PDOT and Flexcar entered into a one-year carsharing pilot program, with the objective of providing policy and public support for carsharing in Portland. In 2006, the city designated Option Zones for on-street carsharing parking via orange poles on parking.

Overall, the case studies suggest a complete range of sustainable transportation services involves a long-term step-by-step process. Both private players and public players learned from each experience to adapt their services and regulation together. When experiences are fruitful they appear to pave the way for long-term collaborations.

Public-Private Profitability Assessment Tools to Capture Value From A One-Way Carsharing Service

The case studies uncovered the original motivations of the players. Public players are mostly driven by reaching their environmental targets and to win electoral elections. Private players want above all to benefit from a first mover advantage and anticipate market disruption.

Many local governments and companies aim to drive change together. So far, they have primarily focused on refining their visions and objectives. However strong their strategies seem on paper, feasibility and execution need to be proven. Pilot projects are required to address operations management. As far as one-way carsharing is concerned, public and private players are largely concerned about the value they can capture from operating carsharing services. Public players want to know how much one-way carsharing can reduce pollution and traffic congestion and increase transportation accessibility. Private players are motivated to understand what the return on investment of a one-way carsharing service is on their business model. Highlighting value streams for both public and private players requires a carsharing pilot-project of a notable scale (e.g., 100 to 200 vehicles at a minimum). In Portland and Seattle, car2go operated a fleet of 200 and 330 cars, respectively. The city of Munich and DriveNow launched its first project pilot integrating 200 cars. In Paris, Autolib’ started with a fleet of 254 cars. A pilot project with a larger scale is a way to foster a culture of change. On the contrary, DriveNow launched a fleet of only 70 vehicles and did not have data on a scale that was large enough to convince the city of San Francisco.

Pilot projects can help both public and private players address profitability assessment. In Seattle, car2go was required to report regularly on curb space use and to prepare a report to the Seattle Department of Transportation (SDOT) summarizing findings from their annual membership survey. One-way carsharing services have the potential to help cities meet their environmental targets and provide travelers with more mobility options. They can also contribute to enhancing a company's innovative image and improving their attractiveness. Private players can confirm the sustainability of their business model with a pilot project. Société Autolib' is expected to reach breakeven in 2015. Not surprisingly, the Bolloré Group does not focus on the profitability of Autolib' only. Autolib' creates value for the whole Bolloré group because Autolib' is a client of IER, Polyconseil, BlueSolutions, and other Bolloré Group subsidiaries. Pilot projects are also opportunities to increase a company's vehicle visibility and generate a visual promotion. This is aligned with the capability building approach to value management (Lenfle, 2008; Loch et al, 2006). Carsharing pilot projects allow both public and private sectors to promote their innovations, images, and strategies. They can be used as a marketing tool. Autolib' is a notable example. On the public side, the project was unveiled by Bertrand Delanoë two months before his reelection as Mayor of Paris. To Bolloré Group, Autolib' is above all the flagship of its LMP battery technology.

Business model sustainability depends on the players' ability to capitalize on their assets during the roll-out stage. The most important assets of public and private players are their teams and collaboration with specific players. In Seattle, car2go benefited from the support of the Committee Chair who took the lead and introduced the bill to have the legislation changes implemented. Both public and private teams need to build expertise in operating one-way carsharing services. These skills cannot be found inside public agencies or the mother companies. The case studies demonstrate that teams are subject to change because of political elections, internal reorganizations, or both. In Munich, a new team from the Urban Planning Department is now taking over the carsharing project. Not surprisingly, both public and private players face the challenge of how to maintain and upgrade the skills of their teams.

Pilot projects allow private and public players to explore new tools for value management. The case studies show that both governments and companies are assessing carsharing marketing, economics, strategic goals, and social value while operating the system. Key performance indicators for carsharing projects focus on a deep understanding of the strategic value generated of these services (Brady and Davies, 2004; Shenhar and Dvir, 2007).

In Table 5 below, we provide an overview of key points from the discussion.

Table 5: Summary of the discussion

Public-Private Organizational Structures to Deploy A One-Way Carsharing Service
1) The case studies demonstrate that carsharing projects have disrupted both public and private existing organizations.
• **Private sector:** Nor BMW, nor Bolloré Group, nor Daimler directly operated the carsharing service. DriveNow, Autolib', and car2go are business units with specific processes, structures, and cultures. At the same time, they maintain tight links with their mother companies at the senior executive level.
• **Public sector**: Cities needed to adapt their organizations to meet the challenges of one-way carsharing. The studies primarily revealed how each carsharing project involved many entities and departments that were not used to collaborating together before.
2) The case studies suggest that carsharing projects have allowed public and private players to build up specific competencies.
• **Private sector:** DriveNow, Autolib', and car2go have progressively strengthened their team by hiring people with complementary skills from outside their mother companies.
• **Public sector:** Cities had to develop new competencies to operate their carsharing services. Not surprisingly, the city of Paris capitalized on the Velib' bikesharing experience to launch the carsharing service.
3) The Autolib' case study illustrates that one-way carsharing can eventually lead to the creation of original public-private organizations.
• Autolib' Métropole is a public meta-organization representing all city members. It can be defined as a public-private interface.

Public-Private Project Management Processes to Roll-Out A One-Way Carsharing Service
1) The case studies show that private and public players have built on each carsharing experience to drive change.
• **Private sector:** DriveNow / ReachNow and car2go have constantly improved their service operations to enter new markets. An innovation project can fail to reach its initial objectives, but it can prove to be very useful for future projects and/or the firm.
• **Public sector**: Cities have progressively adapted their regulations to better match with carsharing requirements. Changes in institutional framework are needed to ensure economic success of new technologies.
2) The case studies suggest that a fruitful pilot project can lead to other sustainable transportation projects, building innovation trajectories.
• **Private sector:** In July 2007, Paris launched Velib', and the "lib'" concept was born. Autolib' is a follow-up to the success of Velib'.
• **Public sector:** CarSharing Portland was created in 1998 as the outgrowth of a feasibility study co-sponsored by the Oregon Department of Environmental Quality (DEQ) and the Portland Office of Transportation (PDOT) suggesting carsharing would work in Portland. In 2000, Flexcar became the successor to CarSharing Portland. In June 2004, PDOT and Flexcar entered into a one-year carsharing pilot program, with the objective to provide public support and policy for the support of carsharing in Portland. In 2006, the city designated Option Zones for on-street carsharing parking.

Public-Private Profitability Assessment Tools to Capture Value From A One-Way Carsharing Service
1) The case studies demonstrate that highlighting value streams requires a carsharing pilot-project of a notable scale (e.g., 100 to 200 vehicles at a minimum).
• In Portland and Seattle, car2go operated a fleet of 200 and 330 cars, respectively.
• The city of Munich and DriveNow launched their first pilot with 200 cars.
• In Paris, Autolib' started with a fleet of 254 cars.
2) The case studies suggest that pilot projects can help both public and private players address the profitability assessment challenge.
• **Private sector:** Private players can confirm the sustainability of their business model with a pilot project. Pilot projects are also opportunities to increase a company's vehicle visibility and generate a visual promotion.
• **Public sector:** One-way carsharing services can help cities meet their environmental targets and provide travelers with more mobility options. They can also contribute to enhancing their innovative image and improving their attractiveness.
3) **The business model sustainability depends on to the players' ability to capitalize on their assets during the roll-out stage.**
• **Resources:** The most important assets of public and private players are their teams and collaboration with specific players. Both public and private players face the challenge of how to maintain and upgrade the skills of their teams.
• **Key performance indicators:** Private and public players focus on a deep understanding of the strategic value generated.

Conclusion and implications

Transforming mobility requires integrating public with private services into a single transportation system. In this paper, we highlighted practices for public and private players to drive change based on collective experience. We benchmarked five one-way carsharing initiatives focusing on how local governments and private companies adapted their organizations, processes, and tools, and they collaborated together over a long timeframe. The results provide guidelines for both local governments and private companies and contribute to both public policy and business management literature.

We developed a qualitative and multi-case study research design that has allowed us to study five innovative services within their specific contexts. However, our case studies are limited to one-way carsharing initiatives. More research is needed to complete this picture.

Operational and managerial implications

The case studies have helped us identify public-private patterns on organizational structures, project management processes, and profitability tools. First, both public and private players need to make their organizations more agile to turn their written strategies into innovative transportation products and services. Results indicate the need for separated entities that have the freedom to deploy innovations while benefiting from a strong link and support from their mother organization. Results underline that these entities build specific capabilities over time. These are important assets to leverage to roll-out innovation projects.

Second, results indicate that pilot projects are critical to driving change. Pilots allow local governments and private companies to adapt regulation frameworks, improve service operations, and foster a culture of change across organizations. Collaborating with an external player is an important way to overcome internal resistance to change within local governments and private companies. Getting the support of Chief Executive Officers on the private side or Mayors on the public side can help to provide credibility and speed up processes.

Third, given their disruptive nature, profitability of innovations in urban mobility are initially hard to justify. Neither local governments nor private companies can rely on this to start. However, the case studies indicate that a minimum scale of 100 to 200 cars is needed to provide enough data to best assess their marketing, economic, strategic, and social value. Furthermore, many tangible and intangible benefits are understood during the pilot phase. Profitability comes only when these benefits are leveraged into other innovative products and services. Thus, it appears difficult to adopt a financial approach to profitability alone to assess pilot project value. Results indicate that a key asset of a pilot project is that can enable players to build upon over time. As a result, players need first to understand all the strategic and social benefits of their innovations. Then, they can ensure their profitability by launching innovative projects that leverage the assets they have built. A long-term urban mobility strategy is needed to yield positive marketing, economic, strategic, and social outcomes.

We observed that systematic practices to launching, managing, and evaluating a large sequence of urban mobility projects are needed to evolving urban transportation innovation. At the beginning, players should be able to adapt their organizations, processes, and tools to the specific characteristics of the environment and mobility projects. When their strategy becomes more mature, they should capitalize on the assets they have built over time through the pilot projects.

Theoretical implications

In summary, this paper has made three broad contributions. The first contribution concerns organizational structures. Our study has confirmed the key role that local governments play in driving change in behavior and shaping transportation innovations through regulation and practice-based interventions (Dowling and Kent, 2015). In line with organization-focused business studies and the "ambidexterity" theory, we have shown that the public organizational structure is a key success factor of this transition. We have demonstrated the importance of having dedicated business units for both public and private players to best adapt to innovative mobility challenges. Both public and private players need to gain agility and become more entrepreneurial to drive change in urban mobility. Our findings encourage future studies to focus on public governance impacts on transportation innovation at the local level.

Our second contribution involves project management processes. This case study analysis confirmed that risk allocation and sharing, along with long-term public-private relationships, are critical success factors of public-private partnerships (Osei – Kei and Chan, 2015). We have also underlined that innovation is increasingly generated in collaboration with external players (Petersen, Handfield and Ragatz, 2015). We have supplemented existing studies by showing that both public and private players need to manage innovations in urban mobility-like exploration projects (Maniak et al., 2013). The co-design of the service, co-assessment of its value, co-allocation of risks is an on-going process throughout the entire project (Maniak and Midler, 2014). Benefits of project exploration are hardly predictable; however, they are important drivers in creating business opportunities. They can help public and private players to safely experiment with new ideas quickly and to build new capabilities (knowledge and assets).

The third contribution concerns profitability-assessment tools. Governments have focused on evaluating the social and environmental impacts of innovations in urban mobility. While there is a need for further research, one study of 9,500 people who participated in roundtrip carsharing in the US and Canada documented numerous impacts on an aggregate basis (Shaheen and Chan, 2015). Analysis tools should be developed and

employed to pilot projects, as they enable local governments to build knowledge, skills, and new project management capabilities. This research opened up several fruitful avenues for future research that highlights how these public policies and business management studies can learn from each other.

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