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Paradigm shift?

The Automotive Industry in Transition

**Autonomous vehicle for flexible public transportation systems:
towards a shared on demand mobility**

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Abstract

The paradigm shift notion was created by Thomas Kuhn (1962) as a way to describe major disruptions responsible to *Scientific Revolutions*. For Kuhn, a “paradigm” designates as well knowledge, methodology and technics, as models, beliefs and values, all elements shared by the members of the community anchored in a philosophical and theoretical framework within which theories, laws, and generalizations and the experiments performed in support of them are formulated. Experiencing a paradigm shift obliges the whole community to think different and build a new philosophical, theoretical and operational framework.

Is the automotive industry going through a paradigm shift? Can we now describe major disruptions in technology, value chain and uses that may allow us to talk about a revolution?

In her book, the Automobile Revolution, Attias D. (2017) clearly presents how the complexity of the automotive sector has dramatically grown in the last 10 years, thanks to technology disruptions as well as regulation’s changes and transformations in users’ behavior.

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This tryptic technology / regulation / uses is probably the corner stone of deep mutations in the automobile industry giving the impulsion for a real paradigm shift opening to a new mobility paradigm.

The new mobility paradigm links companies, policy makers, and a new type of customer called “next-generation consumers” or “next-gen consumers” (Firnkor, Muller, 2015) that demand more durable, efficient and cheap mobility, are ready to play by the rules of the circular economy, replacing possession by use and are looking for mobility on demand.

In the new mobility paradigm, autonomous vehicle play a major role (Buehler, Iagnemma, and S. Singh, 2009; Eskandarian, 2012; Attias, 2017), mainly for urban mobility, allowing to increased safety, as the automation reduces the effects of human errors, productivity, as humans may work instead of driving, and traffic efficiency by lowering congestion, as automated vehicles can platoon (ie precisely monitor one another’s position and coordinate their motion).

The most revolutionary impact of the autonomous vehicle will probably be on collective public transports: by introducing on demand mobility in collective public transport, it will so deeply transform collective transport uses and business models that we’ll undoubtedly attend to a real paradigm shift.

The implementation of autonomous collective transport is building the framework for the mobility revolution, because it involves numerous actors in very diverse fields, and forces policy makers to tackle huge problems as complex as insurance regulation, personal data collection, and energy and communication networks administration, fleet management, along with the emergence of new business models in the smart city context. Indeed smart cities and the new mobility are not only related, they also share the same DNA, as they are both a combination of technology push and demand pull (Angelidou, 2015).

In the urban area, collective transport will be organized differently in the forthcoming mobility system, which will be much more multimodal than it used to be as yet. In the near future, new economic models will connect the fourfold product-service-structure-market to the new mobility technologies and to the societal shift towards sharing, or the circular economy, sustained by digital technologies. This evolution is leading to responsible and sustainable mobility in connection with the development of smart cities (Attias, Mira Bonnardel, 2017).

Indeed, as RethinkX’s report states: *“by 2030, within 10 years of regulatory approval of autonomous vehicles (AVs), 95% of passenger miles traveled will be served by on-demand autonomous electric vehicles owned by fleets, not individuals, in a new business model called ‘transport-as-a-service’ (TaaS)”*.

The development of TaaS and smart mobility is the key to the transformations cities will have to perform by combining technology into specific local models, such as dynamic traffic management, and extended multi-modalities. But *“the management of urban transport flows is*

part of a much larger issue in that, in the context described above, aims to reorganize the infrastructures that make up towns, enrich the services delivered to their inhabitants and, beyond that, involve those inhabitants in their co-production” (Geoffron, 2017). Inhabitants are becoming prosumers, i.e. both producers and consumers.

Interactions between autonomous connected vehicles and smart cities are twofold: on the one hand, the automotive industry will influence the shape of mobility patterns, and on the other hand, public policies will organize the urban space within the new mobility paradigm, offering multi-modal mobility (Kellerman, 2011). From an economic perspective, this multimodal mobility will offer a wide range of new business models.

The objective of our research is to present how the tryptic technology / regulation / uses will shape a new disruptive collective transport system. In this paper we specifically present the uses by analyzing an experience conducted since 2016 in Lyon with an autonomous shuttle, Navly, which circulates in the city center. 300 users of the autonomous shuttle were interviewed in 2018 and expressed their feelings about their uses of the shuttle. We present the main results of this survey. This quantitative analysis illustrates the change of the concept of public transport and enriches our current thinking.

Our research project takes place in the context of the European project Avenue³ (Autonomous Vehicles to Evolve to a New Urban Experience). Within the project, we analyze data that will allow us to present a prospective view for the future of collective transport.

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³ <https://h2020-avenue.eu/>

The aim of the Avenue project is to create disruptive public transport services based on on-demand, environmentally friendly, affordable and inclusive public transport. The project includes the main trends in the future for transport such as electric and self-drive vehicles, car connectivity, digitalization and sharing economy. The test sites for the autonomous e-minibuses are located in four European cities: Lyon, Geneva, Luxembourg, Copenhagen and 3 further replicator cities. The project runs from April/2018 to April 2022

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