



# Enabling Conditions for Operations: pilot availability, SES, level of automations

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Common Vision Workshop for Small Aircraft Transport Mode,  
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ONERA

THE FRENCH AEROSPACE LAB

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# Pilot availability



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# Which issues?

## COST

Small aircraft transport = low number of passengers per aircraft

Low number of passengers per aircraft = overall cost of the trip to be divided by a small number:

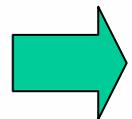
- **Pilot salary**
- Ground personnel salary
- Air vehicle cost
- Energy cost
- Airport / airfield taxes

# Which issues?

## LOGISTICS

### Pilot Flight Time, Rest, and Fatigue

- Small aircraft transport = high number of short legs
- Flight requests may be concentrated early in the morning and late in the evening



How to organize pilots flight time and rest time?

# Which issues?

## LOGISTICS

### Pilot Flight Time, Rest, and Fatigue

FAA: a pilot is not allowed to accept, nor is an airline allowed to assign, a flight if the pilot has not had at least eight continuous hours of rest during the 24-hour period

- The pilot needs to be able to look back in any preceding 24-hour period and find that he/she has had an opportunity for at least eight hours of rest
- If a pilot's actual rest is less than nine hours in the 24-hour period, the next rest period must be lengthened to provide for the appropriate compensatory rest

# Which issues?

## HUMAN RESSOURCES

Pilot selection, education and training

Selection - The “right profile” for a pilot will depend on:

- The automation level of the aircraft
- The service that will be provided to him/her:
  - Technical about the aircraft
  - Logistics for the preparation of the flight (airspace, weather, etc.)

Education and training

- To be defined according to the overall system definition ... it takes time to educate and train humans!



# Single European Sky Sky to be used for what purpose?



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# Politics: what is going to happen in Europe?

## SES for long haul flights : no alternative

**The Guardian, Monday 18 April 2011**

« EU could ground **short-haul flights** in favour of high-speed rail »

« Transport plan aims to reduce carbon emissions from sector by 60% over next 40 years »

"At Heathrow there are no new runways, but we desperately need to increase capacity and you can do this if you reduce short-haul flight connections," said Kallas. The commissioner added in an interview with the Guardian that the UK should look at the example of Spain, where high-speed rail has hit demand on a previously popular flight corridor.

# Politics: what is going to happen in Europe?

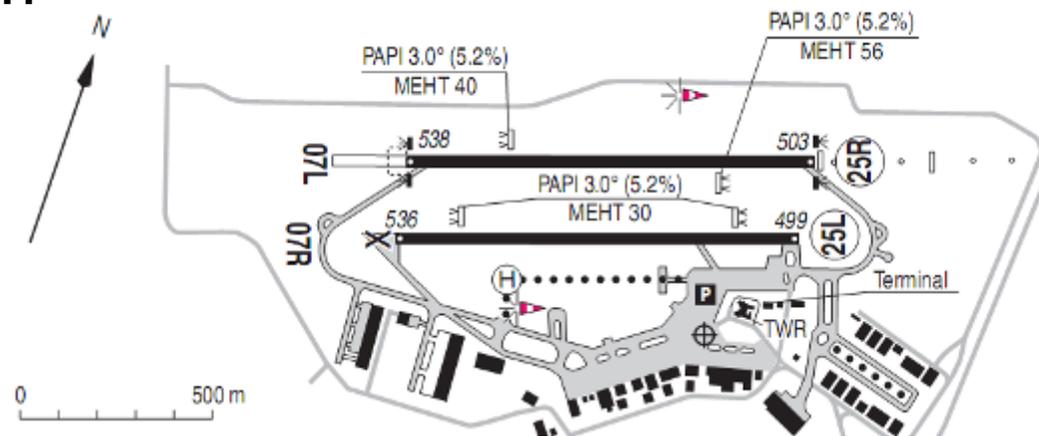
## PATS using smaller airfields?

Short haul flights are often used as a first leg for a connections with long haul flights:

- Efficient ground transport to be set up between small and large airports

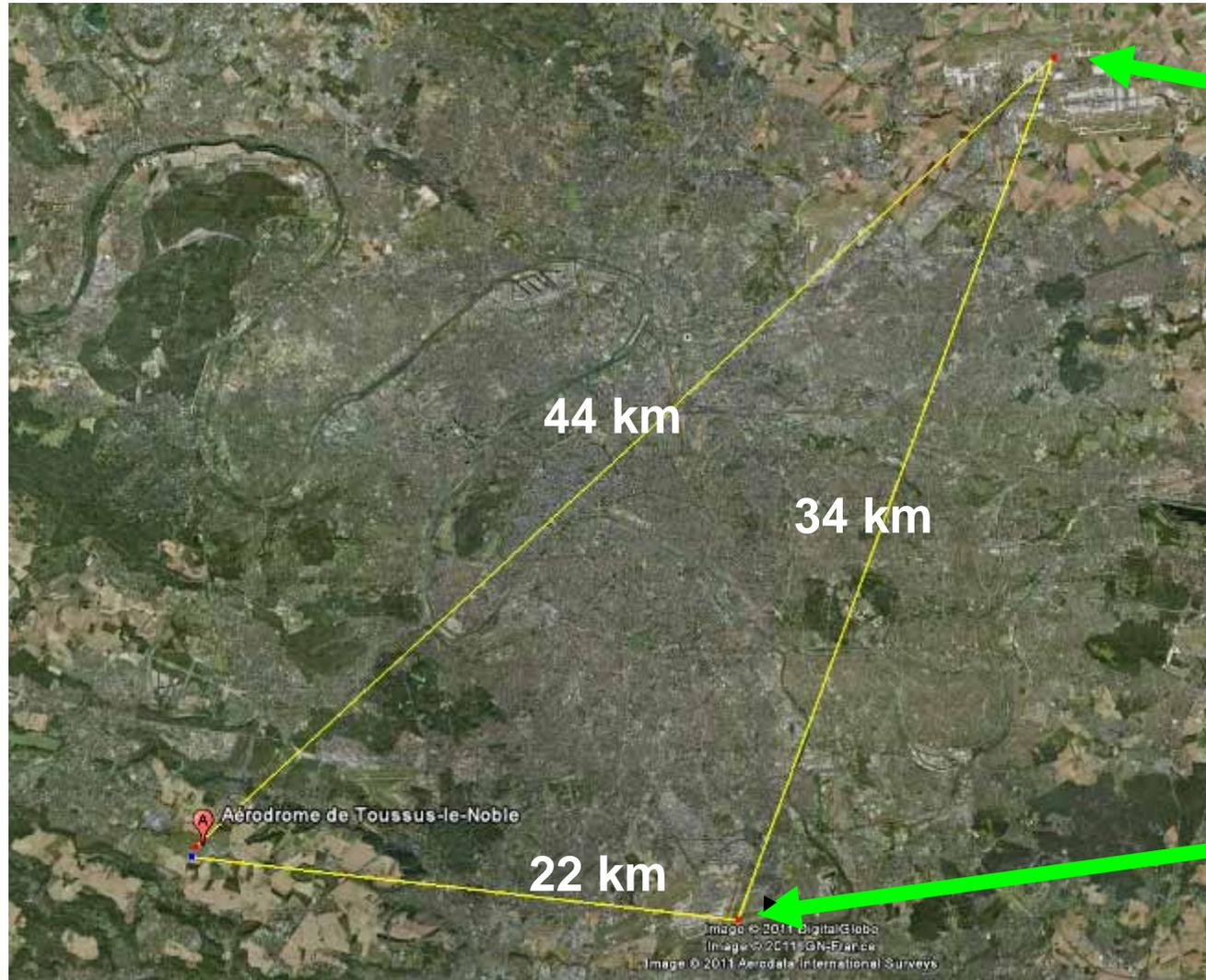
Small airport neighborhood residents not ready to accept additional nuisance...

Let's consider  
Toussus le Noble  
near Paris



# Politics: what is going to happen in Europe?

## Toussus le Noble: ideally situated!



**Roissy  
Charles de Gaulle**

**Orly**

# Politics: what is going to happen in Europe?

## Toussus le Noble

Journal officiel de la République française, **10 août 2011**

- Airport closed for all traffic equipped with internal combustion engine on Sunday and public holidays between 12:00 and 15:00 (from 1st April to 30th September)
- Traffic limited to VFR flights of Toussus based aircraft from 6 AM to 7 AM
- Traffic limited to Toussus based aircraft when no ATC



# Environment and Levels of automation



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## Which issues?

1. For cost reason, it would be nice to have pilots able to operate several aircraft
2. For logistics reason, it would be efficient to enable air vehicles to fly without anybody on board to be relocated to another airfield
3. For environment purpose, aircraft should be “emission less” and “noiseless”...

Is it reasonable to propose a Small Aircraft Transport Mode with the current technologies and organizations?

# Which solutions?

- Electrically powered aircraft
- Highly automated SAT with automated aircraft
- “Ground Pilots” have only to monitor what the aircraft are doing and to make decisions in case the vehicles do not behave as desired
- Several pilots are “operating” several aircraft simultaneously from a remote pilot station
- Situation awareness must enable detection of any derivation from expected behavior

The PPlane project’s primary conclusions tend to promote this long term solution

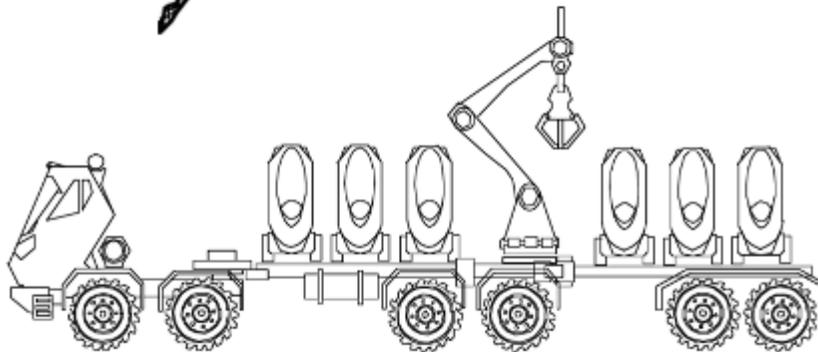
# Which solutions? - NASA view

## On Demand Mobility Key Components

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**1.** Absorb most work related daily mobility demand with low environment and resource impact virtual/telepresence technologies. Provides margin for INCREASED air travel and enables Zip Cars to meet short range demand.



**2.** Expand Zip Car concept to electric, custom-sized vehicles that can be delivered anywhere any time. Eliminate 2<sup>nd</sup> car ownership requirements. Reduce global manufacturing demand of resources. Provides margin for INCREASED air travel.



**3.** Expand Zip Car Concept to Electric, Autonomous, On-Demand GA aircraft & local airports. Meets historical driver/Millennials need for flexibility, and increased effective speed. Electric Propulsion Provides margin for INCREASED air travel.

Yuri Gawdiak May 14, 2010

# Which solutions? - NASA view

## Needed Changes - NextGen Level 6 plus:

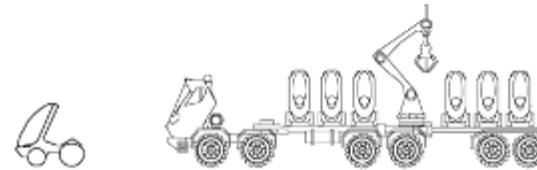
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Irrational Daily Traffic Congestion



Large scale 80% Telepresence for work.

Zip Car



On demand, all electric, custom sized vehicles delivered

to customer. Reduced consumption (2000%)

capacity of surface vehicles. **Lead the World by helping Civilization sidestep unsustainable consumption and thereby preventing a possible Global Resource/Environmental Crisis**

Yuneec e340 Electric Airplanes



Adv. GA Autopilots

Autonomous Electric Zip GA



Global Hawk/Adv Sensors



On demand, Electric, 1-4 passenger custom sized autonomous, sense & avoid aircraft. Meet historic trend of greater flexibility & shorter travel time at affordable costs. Use of parachutes for added safety.

\* BTS data for 2007 (at [http://www.bts.gov/publications/pocket\\_guide\\_to\\_transportation/2010/pdf/entire.pdf](http://www.bts.gov/publications/pocket_guide_to_transportation/2010/pdf/entire.pdf), pages 17 and 19) show an average of 1.58 passengers per car (Excess capacity 5 - 1.58 = 3.42. 3.42/1.58 = 216%)

# No conclusions, only questions...

- How long will it take to set up a Small Aircraft Transport mode based on current technologies?
- Once it is mature, will it still be socially acceptable?
  - Energy consumption
  - Environmental footprint
- How to deal with these issues in SAT Rdmp?