Shaping the impacts of new technologies:

A Call for New European Mobility Policies

Final Report

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For Rebecca Harms MEP

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1. SUMMARY

Summary

For a century, technologies in the transport sector have essentially remained the same. The use of private cars dominated our lives, our cities, our landscapes, our economies and our imagination. For decades, the arguments in the transport debate have also essentially remained the same. Environmentalists, consumers, spatial planners and public transport have been in opposition to a mighty car industry, only slowly shifting perceptions and behaviours, but preparing the terrain for deeper change.

Today, two new factors require a completely new approach and offer the opportunity to overcome ritual partisanship: the availability of new technologies and new actors in the international competition.

The present report aims at promoting a debate on innovative EU policies in the field of transport and mobility. An urgent debate, as the results show: The transformation of the transport system and of mobility behaviours may be more rapid and far-reaching than most people believe. To reap potential environmental and social benefits and to manage inevitable problems, the development of appropriate regulatory frameworks is essential and a challenging task.

In Chapter 2, the report provides short impressions of the speed of change and resulting challenges. Based on a system analysis of technology innovation, the transport system and its societal dimensions (summarised in Appendix I), the report then focuses on the political force field involving the drivers of change and a variety of actors (Chapter 3). Finally, in Chapter 4, it identifies key elements of appropriate new European mobility policies.

Strong drivers for a deep transformation of the transport system

A first driver are fundamental technical innovations : electric vehicles, driverless vehicles and sharing platforms. All promising less pollution, less climate change, cheaper transport, higher efficiency, more comfort, more safety. A second driver is international competition: Emerging economies and IT companies are new and determined players in the game. A third driver is urbanisation: growing dense conurbations call for more space efficient mobility.

The speed of change is hard to predict, but we need to be prepared for disruptive changes within the next ten years. While each of these drivers pushes for change, the economics of their combination may be irresistible: When driverless electric vehicle fleets for passengers and freight, flexibly organised through sharing platforms, can provide relatively clean and comfortable transport at less than half the present cost, those who try to defend the incumbent system will not be able to resist for long. China makes huge efforts to build a globally leading vehicle industry based on these new technologies. European and US car makers and governments have lost their power to control the agenda.

Delaying change is no option for Europe

Given the outstanding importance of the automotive industry for European economies, Europe has much to lose in this transformation. Vested interests in old technologies, the jobs of millions of drivers, the difficulties of adapting the existing mobility system to new structures – all these all are tempting arguments for trying to slow down change.

But by moving too slow, European car industries may be seriously threatened in their existence and other European industries may suffer as well.

The objectives of new European mobility policies must therefore be twofold:

- to realise the potential environmental, economic and social benefits of new technologies and
- to maintain the strength of the mobility sector

This requires a far-sighted, sophisticated approach and – as there will be winners and losers - will not be possible without some pain.

Attractive transformation paths of the mobility system

Starting from present dominant transportation modes, we can conceive a number of different transformation paths, which all follow three basic trends : low tech to high tech; products to services; low density to high density. Of particular interest are transformation paths substituting present combustion engine cars and trucks for cheaper and environmentally and socially more friendly solutions.

An economically and environmentally beneficial transformation of the present private car may consist of substituting 1) the combustion engine by an electric drivetrain, 2) the driver by an automatic system, 3) private ownership by a publicly accessible fleet 4) individual rides by shared rides, and finally 5) integrating these vehicles in a comfortable seamless intermodal system. It appears that the largest environmental benefits are reaped through electrification (step 1) and shared rides (4), whereas the largest savings occur in the shift to public systems (3) and shared rides (4).

Shifting vehicle ownership and operation from private individuals to publicly accessible and governed ride-sharing systems is therefore a key feature of the transformation. For short distances improved infrastructure may support low-power individual "active" mobility including walking, bicycles, scooters etc.

In long-distance freight transport, economic drivers point into the opposite direction: Substituting conventional trucks with driverless road carriers will strongly reduce transport costs, favour large private fleet operators and make it difficult for rail freight to compete. However, for dense cities, confronted with the growth of online trade, it might become attractive to establish some kind of public freight distribution system, ensuring more efficient last-mile delivery by a small number of operators with specialised low-power vehicles, operating from local hubs.

Problems to be tackled

Considering such an attractive scenario in a larger context, several problems arise.

The shift to electric drivetrains and a declining number of vehicles is a difficult challenge for the European car industry – even if it tries to compensate reduced hardware production by offering mobility services. However, sticking to old technology trajectories may result in a dangerous loss of competitiveness, compromising also the overall innovation capacity of European industries.

Employment losses may even be more serious among drivers of all categories than among highly skilled workers in the car industry. The need for requalification is inevitable in any case and may only be mitigated by developing appropriate programmes in time. Problems may be particularly hard in specific regions – not only in those where automobile production is concentrated but also in those where working as a truck-driver is one of the few remaining occupations.

Another complex issue are the spatial effects of new mobility offerings. Will the gap between metropolitan and peripheral areas grow because mobility services are more profitable with high population density? Will roads be congested by cheap autonomous taxis? Are new services a threat for traditional public transport? These questions are intrinsically linked to the challenge of developing an appropriate regulatory framework for mobility services.

Conditions for the success of European mobility policies

This report concludes that the dual objective explained above can only be reached if European policies succeed to ensure:

1. A rapid shift towards space-efficient flexible mobility services
   – shared use of high-tech high-power vehicles ("passive mobility")
   – a framework for public transport systems
   – more emphasis for individual low-power mobility ("active mobility")
2. A forward looking industrial policy for Europe based on this orientation

The need to develop a new framework for public transport and mobility systems

No special regulations are needed for switching to electric propulsion. Tighter emission norms, however, may speed up the process. The situation is different for driverless vehicles and new passenger mobility services: they need new legislation and permits. Ensuring safety for autonomous vehicles is not enough. As discussions about Uber have shown, traditional rules for taxis and mass transit are not appropriate for services based on the new technologies and business models.

There is an obvious danger, that new private monopolies could dominate the passenger transport sector and optimise their operations for private profit and not for the public good – if they were free to fully exploit network effects and data across all transport functions. Under generous laissez-faire policies, one or two companies might take over the Mobility-as-a-Service market in metropolitan areas, maximise the number of rides, put traditional public transport under heavy pressure, control data on passenger flows essential for public policies, influence passenger itineraries according to commercial interests, dominate the communication infrastructure for autonomous driving and neglect peripheral areas where services are less profitable …

This report argues that traditional monopolistic municipal public transport companies are also no solution for a rapid shift from 20% to perhaps 80% essentially public transport. We need a transport governance structure that ensures that private and publicly owned operators both contribute in providing a seamless system of public transport services. The report calls for learning from the difficult experience of establishing differentiated governance structures in the electricity and telecom markets: Different functions in the overall system must be distinguished, specific markets and market roles must be defined so as to ensure competition, and the pursuit of public interest must be ensured by setting appropriate rules. As we have seen with the different network, railway, telecom etc. authorities, as well as with institutions ruling the financial sector, permanent learning and an independent authority will be essential. Starting to structure mobility markets in this way is extremely urgent as information and communication structures are already being built without a coherent concept defining market roles . Data governance will be a key element in future mobility governance structures.

A forward-looking industrial policy is possible

Decreasing transport costs will reduce turnover in directly transport-related activities – but may trigger growth in other areas. But also in the mobility sector many new activities can be created securing international competitiveness in time, instead of losing mobility markets to non-European competitors.

The transition to more sustainable modes of transport and the shift to a comprehensive publicly governed mobility system opens many new opportunities:

- New kinds of vehicles for efficient and comfortable passenger mobility: for high-speed shared-ride ”passive” mobility and for low-speed self-controlled “active” mobility
- New kinds of vehicles and devices for efficient micro-logistics
- Smart infrastructures including information and navigation systems, freight hubs, comfortable multimodal passenger interchanges, adaptation of roads and useless parking spaces…
- New services for supplying and maintaining transport means, for navigation in all modes, for increasing comfort for passengers in seamless mobility services, including enhanced use of travel time for work and leisure.
- New activities in now peripheral areas….

Modern economies depend on high degrees of multiple rapid interactions. Therefore, despite all new telecommunication opportunities, urban agglomerations are more than ever growth poles attracting increasing shares of the population. Ensuring efficient, comfortable and affordable transport is therefore one of the most effective economic development measures.

Industrial policies envisioning such a transformation require determined and far-sighted action not only at the national level. Coordinated European efforts will be necessary for facilitating active transformation of incumbent industries, speeding up requalification of human capital, encouraging innovation and supporting the emergence of new European champions in an increasingly competitive global context. On the other side we will need much more experimentation at the municipal and regional level for developing models able to give answers to the urgent challenges outlined here.

Most instruments of an effective industry policy are known. However, they are useless if not guided by a joint vision.

Start now to organise a broad European learning process

The challenges outlined in this report are larger and more urgent than the the general public or the political sphere are acknowledging. Rapid developments in transport in mobility affect our personal lives and our economies more directly than the much discussed changes in the electricity sector. We urgently need to start a broad European discussion about joint visions and options and we need to organise an intense mutual learning process for being able to cope with the challenges in time, to seize the opportunities for environmental, social and economic benefits and to avoid severe damages in the European economic tissue and in our ability to control most important infrastructures for everyday life.

2. FIRST IMPRESSIONS: CHANGE IS COMING FAST

Change is faster than expected I

Electric buses:
Shenzen has 14.000 on the streets

By the end of 2017 Shenzen (China) has replaced all diesel buses by electric buses. The Chinese company BYD delivered 80% of the electric buses in the city. Shenzen, a city of 12 million, has achieved the complete switch in 6 years.

E-bikes: Over 250 million e-bikes provide an important share of passenger transport in China

In 2016, 32.8 million e-bikes were sold in the Asia-Pacific region, compared to only 1.6 million in Western Europe (statista). The $ 40 bn business in China is now expanding to other continents. European e-bike manufacturers are complaining about high-pressure imports with dumping prices by Chinese companies.

Change is faster than expected II

Autonomous driving: Industry consensus: Fully autonomous driving available 2021/22

Apple, Google, Samsung, Tencent, NVIDIA, Panasonic, Baidu … Tesla, BMW, Daimler, VW, GM, Nissan, BYD… Continental, ZF, Bosch, Delta… Uber, Lyft, Didi Chuxing…

IT companies, automotive OEM and component manufacturers, transport service companies are spending multi-billion budgets for developing autonomous driving. Time horizons have moved from 2025 to 2021. Waymo is testing raid-hailing vans without driver in Phoenix. GM plans large-scale deployment of self-driving cars in 2019

Estimates for availability of fully autonomous driving: **Nissan: 2020**, **NVIDIA: 2021**, **Panasonic 2022**, **BMW/FiatChrysler/Continental/Intel/Mobileye: 2021, Tesla: 2019, Bosch/Daimler: 2022, GM 2019**

Driverless shuttles, Mobility as a Service (Maas): comfortable,

are key for future urban transport. All major car manufacturers have plans. Most important new brands:

- MOIA by Volkswagen
- E.Go Mover by ZF and e.Go (Germany)
- NAVIYA (France)
- VIA shuttle service by Daimler
- Deutsche Bahn has started tests

Step by step introduction from defined routes to general ride-hailing availability

Change is faster than expected III

Electric utility vehicles:
Already today: lower life-cycle

BYD recently delivered the first electric garbage trucks to the city of Palo Alto. With a range of 120 km, a payload of 8,5 tons and a top speed of 90 km/h it fulfils all requirements. Annual savings are estimated at 16.000$ (at US fuel price, in Europe diesel costs twice as much). Savings through electric drive are more important for commercial vehicles with high utilisation rate than for individual cars which are typically used less than 5% of the time.

Electric and autonomous trucks:
Tesla likely to turn freight transport

Walmart, DHL etc. have already ordered the Tesla Semi: It costs $180,000, has a range of 800km and saves $20,000 p.a. on fuel compared to a diesel truck (cost-$120,000). Tesla is not alone in this market but not matched: BYD, Nikola and others are set to start selling battery or fuel cell semi trucks.
In the US driverless trucks could reduce transport costs by 40%. Point to point autonomous driving is easier than delivery in cities: large market shares can be expected earlier than in passenger or delivery transport.

Change is faster than expected IV

Flying taxi: Airbus Vahana is flying since January 2018, planned to be production-ready by 2020

Airbus is considering various technologies. Airbus' Mathias Thomsen announced at a conference in Paris October 2017, that by 2022 they plan to have a commercial offer with comparable transport costs to rail, much cheaper than conventional taxis.

Several companies are working on similar concepts: Uber/NASA (pilot service LA 2020), Boeing, Kitty Hawk…

faster than a car, maiden flight April 2017, manned flight 2019, on-demand service 2025.

Midrange electric airplanes: Easyjet hopes to fly electric by

EasyJet is cooperating with the British company Wright Electric, which focuses on battery-based aircraft.

Siemens has developed a world-record electric motor for aircrafts and is cooperating with Airbus.

Boeing and JetBlue have invested in Zunum Aero, a US company planning to **deliver a hybrid electric airplane in 2022**. The 12-seat-aircraft is will have a 1000 km range, comes with 80% lower emissions and noise, and costs 4.2 ct/seat-km. Zunum claims to reduce air fares by 80% through cheaper operation and direct flights (avoiding hub-and-spoke trips).

Chances and risks at first sight

Lower transport costs

Autonomous trucks and shared MaaS autonomous passenger vehicles will lead to a fast decline in transport costs for new systems through lower operation costs and higher utilisation rates. Some experts claim huge reductions: One ton-km may cost 1/2, one person-km may cost 1/10, compared to traditional trucks and private cars.

Potential benefits for the environment

- No direct greenhouse gas emissions
- Drastic reduction of local pollution
- Considerable reduction of noise
- Electrification & energy storage in transport facilitate growth of renewables in overall power generation

Rapid decline in car sales

KPMG forecast that autonomous driving will result in a "precipitous decline" of sedan sales in the US from 5,4 million currently to 2,1 million in 2030.

Tony Seba (Stanford University) even claims that by the middle of next decade internal combustion engine car sales will be near zero and US car sales will be down to 1/5 by 2030.

More transport – more congestion?

Lower transport costs will lead to higher demand. Even with individual rides and without optimised freight loading, cost reductions would be substantial. Resulting traffic growth may be unbearable and require additional infrastructure. Tempting opportunities for airborne transport. Adequate policies are needed for favouring shared rides and containing traffic growth. Automated driving brings smoother traffic flows.

Declining employment in transport

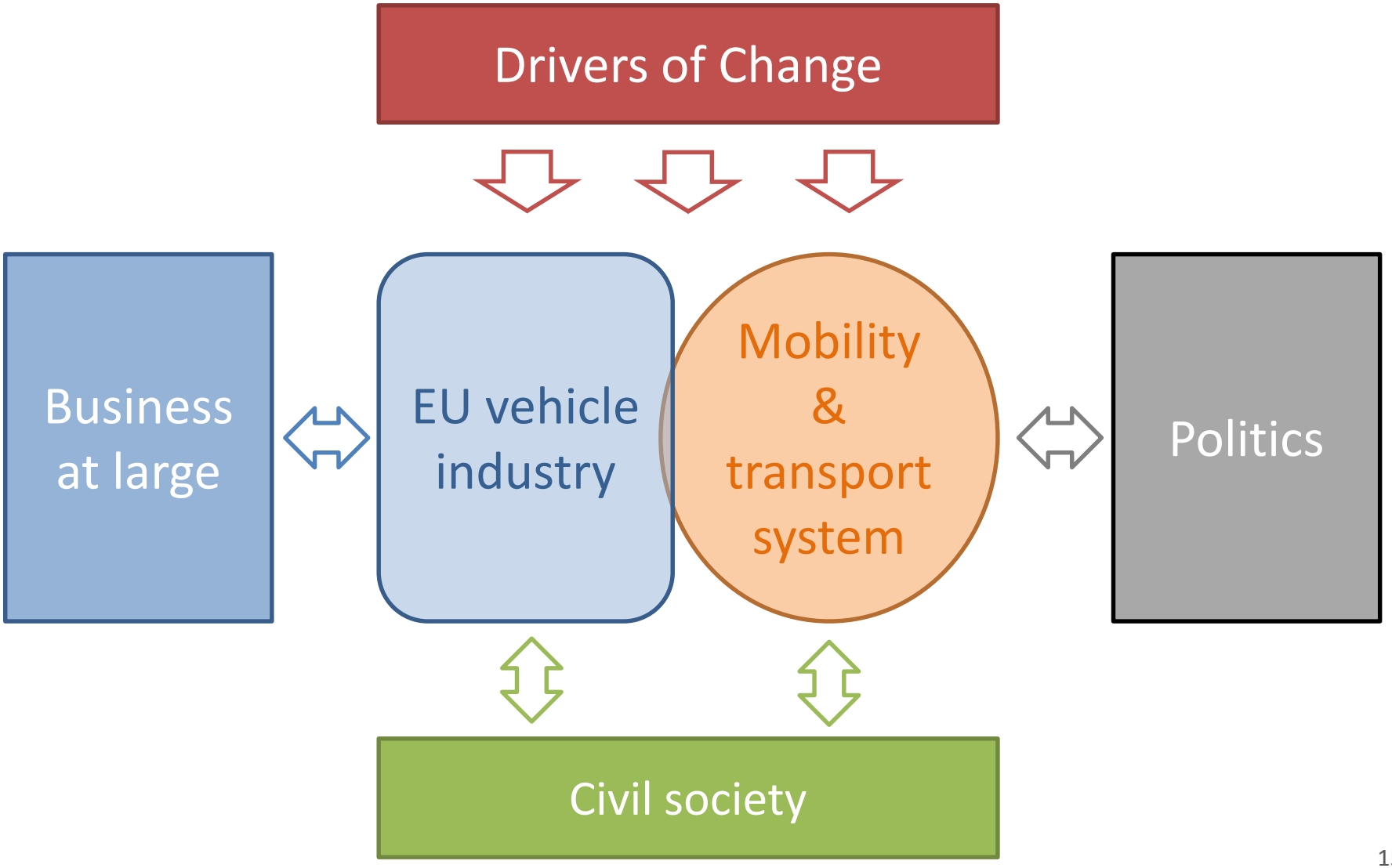
- Less cars means less jobs. Moreover, electric vehicles have less complex mechanics. In the EU, 3,3 million are employed directly or indirectly in automotive manufacturing.
- 9 million are employed in car related activities. The International Transport Forum of the OECD estimates that in Europe alone up to more than two million truck drivers will become "redundant" by 2030. Add van and taxi drivers.

Better accessibility in many areas

Deployment of cheap Mobility as a Service in urban and rural areas may improve accessibility and mobility for all ages and social groups, even in peripheral areas – provided that services are not monopolised and regulation continues to mitigate the inherent advantage of densely populated areas. This will have impacts on commuting, infrastructure, industry locations and real estate markets. All spatial patterns will be affected.

3. Understanding the force field: Options for European politics

Understanding the force field



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Three Drivers of Change

- **Technological innovation**
  offers disruptive opportunities worldwide:
  1. Electric drivetrain (*battery, power electronics*)
  2. Driverless vehicles *(artificial intelligence, sensors, communication)*
  3. Sharing platforms (*pervasive internet, cloud computing, artificial intelligence*)
- **Global competition**
  - from emerging economies (*China*)
  - from new players (*Silicon Valley*)
  - challenging incumbent vehicle manufacturers
- **Urbanisation**
  - Increasing share of population lives in cities
  - Urban areas get more dense → increasing problems with individual cars
  - Density & intensity of interaction increasingly important for economy
  - Changing urban lifestyles *(dense interaction, sharing, from ownership to services)*

Be prepared for disruptions!
Dynamics of change are hard to predict

- Technical availability within two to five years

	Competitive compared to	*Technical availability*	*Commercial availability*
Electric cars and trucks	*conventional vehicles*	*2 years !*	*2 years !*
Driverless vehicles	*vehicles with professional drivers*	*3-5 years ?*	*depends on politics*
Air taxis	*conventional taxis*	*5 years ?*	*depends on politics*

- Enticing benefits may push for rapid adoption
  - Impressive cost reductions *(up to 50% for passenger and freight transport)*
  - Important comfort improvements
  - Outstanding environmental benefits (> 50% reduction in emissions)
- Important vested interests at stake – slowing change seems a tempting option
  - Industrial assets in the car and oil industry (>> € 100 billion)
  - High-skilled car industry jobs (11% of European manufacturing employment)
  - Jobs of professional drivers (> 4 mio)
- Changing lifestyles may take time
  - EU 2015: 250 million cars / 500 million inhabitants
- Delaying change
  → high risk in a competitive environment
- Delaying the debate and preparation of change
  → loss of opportunities to shape conditions
  → risk of growing fear and populist reactions

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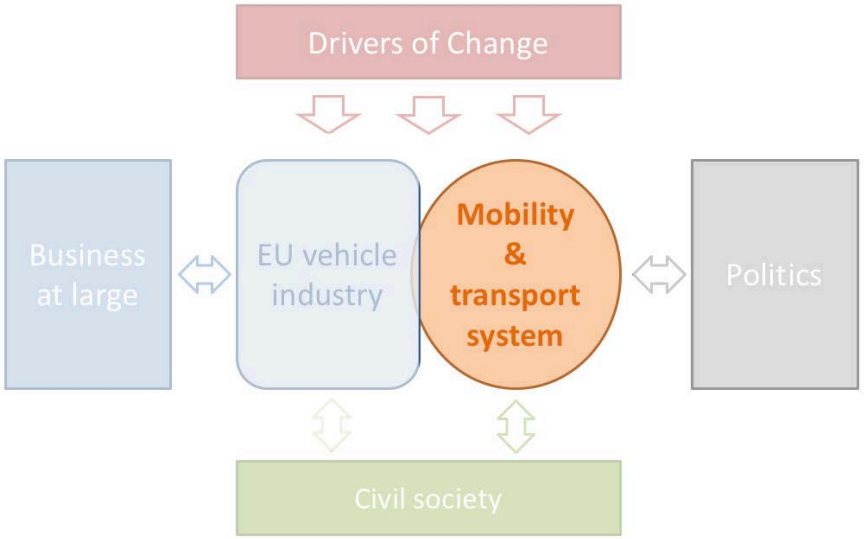
Mobility & Transport System



Key transformation paths

All	low tech	→	high tech	***Tech innovation***
	products	→	services	***Global competition***
	low density	→	high density	***Urbanisation***

Drivers

PASSENGERS

A Individual high motorisation *conventional private cars* → Shared high-power vehicles *integrated flexible driverless electric public mobility services* — far

B Individual high motorisation *conventional private cars* → Individual low-power modes *cycling, walking, e-bikes, micro-vehicles, services, infrastructures* — near

FREIGHT

C conventional trucks → Automatic large-scale logistics systems *Driverless electric trucks, IoT, robots* — far

D conventional vans → City- and micro-logistics systems *e-bikes, robot carriages, interchanges, depots* — near

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Key transformation path A:

conventional private car → advanced shared mobility services

			electric	*driverless*	*public access*	*shared ride*	*multi-modal*	COMFORT	ENVIRONMENT	COSTS	SOCIAL	*Rough estimation of some impacts*		
												Capital cost	*Parking space*	*Road space*
												per person-km[1]		
0	**Conventional private car**											*100%*	*100%*	*100%*
	↓							↓	↓	↓	↓			
1	**Electric vehicle**	EV	X					Charging no problem by 2020	Drastic reduction of emissions in operation	Slight advantage by 2020	Less jobs in manufacturing	*110%*	*100%*	*100%*
	↓							↓	↓	↓	↓			
2	**Autonomous (driverless) electric vehicle**	AEV	X	X				Comfortable	Optimised driving		Less accidents Less jobs in operation	*150%*	*100%*	*100%*
	↓							↓	↓	↓	↓			
3	**Public mobility service with AEV**	PAEV	X	X	X			Very comfortable	Less vehicles, less parking space	Drastic capital cost reduction → widespread adoption	No need for own car, better accessibility Less jobs	*23%*	*53%*	*100%*
	↓							↓	↓	↓	↓			
4	**Shared ride driverless mobility service**	SPAEV	X	X	X	X		Slightly longer trips	Less vehicles, less infrastructure use	Less operational costs	Affordable transport for all challenge: urban/rural, modal split	*14%*	*27%*	*52%*
	↓							↓	↓	↓	↓			
5	**Integrated flexible inter-modal mobility service**		X	X	X	X	X							

[1] Assumptions: Vehicle usage time in public mobility service: 50%. Vehicle occupancy in shared ride: 2,5 persons. Capital cost shared AEV: 180% of conventional car.

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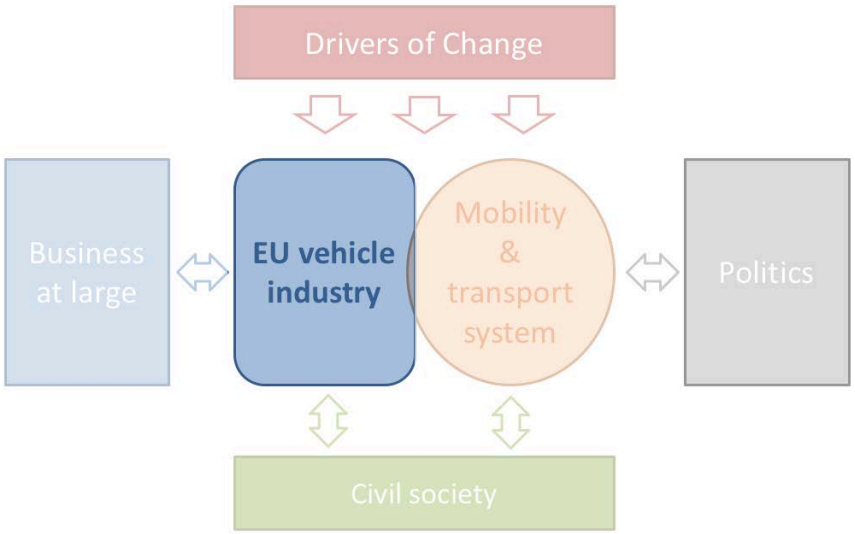
EU vehicle industry



The European car industry is falling behind

		Europe	USA	China	Other Asia
Engineering & Production	Mechanical Engineering				
	Vehicle Production				
	Battery Production				
Technology	Electric drive				
	Autonomous drive				
	Software				
Economics	Ability to invest				
	Home market				
	Sharing platform				
Politics	Overall strategy				
	Government support				
	Regulation autonomous driving				

low — high

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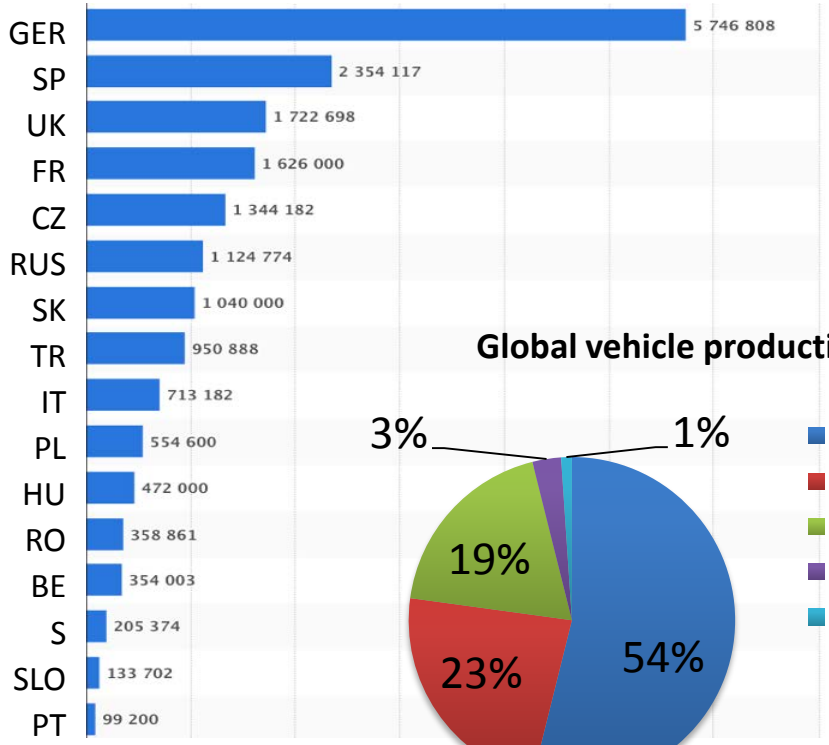
The EU vehicle industry is most important for the European economy

Car production in Europe 2016

High skilled employment: 3,3 mio
10,9% of EU manufacturing employment
Investment of EU car industry: €50bn / a
Germany: 35% of all R&D investments

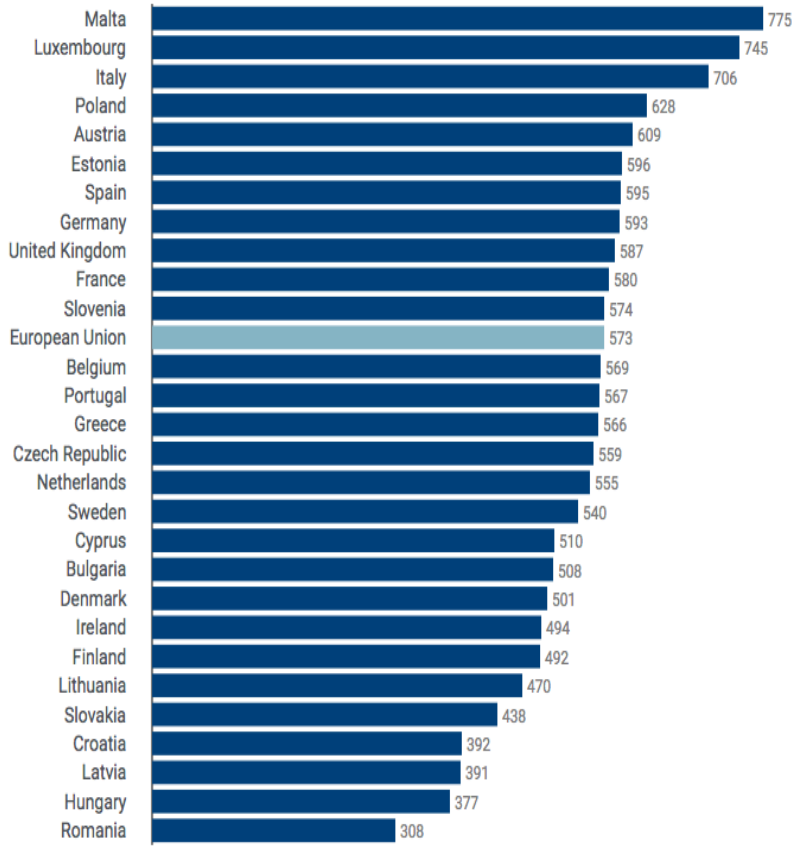


Global vehicle production 2016

© Statista

Car density 2015

USA	821	cars/1000 inhabitants
EU	573	
Russia	358	
Brasil	206	
China	118	
India	22	



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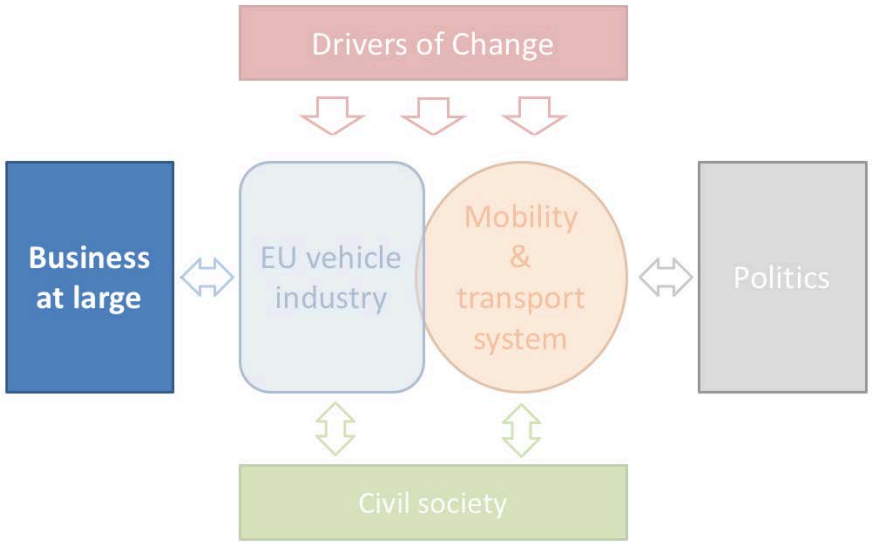
Business at large



Business at large may gain in a transformation that avoids deindustrialisation

- **In general, industry and trade** are very interested in lowering transport costs and ensuring smooth traffic
  Therefore they may support the introduction of electric and driverless vehicles, traffic control and efficient use of infrastructure
- The **oil industry** was a heavy supporter of the individual fossil fuel car in national and international politics – their focus may have shifted to strongly growing economies
  - The transport sector: more than half of oil consumption
  - Revenues of European oil and car companies are comparable
  - Employment in the oil industry is much smaller
  - The oil industry is slow in shifting towards other energy sources
- Electric **power companies** are interested in the electrification of the transport sector. They understand that this must be associated with a shift towards renewable energy.
- The **construction industry** may profit from sophisticated infrastructure requirements but needs to adapt
- Most industries benefit from **innovation impulses and R&D spending** of the car industry → innovative transformation is welcome, decline is feared
- **Tourism and other personal services** may profit from easier and cheaper transport
  However, equilibrated development is essential for destinations in peripheral areas
- **ICT industries** would clearly be winners of a rapid transformation of the mobility sector

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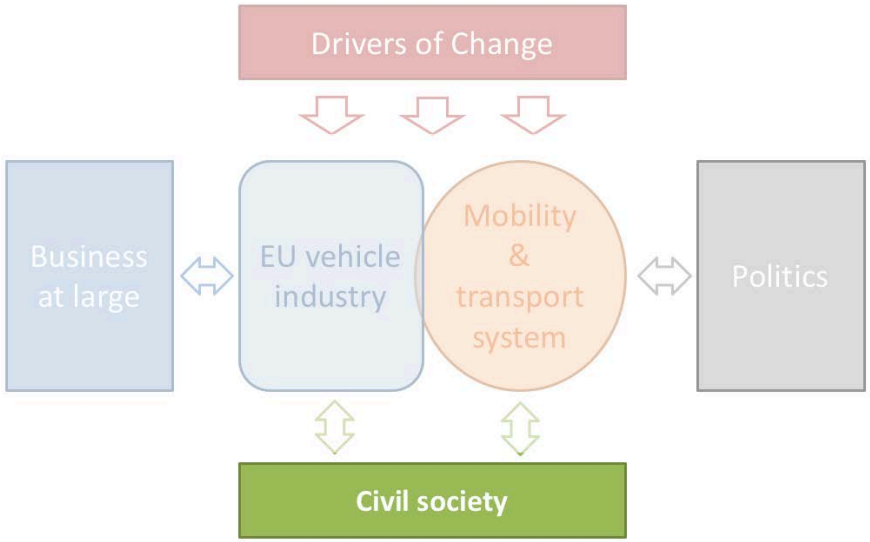
Civil society



Attitudes are changing

Since many years slow changes in attitudes concerning transport and mobility have been evolving. It seems that in a growing number of places they are passing a threshold from minority to majority, suddenly leading to changes in public policies.

- **Car ownership and driving** have become **less attractive** in industrialised countries
  USA: drivers license in the 16 to 44 age group: 1983: 91,8%, 2014: 76,7%
- **Bicycles**, electric bicycles and shared bicycles have become **very popular**
  China sales 2017: Passenger vehicles 24.72 mio, electric bikes 15.72 mio.
- **Metropolitan cities** rethink the **role of car**
  London is introducing a ultra low emissions zone
  Paris has banned cars from the Seine river, pioneered bicycle plans
- **"Active traffic": Health aspects of transport increasingly recognised**
  Habitual walking and biking as daily exercise
- **New actors** in the mobility debate
  Trade unions, regions with car manufacturers, small and medium scale cities

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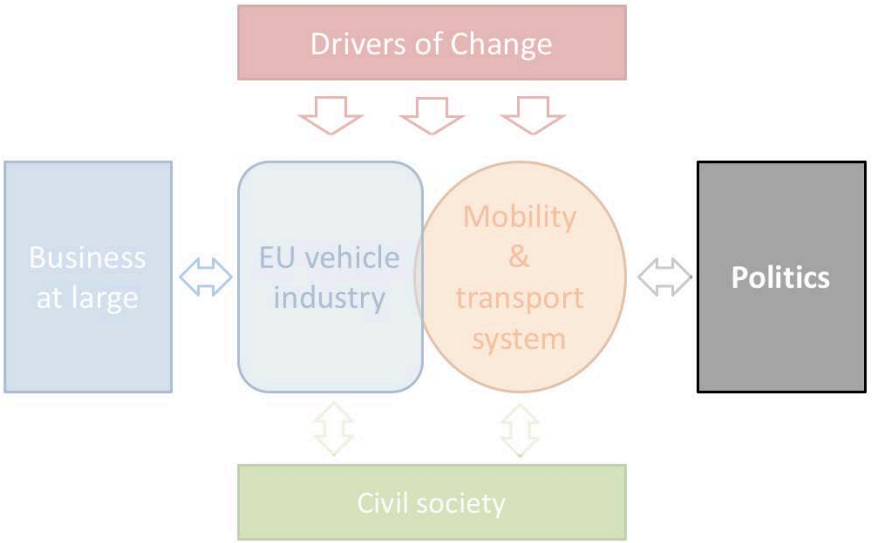
Politics



Diverging interests of EU member states and their neighbours

	Have nots	Work horse	Power club	Small & modern
Economic importance of car sector		■	■	
Jobs in manufacturing	■	■	■	
Jobs in services (truck drivers etc)	■	■		■
Openness to shared use				■
Status of digitalisation			■	■
Use of bicycles			■	■
	Greece	*Poland*	*France*	*Denmark*
	Romania	*Slovenia*	*Germany*	*Switzer-land*
	Bulgaria	*Slovakia*	*Italy*	*Sweden*
	Croatia	*Hungary*	*UK*	*Nether-lands*
	Serbia	*Czech R*		*Austria*
	Mace-donia	*Spain*		*Belgium*
		Portugal		*Baltic States*

weak — strong

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Politics can shape the future of mobility in Europe

Disruptive new technologies, global competition and urbanisation will cause a rapid and deep change of mobility and transport in Europe.

potential problems	direct consequences	potential benefits
• High job losses in manufacturing and traditional mobility jobs • Diverging interests between European countries • Deindustrialisation of now strong regions • Widening the gap between rich and poor and between metropolitan and rural areas • Loss of European innovation capacity and competitiveness	• European car manufacturers face new competitors • Fast shift to electric drive • Lower cost of mobility and transport • Value chain will shift from vehicles to mobility services • Increased use of autonomous vehicles	• Reduction of noise and air pollution • Reduction of Greenhouse gas emissions • Reduced number of vehicles, freeing up inner city space • Increased mobility for people with limited mobility • Comfortable integrated transport system requiring less infrastructure

European politics cannot stop the change.
Delaying change, could jeopardise the competitiveness of European economies.
Only politics can tip the balance in favour of the common good.

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Politics has to deal with many ACTORS: A wide range of strong interests

Industry at large

Energy supply industry
Oil companies, gas stations, electric power companies, distribution grids

Transport infrastructure industry
Construction industry, cement and steel industry

Users of mobility & transport services
Industry, trade

EU vehicle industry

Road vehicle manufacturers
Premium brands, mass market brands, trade organisations

Component supply chain
Large and multinational suppliers, SMEs

Rail and aircraft industry
Rolling stock industry, rail system providers, aerospace industry

Trade Unions
in manufacturing

Mobility & Transport System

Vehicle service industry
Car sales, repair shops, parking industry,

Mobility and transport services
Railways, logistics companies, airlines, airports, local and regional public transport, taxi companies

Trade unions
in services

Politics

Cities
Metropolitan cities, medium-size cities

Regions
Peripheral and rural areas, mixed regions

National and European politics
governments, regulation agencies, advisory structures, intergovernmental bodies, EU institutions

Civil society
Climate organisations, environmental organisations, consumer groups, ad hoc citizen groups, research

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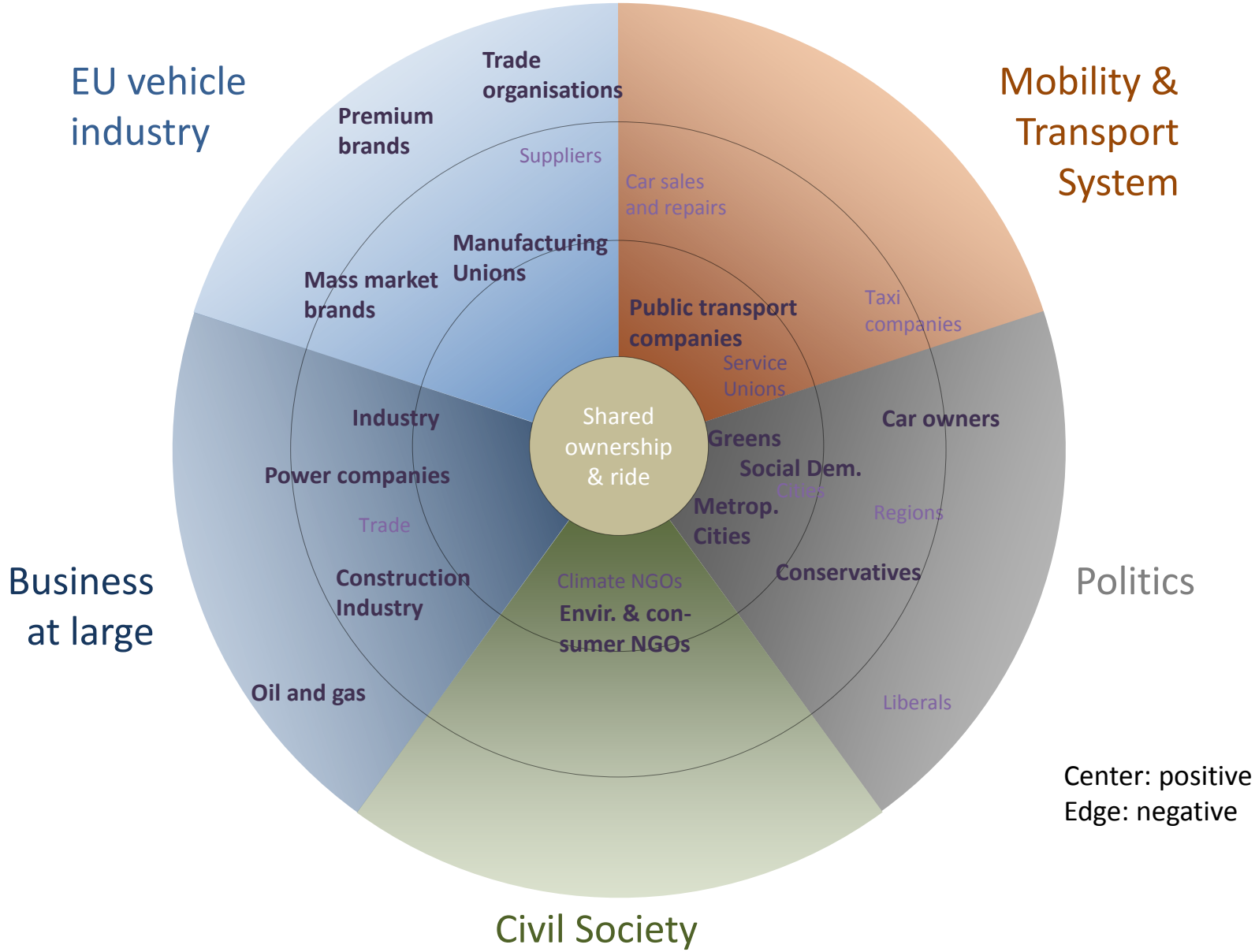
Actors' positioning: Shared ownership & ride



Center: positive
Edge: negative

4. Developing new European mobility policies

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The starting point: European Assets

Europe has much too lose if it does not develop appropriate policies in time. But it has also important assets to start with. Europe still is a global leader in many transport- and mobility-related activities. And it has excellent preconditions for leading in the development of new, more sustainable mobility policies. Without appropriate action this potential leadership role may be lost very quickly.

Europe has globally leading vehicle industries

- Premium brand & mass market car manufacturers (No. 1,2,3 & 1)
- Truck and commercial vehicle manufacturers (1, 2, 4)
- Rail industries: rolling stock and infrastructure (2, 4, 6, 7)
- Aerospace industries (1)
- Premium Two-Wheel-Industries

Europe has globally leading logistics industries

- World leaders in Integrated logistics (1, 2, 4)
- World leaders in maritime logistics (1, 2, 3)

Europe has unique flexible industrial skills

- Globally leading highly specialised SMEs in B2B markets
- Long tradition in flexible specialisation in B2C and B2B markets

Europe has a long tradition of dense civic urban life

- A culture of dense and varied cities with high intensity of interchanges
- A tradition of striving for high living standards and accessibility to the countryside
- A tradition of high environmental and social awareness

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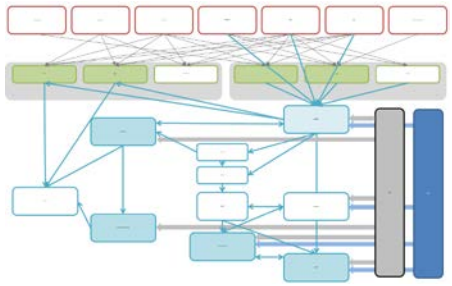
Objectives and conditions for success



A complex system in rapid transformation

Objectives of European Mobility Policies have to be twofold:

- **To realise the potential environmental, economic and social benefits of new technologies**
- **To maintain the strength of the mobility sector in Europe**

Success depends on :

- **A rapid shift towards space-efficient flexible mobility services**
  - ➔ **shared use of high-tech high-power vehicles ("passive mobility")**
  - ➔ **a framework for public transport systems**
  - ➔ **more emphasis for individual low-power mobility ("active mobility")**
- **A forward looking industrial policy for Europe based on this orientation**

All these conditions have to be fulfilled to meet the objectives.
However, many constituencies do not support them all yet.

Shared use of motorised vehicles is key

Pervasive Internet access with smartphones has triggered a boom of the so-called sharing economy. In mobility we must distinguish two kinds of sharing:

Shared ownership or shared services means that one vehicle can serve many persons. Better utilisation over time can drastically reduce capital costs for vehicles. Even when vehicles are used individually, by one person at a time.

Shared ride means that several persons use a vehicle at the same time. This can drastically reduce the need for infrastructure and resources and so reduce pollution and costs

Classical mass transit incudes shared services and shared rides. However, with rigid itineraries and timetables it can be comfortable and rapid only in densely populated areas at peak times. Providing new dimensions of flexibility and different kinds of vehicles, new technologies can drastically extend these advantages in space and time.

1. Shared ownership / mobility services

- Private cars are standing idle 95% of the time
- Shared cars (maintaining individual use): up to 10 times more intense use
  - Reduce capital costs
  - Avoid degradation without use
  - Require less parking space, less public space

2. Shared rides

- Individual car use: vehicle occupancy in Berlin: 1,3 passengers
- Shared rides (ride pooling in normal cars, shuttles, buses, mass transit):
  - More intense use
  - Reduce capital costs
  - Require less (road) infrastructure, less public space

New technologies facilitate shared ownership and shared rides:

- Driverless vehicles
- User-friendly on-demand systems
- Intelligent flexible routing

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A new framework for public transport

- Publicly accessible mobility services are public transport
  - The shift from ownership to services is a shift from private to public transport
  - Mass transit and shared ride allow for high density, individual cabs do not
- The success of Uber has shown that neither laissez-faire nor a simple ban are solutions to the challenge of new privately operated mobility services
  - Sharing platforms bring important economic benefits to users and vehicle operators even before the introduction of driverless vehicles
  - Platforms having strong network effects (see *Google, Facebook*) tend to form monopolies
  - Such private monopolies may strive for vertical integration of functions giving them a huge influence on whole sectors of public life and the economy
- We can learn from previous experiences in telecommunication, rail and power sector regulation:
  - There, a combination of new technologies and ideologically driven "liberalisation" had also lead to the threat of dominating private monopolies
  - Gradually, national and European regulation agencies are learning how to define different roles in a sophisticated "market design", ensuring the ongoing functioning of market mechanisms and the pursuit of public goals
- We need an appropriate "market design" for an integrated public transport system including competing private operators for specific roles
  - Natural monopolies such as the use of public space, roads, rails, traffic management and traffic communication structures must remain subject to public decisions

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Ideological preferences in regulation

LEFT — **RIGHT**

direct control

state monopolies

slow innovation

bureaucracy risks to beat public interests

*competent & independent **regulation agency** must set and continually adapt rules (e.g. central banks, Bundesnetzagentur…)*

market design

contained markets
specific rules
market roles

competing companies in several roles
&
temporary concessions for natural monopolies

competition

innovation

public interests respected through rules

minimal regulation

free market

unhindered use of network effects

destroys

private monopolies

bureaucracy slowing innovation

profit beats public interests

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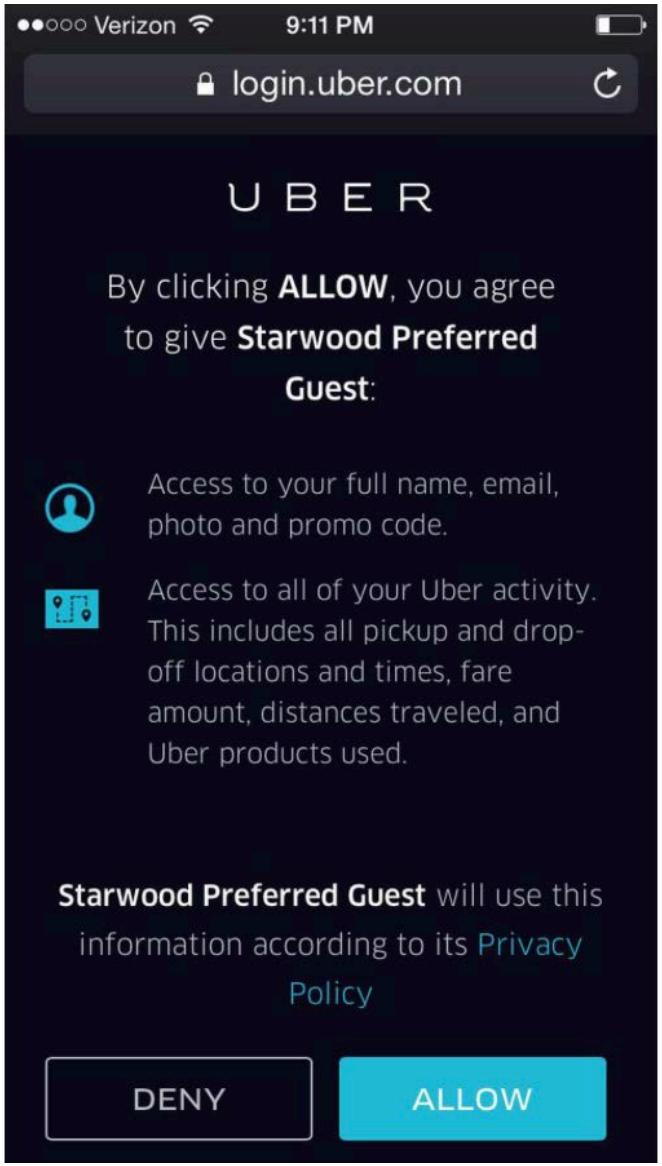
Data governance



- **Data will play a key role for a variety of functions**
  - Planning and managing infrastructure
  - Developing, producing and managing vehicles
  - Managing traffic flows
  - Managing vehicle fleets
  - Independent driverless navigation
  - Connected driverless navigation
  - Matching mobility offers and demand
  - Managing Payments
  - Marketing at all levels
- Large companies try to control, monopolise, and connect data from these different functions – potential network effects and profits are huge
- **Appropriate design of markets and data governance** should distinguish and connect these functions so as to
  - Ensure user privacy
  - Avoid uncontrolled monopolisation of infrastructure functions
  - Ensure public access to data relevant for infrastructure, spatial planning and further development of regulatory framework
  - Ensure competition and diversity in all markets
  - Provide opportunities for small companies and innovation

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Low power mobility ("active mobility")

The transformation path leading from individual high motorisation to individual low-power modes (path B, see above) is an adequate way of reducing environmental impact and space requirements of passenger transport for short distances. It maintains high individual freedom of motion and short-term decisions, may be associated with high-tech solutions (e.g. e-bikes) or physical activity and is therefore increasingly referred to as "active mobility". Also for freight transport over short distances highly flexible low-power low-power modes are an attractive alternative.

- Short distances do not require high speeds, heavy vehicles and high-power motorisation
- Short distances are much better served by
  - **low speeds**
  - **no or very light vehicles**
  - **no or low-power motorisation**
  - **low space requirements**
  - **high flexibility**
  - **direct personal control – active mobility increasingly combined with highly efficient tools requiring low efforts**
  - **interoperability with high-power modes for longer distances**
- Low power mobility includes
  - **Passenger transport**: Walking, biking, e-bikes, wheelchairs, low-speed vehicles…
  - **Freight transport**: bikes, small freight vehicles, delivery robots…
- Health benefits from physical movement are increasingly appreciated

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European industry policy: new activities & jobs

An integrated far-sighted European industry policy in the mobility sector should aim at actively supporting the creation of new activities. Daring to seize new opportunities and actively innovating is more important than focusing on the threats for incumbent industries.

The described trends offer a wide variety of opportunities for new kinds of products and activities. Striving at leadership in these fields may compensate for job losses in the incumbent vehicle industries.

This will require a careful and long-term coordination between transport regulation, qualification policies, infrastructure policies, R&D policies and traditional industry policies. Isolated national initiatives will not be enough. A European framework will be essential. And cities will have a key role to play.

- **Enhanced transport infrastructure:**
  electric, communication, management
  - Charging infrastructure, wireless charging, integrating photovoltaics in transport structures
  - Communication for autonomous driving, navigation systems, data management
  - Flexible traffic management on road, rail and air corridors: combining peer-to-peer and central control
- **Broader approach to public transport:**
  new concepts, tools and vehicles
  - Concepts and management tools for flexible, integrated, multi-modal public transport systems
  - Driverless electric vehicles of all sizes including maintenance and charging infrastructure, fleet management
  - Comfortable interchange points, stations, luggage handling…
  - Navigation, micro-navigation, reservation & payment systems
  - Special vehicles: Intermodal pod systems, indoor vehicles, funiculars
- **Freight & logistics:** boom with IoT and e-commerce
  - The largest logistics and trade companies are based in Europe
  - Advanced trucks and special purpose vehicles, drones of all sizes
  - Concepts, software, sensors & communication equipment for integrated logistics systems
  - Intermodal concepts, automatic interchanges, small container systems
  - Micro-logistics & distribution: storage, commissioning & distribution robots, city logistics, box systems
  - New service concepts, local service and distribution centres
- **Personal micro-vehicles and services:** new high-tech comfort
  - Bicycles, e-bikes, skates, scooters, rollators, personal robot carriage…
  - Personal mobility services, device maintenance, sharing services, links to freight distribution

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European industry policy: tools

Industry policy needs a coordinated and targeted use of different tools. Industry is a long-term task requiring clear objectives and strategic thinking. Short-term interventionism can be counter-productive.

- **Ensuring monitoring and setting up strategy capacities**

  Need for stronger EU capacities for integrated strategic thinking

- **Developing a shared vision**

  A shared vision developed in a broad debate can help to align actions across Europe

- **Ensuring appropriate frame conditions for realising the vision**

  All policies must be analysed regarding their support for realising the vision

- **Defending European global players**

  Confronted with determined Chinese and other strategies, key European players have to be identified and defended against take-overs

- **Facilitating the transition of incumbent industries**

  Key incumbent industries may need support in the transition. A competent and transparent agency must ensure that change according to the vision is embraced.

- **Taking care of those affected by change**

  Early orientation and requalification of workforce needed to reduce fears. In a larger context: do we need new social security approaches? Most affected is the unemployed youth.

- **Facilitating the development of new champions**

  A start-up hype for digital business is not sufficient for covering the whole range of needs

Developing New European Mobility Policies:

Start immediately: Organise a broad learning process

Start Now!

- **Enable cities and regions to experiment with new opportunities and rules**
  - European and national governments need to open strict rules and support experimenting
  - New alliances have to learn how to cooperate
  - Cities are strong and motivated actors, make use of the Pact of Amsterdam

- **Start a broad European discussion process**
  - Identifying challenges and opportunities
  - Developing a European vision
  - Defining objectives
  - Forging alliances

**Europe has a chance to play a key role on the way to a sustainable, flexible, comfortable and at the same time cheaper transport system –
but only if we actively discuss and seize the opportunities**

APPENDIX 1
THE SYSTEMIC IMPACT OF NEW TECHNOLOGIES FOR MOBILIY

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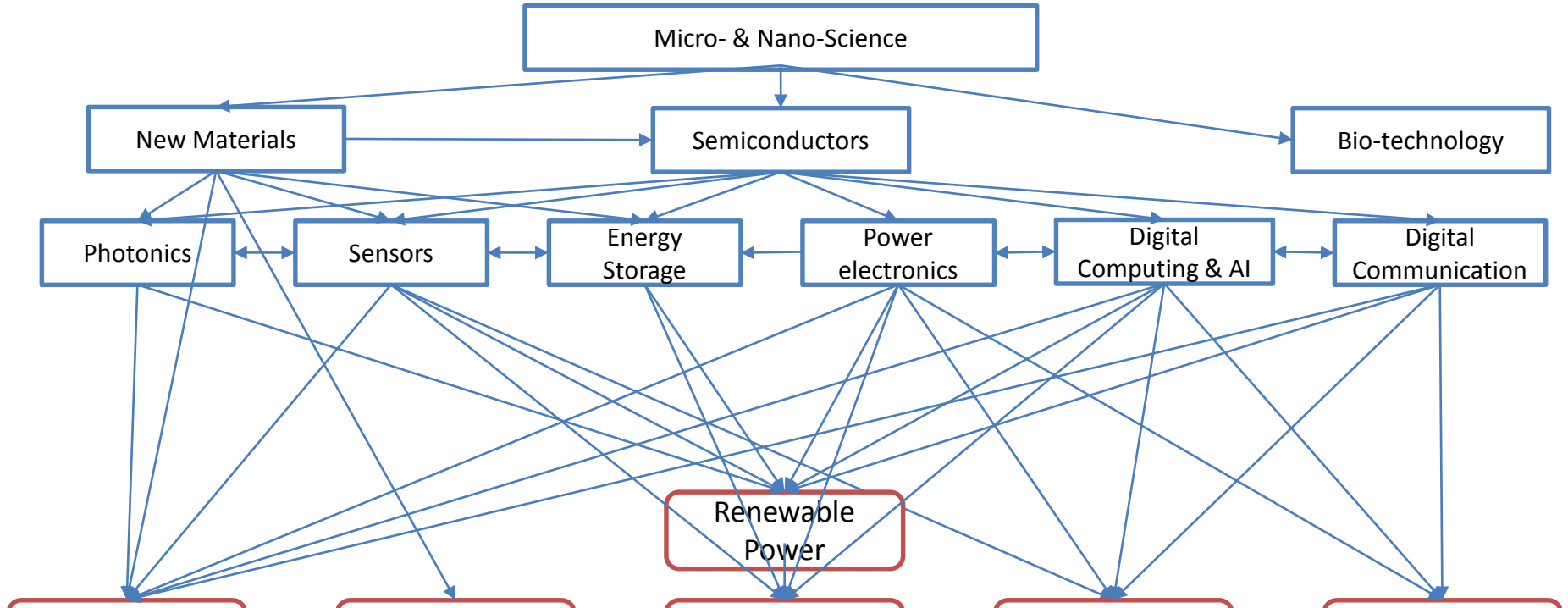
Revolution in science brings a tsunami of new technological options for mobility



- Robots: sensors, actors, AI
- IoT, logistics, maintenance
- Additive Manufacturing
- New Materials

- Composite Materials
- Adhesives, Ceramics
- 3D printing: Optimised Geometries

- Battery
- or Hydrogen+FuelCell
- Power Control
- E-Motor
- Regenerative Brakes

- Sensors, actors
- AI, on-board, cloud
- Communication
- Data Structures

- Routing, real-time system information, ride-hailing, payments
- Management: traffic, fleets, infrastructure
- Digitalise Infrastructure

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After a long period of merely incremental improvements in conventional mobility technology imposed by mature incumbent industries, hundreds of billions are being invested in a gold rush for new solutions

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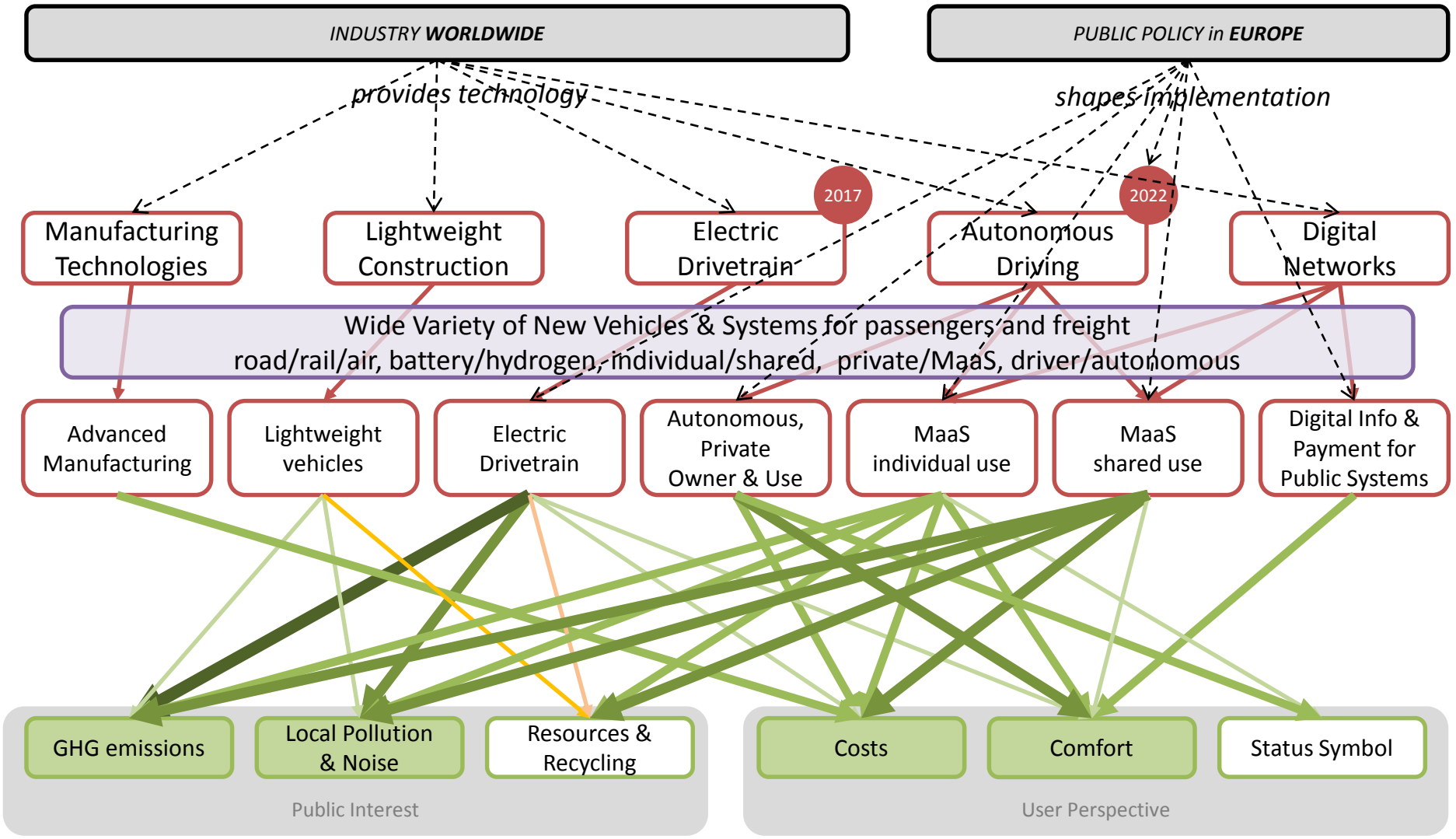
Direct impacts of new technologies: Positive direct impacts will speed up adoption



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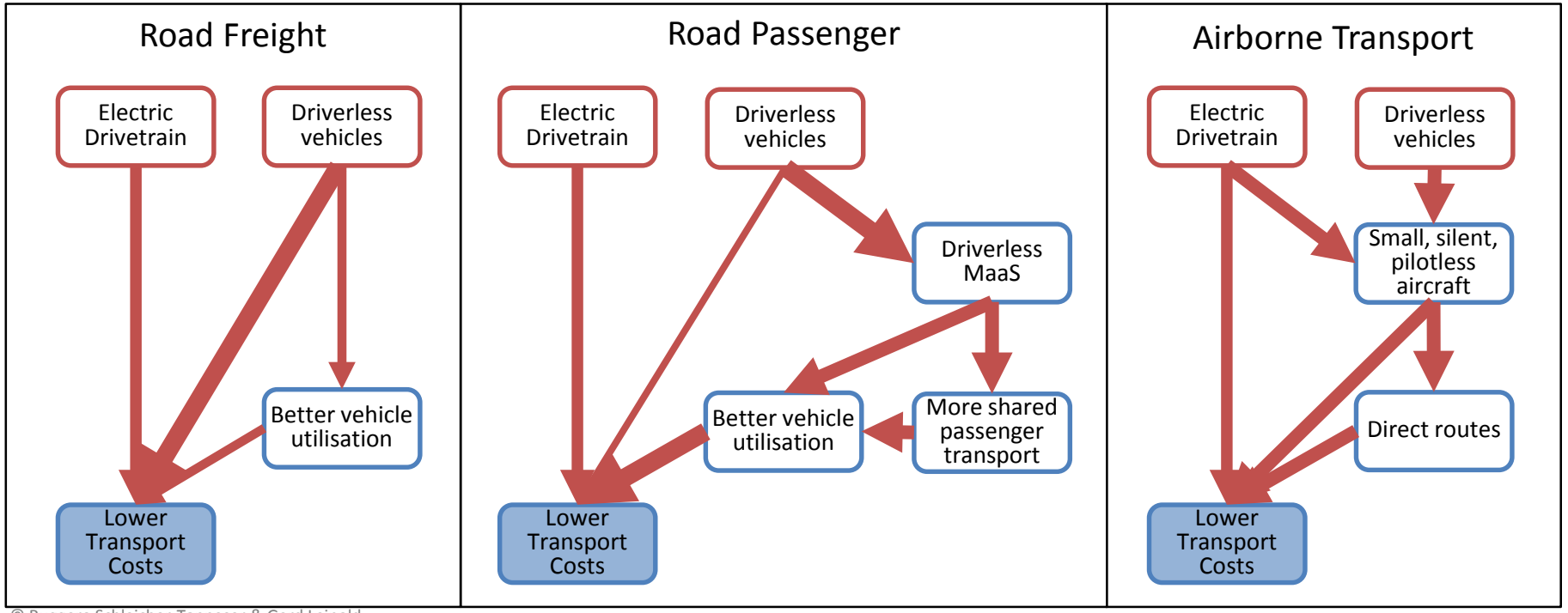
negative ← → positive

COSTS – The tipping point within 5-10 years: Transport gets much cheaper



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A GROWING NUMBER OF STUDIES PREDICT BOLD CHANGES

- In the US up to 50% cheaper than traditional diesel truck
- In the EU 60% cheaper?
- Point-to-point driverless transport well before 2022

- Shared use driverless electric MaaS much cheaper than individually owned conventional car (some say up to 90%)
- This will lead to a sharp drop in private car ownership

- Air taxi cheaper than traditio-nal taxi, comparable to rail
- Regional aircraft cheaper than traditional aircraft (2027)
- Freight drones?

Disruptive cost reductions will have deep systemic consequences

Strong cost reductions open financial margins for facilitating transition

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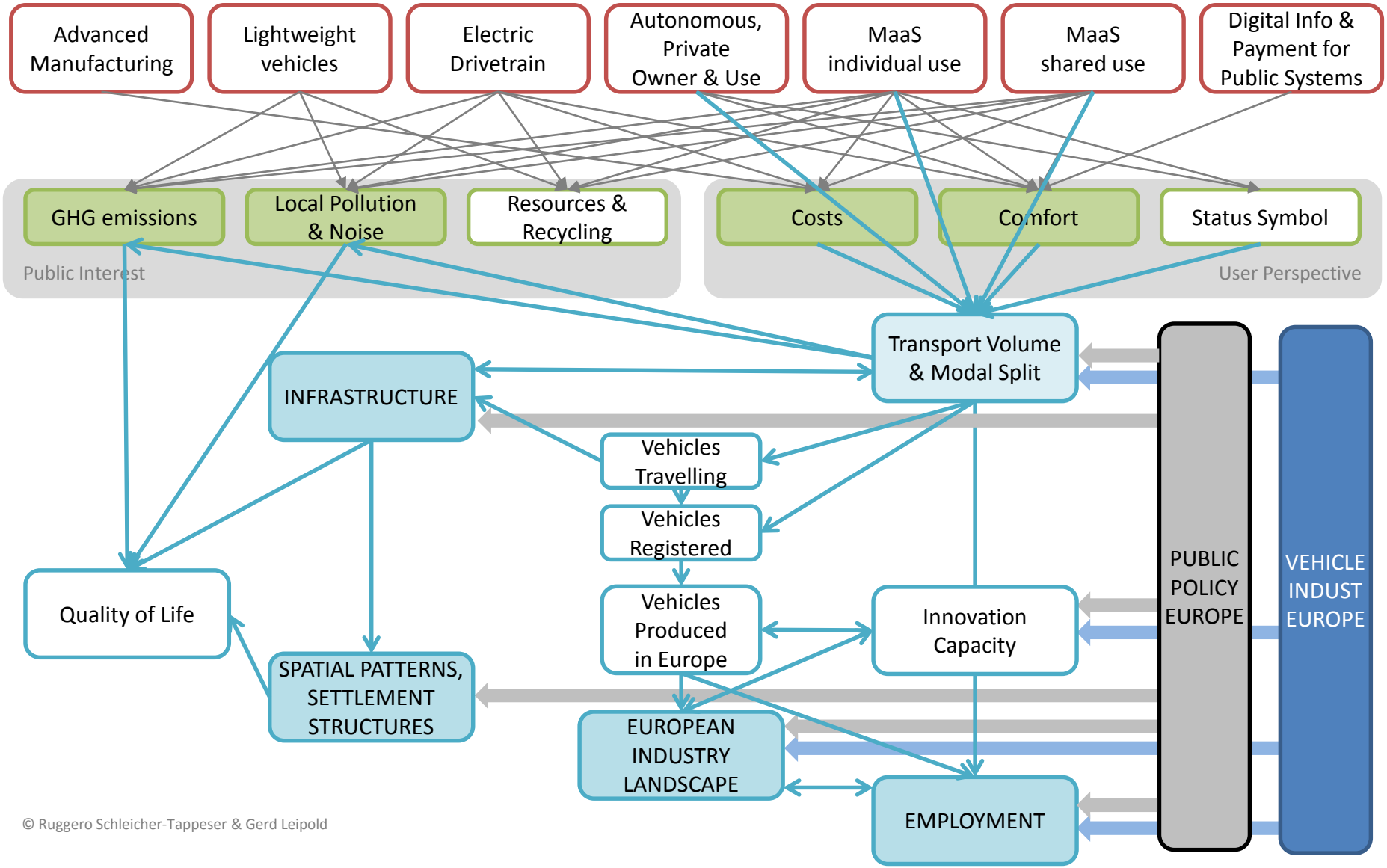
Systemic Impacts of new vehicles: bring difficult challenges, requiring political action



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Environmental Impact, Resources & Recycling

Life cycle assessment: positive

Environmental life cycle assessments have to consider a wide variety of effects and trade-offs that are not easy to bring into one picture. This has been illustrated by the diesel/gasoline debate where the trade-off between local pollution and global climate impact has played a confusing role. Interested parties have often used this difficulty for raising doubts concerning the usefulness of any change. However, a consensus emerges that can be summarised as follows:

- Even with present shares of renewables in electricity generation and with present technologies a transition from conventional cars to electric cars is slightly positive. Increasing shares of renewables and improvements in battery technology will gradually and consistently improve the balance. As a shift to new technologies needs many years, early switching to this promising track is most advisable also if initial benefits seem small.
- However, it is clear, that merely switching to electric propulsion of individually owned and driven vehicles does not resolve the issues at stake
- A more substantial relief for the environment can only be achieved with additional steps in the transformation of the mobility system as sketched in this report:
  - Higher utilisations rates of vehicles in publicly accessible transport systems
  - Higher occupancy rates of vehicles (shared ride)
  - Shift to low-energy “active mobility” for shorter distances

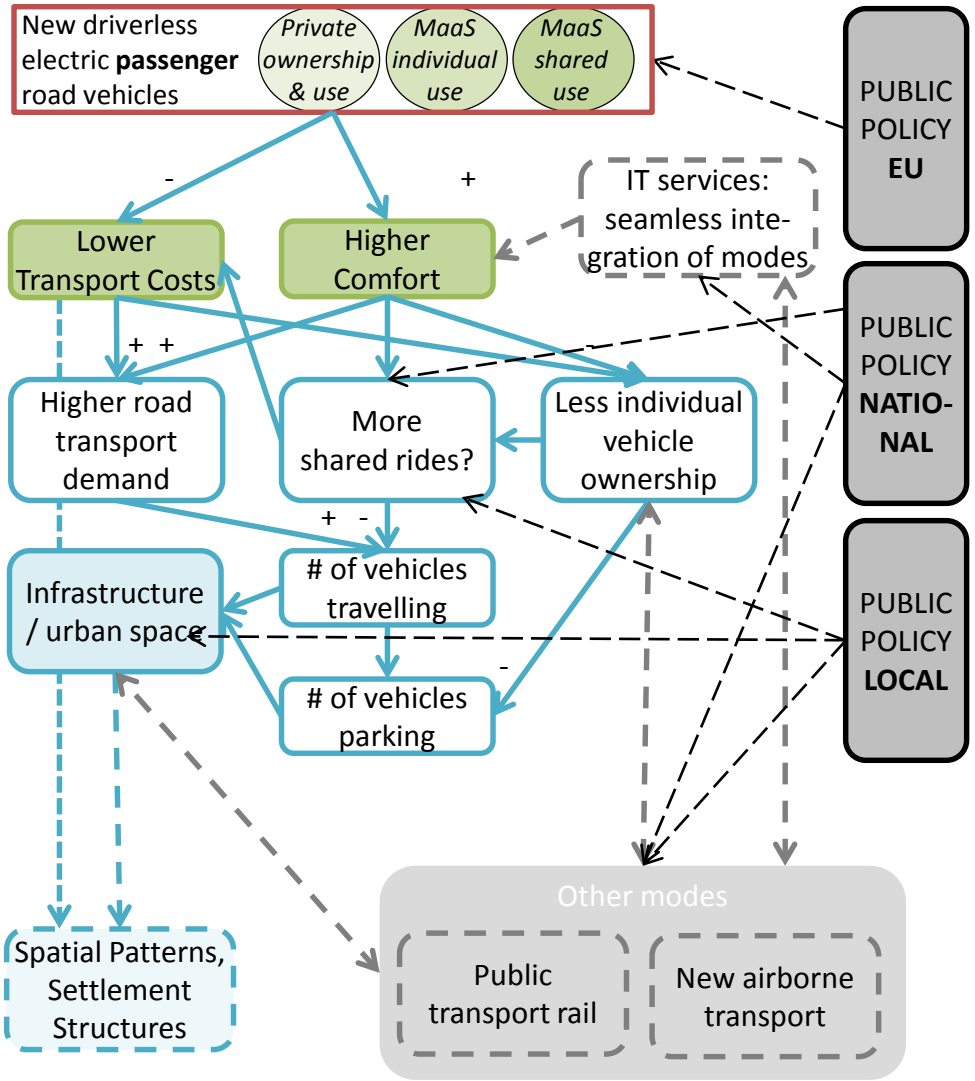
Electricity

In Europe, shifting simply from internal combustion to battery-electric propulsion in transport would increase overall electricity consumption by 20 to 25%. Considering the transition times involved, this seams easily achievable by adding renewable generation capacities as today they are the cheapest way of adding new generation. Moreover, smart utilisation of vehicle batteries may contribute to the overall flexibility of the electricity system, allowing for an easier integration of large percentages of solar and wind energy.

Resources

New batteries, power electronics and high-efficiency electric motors rely on materials rarely used up to now. Some of them are elements essentially abundant on earth, but requiring to build up new production capacities. A case in point is lithium, used in considerable quantities for batteries, but to be found in many places in largely sufficient quantities. A different case are elements occurring only in small ore deposits in very few places. Their scarcity can only be avoided by substitution. Such a case is cobalt. Samsung/Tesla have already reduced cobalt use in batteries to one third and plan to eliminate it in a few years time. In fast growing markets temporary bottlenecks are unavoidable. Determined measures are needed for avoiding unacceptable working conditions (e.g. in cobalt mining). Overall, however, it seems that all new resource problems in this transition can be tackled by a smart combination of increasing production, increasing efficiencies, substitution, recycling. Moreover they are much less problematic than the resource problems the transition will resolve. In any case highest degrees of efficiency and recycling will be most important for containing unavoidable environmental impacts of resource use.

INFRASTRUCTURE:
Road transport passengers



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- **Infrastructure requirements will strongly depend on the extent of individual vehicle ownership and shared rides – both can be influenced by politics**
- Lower transport costs and higher comfort with driverless vehicles may lead to higher road transport demand
- With occupancy rates of around 1,3 persons/car, present road infrastructure has huge reserves if shared rides increase
- The acceptance of shared rides in a fully controlled environment is high: Uber has 50% shared rides in San Francisco, 30% in Paris. Public policies can set powerful incentives for shared rides in densely populated areas
- Mobility apps on smartphones increasingly ensure a seamless integration of different modes along a multimodal journey – public policy should set rules for interoperability and provide appropriate infrastructure for mode switch
- Individual car ownership becomes much less attractive, vehicle utilisation increases, required parking space drops dramatically, opening huge spaces for new uses
- Infrastructure today is conceived to last for many decades – with infrastructure requirements strongly changing already within the next decade, especially in cities, fundamental changes in planning and investment are urgent
- Considerable transport cost reductions open margins for taxation allowing to finance adaptation costs
- For relationships to other modes see next slide

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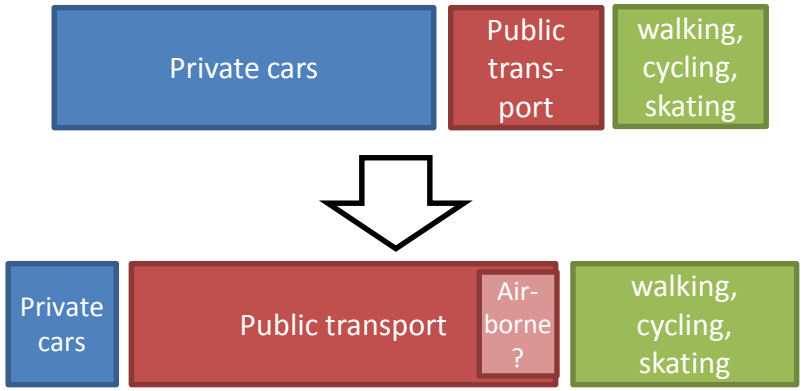
INFRASTRUCTURE:
Changing role of short-distance public transport



PUBLIC TRANSPORT GROWS AND CHANGES CHARACTER

- Public transport includes publicly owned systems and privately owned but publicly accessible systems with public licenses (including private rail companies, airlines, taxis …) – the degree of integration of these systems varies from country to country
- High quality transport systems are essential for mobility in densely populated areas and key to economic development and attraction of investments
- New MaaS (Mobility as a Service) systems are a part of public transport and need careful multi-modal integration for making use of their huge potential for lowering costs, increasing comfort and speed, and relieving the environment
- Public policies at all levels need to develop advanced integrative regulatory concepts for coping with the high flexibility and lower costs of new MaaS, with the resulting conflicts, and for seizing the new opportunities

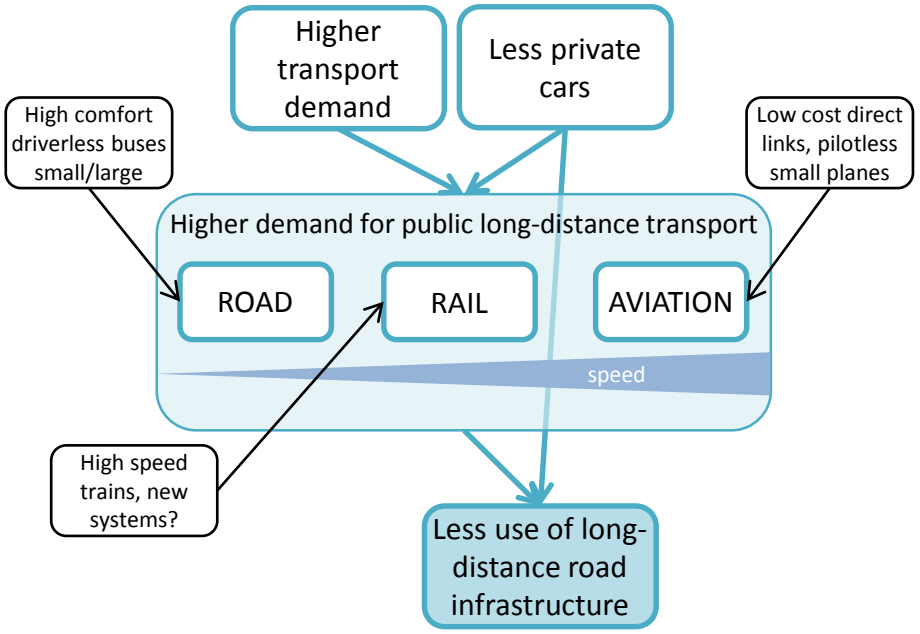
SHORT DISTANCE TRAVEL

- Traditional public transport companies will have to compete and at the same time cooperate with new cheap services – this will require far-sighted and timely guidance. Banning new services (such as Uber) is no solution.
- Decreasing car ownership will result in strongly increased use of an enlarged public transport system
- Traditional urban bus services will have to integrate with new ride hailing services. Urban rail transport will have to ensure high speed, high volume transport on main routes and will see a surge in demand if well integrated. Networks have to be revised. Investments in traditional public transport have to be reconsidered in view of disruptive developments in the next decade.
- New flexible MaaS services may considerably extend the reach of public transport into peripheral urban and rural areas

SHORT RANGE AIR TRANSPORT?

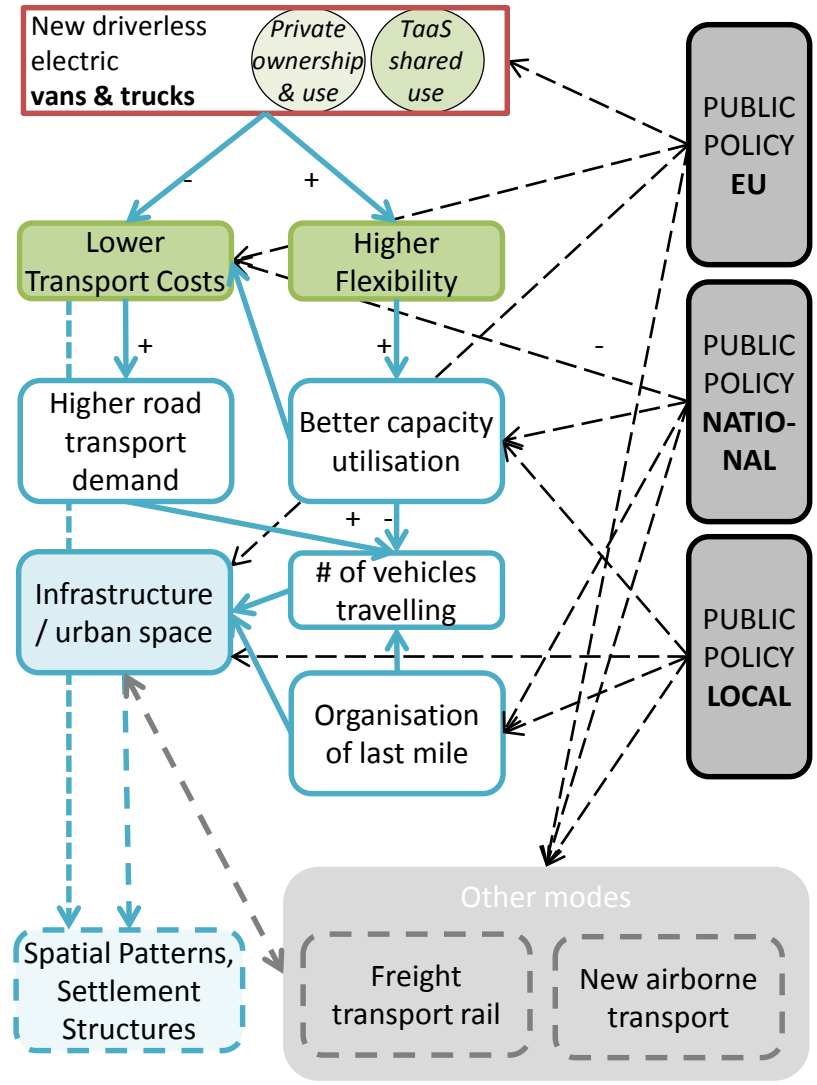
- Still difficult to assess is the potential for short-distance air transport. Use will strongly depend on new public regulation.
- Short range air transport (with VTOL) requires a network of appropriated (small) landing sites, automated air traffic control and new regulation taking care of noise and privacy
- Even if first air-taxi services become available soon for fares slightly above local rail services, assessment and adoption will take some time – however with high travel speeds their attractiveness might be considerable, requiring early considerations of their potential in the 2030ies

INFRASTRUCTURE:
Long-distance passenger transport



- Above 1000 km, already today aviation is dominating passenger transport.
- Below 1000 km, decreasing private car ownership might dramatically shift long distance travels to public transport
- For medium distances driverless shuttles for 2-20 persons may become increasingly attractive and require less vehicles on the road
- Some years later, pilotless small planes may provide low cost direct links between a multiplicity of small regional airports.
- Lower noise emissions allow for less flight restrictions, driverless shuttles for better airport connections, and public airport operators might shift their focus from maximising shopping time of travellers to minimising transfer time
- Medium and long distance rail transport, presently hampered by long investment cycles, complex infrastructure requirements and rigid organisation, needs to adapt in time to this competitive environment
- Rail will have to rapidly increase its capacity on high volume high speed connections and to improve reliability and comfort at interconnections. With long lead times for building new rails, increasing utilisation rates of existing infrastructure by upgrading electronic control systems and unifying standards in Europe will be essential. Probable decline in rail freight transport will free capacities.
- As a result, despite rising demand for medium and long-distance passenger transport, road capacity requirements will decrease. Investments will be necessary at interconnections and in upgrading rail transport.

INFRASTRUCTURE:
Road transport freight:



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- Considerably reduced costs of freight transport will lead to higher road transport demand (no estimates). Cost reductions could provide resources to cover public and private adaptation costs
- *Transport costs account for ca. 30% of overall logistic costs, logistics account for 7% of overall costs in industry and 16% in trade → a reduction of 50% in transport costs would result in 1% reduction of overall industry costs*
- Higher flexibility and 24/7 uptime of driverless trucks will lead to a considerably better utilisation rate – concerning time on the road, optimisation of routes and usage of load space

LONG DISTANCE TRANSPORT

- Road freight cost reductions in the forecasted range (up to 50%) will put a huge pressure on rail freight. Without good progress in automated intermodal container transport, rail freight will decline rapidly – with the exception of heavy bulk goods on high-volume relations. This will further increase road utilisation for freight (EU 2015: 51% road, 12% rail, 37% ships, 0,1% air)
- Outside urban areas, driverless trucks will easily be able to use roads in times of low traffic, optimising infrastructure capacity use
- As a result, long-distance road capacity requirements by road transport might increase, but will not exceed capacities freed by passenger transport

URBAN DISTRIBUTION TRANSPORT

- Increasing online trade leads to a strong increase in capillary urban distribution transport
- Higher efficiencies in distribution could be reached by pooling services of several operators, smart deposit systems and non-motorised last-mile services. Driverless vehicles and IT help optimising. Local government needed to set rules and to help establishing distribution hubs.
- Freight transport infrastructure requirements in cities change, but need much less space than is freed by passenger transport
- Airborne delivery will remain negligible in terms of quantities

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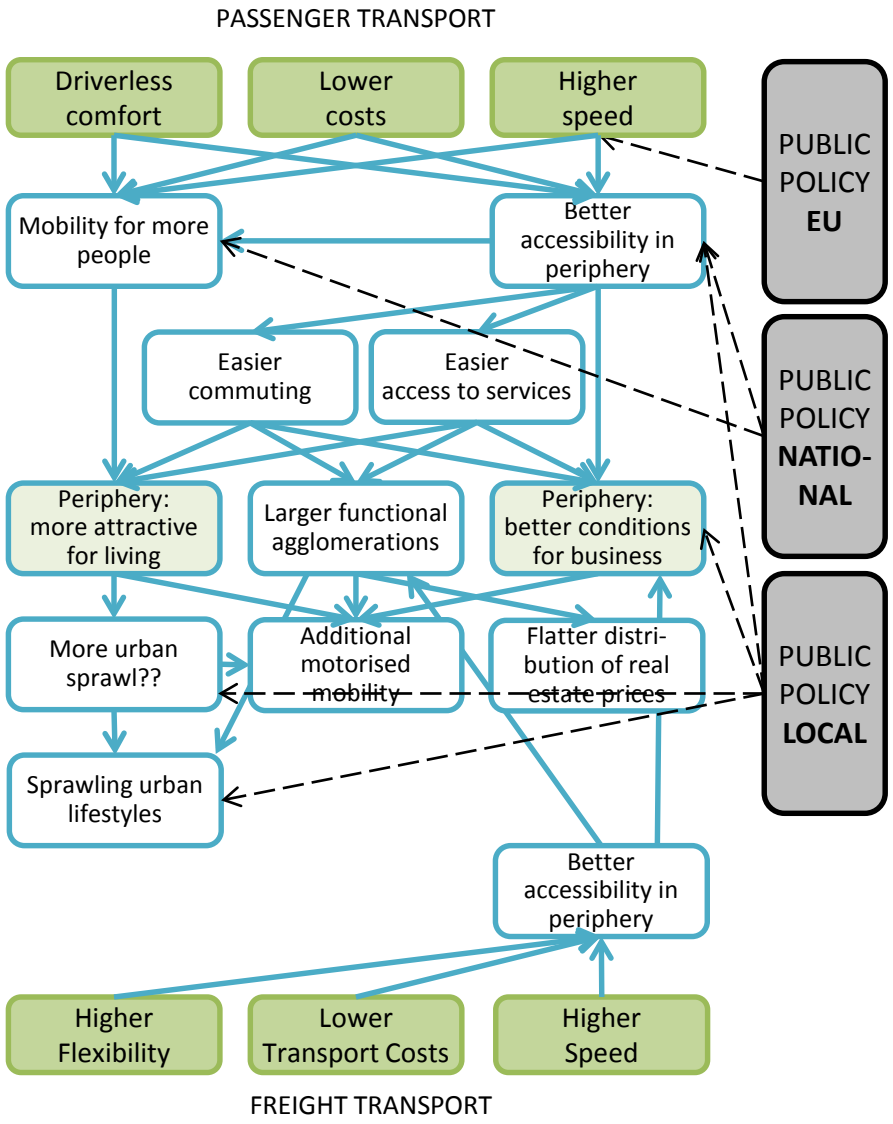
SPATIAL PATTERNS, SETTLEMENT STRUCTURES:



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- Lower road infrastructure use – from passenger and freight transport combined – will lead to higher speeds in local and regional passenger transport
- Driverless vehicles and lower costs will improve personal mobility for people without access to a car (elderly, kids, disabled, poor, …) in urban areas and more so in rural areas
- Accessibility of urban peripheries and rural areas may be considerably improved – for passengers and for freight
- More comfortable, less costly and more rapid transport will facilitate commuting over larger distances. Functional agglomerations will grow in size. People will more easily change occupation without moving.
- Switzerland has shown how improved public transport can increase commuting distances and allow people to stay living in peripheral areas
- It strongly depends on public policies and demographic dynamics whether this leads to further urban sprawl
- Europe has an important stock of high-quality real estate and slow demographic growth. Enabling a growing number of people to flexibly change or combine work and education without being obliged to move, can considerably increase the capability of adapting to deep changes in technology and business
- As the upcoming new transport means can be implemented in such a way that the number of travelling vehicles and the environmental impact decrease despite increasing transport services, spatial effects of their widespread introduction can be essentially positive – if appropriately regulated.

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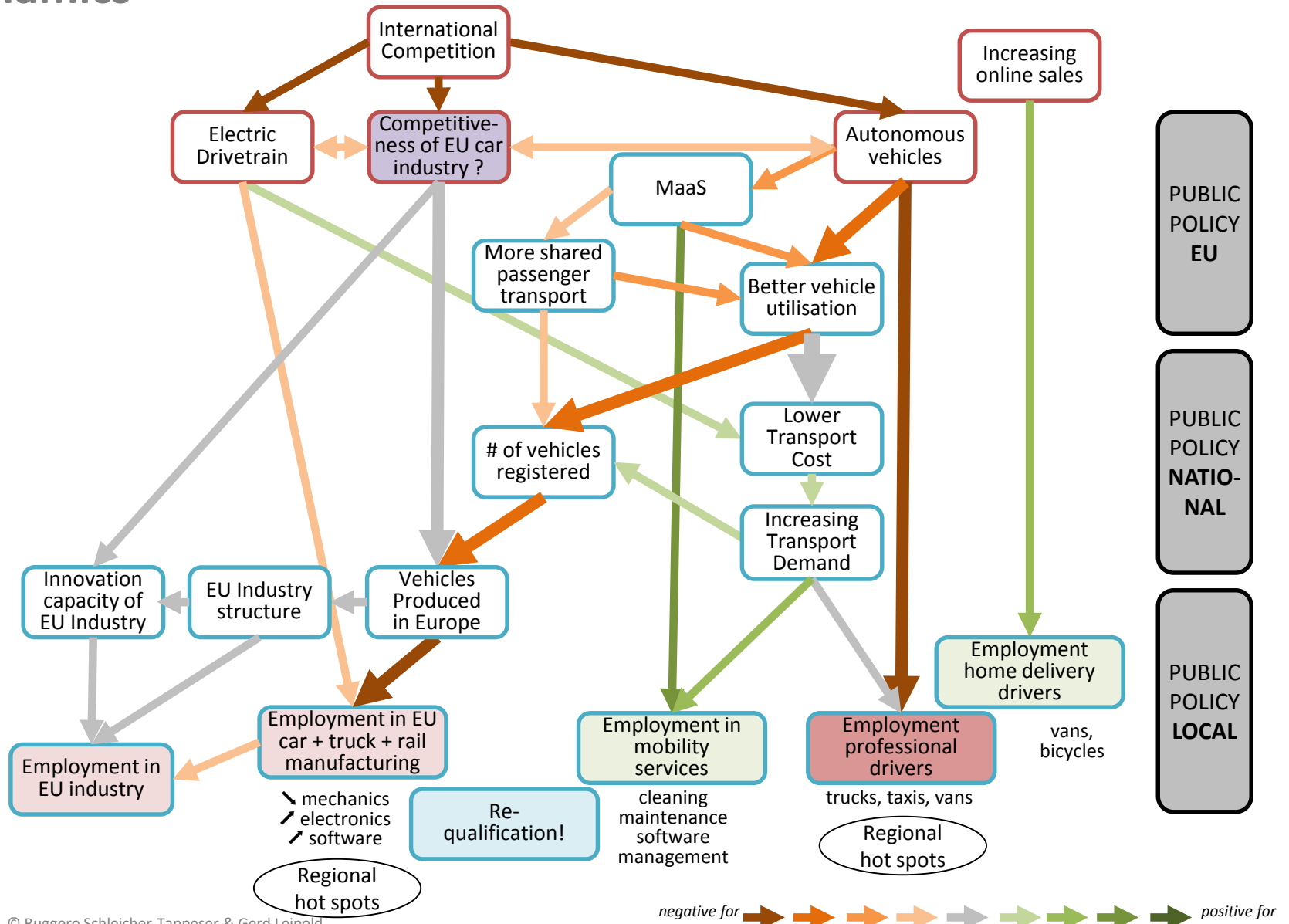
EMPLOYMENT: Dynamics



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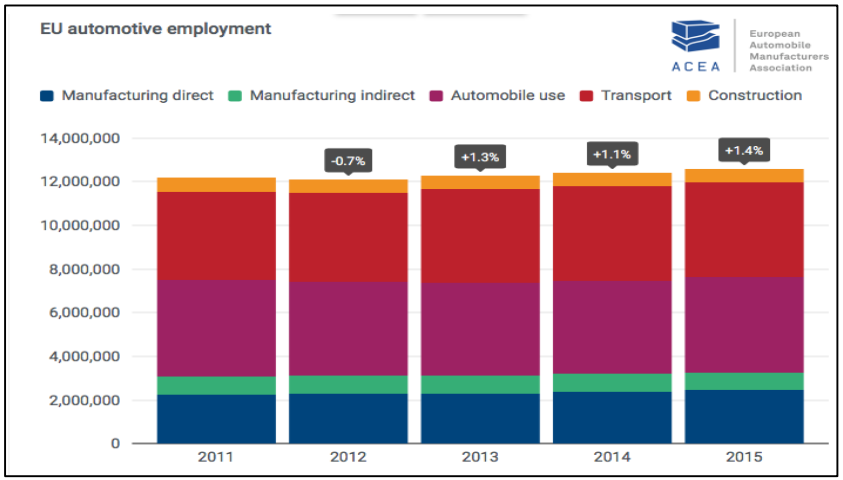
EMPLOYMENT:
Decreasing employment in mobility inevitable

Lessons of system analysis:

- **Employment in vehicle manufacturing will decline and hurt specific regions**
- **Employment in mobility services will increase**
- **Heavy decline in employment of truck and taxi drivers will be challenging**
- **Competitiveness of European vehicle industry is essential for maintaining manufacturing jobs**
- **Delaying the transition towards electric drive and driverless vehicles would hamper competitiveness**
- **Supporting timely requalification of skilled workers towards electronics and mobility services is important**
- **Net employment losses in the transport sector are inevitable, and have to be publicly discussed in time**



Relationships in detail:

- Introducing electric drive technology reduces competitive advantages of the European automotive industry and reduces the amount of labour required – an electrical drivetrain has 210 moving parts instead of 1400 in typical diesel drivetrain.
- However, building up own high e-car production volumes rapidly, will be decisive for the European automotive industry in order to maintain competitiveness. Electric drive technology already today has lifecycle cost advantages for intensely used vehicles. Especially Asian OEM and component manufacturers are pushing costs further down rapidly. Soon also less intensely used (privately owned) e-cars will have cost advantages.
- Introducing autonomous driving will drastically reduce costs of trucking and of ride hailing services. Driverless MaaS vehicles available 24/7 will become much cheaper and more comfortable than driving an own car standing idle 95% of the time. This will increase transport demand but result in much less vehicles required.
- Job losses among truck and taxi drivers will be more important, occur earlier and be more difficult to compensate than job losses in automotive manufacturing
- Politics could slow down change through regulation. This could facilitate adaptation in employment of drivers. However, this would seriously damage competitiveness of EU automotive industry and EU industry at large (higher transport and mobility costs, innovation capacity) and cause more serious employment problems in the medium term. Urgently needed environmental benefits would be slowed down too.
- Politics needs to help adapting: requalification of workers, structural change in particularly concerned areas, building leaders in mobility services.

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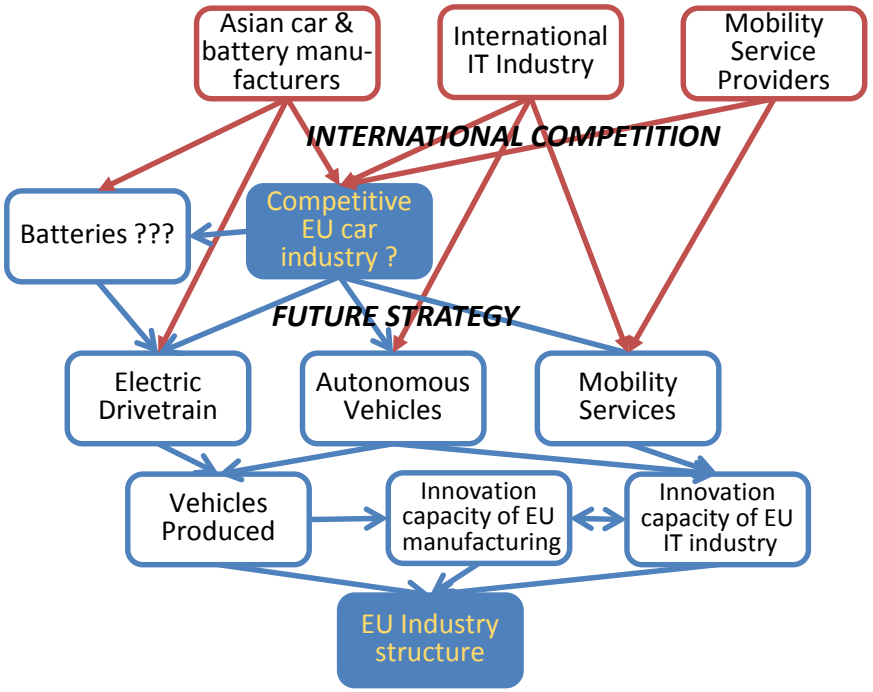
European industrial landscape



ROLE OF THE EU AUTOMOTIVE INDUSTRY

- The European car industry is central to the European industry structure. Serious problems in this industry could have far-reaching negative effects for the competitiveness of the European industry at large.
- Large parts of European industry are intricately related to the automotive sector. Even more important than turnover with components is innovation triggered by the automotive industry in other sectors.
- European car industry invests €50 bn in research annually. German car manufacturers invest €39 bn, 35% of total R&D spending of German industries.

RISKS OF EU CAR MANUFACTURERS STRATGIES

- Downsizing vehicle production in Europe and reducing the mechanical manufacturing required for every vehicle will affect overall European manufacturing. KPMG foresees a “precipitous decline” in car sales.
- Car manufacturers may find new revenue streams in mobility services – such a “tertiarisation” will require completely different, often lower workforce qualifications and less relations to other industries
- Autonomous driving capability is often seen as an add-on providing additional revenue - it requires high-level IT and electronics qualifications, corresponding to the general trend of digitalisation, and faces new competition from the IT industry
- With electric vehicles, the traditional mechanical core business loses importance while batteries and electronics gain.
- European industry has lost its once existing competitive advantage in battery technology and manufacturing – Can it get it back?

A PUSH TOWARDS LARGER INDUSTRIES?

- At first sight it seems that new technologies for mobility favour the emergence of even larger companies dominating vehicle manufacturing, driverless technologies and logistics
- Looking more closely this is not so evident: new niches and opportunities are opening for innovators and specialised services

DO WE NEED MORE DETERMINED EU INDUSTRIAL POLICIES?

- Microelectronics, high speed trains, mobile network technology and photovoltaics are examples where Europe lost promising industries to Chinese competitors backed by determined state strategies. Joint strategy and coordination at EU level could have made a difference.
- The upcoming revolution in mobility has the potential to shape lifestyles and European industries much more deeply than the energy transition. Risks for single European car manufacturers are evident, their strategies not clear. Problem awareness, strategic foresight and political instruments at EU level appear to be inadequate to tackle upcoming problems.

Summary of opportunities and challenges

INFRASTRUCTURE

- **Innovations in road passenger transport open great opportunities for lower infrastructure requirements – if adequate regulation is provided**
- Low costs for Mobility as a Service may lead to falling car owner-ship and strong reduction of required parking spaces. Public transport provided by private operators will dominate but requires appropriate regulation for ensuring comfortable interoperability and efficient use of public space. Big opportunities for improving quality of life in cities.
- Lower costs, supported by additional regulation in densely populated areas, may lead to more shared rides, higher vehicle occupancy and less vehicles on the road – despite increasing demand for passenger transport.
- Air transport may play a positive role for short and medium distances if regulated appropriately.
- Falling road freight transport costs will put further pressure on rail freight. Higher capacity use may compensate transport growth.
- Overall, infrastructure requirements may decrease and transport may speed up with appropriate regulation. Infrastructure adaptations will be necessary, especially for interconnections, rail and aviation. Early planning is needed for avoiding stranded investments.
- Falling costs open leeway for taxation that can cover infrastructure adaptation costs.
- All policy levels must contribute to ensure that new mobility technologies can unfold their potential. Laissez-faire would lead to congestion, social divide and conflicts.

SPATIAL PATTERNS, SETTLEMENT STRUCTURES

- **New transport technologies allow for flexible extension of mobility services: affordable and comfortable transport may even reach rural areas if not monopolised by large commercial operators**
- By ensuring interoperability of a wide variety of mobility service providers on software platforms and physical interchange nodes, mobility and accessibility can be improved in large and small cities, urban peripheries and rural areas likewise.
- The functional size of agglomerations may grow, commuting may increase if transport becomes cheaper, more rapid and comfortable. Peripheral locations may become more attractive if new services are not monopolised. All areas may enjoy reduced pollution and noise from traffic as we know it. More intense commuting may foster the adoption of urban lifestyles in peripheral areas.

EMPLOYMENT

- **Employment in vehicle manufacturing will decrease – the extent will depend on the ability of the European car industry to remain competitive despite increasing challenges.**
- **Decreasing employment for drivers will affect even larger numbers and requalification may be more difficult.**
- The high concentration of car production may lead to regional hotspots of unemployment risks requiring targeted adaptation policies.
- Timely information and adaptation programmes are needed to manage the transition process. Fear of the future and strong negative sectoral and regional effects could lead to a growth of right wing and nationalistic politics.
- New employment opportunities will open in software and electronics as well as new mobility services – often less qualified and precarious.

EUROPEAN INDUSTRIAL LANDSCAPE

- **The automotive industry has a central role in the European industry landscape.**
- It has complex supply relations with many industries and a key role in promoting innovation – a declining role of material manufacturing will affect European industry overall.
- The strong political influence of incumbent industries has often been used for preserving outpaced structures. More strategic foresight, public debate and targeted industry policy at EU level may be needed for avoiding decline.

These new technologies for mobility might allow to overcome the old feud between environmentalists and urban planners on one and the automotive industry on the other side – long-term interests increasingly overlap.

APPENDIX 2
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3. Understanding the force field: Options for European politics

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