



Project funded by the European Union
under the 7th Framework Programme



<http://www.mycopter.eu>

Flying to work? Take a MyCopter!

13th EU Hitachi Science and Technology Forum
"Transport and Mobility towards 2050" , May 10,2012, London

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mycopter Enabling Technologies for Personal Aerial Transportation Systems

Outline

- Innovation and Technology Assessment
- The EU-Project myCopter
- Scenarios and open questions

Cover: August 1956



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Institute for Technology Assessment and Systems Analysis (ITAS)

ITAS at the Karlsruhe Institute of Technology (KIT)

Research Institute at KIT doing *research*:

Research Topics: Climate change, Nuclear Waste Disposals, Environmental Issues,
Biomass to liquid, Energy Futures, Systemic Risks,...

Research for Policy Advice:

ITAS runs the office for technology assessment (TA) at the German “Bundestag”

ITAS coordinates the European Technology Assessment Group (ETAG) of 8 European
parliamentary TA institutions

ITAS advises the German Federal Ministry of Education and Science (BMBF) as well as
other Federal and regional ministries and the European Commission



Innovation

“The fundamental impulse that sets and keeps the capitalist engine in motion
comes from the new consumers’ goods,
the new methods of production or transportation, the new markets,....

[This process] incessantly revolutionizes the economic structure *from within*,
incessantly destroying the old one,
incessantly creating a new one.

This process of Creative Destruction
is the essential fact about capitalism.”

(Joseph Schumpeter (1942):
Schumpeterian Growth)



Technology Assessment

- Un-/intended effects
- Un-/desired consequences
- Main/side effects
- Positive/negative impacts
- Chances and risks

Thinking about Futures

- Present Thinking about Futures
- Near Futures
- Middle range Futures
- (Very) far Futures

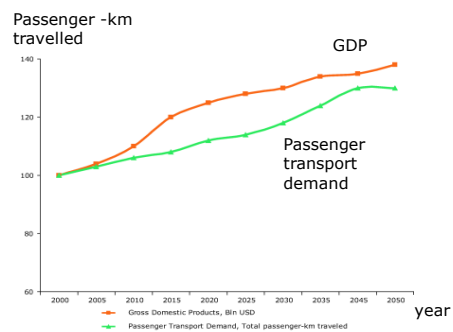


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- the problem



<https://www.ibm.com/developerworks/mydeveloperworks/blogs/sanblog/resource/stau.jpg>



<http://www.eea.europa.eu/data-and-maps/figures/trends-in-passenger-transport-demand-and-gdp-in-pan-european-region>



The „costs“ of congestion



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One potential solution?

- to develop a transportation system that would combine the advantages of a ground-based and the air-based transportation system.
- → a personal aerial transportation system (PATS)



one example from the Out of the Box Study, artist impression of VTOL vehicles in an urban area

Source: Muller et al. 2010, p. 64

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The project myCopter

- Focuses on a concrete context (commuting)
- Is going for “enabling technologies”
- Low or high skilled passenger/driver/pilot?

Two main aspects for TA:

- Automation/Autonomy
- The implementation into the current transportation infrastructure

- Constructive Technology Assessment
- Vision Assessment



What is a Personal Aerial Vehicle (PAV) ?

Mark Moore (NASA): self-operated aircrafts, affordable and usable for a large portion of society, meeting personal transportation needs (Moore, 2006)

DeLaurentis et al. 2002 describe PAVs as: “vehicles of the **future** (30 years) that may operate synergistically with ground and other air infrastructure to dramatically **improve** individual mobility within the larger transportation environment.”

- lower number of seats
- user friendliness and easy to use qualities



The MyCopter Scenarios

modul 1



modul 3



modul 5



modul 2



modul 4



preparation/start
at home

in flight

landing at work



The MyCopter PAV

physical specifications:

- 1+1 seating, size of a mid-size car, MTOW 450 kg
- electric motor

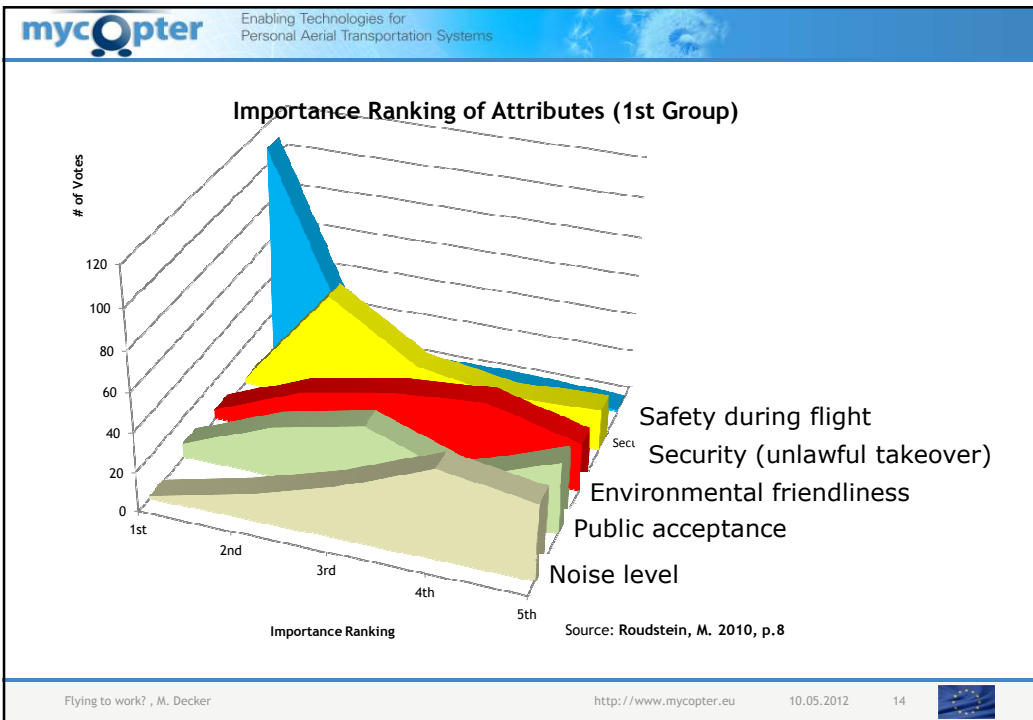
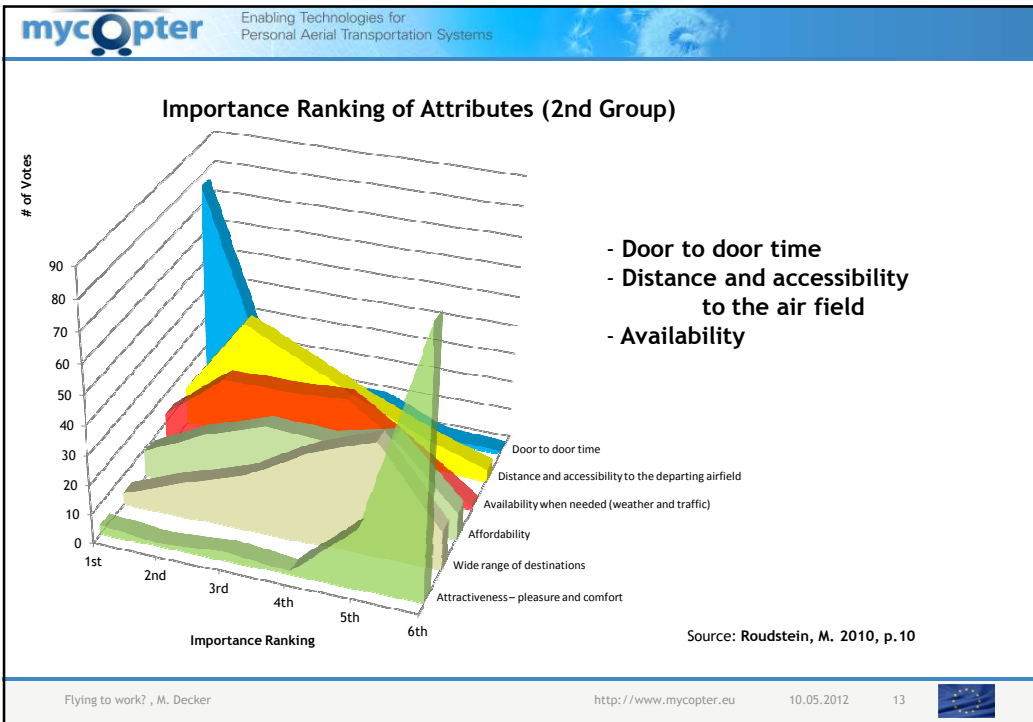
performance specifications:

- no car driving function, but maneuverability on the ground for short distances, VTOL, ability of flying in darkness and ability of IMC (Instrument Meteorological Conditions)
- av. cruising altitude: < 500m
- total range: 100 km
- cruising speed: 150-200 km/h
- level of automation (different ones including **full**)

further requirement

- usability over the year of 90% → weather analysis





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key issue 1: safety

- technical failures
- human induced errors (intern or extern) e.g. pilot`s decisions, mission planning, inadequate pilot experience, tiredness...
- misuse by purpose: terrorism
- external safety hazards (weather, other objects in the air/ground)



key issue 2: legal aspects

- certification of the vehicle
- license for user to fly/use PAV
- allowed times and places of operation in the air and on the ground
- responsibility & insurance



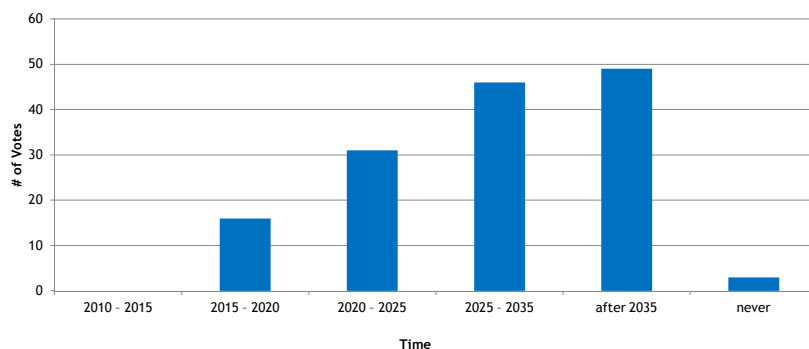
key issue 3: technical & operational aspects

- degree of automation & autonomy
- Air Traffic Management (ATM)
- take-off & landing sites
- parking and storing of PAVs
- support infrastructure




key issue 4: level of automation & autonomy

When will Fully Automated Flight Gain Public Acceptance ?





Source: **Roudstein, M. 2010, p.25**




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PACT Locus of Authority	Computer Autonomy	PACT Level	Level of HMI
Computer monitored by pilot	full	5a	Computer does everything autonomously
		5b	Computer chooses action, performs it & informs human
Computer backed up by pilot	Action unless revoked	4a	Computer chooses action & performs it unless human disapproves
		4b	Computer chooses action & performs it if human approves
Pilot backed up by computer	Advice, action if authorised	3	Computer suggests options and proposes one of them
Pilot assisted by computer	Advice	2	Computer suggests options to human
Pilot assisted by computer on request	Advice only if requested	1	Human asks computer to suggest options and human selects
Pilot	None	0	Whole task done by human except for actual operation

Source: Hill et al. 2007

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<h2>Summary and Outlook</h2> <ul style="list-style-type: none"> MyCopter is not building a PAV, but it focuses on enabling technologies for PAV (such as automation and related skills of driver) the context of use is commuter travelling <p>Many key issues have to be investigated:</p> <ul style="list-style-type: none"> the level of autonomy, Human Machine Interface in the legal and ATM sector huge restructuring is going on assess the effects of PAVs on traffic situation on the ground ecological and economic issues 			

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MyCopter consortium

- Max-Planck-Institut für biologische Kybernetik, <http://www.kyb.mpg.de> (Coordinating)
- The University of Liverpool, <http://www.flightlab.liv.ac.uk>
- École Polytechnique Fédérale de Lausanne, <http://www.epfl.ch>
- Eidgenössische Technische Hochschule Zürich, <http://www.asl.ethz.ch>
- Karlsruher Institut für Technologie, <http://www.its.fzk.de> .
- Deutsches Zentrum für Luft- und Raumfahrt, <http://www.dlr.de/flugsystemtechnik>



Thank you for your attention!

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