

The Network Orchestrator of Charging Station Infrastructure - The PlugSurfing Case Explained

It is common knowledge that technology is changing the world in which we live and work. Yet, an inspirational and important lesson can be learnt from how one European start-up anticipated this change and used it as an opportunity to become one of the fastest growing companies in the EV charging infrastructure sector. To understand the disruptive potential of so called start-ups in general two underlying trends should be made clear:

- Firstly, the automotive industry was experiencing several changes towards the very essence of driving patterns and car production. Autonomous and connected vehicles were rising up the agenda, and a shift in ownership was forecast as private owners, who were once 'customers', soon became 'users' of car-sharing and hailing services. Tightening emission regulations and scandals such as 'Diesel-gate' would soon lead to an increased push in the direction of electric vehicles - cars which would more resemble smartphones than combustion engine vehicles, with fewer moving parts and a 'service' that is more likely to involve an overnight software update rather than a visit to the franchise dealership.
- Secondly, with the push for green initiatives brought on by Germany's chancellor Merkel's "*Energiewende*", a stronger environmental awareness and technological advances facilitating renewables like solar and wind, the Energy industry was beginning to see huge decentralisation in energy production. Consumers were becoming 'prosumers' and more energy efficient in their daily usage. Suddenly, the business of centrally producing, distributing and selling kilowatt hours was becoming less and less attractive for the incumbent utilities.

"Only utilities that embrace change will have a future" wrote Susan Fratzscher in a paper directed at the changing world for energy providers in Germany and the US¹, yet the sentiment behind the quote can easily be extended to the automotive sector.

Taking heed of this advice, both sectors entered a scramble for innovation. Events were sponsored, accelerators and incubators were funded, start-ups and ventures were acquired and entire companies were split-up and re-branded. Whatever success such initiatives might have had so far, there was one further, even bigger threat which these corporates, with their typically slow and conservative pace of top-down decision-making, were not able to accommodate. This was the challenge to the core of their business models to match the hottest companies coming out of Silicon Valley. The large, traditional companies had failed to notice the fast rise of the so-called Network Orchestrators for far too long.

¹ The Future of Utilities: Extinction or Re-Invention? A Transatlantic Perspective.

The Network Orchestrator

Companies such as Airbnb, Uber, Alibaba but also the German Check24 have more than a few things in common: for a start, they are all hugely successful growth companies. Perhaps more strikingly, however, they all have a very low asset base for the tasks they perform for millions of customers around the globe. It has been said, for example, that Airbnb is the biggest hotel chain without owning any hotels, Uber the biggest taxi company without owning any taxis, and Alibaba, the largest retailer without owning stock. Check24 has created full consumer transparency across different sectors like insurance, travel, or electricity. All of these companies, along with countless other examples, perform the role of the 'Network Orchestrator'. Shunning the traditional business models of (tangible) asset ownership or asset production, they instead choose to focus on 'access' to the assets of those in their networks, whether this be a network of taxi drivers, amateur hoteliers, consumers or users. The result of this is that connections are made between their various networks (i.e. a network of users, rooms for rent or taxis to hail). These connections then lead to synergies and generate more value due to their connection to the Network Orchestrator, and in turn further strengthening the Network Orchestrator's role in this business system.

For mobility services like car sharing or ride hailing even "Meta" Network Orchestrators are on the horizon: imagine Amazon's "Alexa" or Apple's "Siri" answering the customer request "call me a taxi" by deciding if a Uber or myTaxi will get the deal or by replying "there is a car2go right outside". With fully autonomous car fleets coming to cities, these stand-alone mobility offerings will converge or get replaced and the best Network Orchestrator of these services might receive all the future value.

The Network Orchestrator model focuses on two key notions: First, 'assets' incur high investments and variable costs and have typically rather low scalability, whereas providing 'access' incurs low cost and is rewarded with high scalability. Second, the key to providing access is found in perfecting the user interface and overall experience with their products and services.

The Increased Value of the Network Orchestrator

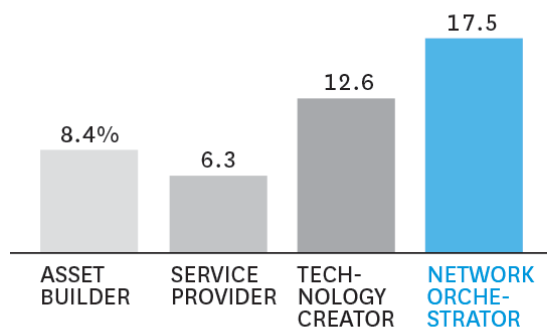
Analysts point out that Network Orchestrators outperform companies with other business models on several key dimensions. These advantages include higher valuations relative to their revenue, faster growth and larger profit margins. Harvard Business Review demonstrates that Network Orchestrators achieve more in terms of revenue and profit margin compared to companies with other business models (either asset builders, service providers or technology creators). The logic behind this,

suspects HBR², is that the networks of the company, for example its user-base, creates value which does not impact the company's marginal costs. TripAdvisor.com, for example, benefits from its reliable customer reviews which provide more value for other users.

NETWORK ORCHESTRATORS OUTPERFORM

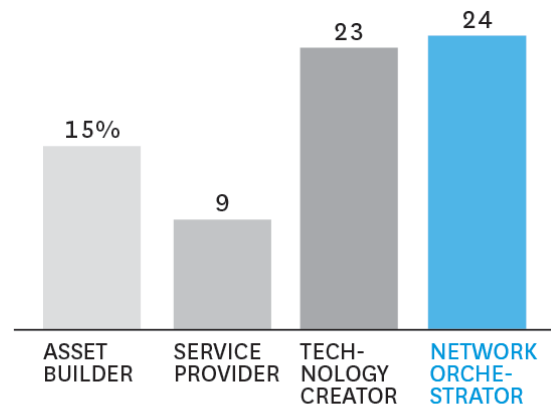
ON REVENUE ...

AVERAGE REVENUE COMPOUND ANNUAL GROWTH RATE (CAGR) 2010-2012



... AND PROFITS

AVERAGE PROFIT MARGIN, 2013



SOURCE BARRY LIBERT, JERRY WIND, AND MEGAN BECK FENLEY

HBR.ORG

The Use Case for EV: PlugSurfing

The model of the Network Orchestrator then was applied by PlugSurfing to one of the biggest problems in E-Mobility: charging your car at every charging station. In hindsight, too, it is clear that the traditional companies who were making the first transition to EV were doing so with an investment focus on asset building. Across Europe, charging networks were being rolled out from the likes of RWE (Now Innogy), Vattenfall, Fortum and Eneco, as well as many smaller local utilities such as the German 'Stadtwerke' (local utilities). Often costing millions of Euros, these charging points that began to furnish our public spaces could be seen as a leap into the bright future, a new dawn of technology facilitating an emission-free mobility. While an appropriate focus on the location, appearance and maintenance of these charging points was evident, however, the question of access for the 'users' of these new electric cars does not appear to have been on the radar.

The result was a product which could be described as very inconvenient if not almost inaccessible. There was no coherent service, user-friendly central database or standardisation for users to locate the charging point when they had a flat-battery, and, even if they knew where the charging points were, authorizing and paying for charging at these points was a jungle. Without anyone to play the

² <https://hbr.org/2014/11/what-airbnb-uber-and-alibaba-have-in-common>

Network Orchestrator role of providing easy access, a situation emerged in which drivers needed to register with each charging point operator separately, resulting in a need to sign 70 contracts before being able to charge at all the infrastructure in Germany (let alone across Europe). Subsequently, the price for charging was hugely opaque as each charging network produced its own tariff scheme and units of measurement (time, kWh, both etc.). As German magazine “Der Spiegel” noted in 2013³, ‘As if this chaos were not enough, there is a lack of a uniform payment system for charging on the road - as a customer, you cannot charge at all the charging points’.

Those companies who did at least see an opportunity in providing access, did so in a manner which was not focused on the customer interface. They created cumbersome and out-dated apps, poor roaming schemes and online portals. Therefore, they were choosing not to concentrate on the one area which modern day business models highlighted as the key driver for generating value: a convenient and trustworthy user experience.

PlugSurfing as a Network Orchestrator

In seeing this vacant role in the charging value chain, the founders of PlugSurfing set to work in creating a product that would connect more users to charging points, and more charging point operators to users. The team developed an app with an embedded map to find charging points and a billing engine to process financial transactions for electric car charging. By June 2014, PlugSurfing’s minimum viable product (MVP) was launched; it featured:

- An app connected to a billing engine (allowing payment by credit card and PayPal)
- Google maps integration displaying the location and availability of charging points
- Connections to 4 Charging Point Operators (CPOs) with 4000 charging points in total

To make the success of the product measurable, they pinpointed three KPIs; these were:

- Amount of user sign ups
- Number of ‘PlugSurfing payable’ charging points’
- Average revenue per user

With the MVP on the market and the founders’ vision in place, the team set their networks to work.

³ „Als wäre dieses Chaos noch nicht genug, fehlt es zudem bislang an einem einheitlichen Bezahlssystem für den Stromstoß unterwegs - als Kunde kann man längst nicht an allen Ladesäulen auftanken“
<http://www.spiegel.de/auto/aktuell/elektroauto-infrastruktur-diverse-stecker-zahlreiche-bezahlssysteme-a-930582.html>

Setting the PlugSurfing Networks to work:

Learning from the experiences of the user is fundamental to the success of a Network Orchestrator.

Deciding on a bottom-up strategy therefore, the team identified two types of user:

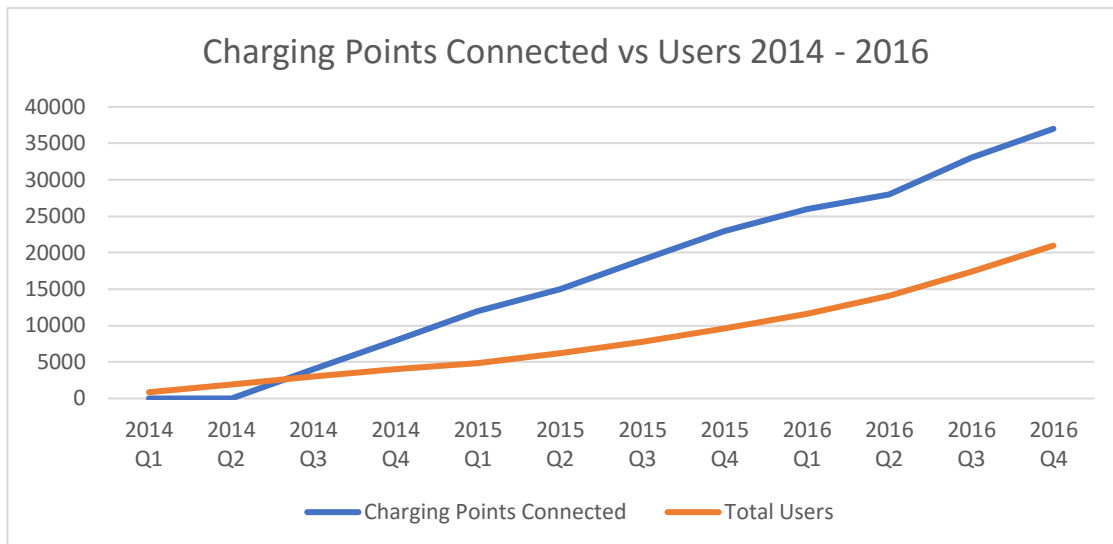
- i. The pioneering private user (early adopters) who would be eager to share his/her experiences with the company.
- ii. Fleet users who would more quickly provide a larger volume of drivers, yet would require more intensive business development from a team with limited resources.

Opting first-of-all for the private pioneer, the next step was to engage them into action and learn from their experiences. To accomplish this, PlugSurfing selected 10 fanatic EV drivers to become its “friendly user base”. They received certain benefits including free charging and an opportunity to shape the product. In return, they would be ambassadors for PlugSurfing both online and offline, communicating in forums and in person that PlugSurfing was either better than other services or, at least, that the founders were willing to learn to ensure that it would become so. Additionally, it was requested that the users approach other charging point networks and asked them to make their own charging points available on PlugSurfing (PlugSurfing in turn would integrate the charging points for free and make them accessible to other EV drivers). Therefore, by engaging with these friendly users, PlugSurfing earned a positive reputation among users and prospects overall, an increased sign-up rate and more partnerships with Charging Point Operators. The only cost to the bootstrapped start-up was the charging bill for 10 users, which in total came in at approximately €500 overall.

Although a good start, obviously the private drivers did not make a large enough target audience for the company to achieve its revenue projections. Rather, they functioned as a foundation on which future growth could emerge.

The second group of users, the fleets, were to have a much higher multiplier effect. These user groups can yield hundreds of drivers with the signing of one contract, and are likely to continue to expand their fleets to include a growing base of electric vehicles. With each new fleet signing up, PlugSurfing's user network was becoming bigger and more influential. With an “army” of users at its side, the start-up was more likely to be promoted at and achieve an integration with all of Europe's charging point networks.

In turn, PlugSurfing's product was becoming more valuable the more charging points that it provided access to. The virtuous spiral that the founders envisaged of the product drawing users, and the users developing the product, was beginning to emerge. Below are graphs demonstrating the growth in two of PlugSurfing's KPIs: number of accessible charging points and number of user sign ups.



PlugSurfing metrics of number of charging points connected and total number of users. By creating value for the two 'networks', the two metrics push each other upwards with minimal cost to the Network Orchestrator (PlugSurfing).

The approach is also showing positive results in terms of revenue with annual turnover doubling year-on-year since the company's inception in 2012.

This success, fuelled initially by focusing on the user interface and understanding the importance of access, influenced every aspect of the start-up, including the recruitment policy the founders put in place to scale the business. Unlike the traditional corporations from which PlugSurfing differentiated themselves, the founders sought to recruit staff who fulfilled only two criteria above academic or institutionalised qualifications. These criteria were:

- i. Soft skills: Is the candidate a socially likable person who can relate to different groups of people? Using soft skills, these individuals can make others feel comfortable, drawing them into their network, motivating them and encouraging them to share goals. This was vital with both PlugSurfing's users and its partner Charging Point Operators.
- ii. Results driven: Instead of being process-oriented and expecting to hide among hierarchical decision-making structures, successful candidates would be ambitious 'go-getters'. The founders believed that to be a successful Network Orchestrator, it was necessary that team members would feel comfortable in being empowered to make the decisions that would affect their role. This would require a strong capability of self-management and the ability to learn fast, as well as a freedom to make (and correct) mistakes while experimenting.

Creating Efficiencies for Charging Point Operators & Users

The role of the Network Orchestrator can only be successful if efficiencies are created for all of the networks which it connects. PlugSurfing, for example, facilitates the process of CPOs marketing their charging networks and users finding them, but it also creates real cost savings in the billing processes of the partner CPOs.

It is arguably through the billing process that PlugSurfing supports its partners the most by allowing them to reduce their billing costs to zero. This is achieved through PlugSurfing's pay-out procedure which shifts the administration and cost of billing to the Network Orchestrator who is able to centralise the process for all its partners and therefore reduce overall cost via a huge scalability.

This creates a revenue stream for PlugSurfing (in terms of a transaction fee) and reduces the burden of micro-billing in a way which no other player in the value chain would be able to manage. If each CPO, for example, decided to bill its users separately, then a user in a city such as Berlin could expect to receive up to 5 different bills per month just for car charging. Consequently, billing costs would be 5 times higher. Applying this logic to the 70 charging point operators in Germany alone would not only make it economically unviable, but also create chaos.

The Network Orchestrator approach, on the other hand, allows for a deep understanding of the user. With PlugSurfing, all customer types are considered (private, fleet etc.), as well as all car models, battery sizes and the idiosyncrasies of each CPO (should the user plug in first or authenticate first, for example). This helicopter view of the market allows for an overarching user interface, exactly the way the customer and the market needs it.

Conclusion

The traditional industries face disruptive challenges because of innovations like the mobile internet, electrification of transport and the switch from fossil to renewable energy. These massive changes create opportunities for new business models, new mentalities and new profitable growth models. The Network Orchestrator concept is a clear example of how disruptive new business models can be. Airbnb, Uber and Alibaba or the German Check24 are the best examples here.

PlugSurfing applied the same model to the world of electric vehicle charging. They are proving that rather than a high budget and a specialist workforce you can achieve just as much or even more by having the right approach, which is almost entirely focused on the needs of the emerging xEV customers. Instead of owning assets or controlling processes, they enable others to achieve their goals on assets owned by other stakeholders than the Network Orchestrator. In other words: the

entire xEV charging value chain is redefined and structured much more efficiently. With success stories like Airbnb and Uber in the back of our heads, it is clear PlugSurfing is having an innovative and modern approach to solve one of the largest problems for fast penetration of electric cars: a virtually unified charging infrastructure, which is ubiquitous and accessible to all customers in an utmost convenient and trustworthy way.

About the authors:

Dr Gregor Matthies

Advisor to Bain & Co. & Earlybird VC and angel investor in mobility ventures

gregor.matthies@gmail.com

Dr. Matthies is a long time follower and investor in cleantech and mobility startups, including Ubitricity, Fleetster and PlugSurfing. He is a strong believer in digital solutions to transform the automotive and utility industry.

Dr Jan Traenckner

Entrepreneur and independent expert & advisor for E-mobility

jt@venturecheck.com

Dr. Traenckner has been active in automotive for decades and is keeping an close eye on the challenges the automotive industry is facing in the light of electrification and autonomous driving.