From Electromobility to Autonomous Mobility in Europe: What Have We Learned? What Is Ahead?

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THE INNOVATION MANAGEMENT RESEARCH PROGRAM AT CRG STRONG ANCHORING IN AUTOMOTIVE FIELD, ON GOING RESEARCH PROGRAM ON EV AND AUTONOMOUS MOBILITY (R. MANIAK & C. MIDLER)

6 doctoral researches

- *The engineering of the deployment of a disruptive platform, the EV case* F. Von Pechmann (C. Midler supervisor) [2014]
- *Strategies and Management of Disruptive Innovation in Emerging Countries - The case of Electric Vehicles in China* B. Chen (C. Midler supervisor) [2018]
- *Systemic innovation management and strategies in the digital age : the case of the mobility industry* G.Marcocchia (R Maniak supervisor) [ongoing]
- *The Development of Electric Mobility System in Indian cities in the next 10 years* H.Sawamura (J. Ruet supervisor) [ongoing]
- *Managing ambidextrous programs: the case of autonomous mobility* T. de Campigneulles (C. Midler and R. Maniak supervisors) [ongoing]
- *Technological breakthroughs and industrial dynamics, the EV case* M.Alochet (C. Midler supervisor) [ongoing]

FROM ELECTROMOBILITY TO AUTONOMOUS MOBILITY IN EUROPE: WHAT HAVE WE LEARNED? WHAT IS AHEAD?

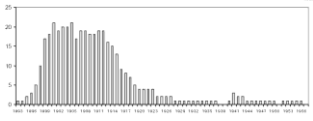
AGENDA

1. **The rise of Battery Electric Vehicle in Europe: the deployment of a systemic disruptive innovation**
   - **A quick historical perspective**
   - **The dynamics of bottlenecks in BEV deployment**
   - **Managing systemic disruptive innovation: learnings from BEV case**
2. **the Autonomous Mobility Challenge: a triple transition and uncertainties for car industry**
   - **A technology transition from internal combustion engine to electric motorization, connectivity, artificial intelligence.**
   - **A business model transition from a B to C product centric to a B to B to C autonomous mobility service business model.**
   - **An ecosystem transition from an established ICE value chain.**
3. **Managing the Autonomous Mobility challenges**
   - **From stage-gate project portfolio management to *ambidextrous program management***
   - **From innovating among the stabilized value chain to *exploring in an emerging eco-system***
   - **From home centric R&D to *worldwide exploration & experiment field***

A BRIEF HISTORY OF EV DEPLOYMENT IN EUROPE

- The early days of automobile: a promising start, victim of the dominant design of internal combustion vehicles

Nbr of EV manufacturers between 1893 et 1956



- **The 1970's and 1980's: time for renewal of R&D efforts from OEM, with the help of public programs**

80 electrified Renault 4 and Renault 5 in the first EDF test feet

Few Electrified 205 by Peugeot

- **The 1990's turn: the market emergence at last?**

Statistiques d'immatriculations des véhicules électriques neufs en France depuis 1993

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Total	276	230	330	1304	727	1361	1360	1046	405	7059

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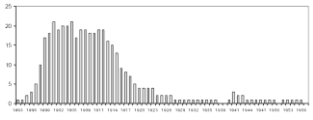

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- **2002 2008 : Consumer market failure but public supported fleet**

2003	2004	2005	2006	2007	2008	2009	2010
500	700	900	1500	5000	8000	11000	15000

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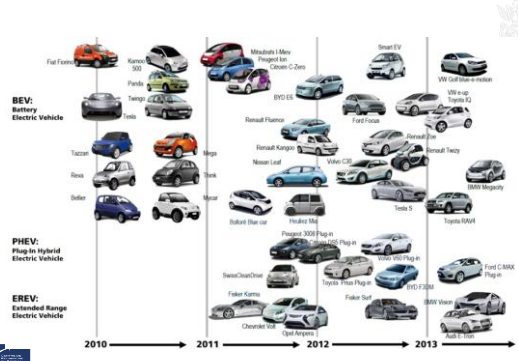
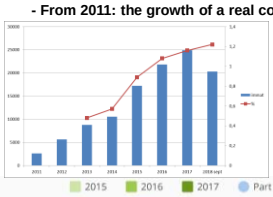
- **from 2011 : a real diversified offer emerges on European market**



- From 2011: the growth of a real consumer market in Europe at last

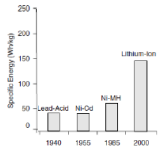


BEV AND PHEV sold in France 2015 2017

The on-going explosion (TOP 5 Europe)

Analysing the dynamics in EV deployment 1/5:
In the 1990 and early 2000's: Battery and Product value bottleneck.

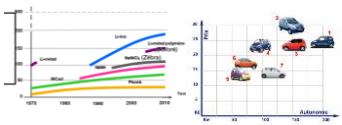
- **A battery technology bottleneck : range and cost**

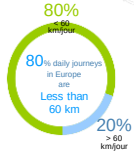


- **A deceptive product offer: electrified ICE cars cannot compete with ICE**

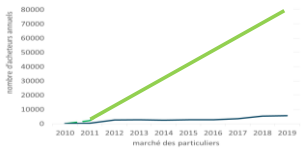
Analysing the dynamics in EV deployment 2/5:
From 2011: a market raise much slower than expected.

- **Real diversified and valuable product offer**
- **The battery range: no more a bottleneck… theorically**





- **But still far from initial market dynamic expectations:**



Analysing the dynamics in EV deployment 3/5:
The customer learning bottleneck.

Public does not know about the real value of EV

The key role of field experiments and early niche markets







Milano experiment
German experiments: Hornburg, RWE-ADAM
SAVE
Vert experiment : La Réunion
Taxi Market
Ioniq : first mass market
Denmark second mass market

Analysing the dynamics in EV deployment 3/5:
The customer learning bottleneck.

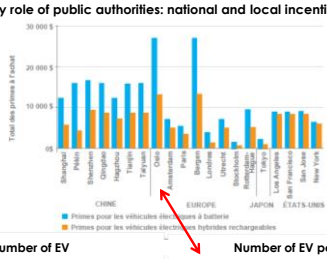
Public does not know about the real value of EV

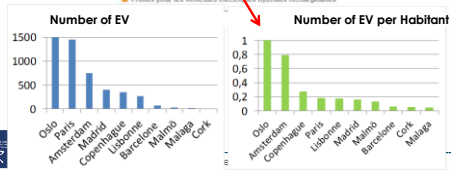
The key role of field experiments and early niche markets

And deeply transform the usual marketing and sales practices to adapt the customer experience to the specificity of EV innovation

Analysing the dynamics in EV deployment 3/5:
The total cost of ownership (TCO) bottleneck.

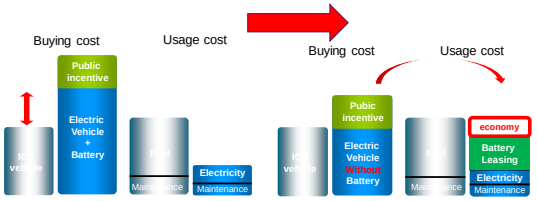
- **The key role of public authorities: national and local incentives**





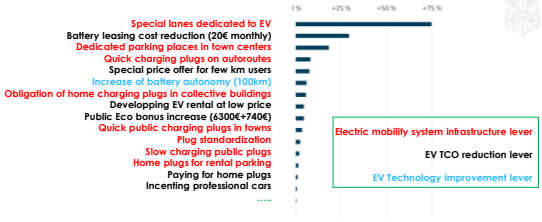
Analysing the dynamics in EV deployment 3/5:
The total cost of ownership (TCO) bottleneck.

- The key role of public authorities: national and local incentives
- Changing the economic model of BEV : the Renault Zoe case



Analysing the dynamics in EV deployment 4/5:
The electric mobility system bottleneck.

Impact of a specific levers on global EV customer sales in French Market



Felix von Pechmann (2014) 14

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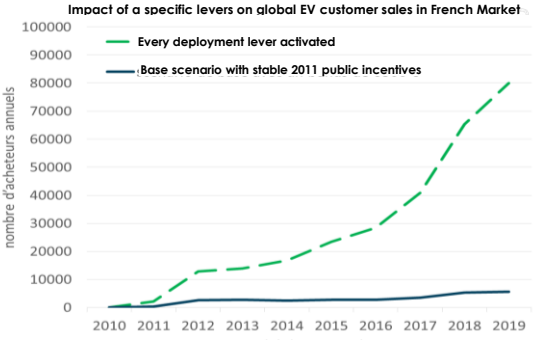

Felix von Pechmann (2014) 15

Analysing the dynamics in EV deployment 4/5:
The electric mobility system bottleneck.

- **Reorienting public incentives from R&D and final customer to EV infrastructure deployment**

Analysing the dynamics in EV deployment 4/5:
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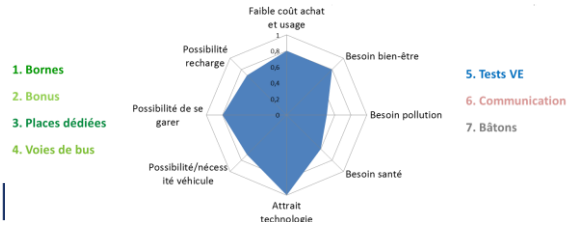
- **Reorienting public incentives from final customer to EV infrastructure deployment**

- **Reorienting the OEM sales and marketing practices from B to C to B to Mobility Prescribers to C**



What have we learn from EV dynamics?

EV is a systemic disruptive innovation transition

1. **The Radicality of the transition (from featuring capability within to dominant design disruptive changes)**
2. **The perimeter of the change (from product centric to mobility system transition)**
3. **The massive scale of the projects (from POC, prototypes and experiments to massive industrial development)**
4. **The speed of the transitions (from sequential cautious stage-gate processes to ambitious market deadlines)**
5. **The need to carry out these transitions while maintaining the existing activity (ambidextrous strategies and organizations)**

What have we learned from EV dynamics?

Managing such transition needs different innovation processes than usual new innovative product development

1. **The radicality of the transition**
   - « Electrified ICE » not enough value
   - Need a global redesign of product
   - And a new business model to compete dominant
2. **The perime** … roduct:
   - To engineer the related electromobility system
   - To manage all the components of new Electric mobility ecosystem
3. **The massive scale of deployment**
   - Strategic commitment to the « real size » move unlocked the technological, market and regulation dynamics
4. **The speed of the transitions**
   - // anticipation of various levers (product AND customer learning AND infrastructure with field experiments.
   - The first movers are far ahead now BUT
   - We are now in the « Tornado » period where new generation offers emerge rapidly, based on the confidence of real massive market. Leapfrogging is possible
5. **The ambidexterity strategy**
   - Autonomous empowered units, high sponsoring and « ambidextrous program management » to coordinate the diverse concurrent learnings
   - The first massive step generally preserve the existing industrial footprint

An efficient management of such systemic disruption needs to address those 5 different challenges concurrently

Autonomous Mobility: an even more challenging transition !!

1. **The radicality of the transition**
   - Techno : Electrified + connected + intelligent
   - Business model:
   - Value for customer ?
   - product => service
2. **The perimeter of the change**
   - Product+infrastructure+mobility system operating
   - New ecosystem: tech+service providers+public authorities….
   - New competitors from outside auto
3. **The massive scale of deployment**
   - Billion size investments in many global OEM
   - World wide transition
4. **The speed of the transitions**
   - Impressive strategic comitments on AM
     - BMW: highly and fully automated driving by 2021
     - Ford: Level 4 vehicle in 2021
     - Hyundai: fully AM for highway in 2020 and urban in 2030
     - Renault: fully AM in 2020
     - Nissan : fully AM by 2022
     - Toyota : 2020 Highway, 2022 City
     - Volvo : fully autonomously on the highway by 2021.
5. **The ambidexterity strategies**
   - Strategic ambiguity:
   - Upgraded ADAS for classic B to C product
   - Shift to robotised mobility service

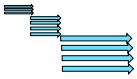
Call for a new innovation management process!!

Traditional auto R&D process		Ambidextrous program management
• Product centric	→	• Mobility system centric

Call for a new innovation management process!!

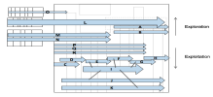
Traditional auto R&D process

- Product centric
- Sequential Stage Gate between homogeneous projects portfolios



Ambidextrous program management

- Mobility system centric
- Program coordination between heterogeneous projects



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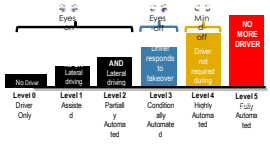
- The ambidexterity strategies
  - B to C sustaining innovation strategic vision



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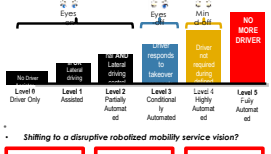

- *Shifting to a disruptive robotized mobility service vision?*

CONCLUSIVE REMARKS

- **On going transition is a new game for automobile industry**
  - Systemic disruptive innovation
  - Incombents are well placed but need to adopt ambidextrous strategies
- **This transition calls for deeply renewing the innovation management processes**
  - Installed sequential stage gate process cannot meet the new game
  - Hierarchical supply chain management is not fitted to manage heterogeneous and unstable eco-système
  - Ambidextrous program management is a potential candidate
- **Next step**
  - Carry out a global survey to map the various forms of learning tracks and ambidexterity choices

Thanks,

Questions ?