Karlsruhe Institute of Technology

WP7: Exploring the socio-technical environment of PAVs

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mycopter

http://www.mycopter.eu

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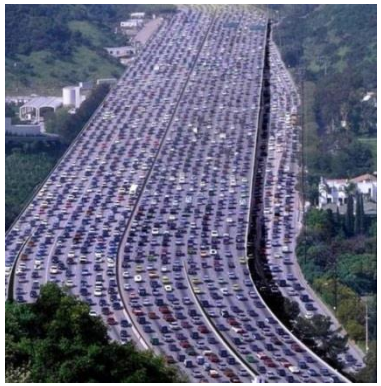
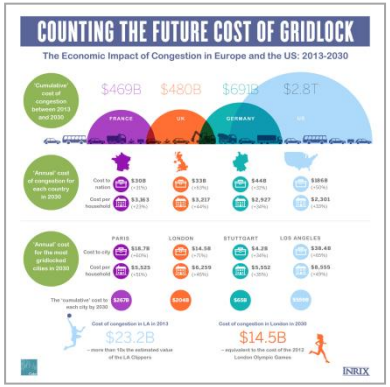
Our contribution to the project

- Project searches for a new technical solution for a persistent (sociotechnical) problem: urban congestion -> “commuting scenario”





- Constructive Technology Assessment (cTA) approach:
  - Participation of TA in early innovation stage
  - Contribute to reflexive pioneering by early and closely interacting with science & engineering

A conceptual image of a PAV

- Scenarios and focus groups with laypersons required to develop a "conceptual image" of a PAV -> PAV as "grey box"
- Reflection within the consortium: "Reference PAV"

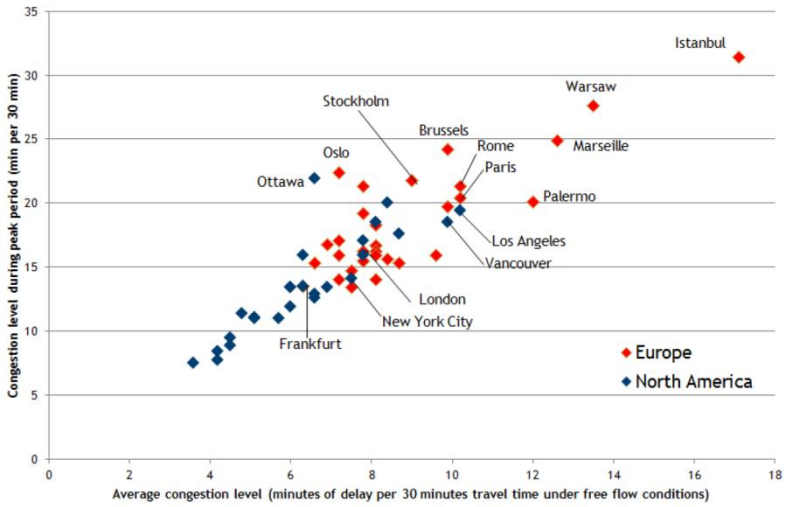
physical specifications	
number of seats	1+1
dimension of PAV	"garageable": size of a large/mid-size car
kind of propulsion technology	preferable electric
max. take-off weight of PAV	450kg
performance	
maneuverability on ground	yes, but only for short distances, no "roadable aircraft"
ability to come autonomously to the user	included in the "full level of automation"
Take-off capability	VTOL required
ability of IMC (Instrument Meteorological Conditions)	yes
ability to fly in darkness	yes
ability to fly in clouded environment	in degraded visual environment, not into clouds, probably
av. cruising altitude	< 500 m above ground level
total range	100 km
cruising speed	150 - 200 km/h
max. speed [km/h]	t.b.d.
climb rate at MTOW [m/s]	t.b.d.
level of automation	two different levels ("fully autonomus" and "augmented flight")
capability of automatic collision avoidance	Yes
capability of automatic landing/start	yes
further requirements:	
usability over the year	90 % per year

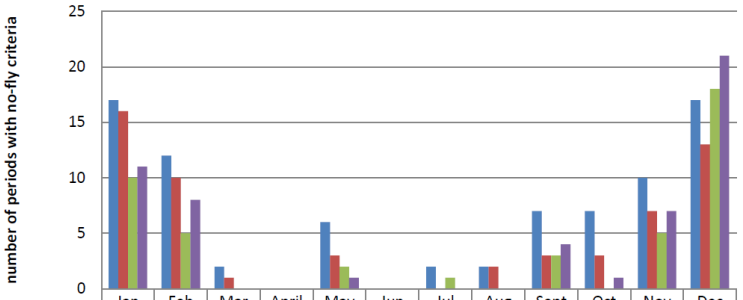
Selected Observations from the Focus Groups

- Four focus groups
- Technical feasibility not a major issue – almost no doubts about the 'doability'
- Main topics identified in desktop research were confirmed:
  - environmental impact, esp. noise footprint and 'fuels',
  - "driver" education,
  - availability,
  - Infrastructures (parking …).
- Additional aspects were mentioned, such as
  - spontaneity / integration into 'real life' trip chains
  - usability "on the ground" (flying at 20 cm level)
  - visual impact / uncomfortable feeling when looking up in the sky
- 'Level of autonomy' in the heart of discussions: No clear position, appears to depend on the purpose of the trip
- Some perceived PAV as "Over-Engineering": Would the technology, if implemented in cars, solve our congestions problem on the ground?

PATS in a Commuting Scenario

- Vast majority (ca. 90%) of commuting trips to work shorter than 25 km and take not more than 30 minutes.
- During peak hours, travel times in some major European cities are 50% longer. In very rare cases they double.
- Door-to-door travel times heavily depend on the PAV concept (pre- and post-trip routines, autonomy level) and infrastructures
- Weather may be another limiting factor.





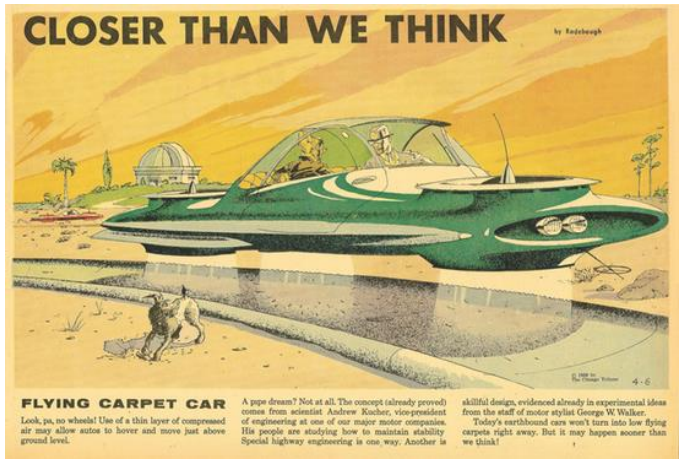
	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
6-8 Uhr	17	12	2	0	6	0	2	2	7	7	10	17
8-10 Uhr	16	10	1	0	3	0	0	2	3	3	7	13
17-19	10	5	0	0	2	0	1	0	3	0	5	18
19-21 Uhr	11	8	0	0	1	0	0	0	4	1	7	21

	< 1.5 km	1.5-5 km	5-8 km	8-10 km	> 10 km
> 5000 ft	X	M6	D3	O	C
2000 – 5000 ft					O
1000 – 2000 ft		M7	D4	D1	
500 – 1000 ft		M8	M5	M2	
< 500 ft	X				

Outlook

- Vehicle design faces challenges: propulsion, energy, noise
- Variety of MMI concepts ok for enabling technologies project ("remain open for options")
- Reduced option space for further system studies needed
- Automation strategy will be key and decisive for deployment:
  - "bottom up": increase level of automation
  - "top down": start with fully autonomous and think about release options
- Concepts for emergency cases still matter of debate (automated rescue systems, role of user)
- Currently a certain regulatory dynamic (UAV development).
- Think about "simple" options for early implementation:
  - "ropeless aerial ropeways",
  - island shuttles / valley hopping,
  - (…)

The vision will stay on the agenda …



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