

Technology Roadmap for Small Aircraft Transport Mode
ILA, Berlin, September 2012

Common Vision
for the development of
Small Aircraft Transport System
in Europe



- ❖ **Expected Benefit for Europe by developing SAT**
- ❖ **SAT-Rdmap project - Objectives and Expected Impact**
- ❖ **SAT Common Vision**
 - **The Overall Approach**
 - **The SAT concept**
 - **Stages of SAT system development**
 - **The Specific SAT Challenges**
 - **Enabling conditions**
 - **Main Recommendations**



Expected Benefit for Europe by developing SAT

❖ **The SAT system will allow to answer to the Flight Path 2050 Challenges:**

- meeting Societal and Market Needs
- maintaining and Extending Industrial Leadership
- protecting the Environment and the Energy Supply

ensuring Safety and Security.



Meeting Societal and Market needs

- ❖ SAT system will **create additional mobility (door-to-door/point-to-point)** for the European citizens as a component of an inter-modality transport system.
- ❖ SAT system will enable the strategic goal: **“90% of travelers within Europe are able to complete their journey, door-to-door within 4 hours”**
- ❖ SAT System will be **interconnected, accessible, predictable, dependable and comfortable.**
- ❖ SAT will be part of a variety of transport services **tailored to individual needs.**
- ❖ The SAT system will **ensure access of small communities to air service**



Maintaining and Extending Industrial Leadership

- ❖ The deployment of the SAT system will ensure the growth of European industry and of SME **ensuring jobs and innovation.**
- ❖ The SAT deployment will be a stimulus **for ensuring a level playing field between Europe and the rest of the world for small aircraft aviation;** this will have to be supported by the right policies, certification processes, funding and regulations, in close cooperation with the main stakeholders.
- ❖ **The SAT system will complement the traditional cargo system** allowing freight distribution in regions with less developed road/train infrastructures or among city pairs with less commercial volumes, partly substituting freight transport by tracks.
- ❖ **Export SAT products out of Europe covering emerging markets.**



Protecting the Environment and the Energy Supply

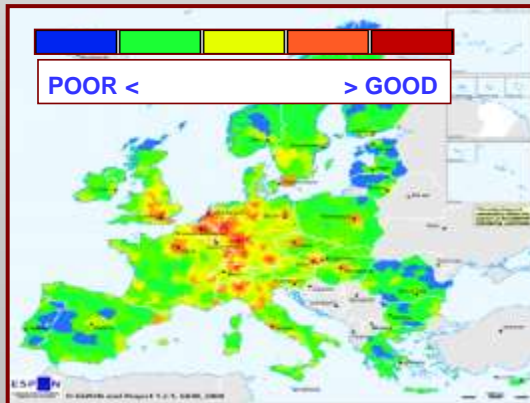
- ❖ **SAT System will be environmentally friendly, affordable, safe and secure.**, The system will enable a reduction of emitted greenhouse gasses compared to other means of travel **by adopting more easily alternative fuel and alternative power sources.**
- ❖ **SAT System development will reduce road travel.** The benefits include the prospect for reduced emissions and energy consumption, in comparison with road transport.



SAT-Rdmap Project Objectives

- ❖ Definition of a **common vision** of the small aircraft transport system for inter-regional mobility.
- ❖ Identification of **demand** and design of a **business case** compliant with the identified requirements which describes the relations among all the system's components.
- ❖ **Risk Assessment** and **cost/benefit performance** of the identified new system's concept.
- ❖ Identification of the **SAT requirements** in terms of **technology needs** and **regulatory issues** to be addressed.
- ❖ Assessment of **current capabilities**.
- ❖ Definition of a **roadmap** to fill the **technology/regulatory/operational** gaps between current capabilities versus the requirements.
- ❖ **Dissemination** actions and establishment of a stable and well **recognised network of stakeholders**.

- ❖ **Pave the way for the general acceptance** of the added value of small-size aircraft transport, operating on commercial scheduled or non-scheduled flights, as a component of the European (Air) Transport system.
- ❖ **Define a highly customer (passenger and freight) oriented service** able to achieve the strategic goal: 90% of travellers within Europe are able to complete their journey, door-to-door within 4 hours in Europe.
- ❖ **Identify the RTD needs** of the European transport service operators and manufacturing industry in order **to become the world leader** in operating, designing and producing small aircraft.





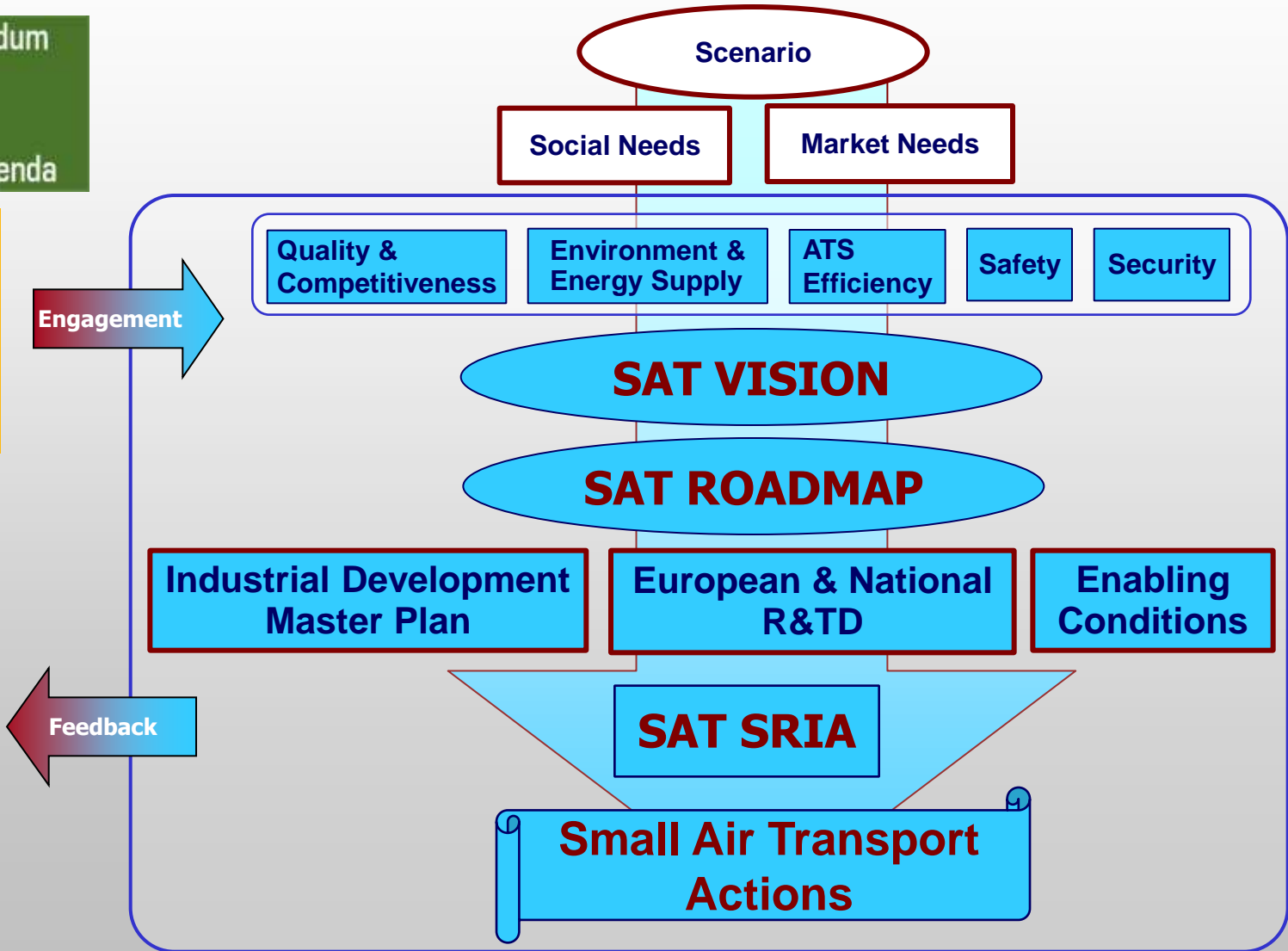
Turning SAT mode into practice



2008 Addendum
to the
Strategic
Research Agenda

Flightpath 2050
Europe's Vision
for Aviation

Report of the High Level Group
on Aviation Research





SAT Common Vision

Social Needs Market Needs

Challenges

Quality & Competitiveness Environment & Energy Supply ATS Efficiency Safety Security

SAT Demand

Scenarios

SAT Products

Aircraft Rotorcraft Engines On Board Comm. & Systems Insertion in SES Airports Certification Standard & Rules

Booking Systems Fleet Management Pilot Training

HL Objectives

Recommendations for Practical Implementation

Expected Benefits HL Objectives vs. Challenges

VISION



The Common Vision



COMMON VISION on the development of a Small Aircraft Transportation system

SAT-CommonVision-D1.1

Version - 6.0

by

Marcello Amato

(CIRA)

WP1 - Leader

and

Angela Vozella (CIRA)	Krzysztof Piwek (SA)	Adriaan de Graaff (AdCoenta)	Isabelle Laplace (NE Systems)	Stefaan Ghys (Fly Aedra)
Daniel Rohacs (RH/T)	Alfred Baron (SA)	Tony Henley (THL)	Janusz Pietruszka (PZLM)	Jiri Duda (Evektor)
Catalin Nae (NCAS)	Frans van Schalk (ALR)	Claude Le Taliec (ONERA)	Aniello Cozzolino (Pieggo Aerodyssey)	Richard Curran (TU Delft)



The SAT Concept

Small Aircraft Transport System will serve:

- ❖ **the need for low-intensity intercity routes** (e.g. for west/east directives also in central Europe), which has been dependent so far on road transport;
- ❖ **regions with less developed infrastructures** (e.g. out of the central European “economic banana”, sea costal regions and islands);
- ❖ **the needs of European personalized and business travel.**



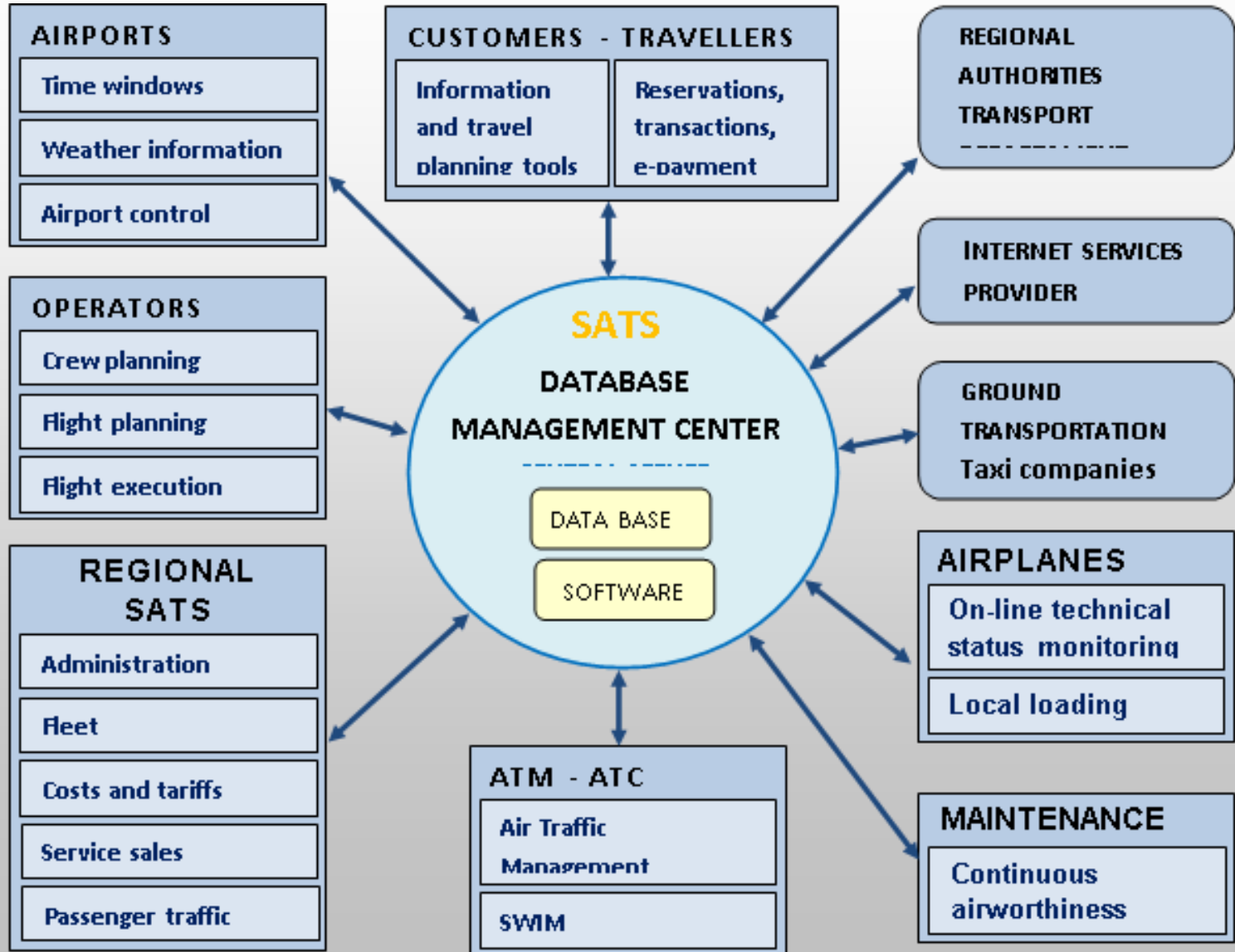
The SAT Concept

- ❖ **SAT system will offer increased mobility** with a highly customer oriented approach.
- ❖ **The SAT system will add a new modality within the Air Transport System and complement international and regional transport.**
- ❖ The SAT System will be **highly customer oriented** (affordable, accessible, predictable, dependable and comfortable), **environmentally friendly, safe and secure, interconnected,**
- ❖ **SAT system will exploit small airports, aerodromes, heliports, seaplane aerodromes,** thus answering to the growing and segmented demand for air transport and will increase the accessibility to transport.
- ❖ **The system will be based on small aircraft and rotorcraft,** with 4 to 19 seats, including amphibious aircraft, **operating scheduled and unscheduled flights in an integrated and intelligent transport management system.**

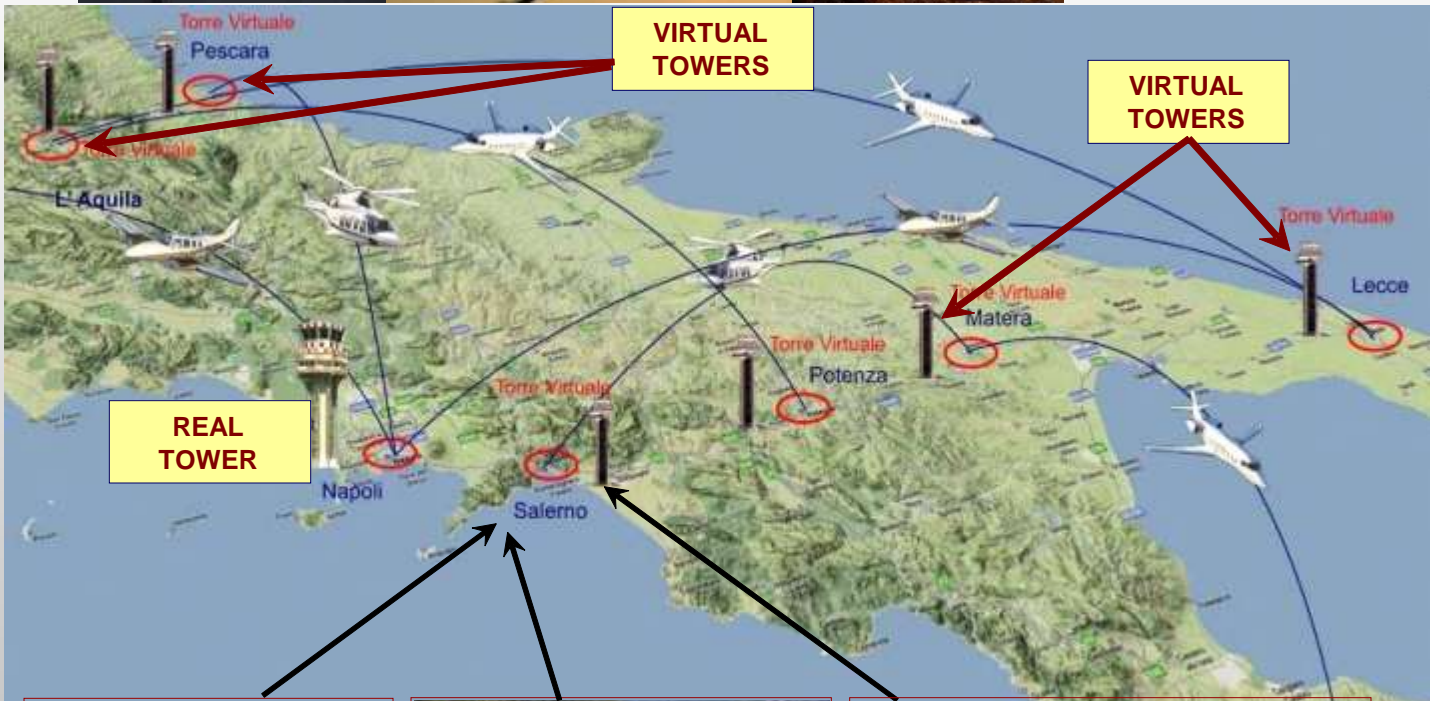


PROVISIONAL CONCEPT

Intelligent Small Aircraft Transportation System Concept



The SAT Concept





The SAT Concept





Stages of SAT system development

In order to get the full deployment of the SAT system according to the Vision, steps should be performed according to the following time frames:

- ❖ **Short term 2020**
- ❖ **Medium term 2035**
- ❖ **Long term 2050**

The SAT Roadmap will focus up to 2035.



- ❖ **General acceptance of the added value of small-size aircraft and rotorcraft**, operating on commercial scheduled or non-scheduled flights, as a component of the European (Air) Transport system.
- ❖ **Perform RTD projects** according to the needs of the European manufacturing industry, service operators and ATM **in order to become the world leader in design and production of small aircraft and in operating a new transport mode.**
- ❖ **Perform dissemination activities.**
- ❖ **SESAR ATM takes into account the SAT system operations** already in the employment phase in 2014.

- ❖ **New business models and IT systems** will be developed **to manage cost effective transport services and to support flight operations**, which should allow achieving high load factors and lower service costs.
- ❖ **The Small Aircraft community** should improve their **coordination** and define an industrial development master plan.
- ❖ **The enabling conditions to develop a SAT system should be improved at regional, national and EU level.**
- ❖ **The system will start developing in some MS or regions** most interested in low cost personal business travelling.



- ❖ **Integration of small-size aircraft and rotorcraft**, operating on commercial scheduled or non-scheduled flights, within a **seamless inter-modality transport system**.
- ❖ **The European manufacturing industry** becoming the **world leader** in design and production of small aircraft.
- ❖ **Appropriate business models** for a full deployment of the SAT system available.
- ❖ **Full public acceptance and political support**.
- ❖ Small aircraft are **resilient to adverse weather**.



- ❖ **New advanced aircraft** vehicles including **clean and silent propulsion systems** available.
- ❖ **Situation Awareness** by the availability of innovative cockpit, flight management systems, new communication and automation. The technology should allow single pilot operations and assist less trained pilots.
- ❖ **New safety and certification regulations tailored to SAT** are available.
- ❖ **Innovative take-off and landing/launching techniques** are adopted.



LONG TERM 2050

- ❖ Innovative small aircraft and rotorcraft are developed in EU with **zero pollutant emissions, very small noise foot print, and low environmental impact all along the life cycle.**
- ❖ The SAT system has the same **safety and resilience level of the large aircraft ATS.**
- ❖ **Free flight and/or free** routing are the standard for operations.
- ❖ **Fully automated SAT aircraft** flying according to **autonomous flight rules.**



The Specific SAT Challenges

- ❖ The main goal of Small Aircraft Transportation System is to **provide high-speed passenger transport to European Regions serving city-pairs with low-intensity traffic.**

Currently these cities are connected mostly by personal cars or anyhow with a travel time from door to door greater than 4 hours, and without near term perspectives for the introduction of high-speed train or scheduled airlines.

- ❖ The SAT System must be
 - **highly customer oriented (passenger/freight)**
 - **environmentally friendly**
 - **safe and secure**
 - **interconnected**
- ❖ The SAT system might be a forerunner of a future reservation system enabling seamless flow for both passenger and (small) freight.



Enabling Conditions

- ❖ The following **enablers** have been identified for the “Product Technologies”
 - Funding
 - Cost models
 - Business Models
 - Certification, Standards and Rules
 - R&TD activities and infrastructure
 - Flexible fleet and pilots
 - Small Aircraft community networking
 - Cooperative network of airports
 - The needed logistics and related technical issues to set up a SAT system must be fully identified.
 - Human issues related to the SAT System are studied for improving public acceptance.

- ❖ The deployment of a SAT system should be recognised as **an answer to the social need** for additional mobility specifically in some regions and city-pairs; these areas would increase their access to transport.
- ❖ A part of the **cost reduction** may come **by setting up the enabling conditions** and among these the proper business model and service operations.
- ❖ **Another part of** the needed **cost reduction** will come **by technology improvements**.
- ❖ SESAR should recognize the importance of SAT system taking into account the SAT system operations already in the employment phase in 2014, avoiding expensive late adjustments. ATM costs reductions are important for SAT deployment.

- ❖ **A proper dissemination and political leverage** is needed to improve awareness of sustainability and possible social benefits of a SAT system.
- ❖ **In the short term** (within 2020) it is essential to perform **dedicated research and dissemination activities** .
- ❖ **SATRdmap Vision and Research Agenda outcomes should be considered as elements of ACARE SRIA.** Research, Testing Capabilities and Education will have to be prioritised taking into account the need for the SAT System deployment.
- ❖ **Horizon 2020 should foresee R&I activities dedicated to the full deployment of the SAT system as an element of future European Transport System.**



END