*UrbanSCOPE - Urban Sustainable Mobility in focus: student education, community, involvement and participative planning* 

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# **AUTONOMOUS VEHICLES IN FUTURE CITIES**

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- Problems and goals of cities
- Transportation system
- Land use
- Planning







### **Prioritization of transportation modes**

Congestion

Noise

- Parking problems
- CO<sub>2</sub> emission
- Energy consumption





Source: Knorr, 2018, 31



### Instead of driving...



### Disability



### Platooning



Source: Vas



- Strenghtening public transportation and non-motorized modes
- Use cases (mass transportation, SAV, PAV)
- Shared autonomous vehicles
  - First and last mile services
  - Gap filling services (e.g. nights)
  - Replacing mass trasportation
  - Paratransit
- Integration (mass transportation SAV)
- Mobility on Demand (North America), Mobility as a Service (Europe)





# Land use – Freeing up of parking spaces

### Place saving parking of autonomous vehicles



#### Source: Motavalli, 2020

- On-street parking
- Surface parking
- Near parking



### Land use

### Zones of the future street

- 1. Curb
- 2. Autonomous buses
- Autonomous cars (ride hailing, freight, etc.)
- 4. Flex zone
- 5. Cycle path

Source: NACTO, 2019, 118



### Land use – Transformation of a city block



### **Reurbanisation vs urban sprawl?**





Source: Chapin et al., 2016, 26

# Planning – Urban and transportation planning

### **1.** Urban planning

(actualization of urban and land use plans, as well as parking guidelines)

- 2. Transportation planning (actualization of transportation development plans, development of integrated transportation models)
- 3. Infrastructure planning

(redevelopment of road infrastructure and road surface)







#### **Multi-lane intersection nowadays**

#### Multi-lane intersection in the future



V2I and V2V technologies



Free/continuous flow intersection



Source: <u>https://www.tandfonline.com/doi/full/10.1016/j.hbrcj.2014.03.009</u>

# Planning – Urban and transportation planning

- **1.** Urban planning
- 2. Transportation planning
- 3. Infrastructure planning
- 4. Renew of planning assets and methods
- 5. New planning principles

![](_page_11_Picture_6.jpeg)

(safety, moving of people instead of cars, equity, technology is only an asset, data driven decision making, act now)

Data, ciber security!

6. City budget 

Drastic drop in vehicle related revenues

![](_page_11_Picture_10.jpeg)

![](_page_12_Picture_0.jpeg)

### **How Revenues Break Down**

The 25 largest cities generated nearly \$5 billion from major vehicle-related revenue sources in FY 16.

![](_page_12_Figure_3.jpeg)

Traffic citation revenues were unavailable from four cities. Gas tax revenues exclude general sales taxes on gasoline and include state shared registration fees for Detroit and Denver.

Source: <u>https://www.governing.com/topics/finance/gov-cities-traffic-parking-revenue-driverless-</u>cars.html

# Planning – Urban and transportation planning

- **1.** Urban planning
- 2. Transportation planning
- 3. Infrastructure planning
- 4. Renew of planning assets and methods
- **5.** New planning principles
- 6. City budget
- 7. Behaviour and time horizon

(North America: proactive, Europe: uncertainty and hesitating)

![](_page_13_Picture_9.jpeg)

![](_page_13_Picture_10.jpeg)

Preparing and piloting cities and towns with considerable local government
 participation (number of cities)

			Medium-	Small	Total
	Megacity	Metropolis	sized town	town	IUldi
North-America	1	10	15	38	64
Europe	4	12	9	18	43
Asia	9	3	2	2	16
Pacific	1	1	1	4	7
Middle-East	0	1	1	2	4
South-America	1	1	0	0	2
Total	16	28	28	64	136

![](_page_14_Picture_2.jpeg)

Source: own construction accordint to the data of Global Atlas (2020)

![](_page_15_Picture_0.jpeg)

- Radical changes, comparable to those of the beginning of the 20th century
- Transportation system: shared usage, integration => goals of cities are theoretically achievable
- Land use: revitalisation of city centers, increasing density, compact cities, mixed land use
- (Urban)planning: maximising the advantages and minimising the disadvantages of new technologies
- Openness of the society?

![](_page_15_Picture_6.jpeg)

# Thank you for your attention ③

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![](_page_16_Picture_2.jpeg)