ESA IAP

SAGAS – Satellite Augmented Global Aircraft Service

Overview of Study Outcome and Follow-up Recommendations

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DEFENCE AND SPACE

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SAGAS

Presentation Objectives: Brief Overview of the ADS-B related Applications/Services that are currently under Study

SAGAS

Satellite Augmented Global Aircraft Surveillance

- ESA IAP funded **Feasibility Study** for the **gainful exploitation of Space Assets** to deliver new and sustainable **ADSB integrated application services**
- Focus is on translating ADS-B technology capability into valuable product/services and assessing the business viability for sustainable delivery and operation

We found these two studies valuable and complementary, potentially reinforcing the value of Space Integrated ADSB solutions across different markets and use-scenarios.

SALSA

Space ADS-B for Lowering Separation Minima Applications

- SESAR JU funded **Exploratory Research** for addressing **the challenges of revisions to Separation-Minima in the Non-Radar Airspace**, and in this context, the value and **performance of Space ADS-B** and the associated **impact to ATC operations**
- **Focus is validating the the performance of the technology capability and assessing the operational impact and benefits in the specific use-scenario**

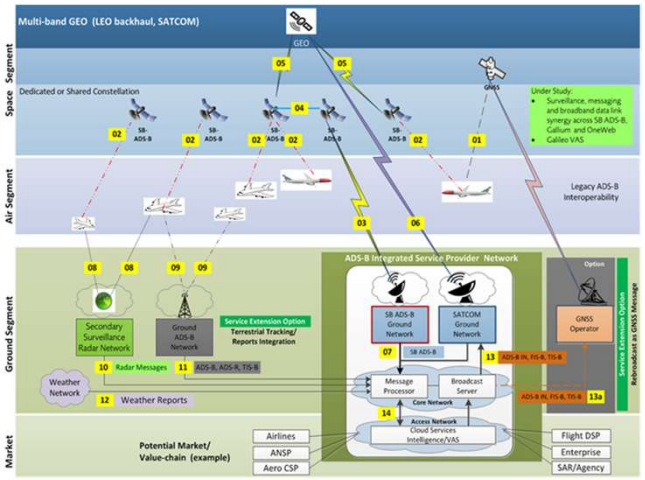
SAGAS

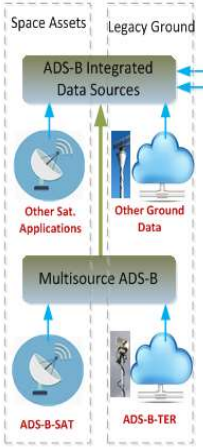
Status: Thanks to ESA IAP, the **value** of Satellite Augmented Global Aircraft (Airspace) Surveillance and the **viability** of Multi-source ADS-B Integrated Services are analyzed ; a follow-up demo and roadmap recommended.

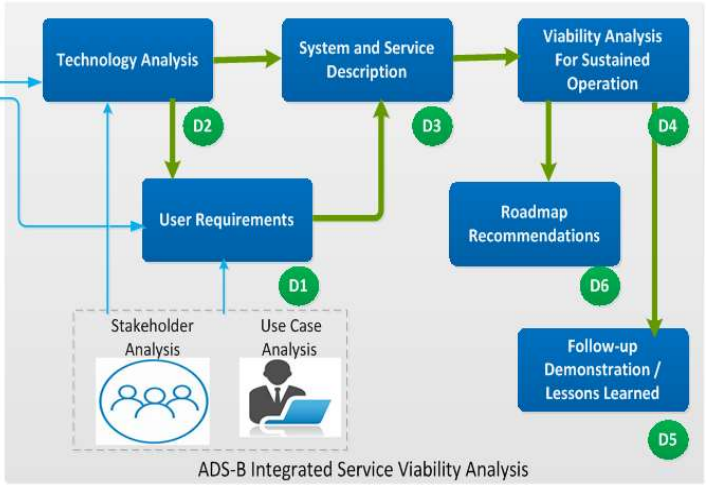
SAGAS Study

- Funded by ESA IAP, 9 Months study to be completed in May 2018.
- Led by AIRBUS; Supported by the Consortium of Study Partners
- Study focuses on the economic and non-economic viability of Multi-source ADS-B Integrated Services for delivery and sustained operations
- Potential follow-up to prove service viability

SAGAS study highlights *the value of Space ADS-B* and the viability of multi-source ADS-B integrated services for aviation enterprises as well for enhancing safety-critical and non-safety-critical surveillance operations. The *importance of institutional support and stewardship* in order to generate economically viable infrastructure service and operational capabilities is also highlighted.







esa European Space Agency

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Study Findings: User Requirements including the Stakeholders interests and the availability /maturity of related Technological capabilities were analyzed in developing the Service Concept and its Viability Analysis

Key Findings:

- Enhanced and continuous surveillance including across the oceanic/remote areas is **increasingly a critical requirement for both the safety and ATS**. Among the ATC operations, there is a **great degree of variability in operations** (e.g. in applying Separation Minima) due to the varying level of surveillance and air-ground data link availability*****.
- **Space based ATM provides a way forward to transit** from the dependence of multitude of discretely owned/operated ground systems **to a service-based infrastructure** in the future.
- **SAGAS proposes a Multi-Source ADSB Integrated system** that delivers enhanced and continuous surveillance across all regions and across all phases of flight, offers critical surveillance diversity and significant value to different markets for both safety-critical and non-safety critical operations.
- Key economic & non-economic aspects for SAGAS delivery **prove to be positive**, albeit some market uncertainty and the sizeable investment risks for Space ADS-B; Stakeholder commitment, in particular **support/stewardship of key institutional agencies** are essential.
- **Proving service acceptance through customer demonstration and early market entry** are vital for the successful long-term roadmap; hence the **scalable digitalization approach by SAGAS**

SAGAS: Key Recommendations:

1. **Promote Space integrated Multi-source ADS-B Surveillance** – for it to be deemed as the *primary source for surveillance in the NRA*; accordingly **validate performances for Standardization**
2. **Market the value of digitalization and applications of** ADS-B integrated surveillance for *generating new operational benefits and revenue opportunities*
3. **Pursue a demonstration project** to validate SAGAS services with users for *both non-safety and safety-critical* operations.
4. **Nurture Stakeholders interests** for the delivery and use of SAGAS services.

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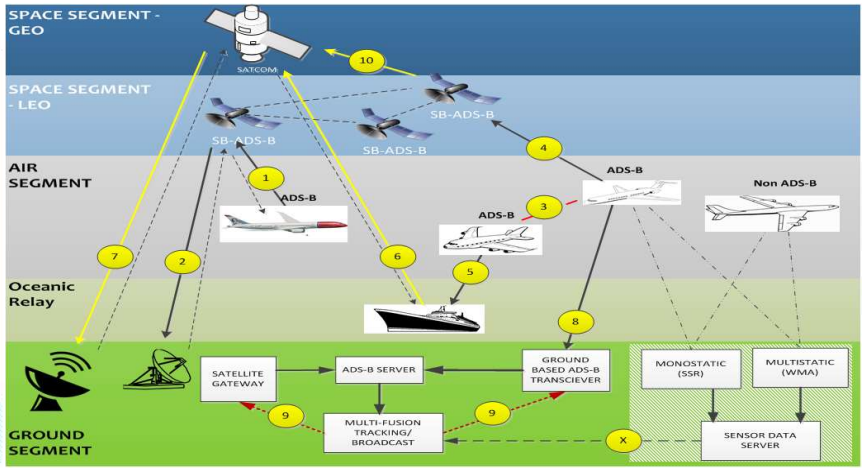
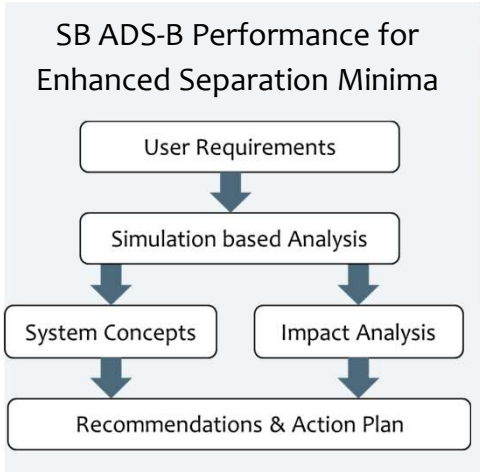
SALSA – Satellite ADS-B for Lower Separation Minima Application

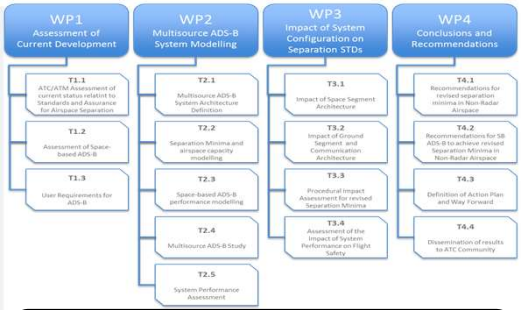
Overview: Thanks to SESAR JU, SALSA an exploratory Research Project, **evaluated the performance and value of Space ADS-B** in the context of enhanced surveillance and **revision to separation standards** in the **non-radar airspace**.

SALSA Study

- SESAR JU funded 24 Months study, completed in Mar 2018 ; Led by AIRBUS led Consortium of Study Partners
- Focused on the **challenges for the Separation Minima revisions** and the **opportunities for enhanced surveillance in the NRA**
- Evaluated multi source surveillance based on ground, air and oceanic relays, leading to a ***system-of systems approach*** for Space integrated enhanced and continuous surveillance, particularly in the non-radar airspace
- Analysed the benefits and impacts to the prevailing procedural separation operations in the NRA and the areas for further validation
- Proposed a target area for new Operational Improvement and the recommendations for follow-up towards operational realization.







…. "a thorough analysis.." "example of bringing value across projects" – SJU Comment

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SALSA – Satellite ADS-B for Lower Separation Minima Application

Findings and Recommendations: With proven-performance, Space ADS-B could become the **primary surveillance** in the NRA, and by auguring Ground ADS-B, an enabler for enhanced /continuous global surveillance and a trigger for potential shift in the ATM operational paradigm

Key Findings:

- Revision to Separation minima is a critical capability for future ATM, which depends on the availability of enhanced and continuous surveillance and reliable controller-pilot data link (CPDLC) capability.
- At present, there is a great degree of variability of Separation Minima depending on the surveillance systems and air-ground data link availability for the ATC.
- Enhanced and continuous surveillance including across the oceanic/remote areas is achievable with the introduction Space based ADS-B and the system-of-system concept proposed by SALSA. *Further validation and standardization necessary*.
- Space based ADS-B technology addresses the geographical surveillance gaps and potentially offers seamless availability across the regions, and also the prospects for surveillance diversity and extension.
- Despite the prevailing CPDLC limitations, the introduction of space ADS-B has the potential for enhanced separation minima as well as improve the safety and efficiency of the air traffic.
- The criticality of Space based ADS-B in the context of ATS Surveillance means there is a need / value for establishing an European-led capability.

SALSA : Key Recommendations

1. Set new OI "**Enhanced Separation Minima in the NRA**"
2. Within the context of new OI, study the
   - ***Maturity/viability assessment of SB ADS-B****, for the required safety-critical service performance, including Service availability monitoring*
   - ***Operational Impact in the NRA*** *in the context of*
     - ***CPDLC availability***
     - ***Navigational and surveillance integrity***
     - ***Safety*** – collision risk, prediction models
     - **Human workload and operator interfaces**
3. **Evaluate the potential new operational-paradigm**, where certified air-traffic surveillance becomes an outsourced activity for air-traffic-control.
4. **Sustain Stakeholders interests** for the Roadmap realization

Thank You

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