Did we just reach the Mobility sector Data Marketplaces tipping point?

Challenges and opportunities for the way forward

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Smart mobility is reaching an inflection point driven by three **market and societal** developments: **A. electro-mobility** which is finally entering the mainstream, **B.** car (and infrastructure) **connectivity** being leveraged beyond its originally intended uses such as infotainment and optimized navigation and C. **demand for cleaner air** in cities and communities

There is a multitude of contributing factors to this rapidly developing field. Connectivity, for instance, combined with advances in sensor technology, are driving paradigm shift towards a crowdsourcing cross domain data-driven smart mobility and related new services for energy efficiency, usage-based insurance, parking, retail, maintenance, and radically new ways to source green energy, pay for it and provide energy flexibility services to grid operators.

Automated Driving is expected to progress significantly towards a high level of automation (e.g. SAE Level 4) thanks to the significant amount of data received from a wide range of sensors providing situational awareness to self-driving functions. Automated driving will also pave the way for new, data-driven, services.

"To build or not to build" the smart mobility cross-domain market places is not a question anymore. How should it be structured, what are the remaining technology and governance gaps to be addressed before reaching wide-scale deployments and what synergies will it have with smart cities, smart energy marketplaces and beyond?, etc. are key question the public and private sector need to address to expedite the deployment pace.

Those questions have been addressed by a workshop co-organised by ERTICO, EC and AIOTI in conjunction with the ITS European congress, Eindhoven, 2019.

Which applications and cross-cutting use cases are driving the need for data marketplaces?

Similar to the Internet development, it's not feasible to predict the future applications or use cases that innovators will come-up with, as long as the infrastructure is built in a user-centric, components reuse and fair sharing of revenue streams in mind. The workshop did however address a number of use cases from innovative scale-ups with good potential for market impact.

Some pilot use cases are explored to accelerate deployment of EV charging points related to housing companies, smart mobility stations, private parking space providers (like railway stations, retail, commercial parking space operators, etc.) smart districts, smart lighting, etc.

Another number of use case relate to maximising the use of renewables and trading flexibility with the energy providers who need to shape demand during peak hours.

Who are the actors of the data market place?

In a previous blog and related whitepaper, we highlighted a set of high level architecture (HLA) principles to unlock IoT enabled data market places. In this HLA, we depicted a set of actors which include data producers, data consumers and data market place providers (which could combine data aggregation and data lake functions).

Smart Cities, where a number of technological factors play an important role in addressing mobility, environmental protection and quality of life aspects, are and will increasingly play an integral part of data marketplaces of all kind. The internet of things has allowed modern IoT enabled cities to collect vast amounts of data, illustrating the concept of the Internet of Everything. But the true value of the data generated and collected can only be realised if a data governance and sharing strategy contribute to proliferating new services across sectors such as energy, mobility, health, etc. Today, Smart Cities are confronted with increasing challenges to meet emerging policy requirements pertaining to climate, environment, transport and energy. IoT has the potential to break the siloes but requires mobilisation of stakeholders and creation of services to cut across different sectors like home and building, parking space providers, EV charging, energy operators, public transport, retail or car sharing etc. To meet the mobility challenges, e.g. especially in terms of coverage of EV charging stations, a public and private investment would be desired. Open and dynamic marketplace mechanisms are instrumental to mobilize the resources around the city and bring together innovators, platform providers and grid operators, e.g to meet capacity for EV charging.
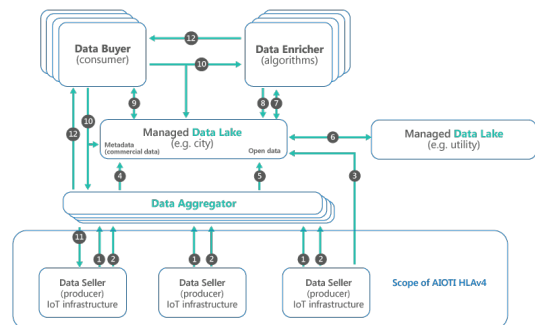
High level architecture of data marketplace, source AIOTI whitepaper

When it comes to smart and electro-mobility, the actors could be described as follows:

- **Data sellers or producers:** include citizens (with mobile apps), automotive OEMs, mobility and fleet management service providers, EV charging solutions providers or operators, decentralised power suppliers, smart cities, energy grid operators and new actors, such as aggregators evolving within the energy transition paradigm.

- **Data buyers or consumers:** include potentially all of the above players, in addition to the new start-ups and agile entrepreneurs and application developers, home and building energy management services providers, renewable energy generators and public sector services providers etc. The data buyers will typically use processed and context enriched data to further value creation and to provide value to end users, while generating new revenue streams. Examples of new revenue streams include responding to grid operators' services requests for flexibility, prediction of the formation of potholes and the whole area of user-enriched mapping.

- **Data marketplace:** similar to digital marketplaces, data marketplaces connect together data producers and data consumers with different options for financial settlements and the range of value-added services provided. Data marketplace providers would typically incentivise the data producers to continue producing quality data of interest to data buyers. The marketplaces would also accommodate the evolving services and data sets according to the needs. Neutrality of marketplaces is a key for active participation and balancing of value creation, unlocking complementary services and pushing the demand curve upwards.

> The workshop involved several service providers who could equally be data buyers or sellers: Charge & Share, Bovnet, Jedlix. Other not present, were also mentioned to illustrate market trends: Otonomo, CLEM.

Market drivers

The market drivers for the emergence of data marketplaces are:

- Most data consumers are unlikely to be able to establish direct business relationship with data producers. Having a single or limited number of stop-shops to acquire data will be key for creating a level playing market around small and large players.

- Most data producers (e.g. OEM) oftentimes do not collect enough volumes of data to create added value for the data consumers. For a set of data to become relevant to data consumers it must be covering a wide scope, which may not be feasible for a single OEM to deliver. Most data producers understand **coopetition** (competing and collaborating at the same time) will be key to reach the required economy of scale for the mobility data market to take-off. Such minimal scale could be created through a neutral host model, a federation or a hybrid approach described in the next sections.

Mobility (and e-mobility) is too big to be dominated by a single player!

While we make a case in the previous section for minimal critical mass for data marketplaces to become attractive, mobility is too big to be dominated by a single player especially in cross domain setups where interactions between platforms and data marketplaces will be a business imperative. Additionally, there must be a choice for the user to change the service provider.

Given the strong competition in the automotive market, no central platform owner could provide seamless charging service at scale. 'A walled garden will not scale and reach critical mass'.

Possible business models

- **Neutral host:** assumes a neutral entity, not specifically owned by any of the data producers or consumers, is responsible for collecting the data, sharing the data and managing the data lifecycle according to user consent and applicable regulations. The ownership of the neutral host service provider could be a joint venture between stakeholders including, OEMs, cities, transportation, etc. this model may speak in favour of **coopetition** (cooperating and competing at the same time) which is a key for the success of a data driven mobility.
- **Federated data market place:** assumes multiple data marketplaces share and mirror metadata (information about data) allowing any user to discover data-sets stored in third parties' marketplaces and eventually acquiring them without being directly affiliated with that market place. This model has been extensively developed in this AIOTI whitepaper.
- **Hybrid data market place:** assumes both of the previous models where for example a neutral host could be implemented for mobility while a federation approach would allow to "access" data sets from other sectors like for instance energy and smart cities data marketplaces.

Market inhibitors and gaps

Several SMEs having attended the workshop have already commercial solutions but are all in early phase. Providers have no clear agenda to offer seamless services for EV charging (e.g. EV charging, parking, seamless payment, tuned to flexible demand response, navigation and reservation, POI) and none have clear ambition to scale. Inhibitors for scaling are in particular the lack of common standards (though there may be existing too many) or the fragmentation of platforms related to eMobility. Complications were highlighted related to meeting GDPR requirements, being compliant to an increasing number of standards imposed, an underlying heterogeneous HW for charging control (e.g. voltage, max power, bidirectional, ..) and speed of installations.

The workshop discussed a number of gaps and inhibitors, those are highlighted in the following radar-style figure.

market inhibitors (5=high, 0=low)
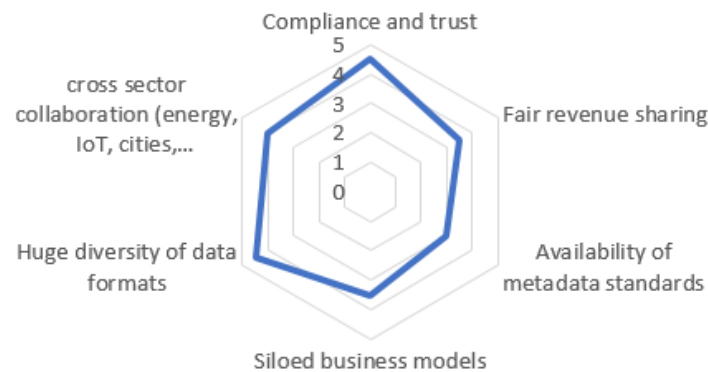
- **Compliance and trust:** building cross domain applications, privacy protection for both personal and non-personal data becomes very challenging at the technical level. Several solutions have been explored at length by academia, but their wide scale implementation did not enter the mainstream yet. Users have also lost some trust in service providers but the situation is changing since GDPR entered into force.

- **Cross sector collaboration:** energy, ICT, IoT and smart cities have traditionally focused on their own needs without paying much attention to cross sector collaboration. Building successful marketplaces supporting the EU digital single market will need increased collaboration because eventually a big proportion of use cases will be cross sectors.

- **Diversity of data formats:** different data formats have proven to prevent cost efficient integration at scale. All vendors claim to have RESTful API, but their own. The market needs to solve data interoperability issues through a limited number of APIs and data models. Eventually when more experience is built, regulation can help in order to reduce the number of possible options.

- **Siloed business models:** Working in isolation, the mobility sector may not be capable of transforming mobility and bringing new services to consumers, the same applies to the energy, smart cities, etc. This transformation will call for the all the sectors to cooperate and compete at the same time (coopetition). Interacting and learning from experiences of successful cross-sector marketplaces, creating interfaces with other marketplaces and collaborate extensively with technology providers and connectivity providers will be essential to move beyond a siloed approach.

- **Availability of metadata standards:** data proliferation argues for the need of metadata, an approach to describe what the data is about and what it could be used for. The buyer must have A. the means to discover accurately data and B. understand its value and intended use. This is the role of meta data standards.

- **Fair revenue sharing:** building data marketplaces would need creating the conditions for fair revenue sharing models and avoiding new monopolies. As we build operational experience with data marketplaces, this aspect needs particular attention from a governance and policy making perspective.

Recommendations and next steps:

This whitepaper recommends joint efforts and collaboration across different ecosystems to address the actual needs for the Digital Transformation in the domain of Mobility of persons and goods and in particular to sustain the deployment of electro-mobility. The paper seeks to trigger discussion among different stakeholders (those that were present during the workshop and beyond) and collect feedback from a wider stakeholder audience to provide their own recommendations.

Associations such as ERTICO and AIOTI in collaboration with EC should jointly take measures to address remaining roadblocks to break silos between climate, energy and mobility, both in terms of technical gaps, infrastructure needs and policy support. Some subjects are already being addressed: e.g. creating metadata standards with the Open Geospatial Consortium.

The network effects of the well-functioning data marketplaces hold great promise for combing solutions in many powerful ways. Unlocking agents of liquidity of data for improving physical infrastructures, paving way for autonomous driving, while building better cities and securing clean air are all worth our collective efforts and should include both public and private sector actions.

We welcome the discussion on the stages of IoT Marketplaces in Mobility at the upcoming IoT week workshop in Aarhus, June 2019.