



Common Vision Workshop on Small Aircraft Transport (SAT) System

Brussels, September 28, 2011

Recollection of WG-1 and WG-2 Discussion

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The SATS approach will add a new modality within air transport and complement international and regional transport.

Small Aircraft Transport 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”)
- ❖ **the needs of European business travel**



SAT Common Vision



Challenges

COST

**Quality &
Competitiveness**

**Environment &
Energy Supply**

**ATS
Efficiency**

Safety

Security

- ❖ To provide a new affordable, accessible, energy efficient and environmentally friendly component of Air Transport System (ATS).
- ❖ To offer a larger choice for transportation through the increasing use of small aircraft serving small airports
- ❖ To facilitate the access to transport for a large number of communities in a cost effective way. To satisfy the needs of transportation in regions where transport networks (especially surface transport) are underdeveloped.
- ❖ To create additional mobility (door-to-door/point-to-point) for the European citizens.
- ❖ To stimulate a co-modal approach for the European transport system.
- ❖ To improve the energy efficiency of transport according to the European Energy Strategy for Transport.



SAT Common Vision



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

Engagement

Quality & Competitiveness

Environment & Energy Supply

ATS Efficiency

Safety

Security

SAT VISION

SAT ROADMAP

Industrial Development
Master Plan

European & National
R&TD

Enabling
Conditions

Feedback

SAT SRIA

Small Air Transport
Actions





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

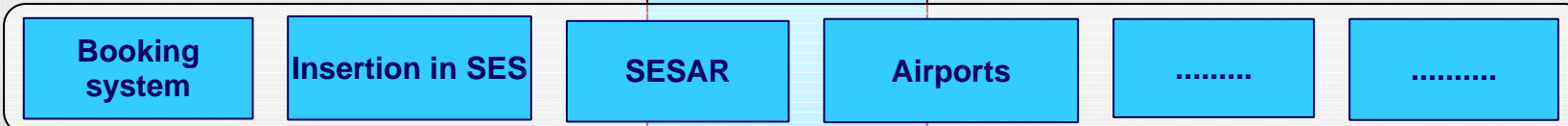


High Level Objectives

Product Technologies



Operations Technology



Enabling Conditions



Technological Objectives

Enabling Conditions

Risk Assessment

Expected Benefits

SAT SRIA



Why a Vision Is Important

- ❖ **Is a catalyst**
- ❖ **Aligns involved people and organizations in joint activities**
- ❖ **Facilitates to set goals, priorities and planning.**
- ❖ **Helps unifying efforts and funding**
- ❖ **Keeps the community inspired and facilitate people commitment**

- ❖ **Describes the shared future a community wants to create**
- ❖ **Reveals and announces the added values for the community of planned activities towards social needs, technological progress and innovation**
- ❖ **Visions can be short “we will have a man on the moon” or as long as a page or two. But, in either case, they must give a clear and compelling picture.**



Workshop Approach

- ❖ **A Discussion Paper was distributed**
- ❖ **Key elements of a vision for a SAT System are presented to set-up the scenario**
- ❖ **Two Parallel Sessions take place to openly collect views and opinions on key elements of the SAT Vision**
- ❖ **Presentation of preliminary Collection of results from Parallel Sessions**
- ❖ **Panel Discussion on three Pivotal Questions**
- ❖ **SAT-Roadmap next steps are discussed**



Activities for SAT Vision to be discussed in the Parallel Sessions

- ❖ **Main characteristics of future Small Aircraft Transport System**
- ❖ **SAT sectors and products where Europe wants to excel**
 - characteristics of new environmentally friendly and efficient aircraft and systems
- ❖ **When products are needed in the market ?**
- ❖ **High Level Objectives for SAT Products**



Common Vision Workshop on SAT Mode
28th September 2011, in Brussels, Belgium, at Regione Campania Office



Parallel Sessions with two Working Groups		
	Parallel Sessions WG – 1	
13:30	<ul style="list-style-type: none">❖ Target Products & Technologies<ul style="list-style-type: none">○ Piston engine A/C - 9 seats or fewer – MTOW up to 5670 kg,○ Turboprop A/C - 19 seats or less - MTOW 8618 kg○ Jet A/C - 11 seats or less – MTOW up to 7600 kg❖ HLO for Product Technologies❖ Enabling Conditions for Product Technologies<ul style="list-style-type: none">○ R&TD infrastructures○ Certification, Standards and Rules○ Industrial Master Plan○ Funding❖ Product Technologies HLO vs Challenges	<p>WG – 1 lead by A. de Graaff (AD Cuenta) M. Amato (CIRA)</p>
15:30	Coffee Break (15:30 - 15:45)	





Parallel Sessions WG – 2		
13:30	<ul style="list-style-type: none">❖ Target Operation, System Concepts and Technologies<ul style="list-style-type: none">○ Booking system○ Fleet Management○ ATM and SES○ Airports○ Automation level for SAT and operation modes ❖ HLO for Operation Technologies ❖ Enabling Conditions for Operations Technologies<ul style="list-style-type: none">○ Pilot Training○ Insertion in SES○ Certification, Standards and Rules○ R&TD funding ❖ Operation Technologies HLO vs Challenges	<p>WG – 2 lead by</p> <p>T. Henley (Consulting) S. Ghijs (Fly Aeolus)</p>
15:30	Coffee Break (15:30 - 15:45)	





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WG1

WG2



	Preliminary Results Collection	
15:45	Product Technologies and Enabling Conditions Product Technologies HLO vs Challenges	WG-1 Leader A. de Graaff (AD Cuenta)
16:00	Operation Technologies - Enabling Conditions Operation Technologies HLO vs Challenges	WG-2 Leader T. Henley (Consulting)



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Working Group 1 Target Products and Technologies



To be tackled in the Common Vision

- ❖ **SATS Vision**
- ❖ **Target Products & Technologies**
 - **Piston engine A/C - 9 seats or fewer – MTOW up to 5670 kg,**
 - **Turboprop A/C - 19 seats or less - MTOW 8618 kg**
 - **Jet A/C - 11 seats or less – MTOW up to 7600 kg**
 - **.....**
- ❖ **Challenges and HLO for Product Technologies**
- ❖ **Enabling Conditions for Product Technologies**
 - **R&TD infrastructures**
 - **Certification, Standards and Rules**
 - **Industrial Master Plan**
 - **Funding**
- ❖ **Product Technologies HLO vs Challenges**



Recollection WG-1 discussions



Target Products and Technologies



SATS Vision

- ❖ The importance of SATS as a new air transport mode was generally accepted.
- ❖ Better marketing for SATS needed
- ❖ SATS is seen as a niche market



Challenges and HLO



COST	Quality & Competitiveness	Environment & Energy Supply	ATS Efficiency	Safety	Security
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COST IS FELT AS VERY RELEVANT



Target Products and Technologies



Target Products & Technologies

- ❖ Piston engine A/C - 9 seats or fewer – MTOW up to 5670 kg
- ❖ Turboprop A/C - 19 seats or less - MTOW 8618 kg
- ❖ Jet A/C - 11 seats or less – MTOW up to 7600 kg
- ❖ Light Helicopters
- ❖ Alternative Propulsion

❖ Simple Fixed wing aircraft and rotorcraft should service the SATS market. Also include autogyro and amphibious planes

❖ Little support for VLJ or jet powered aircraft (too expensive)

❖ Targets should be set for each requirement and trade off studies should be performed

❖ Cost is the most important requirement and should be added to the overall requirements.



Challenges and HLO

COST

- ❖ Tariffs are the result of the sum of DOC and IOC divided by productivity (*speed x capacity x utilization*)
- ❖ DOC should be lowered by at least 20% compared to the current generation
- ❖ Capacity may grow to 9/10 pax for the lower very short-haul short-haul segment
- ❖ Speed minimum 400-500Km per hour
- ❖ Utilization should be 2000 hours per year (*600 flights per year or 10 flights per day*)
- ❖ See Cape Air for Operating Model



Challenges and HLO

COST

- ❖ Several cost issues need attention : production cost, maintenance, crew cost, off the shelf equipment and systems
- ❖ Design for maintenance must become a good practice
- ❖ Weight should be low (250Kg per seat)
- ❖ But most important is the development of new piston/ electric engines as the sector is using engines designed 50 years ago (diesel engines are not the solution)
- ❖ New configurations should be investigated for aircraft after 2020 (VTOL/Tilt rotor)
- ❖ Training cost should be low



Target Products and Technologies



Challenges and HLO

QUALITY

- ❖ **SATS will not need to operate 24h per day / 7 day a week in all weather conditions: find balance between cost and predictability of flights**
- ❖ **Good dispatch reliability is essential (*simple aircraft like Do 227/ Islander*)**
- ❖ **Cabin noise needs more attention (*connected to location of the engines and trade off with external noise*)**



Target Products and Technologies



Challenges and HLO

GREEN

- ❖ External noise is seen as the most important factor
- ❖ External noise should be reduced compared to current aircraft (*better propeller design*)
- ❖ Visibility of small aircraft may also be an issue (*make the aircraft invisible by blending it in the environment*)
- ❖ Electric propulsion should be addressed
- ❖ Flight profiles need to be changed (*steep approach, take off*)



Challenges and HLO

TIME EFFICIENCY

- ❖ New ATM concept is needed.
- ❖ SESAR should recognize the importance of SATS
- ❖ Restructuring European airspace urgently needed
- ❖ New GNSS based equipment needed both in the cockpit and at airports
(no additional infrastructure cost)
- ❖ SESAR equipment requirements for small aircraft are too costly



Challenges and HLO

SAFETY

- ❖ **New cockpit design for low workload. SATS technologies will be more advanced than for large airliners**
- ❖ **Single pilot operations / Ultimately pilotless**
- ❖ **Make GA aircraft safer and achieve a good safety record (*also important for the image*)**
- ❖ **Regulations need to be changed (*cheaper/faster*), for certification, operations/ pilot license, etc**
- ❖ **Insurance cost should be lower**



Target Products and Technologies



Challenges and HLO

SECURITY

- ❖ Not discussed
- ❖ Security is anyhow recognised to be a relevant element to be included in the SAT Common Vision and SAT ROADMAP



Target Products and Technologies



High Level Objectives

Challenges		Challenges					
		Cost	Quality	Environment & Energy Supply	ATP Efficiency	Safety	Security
Products							
S A T P R O D U C T S	Piston engine A/C - 9 seats <9 MTOW < 5670 kg						
	Turboprop A/C Seats < 19 MTOW < 8618 kg						
	Light Helicopters						
	Alternative Propulsion						

TO BE FILLED



Target Products and Technologies



Technological Objectives Piston engine A/C – seats < 9 – MTOW < 5670 kg

Tech. Objectives		Technical Objectives				
		Low Noise Low Emission Configuration	Out of autoclave production	Low energy low weight Ice Protection	Low weight Ice Protection	Crash- worthiness
HLO						
	OFO					
		All Weather Operations			❖	

TO BE FILLED



Target Products and Technologies



Enabling Conditions for Product Technologies

❖ R&TD infrastructures

○

❖ Certification, Standards and Rules

○

❖ Industrial Master Plan

○

❖ Funding

○

TO BE FILLED



Challenges and HLO

CONCLUSIONS

- ❖ The importance of SATS as a new air transport mode was generally accepted.
- ❖ Better marketing for SATS needed
- ❖ Step change in aircraft technology needed
- ❖ Engine technology is critical
- ❖ To be developed ATM concept and airspace classification suitable for SATS
- ❖ Novel concepts for SATS aimed at longer term



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Working Group 2

Target Operations, System Concepts and Technologies



To be tackled in the Common Vision

❖ Target Operation, System Concepts and Technologies

- Booking system
- Fleet Management
- ATM and SES
- Airports
- Automation level for SAT and operation modes

❖ HLO for Operation Technologies

❖ Enabling Conditions for Operations Technologies

- Pilot Training
- Insertion in SES
- Certification, Standards and Rules
- R&TD funding

❖ Operation Technologies HLO vs Challenges



Recollection WG-2 discussions



Target Operations, System Concepts and Technologies



Challenges and HLO

COST	Quality & Competitiveness	Environment & Energy Supply	ATS Efficiency	Safety	Security
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Challenges and HLO in bold “HLO” / “ENABLERS” in red

COST

- ❖ Differential Fuel costs on international and small airports
- ❖ Insurance
 - Agreement FOP minimize liabilities up to say 100.000
- ❖ High SESAR costs
- ❖ ATC and navigational costs



Challenges and HLO in bold “HLO” / “ENABLERS” in red

COST

- ❖ **Management of resources (example fleet and pilots vs. rural areas)**
 - **Decrease empty legs**
 - **Information (traffic) and communication availability in order to share seats or empty legs**
 - **Enlarge flight hours to 2000 flight hours/year and increase load factor**
- ❖ **On-demand, air taxi, sharing, FOP models have different challenges**



Challenges and HLO
in bold "HLO" / "ENABLERS" in red

QUALITY AND COMPETITVENESS

- ❖ Requirement to use international airports for international on-demand travel
- ❖ The passenger does not know the real characteristics of the product
- ❖ The SAT concept is not known and marketing is expensive
- ❖ Social acceptance (+: employment, regional economy -: NIMBY, product, noise & emission)
 - Persuade local authorities
 - Everybody must be a customer
 - Make solid and reliable numbers
 - Defend that the effects are better then alternatives
 - Work together with neighbouring associations and habitants



Target Operations, System Concepts and Technologies



Challenges and HLO in bold "HLO" / "ENABLERS" in red

QUALITY AND COMPETITVENESS

- ❖ **Fear of flying**
 - Improve comfort
- ❖ **Improving technology as substitute for personal travel**



Challenges and HLO
in bold "HLO" / "ENABLERS" in red

GREEN

❖ **XX**

❖ **Flight profiles need to be changed (steep approach, take off)**



Challenges and HLO in bold “HLO” / “ENABLERS” in red

TIME EFFICIENCY

- ❖ **Air Traffic Services SESAR integration**
 - **Engage towards the whole industry**
- ❖ **Integration with large and small airports (non ILS at airports vs. Aircraft fitted with the necessary systems)**
 - **Resolve FL issues in TMA (commercial vs. personal air traffic)**
- ❖ **Maintain uncontrolled air space?**
 - **Aircraft dependant**
 - **Traffic situation awareness and collision avoidance**



Challenges and HLO in bold “HLO” / “ENABLERS” in red

SAFETY

- ❖ **Simplify Regulations: non-mature enough, structure of the EU, change of regulations is difficult**
 - **Look at the regulatory environment (value vs. safety)**
 - **Question mark safety vs. Models (public/commercial)**
 - **Adapt instead of changing**

- ❖ **Provision of effective/efficient pilot training - Pilot inexperience**
 - **Reliable, certifiable on-board pilot support systems**
 - **Develop approach for mass small personalized aircraft operations services**



Challenges and HLO in bold “HLO” / “ENABLERS” in red

SAFETY

- ❖ **Safety management system (reporting improves safety)**
 - **Organization**
 - **Participation of stake holders**

- ❖ **Small aircrafts are sensitive to adverse weather**
 - **Develop additional support to keep the aircraft operating in adverse weather**
 - **Directly feeds into comfort and easy flying**
 - **Poor visibility of landing systems in adverse weather**
 - **Achieving high integrity of landing systems and using new infrastructure (Satelite Nav+, etc.)**



Challenges and HLO
in bold "HLO" / "ENABLERS" in red

SECURITY

- ❖ **NO SHOWSTOPPER Secure fleet from terrorist attacks**



High Level Objectives

Challenges		Challenges					
		Cost	Quality	Environment & Energy Supply	ATM & SES	Efficiency	Security
PRODUCTS	Booking System						
	Fleet Management						
	ATM & SES						
	Fuel Cost						

TO BE FILLED

Technological Objectives Booking System

Tech. Objectives		Technical Objectives				
		AA	BB	CC	DD	EE
HLO						
HLO	A	✦			✦	
	B	✦	✦	✦	✦	✦
	C			✦		

TO BE FILLED



Critical Enablers Technological and institutional

❖ General enablers

- **Flexible fleet and pilots**
- **Cooperation between airports and small aircraft providers, etc.**



Target Operations, System Concepts and Technologies



Enabling Conditions for Product Technologies

❖ Pilot Training

○

❖ Insertion in SES

○

❖ Certification, Standards and Rules

○

❖ R&TD funding

○

TO BE FILLED



Some definitions that we should think about

- ❖ On-demand vs. air-taxi
- ❖ Scheduled vs. Un-scheduled
- ❖ Share aircraft vs. Fractional aircraft
- ❖ Remote region (not accessible within 4 hours ?)
- ❖ What is noise ?
- ❖ Make the goals SMART



Target Operations, System Concepts and Technologies



Challenges and HLO

CONCLUSIONS

- ❖ The importance of SATS as a new air transport mode was generally accepted.
- ❖ Better marketing for SATS needed
- ❖ Cost, Quality & Competitiveness Challenges are determining factors
- ❖ Safety and Predictability of Operations are very important element
- ❖ SATS insertion in SESAR has to be tackled