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► **To cite this version:**

Giulia Marcocchia, Rémi Maniak. The ignition of auto-mobility ecosystems projects -Insights from three case studies. R/Evolutions. New technologies and services in the automotive industry, Gerpisa, Jun 2017, Paris, France. hal-04530099

HAL Id: hal-04530099

<https://hal.science/hal-04530099>

Submitted on 2 Apr 2024

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25th Gerpisa International Colloquium Paris, June 14th 2017

The ignition of auto-mobility ecosystems projects - Insights from three case studies

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Abstract

Automotive players know that the battle toward long term profitability involves partners previously not related to the traditional automotive sector value chain, such as European Commission or Google. The interplay with these new entrants generates different engagement frames, compared to the supplier-OEMs relationship in a stable value chain. The need and the forms of performing such partnership with an extended and heterogeneous panel of partners, is a strategic question traditional players struggle with, and it drives to a paralyzing paradox. The tension resides in defining the adequate measure of engagement, the typology of relationship, the length of the time horizon, traditional players should engage with the new players, considering that actions in this direction diverts resources from traditional business. Go for a strong, long-term vision based engagement, with hard-to forecast impacts on traditional business or for a weak, short-term communication goal based one?

The communication investigates how heterogeneous partners engage into collaboration aiming at the creation of an ecosystem for the deployment of services involving public and private stakeholders. How does the engagement take off and by which parameters is it influenced?

Key words: ecosystem, platform, public private partnership, business models, mobility, collaboration

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1. INTRODUCTION

Mobility innovation practices have been disrupted by the introduction of environmentally friendly and digital technologies, resulting in different degrees of evolution of value chain dynamics, including partnerships, business models, ecosystem definition, identity of and relationships with stakeholders. The quest of profitability is struggling with a long term horizon, with traditional industry, jurisdictional (policy making related), sectoral and geographical boundaries and consequent complex-to-identify and quickly evolving key success factors.

The automotive industry has been strongly affected, as openly discussed by some leaders, such as Akio Toyoda: *"I feel a strong sense of crisis about whether or not we are actually executing car-making.....The present automobile industry is being asked to make a paradigm shift"*.

But more opportunities are created by the platform-ization of the activities, and some actors are getting aware of the widening of the related ecosystem and of the need of new relationships. Talking about the effects of EV adoption, Boris von Bormann, CEO of Mercedes-Benz Energy Americas, said *"Looking a few years out, as we have a stronger penetration of EVs in the market, you'll have more demand on the grid, which may need to be supported by storage"*. The above evolution of business horizon results in new networks: *"We are forced to get into certain partnerships in order to seize new mobility opportunities"* (OEM connected vehicle manager).

It appears clear that profitability needs to be pursued in the establishment of new ecosystem in which heterogeneous players (including competitors) need to interplay with unknown dynamics and in a relatively short timeframe. This requires resources, time and a certain mindset to effectively and successfully engage in ecosystem creation, and it is in conflict with the traditional drivers of growth strategy and partnership framing. The challenge is therefore how to conciliate the above described tension, by defining the adequate level and timing of the engagement.

The literature on innovation management and ecosystem covered the analysis of how to manage relationships toward innovation deployment, but there is no mention on how to drive partners to engage in it.

Building systemic (Teece 1996) and disruptive (Bower&Christensen 1995) innovation requires alignment of players during project development, and the value to customer is created by the complementarity with other players, but without considering the cooperation with competitors (Adner 2006) and how to engage in arrangement forming toward interdependent value creation.

Literature in platform leadership suggests engagement could be fostered by leader actions to motivate complementors to invest upfront, building together a growing disruptive market (M. A. Cusumano & Gawer, 2002; Annabelle Gawer & Cusumano, 2014), but it does not consider leadership actions in case of more ambitious platform building, as the ones behind ecosystem creation. The need of flexibility degrees in discovery and adjustment in so defined exploration projects has been identified (Lenfle 2008), but the perspective of heterogeneous partners' interactions has still to be analyzed.

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Even if the relevance of dynamic alignment of public and private actors for systemic and disruptive innovation management has been identified (Pinske, Bohnsack & Kolk, 2016), the perspective of the engagement needed during the phase of ecosystem creation has not been explored yet.

The central question of the paper is how the collaboration among heterogeneous partners is engaged during the creation of an ecosystem.

In order to answer to this research question, we chose three cases, two of which are part of the European Commission research program Horizon2020, aiming at promoting smart mobility (electric vehicles, big data for connected cars), and the third one is a collaborative initiative for autonomous driving based services development in urban areas.

The first section provides a summary of the relevant literature about innovation management, ecosystems, public private partnerships, platforms, dynamic capabilities and exploration projects. The second section describes the cases and the methodology. In the following section, we provide a narrative of the three cases. In the last section, we discuss the findings based on the case study analysis, and link them with existing literature.

2. LITTERATURE REVIEW

Three bodies of literature provide, from different perspectives of analysis angle and width of perimeter, decisive insights about the management of such eco-systemic innovation projects.

- The first one roots in innovation, and project management, and progressively had to integrate external contributors and project stage (exploration),
- The second one has been building an extensive comprehension of the “ecosystem” phenomena, and framing how several players can align.
- A transversal literature on Project Public management, including Public private partnership and collaborative public management literature, elucidates the challenges such partnership.

2.1. FROM NEW PRODUCT DEVELOPMENT TO COLLABORATIVE INNOVATION MANAGEMENT

Historically, innovation management has been focusing on new product development. Scholars and companies have been wondering about how to improve quality, cost and lead times of development projects (Clark & Wheelwright, 1993; Clark & Fujimoto, 1991; Midler, 1995).

This contributed to dramatically improve theories and methods, theorizing and implementing concurrent engineering, multi-project rationalization through platform strategies (Cusumano & Nobeoka, 1998), frontloading approaches (Thomke & Fujimoto, 2000), fuzzy-front-end and advanced



engineering management (Khurana & Rosenthal, 1997). The diffusion of these theories allowed increasing the pace of new product launches maintaining R&D costs under control.

Building on this pioneering work, academic efforts had to deal with two trends.

First, as innovation based competition (Brown & Eisenhardt, 1997; Midler, Benghozi, & Charue-Duboc, 2000) got increasingly tough, differentiating on ever more fast-moving markets called for ever more innovative products, while streamlined product development processes can only deliver products in line with the *dominant design* (Abernathy & Utterback, 1978; Leonard-Barton, 1992). This stands as a great paradox since project management initially ambitioned to manage innovation (Lenfle & Loch, 2010).

To overcome this, scholars identified a new type of project called “exploration project”, which aims to explore promising value arenas, discovering and adjusting along the project its specifications, strategic impact, required partners, etc. (Lenfle, 2008). The management of such projects requires shifting from a “cost-quality-lead time” control perspective to a learning-based project management perspective.

This implies to manage and evaluate in parallel the dual impact of the project: (1) on direct profit, since the disruptive offer can eventually be a successful “blue ocean” market success (Kim & Mauborgne, 2004) (2) on firm resource and competences, since the project can be a commercial failure but provide a critical update on firm competitive advantage (Brady & Davies, 2004; Maidique & Zirger, 1985; Maniak & Midler, 2014).

A second important evolution of this stream of research is to increasingly consider external players not only as classical “suppliers” or “partners”, but rather as “complementors” (Yoffie & Kwak, 2006) which have to co-invest upfront with the focal innovating firm. Each has to develop complementary assets and offers (Teece, 1986, 1996) so that the final offer takes benefits from various contributions. The focal firm can leverage both its existing assets and lines of products, incorporating ideas and expertise coming from a wide range of external contributors rather than only on internal forces (Chesbrough, 2003). It can also integrate a selected pool of contributors deeply and early in a given development project to incorporate their inputs in the DNA of a given project (Appleyard, 2003; Bidault, Despres, & Butler, 1998; Lamming, 1993). The relevance of external players in shaping production and strategic decision-making, drives to the criticality of the support mobilization within mitigated boundaries among them. The use of discursive resources to achieve this goal in presence of such “political coalition” has been identified as key in the process of shaping players interests in the coalition driven by a multinational company (Whitford & Zirpoli 2016).

There is a strong convergence between these two trends. Engagement dynamics must consider that each organization involved in such ecosystemic project, has a dual agenda which keeps it onboard and investing: (1) feed its own strategic roadmaps & assets to exploit after / aside the collective project (2) contribute to the collective project in order to really build a successful and profitable common offer (Maniak & Midler, 2008; Segrestin, 2003).

It also appears that such ecosystem-generative projects involve industry transition and they challenge the alignment partners developed internally, but which is very often withholding the effective challenge of new technology or competition. The ambidextrous ability to implement incremental and



revolutionary changes (Thusman&O'Reilly 1996) had been described considering one actor entering an industry and not in such a specific phase of ecosystem development by heterogeneous actors.

To sum up, existing innovation management literature provided great insights about how to manage ambitious and systemic projects. However, as far as we know, there is very little research which investigates engagement dynamics in a context of large and heterogeneous stakeholders which have to co-invest.

2.2 THE ECO-SYSTEM APPROACH

Since the proposition of the *business ecosystem* concept (Moore, 1993), the notion of ecosystem became a central concept to represent a collaborative form of value creation involving heterogeneous partners. The analogy with earth or ecological ecosystems points the critical interdependencies among the partners. Ecosystem stands as “*the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize*” (Adner, 2017).

Vision alignment is seen as key factor to successful ecosystems, although it presents challenges to hierarchical organized companies, focused on identifying the customer willingness to pay (Moore 2006).

In the ecosystem originated by new mobility paradigms (de-carbonization, intermodal and collaborative), the role of the key actor for stakeholders engagement via interaction building and project and vision sharing could be played by IT companies, or public institutions (Donada & Fournier 2014). The relevance of the evolution toward an open eco-system approach and the collaboration with stakeholders have been identified as keys for companies involved in radical innovation unfolding, such as electro-mobility (Donada & Attias 2015).

Even if authors all agree on the definition of these form of business structures, and that an ecosystem follows a maturation process from emergence to stabilization and renewal (Moore, 1993) the process of creation of these arrangements is still quite underexplored. The need of co-evolution of roles in the business ecosystem has been stated (Moore 2006), but the process of ecosystem shaping is still to be investigated (Jacobides *et al.* 2016).

Authors clearly identified that potential ecosystem members' investment relies on strong incentive mechanisms. That's why the identification of intermediaries and complements, as well as analysis of costs and benefits for intermediaries are set as key step for ecosystem to take off (Adner, 2006). Players who control the architecture and interfaces of the final offer are in the best position to capture most of the value created by an ecosystem, which stands as a great incentive for certain firms to become and remain platform leaders (Jacobides *et al.* 2016; Jacobides *et al.*, 2007; Jacobides 2006).

Platform leadership actions demonstrated as key toward incenting complementors to invest upfront, building together a growing disruptive market (Gawer & Cusumano 2014).

The ecosystem-related literature provided critical frames to consider how a collection of players can deliver and share value, but we need more insights on the dynamics of engagement toward the collaboration among such players.

2.2. THE PUBLIC/PRIVATE PARTNERSHIPS

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The influence of trust between public and private actors as key step toward the success of cooperation between corporations and governments (Laura *et al.* 2010), and the link between the articulation of public/private level of governance and the activities as a success factor of PP partnership (Markard & Truffer 2008) have already been identified.

The deployment of highly systemic and disruptive innovation appears then linked to socio-cultural, economic and legal frames evolution, as already described for sustainable technologies (Kemp *et al.*, 1998). In this context, the dynamic alignment of private and public actors becomes a key condition for systemic and disruptive innovation management (Pinkse, Bohnsack, & Kolk, 2016).

The identification of network and its challenges for the understanding of the key success factors of PPP (O’Leary&Vij 2012, O’Leary&Bingham 2007) provides elements for understanding a static situation, but as collaboration has dynamic characteristics, and the implication of such challenges evolution should be contemplated on systemic and disruptive innovation projects. The degree of autonomy and interdependence is a defined paradox in collaborative public management (O’Leary&Vij2012) which influences the level of engagement managers and organization.

Motivation and commitment of collaborators is one the factors to consider for public manager before collaborating (O’Leary&Vij2012), but the trajectory of these during the collaboration, depending on the set up of the collaboration itself, have not been treated.

2.1. SUMMARY AND RESEARCH QUESTION

Current innovation global themes such as smart mobility, smart cities and digital disruption as endless service opportunities ignitor question theories and practices. Ecosystem-related theories now consider ecosystems as recognized structure for value creation and capture. Innovation management theories supplement this literature and recommend that companies who face such innovation challenge engage “exploration projects” and manage them dynamically. Public-Private partnership literature guides in the analysis of static situations of innovation management, while the creation of ecosystem and the coordination needed for it, requires the consideration of dynamics evolution.

In this communication, we study the ecosystem creation phase in which private and public players should engage together for a common ambitious adventure. How to build engagement among heterogeneous partners during the phase of ecosystem creation aiming at service deployment by public and private actors? To answer this question, we will provide an in-depth analysis and discussion of three projects with a value creation ambition and an important ambiguity since many partners are competitors, coopetitors and have many partnership scenarios.

3. METHODOLOGY

3.1. RESEARCH DESIGN

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We chose to investigate three projects focused on topics at the core of the discussion for smart mobility, such as the creation of new physical and digital infrastructures, new user experiences and revenue from car data, and autonomous driving. The projects play a role in smart mobility ecosystem creation at different moments.

The first case, developed by a consortium formed by four automotive manufacturers (OEMs), one energy supplier, a service operator and one academic institution (we were part of it), aims to deploy 200 EV charging stations in 2 years along a national highways network.

The second one, developed by a consortium formed by three carmakers, two service providers, two private IT and cloud operators and one academic institution (we were part of it), aims to create the prototype for a marketplace to monetize data extracted from connected cars.

The third case, developed by one carmaker, in collaboration with a Tier1 supplier and several industrial public and academic partners, aims to create a shared vision of the autonomous mobility, as a first step toward profitable services for autonomous driving integration into local urban environment.

The three cases are complementary because they intervene in the ecosystem creation at different stages of smart mobility progress. They represent increasing levels of systemic-ness and of disruptive-ness degrees, regarding the setting of partnerships with public and private partners, the collaboration needed among competitors, and the need of coordination of some of the partners with their international headquarters for offer generation and technical standards setting.

Here below in Table1 the detailed and framed explanation on the main characteristics of the cases.

Table 1: Summary of the three cases

	EV Fast Charging infrastructure	Data Marketplace prototype	Autonomous Driving vision
Duration	Early 2014-Dec 2016	April 2015-April 2018	January 2017-June 2017
Goal	Commercialization of a service through the deployment of 200 EV fast charging stations along the highways network	Exploration validation through the creation of a prototype of marketplace for car-derived data transactions and service creation	Vision creation of urban applications of autonomous driving through the knowledge sharing and co-construction using design methods
Category	Service	Product	Service
Context of direct action	National (national territory)	European	National (local-cities)
Partners	Private+Public: Four OEMs, one utility provider, one service provider, one academic institution	Private: Three OEMs, two service providers, two privacy IT and cloud operators, three management and academic institutions	Private+Public: Four OEMs, one utility provider, one service provider, one academic institution
Typology of partnership	formal- consortium contract	formal- consortium contract	informal-target principle based collaboration agreement
Industry perimeter	Transportation first, energy management as second step. Local dimension	Transportation first, vehicle use optimization, local and European perimeter dimensions.	Transportation and logistic first, ressource management as second step. Local dimension
Project leader	Public: one entity, Utility provider	Private: one entity, One OEM	Private:two entities, One OEM and one Tier One supplier

We were involved in the projects as “business model analysts”.

3.2. DATA COLLECTION:

The current status of data collection is shown in the above table:

Table 2: Data Collection overview

	Number of meetings	Type of data collection	People	Duration
EV fast charging infrastructure Consortia steering and operational committees	3 operational committees, 7 steering committees, 1 dedicated workshop	written field notes, strategic orientations and priorities, available knowledge, technology roadmap, financial concerns	EU Consortia partners (utility provider charging network manager, service provider CEO and project manager, consortium contract legal advisors, OEMs EV business units responsible and managers, academic partners)	Half a day each
Data Marketplace Consortia steering and operational committees participation	8 Consortia meetings, 2 workshops, 1 two-day pre-EU review meeting	written field notes, strategic orientations and priorities, available knowledge, technology roadmap, financial concerns	EU Consortia partners (OEMs responsible of data management, responsible of telemetry, service provider in mapping and weather information CEO and business development managers, cloud computing managers, privacy management consultant, academic partners for technical framing of the platform)	1,5-2 days each
EU official kick-off and results presentations	2 in Brussels and 1 in Luxembourg	written field notes, EU commission priorities, available performance on current and previous projects	EU Consortia partners, European commission leaders	one full day each.
Autonomous mobility system meetings	14 meetings	written fields notes, strategic orientation, vision of futures, current available knowledge, reaction to new process	OEMs open innovation and NPD managers, Tier1 supplier innovation manager and designer, public municipality representative, external experts and potential customers	Half a day each
Interviews	36	written interview notes, interviews recording, managerial considerations on strategic positioning and value chain perception	public and private stakeholders such as local municipalities, smart cities architects and actors, insurances, highway operators, Automotive and digital platform consultant interoperability providers, fuel distributors, urbanists, International energy Agency and academic researchers.	from 1 to 2 hours each

Almost the total of interviews was performed as in person meetings, with only one over the phone.

Relying on these data, we followed a process analysis creating (and recreating dynamically) a narrative of how things (Dumez .H Jeunemaître A 2006) organizations, people, opinions, objects, etc. – evolve overtime and why they evolve in this way (Van de Ven, 1992).

The following section provides the narrative of the three projects, putting emphasis on the evolution of (1) the motivation of project partners and the way they make sense and report it (2) the project management settings.



4. CASE DESCRIPTION

4.1. CASE 1 —EV FAST CHARGING NETWORK INFRASTRUCTURE

4.1.1. The initial setting

Being the price of an EV extremely high and infrastructure on the public soil not available, the adoption of EV was low and the electrification of transportation a struggling object. Public and private actors keep trying partial solutions, while private actors and public-private initiatives push the adoption their way (i.e. Tesla, Autolib'). The imperative of environment protection pushes international institutions such the European Commission to fund projects for adoption enhancing and economic and social benefits wide-spreading.

The observed consortium was composed by four automotive manufacturers, one utility provider, one service provider and one academic institution. These organizations jointly applied one year before to the EC, answering to a call for projects in the context of EV infrastructure development. They finally got the funding. The goal set by the consortium was to implement a profitable network of EV fast charging stations covering the highways in France and commercial areas in the vicinity of highway exits, for a total of 200 stations.

The consortium contract started in early 2014 and ended in December 2016.

4.1.2. From project funding approval to contract agreement: Early 2014 - February 2015

Since the project funding approval in early 2014, all partners formally agreed that the common goal was to move electric mobility forward, which was a fit for every partner's internal commercial and technology roadmap. Contract signature was the first focus of partners' discussions.

Differences arose between contract negotiation and partners' internal processes, which impact project development. The disagreement on contract ignited debates on service providers' responsibilities clauses, service price and technical progression of station definition. Besides every partners needed to reach agreement internally on moving the boundaries of contract engagement acceptability. Every partner defended its initial interest setting, focusing on timeline completion for return on investment target achievement, although there was no interaction among partners on direct-sale business plan parameters and hypothesis definition. Preliminary awareness of not viability of this frame and of the impact of public authorities on project timeline completion emerged. The need of moving forward operations on infrastructure definition pushed the partners to agree on clauses.

4.1.3. Resistance tempering by contract signature and regulation constraint: March 2015-August 2015

Since contract agreement, few operational activities were kicked off at consortium level, while a certain progress was performed on service infrastructure technical definition. The sudden consideration of a regulation to comply with resulted in a heavy impact on project milestone completion. More resources had to be allocated to minimize the impact on overall target achievement and on partners' internal roadmaps, clearly perceived by all partners. Along with the operational Marcocchia, G. & Maniak, R. (2017)



contingency, the simultaneous accomplishment of partners' internal process for contract signature resulted in an increased degree of flexibility of partners toward each other, allowing sharing on project status and site negotiation process, alignment on project performances expectations starting, and cooperation in collaborative attitude in charging station testing.

Partners realized that an overall learning process for conditions negotiation with external actors was ongoing and that a more extended dialogue was open for partners with previous experience in such a relationship and negotiations.

Partners became more aware that project profitability relies on sharing technical information among OEMs, customer awareness strategy and EC project previous experience among all partners, and on the ability to collaboratively involve partners beyond the consortium.

Besides, the opportunity of participating to a future European funded project arose and partners openly shared their interest in participating.

4.1.4. The epiphany of first users' feedback: September 2015- end of project

Joint actions on customers' awareness and service experience were taken, while EC confirmed the priority of profitability target. First feedback from users had the effect of urging partners to introduce modifications in price scheme and operational flow had to implement in order to comply with EC expectation. Information on modifications to be taken was informally and partially discussed, while partners discovered a learning-by-doing process and started to share consideration of other revenue stream collectable from the infrastructure.

Consortium officially declared to EC the project was delayed, and that it would have committed to the completion even beyond the boundaries of EC funding, due to the strategic value of the project on their internal roadmaps.

Although OEMs and service provider partners never found a full alignment on business model vision, a certain degree of cooperation was achieved. Some of the partners became open to new partner dynamics in such projects, such as co-innovator partnership.

As far as value from the project, partners' initial vision of the project as internal sales booster evolved toward a more collaborative target on how to reach the desired adoption effect, with arising awareness on the current impact of the project in their strategic roadmap. The project at the end was seen as "*a marketing site to work on together*" (utility provider).

4.2. CASE 2 – THE CAR DATA EUROPEAN MARKETPLACE

4.2.1. Initial analysis

Mobility actors nowadays must consider how the value generated by the connectivity can be collected and distributed. Digital platforms enable the concretization of the value generation among users groups which were trying separately to increase the value of the data stream. EU funded project of



data marketplace prototype creation was the perfect tool at the right moment for OEMs, IT specialist and service providers to initiate the dialogue.

The consortium is composed by three automotive manufacturers, two service providers, two privacy IT and cloud operators, three management and academic institutions. The goal set by the consortium was to develop a prototype of profitable marketplace for the exploitation of data collected from cars, for new services creation in automotive-related field and in cross-sectorial applications. The project started in April 2015 and will end in April 2018.

4.2.2. Marketplace technical features: not an easy add-by-add process, but a shared decision-making process: April 2015- October 2015

For involved partners, the declared interest in the project was initially linked to direct sales increase of current products and services. Data format and packages initially proposed by OEMs were debated during months among partners in the aim of format coherence consensus reaching and use cases applicability. Several workshops of partners' sub-groups were introduced as effort of alignment on vision toward key features of the marketplace, including standardization, data privacy and cybersecurity.

Service providers started expressing initial hypothesis of use and declared which data would have been of their interest *"We will be interest only in the data that generate benefic effect in the magnitude of the service purposes, otherwise data should stay with the OEMs, because there is no shared business case"* (Service provider) .

Some partners realized that the challenge of the project on this subject could have been beyond the compliance with existing regulation, up to the influence in the future legislation definition for other highly systemic and disruptive projects (i.e. the autonomous driving).

The overall approach to the project business model was based on business plan definition for the direct sale of data from the marketplace, without discussion on value proposition for users. From analysis of preliminary features of the marketplace, this frame appeared not to be viable, unless assigning a "safe" high price to the service, endangering the early-adoption dynamics.

4.2.3. Defining-by-doing acceptance: November 2015-August 2016

As far as offer side, first results on external potential users investigation and the on-going dialogue among partners on data package definition led to the general consensus on the fact that *"the world cannot be defined at the beginning of the project"* (OEM). On data package format and use cases, partners embraced the iterative process of definition between offer and demand. Some OEMs started to provide some data to service providers to start exploring use of them, but there is still no requirement definition from service providers.

The business plan exercise was slowed by the pricing building mechanisms. Partners were divided between a commercial performance of the project, searching the commercial viability of the marketplace, and a more exploratory performance. The role of the project was perceived as a mean to become a supplier of a dominant platform dedicated to a bunch of data from different sectors to a specific market target (*"the goal of the packages resulting from the brainstorming is to feed* Marcocchia, G. & Maniak, R. (2017)



Californian developers” OEM). Besides, service providers shared with the consortium an evolved vision of certain marketplace features for inciting interactions of platform participants. Data collection requirements were defined by service providers, which allowed the test demonstration activity to be developed.

A wide exploration process revealed that the panel of potential users and complementors was wider than the current partners’ focus. Partners realized that the business model viability and the strategic positioning of the marketplace relies on the ability to collaboratively involve in the dynamic such users and complementors beyond the consortium.

Sessions on business model design were performed in order to incitate shared understanding of main concepts and impact of each other decisions on platform performance, aiming at jointly defining among the partners the value proposition. Partners temporarily agreed on shared understanding, but internal culture and processes reduced the impact of such agreement. All the above considerations drove the project to a delay in deliverables completion compared to time-plan.

4.2.4. Service provider partner replacement as a project performance enhancer: September 2016- March 2017

At mid-term, the open issues are still several, in term of offer and demand, marketplace business model and user incentives definition, but collaborative initiatives on data package collection and tests are ongoing between OEMs and service providers. As far as technical knowledge, partners expressed their improvement on both sides knowledge (offer-demand sides).

As far as value perception, the project is still perceived as commercial-viability-oriented and exploratory project at the same time. Some partners realized that part of the value of the marketplace resides in indirect value sources. The question on the business model is at the core of the discussion and the need of a “risk mentality” appears key to the partners in order to make business sense of the project. Some partners (OEMs) declared the gap between this approach and their traditional logic of business plan. Some others (service provider) declared re-consideration of automotive as business focus for the future and modify heavily their interest toward the project, with final decision of leaving the Consortium. A new partner is found by another Consortium partner and rapidly introduced to the others for approval. The replacement of one service provider partner ignited a new vision on collaborative results achievable by the partners. Joint use cases of data packages are investigated and partners declared the potentiality of internal use of project results, as a project performance beyond already set ones.

The pertinence of a more flexible strategy for project development is pointed out by some partners.

4.3. CASE3: THE SHARED VISION OF AUTONOMOUS DRIVING FOR CONCRETE AND READY-TO-TEST USE CASES IN URBAN AREA

4.3.1. Initial settings

Digital technology impact in mobility industry reaches its highest level with the autonomous driving. Hardware manufacturers, software manufacturers, public institutions have to act more like musicians

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of an orchestra, than solo, but public/private sectors, hardware/software development processes all is driven by different parameters and operational logics. Projects are launched, but with a very large scope and therefore hard to achieve. A smaller-but-more-achievable collaborative initiative was a shared intent of some stakeholders, who took action in a non-traditional way.

The set of players is composed by one automotive manufacturer, one Tier1 supplier, one academic partner, one public authority and progressively involved external contributors as autonomous driving urban stakeholders. These actors unite effort in order to explore and converge towards a shared vision of autonomous mobility leading to future services. There is no formal frame or funding provided by one of the actors or by external entities.

The project started in January 2017 and will last until June 2017.

4.3.2. The relevance of the perspective and the team composition: January 2017-February 2017

From kick off meeting, the brainstorming and creative process allowed an initial shift from the consideration of the dominant design of a transportation object, to a wider consideration of the action within the urban environment. The goal of the project was extended to learn how to work collaboratively. Since the very beginning, the process of vision shared construction was defined as a mix of creative methodologies, and more specifically an overall frame of design thinking with an exploration path based on C-K theory. Team members shared knowledge and practices on above design theory and methods.

The exploration preliminary results have been discussed with a representative of the public local institution. It was the occasion to confirm shared interest in the exploration. The creative process could be pursued with the aim of iteratively reconsideration of the target perimeter and the width of the team to be involved. The relevance of the direct dialogue among players in confirming shared intentions and target was declared and the regular and purposeful involvement of players defined as key success factor.

4.3.3. Discovering the augmented target: March- April 2017

Additional sessions of open discussion with stakeholders were added and the internal debate resulted in widening the scope of the target of the project and in an extension of project duration. Declarations such as *“Mobility is a social and cultural issue before being a technical one. Companies must positioning themselves as providing tools for new dialogue”* (Urbanist), contributed to the discussion depth and width.

Team members realized that the project could be a way to perform shared knowledge and participants’ intention convergence, to be used beyond the scope of the project itself, but that would keep requiring collaborative approach in knowledge sharing and process steps iteration and pertinence verification.

The creative process integrated a challenge of the state-of-the-art with information graphic designer. This generated an open debate on which another level of scope widening was reached: the project is able to generate two main strategic results, one external and one internal to participants’ organization. The external one is the ignition of interactions among stakeholders of an emerging ecosystem, the

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second one is to define the experimental process as an effective one for innovation ignition and for knowledge structuring among heterogeneous actors.

This awareness acted as knowledge-box opening for each team member, who shared experiences and useful feedback from previous projects. Project goal was openly understood and assumed as vision toward actionable objects, and pilot concepts have been challenged for further development.

5. DISCUSSION OF THE CASES

The three projects represent for all players the opportunity to take action on future trends of smart mobility: resources and data management. The analysis of these projects provides the recognition of a common path in collaboration role in their management, and similar conditions for engagement. In this section, we describe this common path.

5.1. STARTING POINT

Each player in each project had its own R&D roadmaps concerning “Big data”, “Autonomous driving”, “Energy revolution”, “smart cities”. The initial purposes motivating the participation to the project were shared among the partners, mainly related to drive future competitiveness and provide important positive externalities in term of value and job creation.

In all cases, allocation of resources was coherent with the project target achievement, being strictly up-front defined in EC projects and flexible on-the-way defined for the AV project.

Each player initially realized a certain degree of coordination with the others was needed, given the ambition and the systemic-ness. The “European Call for Project” appeared as an opportunity for all players to go forward on these critical issues, including converging toward common standard and enlarging the scope of their action for profitability achievement. The initiative of the AV project was perceived as the adequate flexible frame for handling such a complex object as the autonomous driving in urban area. The project represented the opportunity to federate initially un-related actors toward a richer panel of exploration for a more actionable vision of the autonomous driving in urban areas.

The two EC projects began with a “fuzzy” common vision of the future and joint interests. Industrial companies teamed together for a contractual engagement and apply, showing that they wanted to create value together in line with this vision. The AV project began with a clear purpose of each actor to participate to a shared vision. Actors teamed together for an un-formal engagement and started to dedicate resources.

5.2. THE DEVELOPMENT

Projects had on one side, to commit toward a specific plan, (EC projects) with defining work packages, milestones, while the third project was driven by a flexible plan driven by a creative experimental process. However, both EC project had to report deviations in project completion and profitability. In the AV project, the degree of flexibility in time-plan management allowed adjustment needed during the discovery of key issues at stake in the project.

Regulation, first users’ feedback and technical standards definition acted as time-plan perturbing factors, but they also ease the comprehension of collaboration need toward deviation resolution. Partners understood that the individual business target on each project could only be reached by collaborative actions toward strategic decision-making within the project.

The management approach to the project of public and private partners was not harmonious, with different management drivers, which results in a lack of coherence among partners’ engagement during the first phase of projects.

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There was another important deviation concerning “business model”. Each EC funded project committed to find a self-standing profitability by the end of the project. However, no project could show enough direct customer volume or appeal to support incomes, or show a converging running cost structure. In the case of AV project, the profitability was part of the list of issues to be addressed by the vision, but there was not a firm target imposed by the leader or by an external actor.

The explanations are convergent on the three projects.

The time needed by EC projects partners to shift from the initial common “fuzzy shared vision” to a concrete definition of what to be done together, was not only a question of personal relationship, but rather on exploring the in-depth alignment of partners, and correlated with each partner specificity in relation with practices of such projects. The demanding reporting process requires a strong investment from each partner, empowering each corresponding internal project internally, and requesting to validate this position with various internal divisions. This took a lot of time in each project and contributed to the project initial inertia. For the AV the representation of the vision was the target of the project, therefore not clear at the beginning, but partners had a very clear alignment on what had to be jointly done.

Once this initial “common commitment & trust” are acquired, players discover the real strategic agendas of other partners, they go deep into their technical background, and realize that they also have other partnerships on the same issue.

Observations showed that, even with delays in official target completion, partners increased their engagement, with one exception.

In EC projects, partners had to show that they converge towards the initial plan, which keeps everyone incited to go beyond the a priori divergences, and to find ways to go forward.

Furthermore, motivation to collaborate was triggered by the concretization of the fact that collaboration with competitors and external private and public players to deploy networks was needed to get a real monetization of data and resources management.

Project management initial settings appeared to be incoherent with partners’ level of awareness and understanding of project implications, as it appears from the table below:

Table 3: Project Management settings evolution

Project management settings	EV Fast Charging infrastructure	Data Marketplace prototype	Autonomous Driving vision
Reporting			
at project start	contractual reporting, at fixed dates for project status and deliverables, following EC request	contractual reporting, at fixed dates for project status and deliverables, following EC request	no official reporting, fixed date for the project deliverable, no interim reports
at project end/at present	no modifications in reporting tools, deliverables and interim reports sometimes delivered later than original plan	no modifications in reporting tools, deliverables and interim reports often delivered later than original plan	no official report introduced, deliverable date delayed by 2 months
Timeline			
at project start	part of the consortium agreement and approved by EC	part of the consortium agreement and approved by EC	defined by partners involved
at project end/at present	no modification, but goal not achieved on time	modification under discussion, and modification to some deliverables	modified by partners involved
Governance			
at project start	project leadership by public institution	project leadership by private firm with input from other private partners	collaborative contribution by partners
at project end/at present	project leader with strong implication of partners	project leader with strong implication of partners	automaker and tier1supplier
Participation			
at project start	mandatory attendance at fixed dates	mandatory attendance at fixed dates	upon players' interest and availability
at project end/at present	compliant with contract requirement, few partners active in debate	exceeding contract requirement in term of presence. Participation in debate increased, in some cases with relevant inputs	increasing along the development, with deeper level of participation in debate

In the EC funded projects, the reporting is defined upfront, and it is maintained formally unchanged during the project, although the completion of it is often delayed. In the AV project there is no reporting obligation and project is delayed as well. The timeline is in the three cases established before or at project kick-off, but during the project development it appears to all participants as not adapted. Depending on the project, we observed a different degree of acceptance of it and management of the consequent impact on project goal completion. From the first EC funded project, to AV project, the awareness of timeline-target misalignment had occurred at earlier stages of the project, resulting in an



increased acceptance degree. The typologies of governance are different among the projects, and we observed an increased implication of partners in all projects, although at different degrees. Governance seems to evolve from two extremes to a middle ground of few players, who have all very strong links between project results and internal roadmap development. We noted that in all projects settings, flexibility appeared as needed “tuner”, included since the beginning in the AV project, while a discovered necessity in the other two projects.

The moment in which partners started to collaborate and the degree of collaboration, both vary among the projects, with a slower ignition and moderate degree of it in the first EC project to an initial intention statement and high degree developed during the AV project. The lack of contractual frame for a formal engagement does not prevent partners to engage in a firm participation and active contribution toward a shared target. In ecosystem creation initiatives, it seems that rigid contractual frame and upfront investment are not the only elements fostering partners’ collaboration.

Based on the list of challenges a network is face with (O’Leary & Bingham 2007), authors analyzed the evolution of parameters influencing the successful management of the challenges from the perspective of the network the projects created. The analysis is reported in the following table:

Table 4: Challenges evaluation of networks at the core of the projects

Members characteristics	EV Fast Charging infrastructure	Data Marketplace prototype	Autonomous Driving vision
Interests			
at the beginning	all partners join with individual interest to be achieved by linear interactions of one-to-one discussion service supplier-OEM	all partners join with individual interest to be achieved by simple supply/buy relationship	members participate with individual interest to be achieved by networked interactions of collaborative debate
at the end/current status	few partners realized a wider range of interests could be achieved through the project, but only through collaboration	some partners realized a wider range of interests could be achieved through the project, one service provider doesn't and quit the project	awareness of the need of wider scope of the projects for more individual interests to be pursued
Missions			
at the beginning	defined for all the partners, divergent in some cases because of competition	defined for all the partners, divergent in some cases because of competition	defined and convergent
at the end/current status	unchanged even with evidence from the project suggests in some cases the need of evolution	unchanged with the exception of one partner.	unchanged
Organization culture			
at the beginning	different	homogeneous	different
at the end/current status	unchanged	unchanged	unchanged
Methods of operations			
at the beginning	different	homogeneous	different
at the end/current status	with changes for some partners	with changes for some partners	with potentiality of changes for some partners
Power degree			
at the beginning	homogeneous	different	different
at the end/current status	unchanged	changed for some partners	unchanged
Stakeholders groups and funding			
at the beginning	different among members	homogeneous among members	highly different among members
at the end/current status	changed	changed	unchanged
Multiplicity of sub-issues			
at the beginning	moderate high	high	very high
at the end/current status	increased	increased	increased
Multiplicity of decision-making forums			
at the beginning	moderate high	high	very high
at the end/current status	increased	increased	unchanged
Members' Interpersonal relationship			
at the beginning	formal	formal	unformal
at the end/current status	formal, with some one-to-one softening as exception	increased relevance of soft-skills, mix degree of formality and unformality	positively impact by project development
Governance rules			
at the beginning	formally established and hierarchical	formally established and hierarchical	un-formally established and collaborative
at the end/current status	respected	challenged	respected
Relationship with public (citizens)			
at the beginning	low in term of service use	high in term of data generation, low in term of data use	very high in term of service use and impact on daily life
at the end/current status	increased	unchanged	unchanged



The table shows that network members' interest awareness and coherence with project goal is not always clear at the kick off for all the participants, and it can be tested during the development. While awareness and coherence become clearer, the more relevance the collaboration among partners acquires. During the project, the methods of operation of some project partners and their power degree changed, with the introduction of new processes and the shift of business unit relevance. The new processes introduction happened for the more traditionally managed partners, while the shift of business unit relevance has been reported for the more dynamic partner in one project. Besides, the composition of stakeholder groups, the number of sub-issues and decision-making forums to consider for project target changed for the EC funded and upfront formally set projects, while the high degree of flexibility applied since the beginning to AV project allowed the very early consideration of such network complexity.

All projects deviated from initial targets, all reaching a certain degree of collaboration, but they did so at different moments and at different degrees, as they are developed by a different mix of partners which results in a different answer to network challenges. The projects with a larger number of partners already mature on previously acquired experience diffusion reacted more rapidly and efficiently to solve the paradox of project request and operational actions toward target achievement. Some projects required a period devoted to technical standards, which was helpful in identifying the strategic impact of standards on project business target achievement, and therefore in engagement building process. Partners' cognitive approach to EC funded projects was not homogeneous, while it was coherent for all partners involved in the AV project.

6. CONCLUSION & FURTHER RESEARCH

The communication aimed to contribute to provide elements about how to manage emerging ecosystems in mobility, which requires that several heterogeneous organizations heavily invest upfront, in order to co-construct a systemic offer with both high shared interest and high shared uncertainty.

We bridged the innovation management, ecosystem and public-private partnership literatures to understand how partners engage in such eco-systemic projects.

Then we tracked three projects using these lenses, paying attention on how heterogeneous players, initially motivated by the same future business concept (in our case electro-mobility, data marketplace and autonomous driving) progressively build ecosystems through collaboration and interdependencies which divert resources from traditional business.

6.1. IMPLICATIONS

6.1.1. Theoretical implications

Bridging innovation management theories, ecosystem and public/private partnership literature allows the identification of an alternative model of co-innovation under definition.



The collaboration built on increased engagement degree logic invites to go beyond the binary logic of upfront strict definition of ecosystem projects which is prevalent in the platform leadership and ecosystem management literature. This opens new research avenues to manage the ecosystem alignment related to partners' characteristics at project beginning, and that innovation management theory could evolve toward inclusion of engagement factors toward collective alignment and socio-technical regime shift. The analysis of the empirical cases contributes to the PPP literature on the observation of real time collaboration establishment, with hints on how it performs overtime.

6.1.2. Managerial implications

Observed projects represent a mix of constraints and opportunities to be discovered during the development and which successful management depends on the collaboration development among partners and network members. They started with a shared declared purpose and an adequate allocation of resources. Nevertheless, their trajectories didn't match the forecasted planning, and they induced an unexpected partners' engagement and target achievement among public and private stakeholders. Such deviations can be explained by an unsuitable matching between the practices of such eco-systemic project management and the specificities of each partner initial dynamic.

Beyond traditional homogenous vision of collaborative R&D projects, our analysis shows that project management settings (reporting, timeline, governance, participation...) should adapt to partners' maturity at the beginning of the project (defined as the level of previously acquired, stabilized and diffused experience), number of similar projects under simultaneous development, and ambidextrous capacity for effective application of knowledge and results from previous projects, initial actors alignment in term of technical standards, cognitive setting (or awareness) and roadmap development. This highly conditions partners' incentives and coordination obligation. Relying on different partners' maturity, every project should allow a time frame (six month) for vision exploration and sharing and partners list definition, before getting into operational activities.

Consequently, different typologies of management and tools should apply depending on the initial "cocktail" of parameters. Finally, the analysis also questions the public-private traditional practices and invites to bridge private and public theories. It namely invite to consider public authorities not only as ex ante or ex post "regulation players" or reporting receivers, but as active "project members".

6.2. RESEARCH LIMITS

An interesting direction for further research could be the cross check of the above results with quantitative analysis of systemic and disruptive innovation deployment results through public/private collaboration aiming at ecosystem creation.

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