



SESAR JOINT UNDERTAKING

Single Programming Document 2020-2022

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Abstract

This document is the Single Programming Document of the SESAR Joint Undertaking (SESAR JU) for the 2020-2022 period.

It provides multi-annual (2020 to 2022) and annual (2020) programming components and forms the multi-annual and annual work programmes of the SESAR JU. Once adopted, this Single Programming Document will replace the Single Programming Document 2019-2021 insofar as it refers to the years 2020 and 2021.

FINAL DOCUMENT

Founding Members



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Note: the content of this document has been developed on the basis of the current guidelines from the Commission on the establishment of the Single Programming Document (Communication from the Commission C(2014) 9641 final¹). Changes required from the recently adopted revised Framework Financial Regulation² and, subsequently, from the revised SESAR JU Financial Rules³ will not be applicable before the 1 January 2020⁴.

¹ Communication from the Commission C(2014) 9641 on ‘the guidelines for programming document for decentralised agencies and the template for the Consolidated Annual Activity Report for decentralised agencies’.

² Commission Delegated Regulation (EU) 2019/715 of 18 December 2018 on the framework financial regulation for the bodies set up under the TFEU and Euratom Treaty and referred to in Article 70 of Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council, OJ L 122, 10.5.2019, p. 1–38.

³ As adopted by the SESAR JU Administrative Board on 9 October 2019 through Decision ADB(D)21-2019.

⁴ In line with Articles 111 and 112 of the new SESAR JU Financial Rules adopted on 9 October 2019, Articles 31 and 46 of the repealed SESAR JU Financial Rules adopted on 25 June 2015 shall continue to apply until 31 December 2019.

Foreword

In support of European policy and legislation, the SESAR Joint Undertaking (SESAR JU), founded by the European Union and EUROCONTROL, is a key enabling organisation for the modernisation of European and global air traffic management (ATM), and the coordination and concentration of all ATM-related research and innovation efforts in the EU.

Since its establishment in 2007, the SESAR JU, together with its Members and partners, has provided a significant return on the original EU investment. It delivers high-performance solutions in accordance with the European ATM Master Plan and with its performance ambition in terms of environmental efficiency, capacity, cost-efficiency, and safety. The SESAR JU thus stimulates the aviation ecosystem development, generating employment and business opportunities while ensuring the delivery of tangible societal benefits such as decarbonisation and the reduction of aviation's environmental footprint.

By successfully implementing the SESAR 2020 Programme, the SESAR JU leverages digital technology in air traffic management. It will continue to provide the most efficient way of implementing research and innovation for Europe, further contributing to the delivery of the Single European Sky and the broader EU Aviation Strategy, while providing investors with a sound return on investment. Additionally, the SESAR JU is continuously reinforcing the role of the EU as a global actor in the field of aviation.

The SESAR JU's Single Programming Document 2020-2022 (SPD 2020-2022) builds upon previous successes and outlines an ambitious roadmap to the successful implementation of the SESAR 2020 Programme and of the other SESAR JU missions over the next three years. This document describes six strategic areas of operation (the ones already described in previous SPD's) that the SESAR JU will pursue during the outlined programming period. In the period from 2020 to 2022, the SESAR JU will continue research and investment efforts through new Exploratory Research projects, through the closure of Wave 1 projects, through the ramp-up of Wave 2 projects, and through launching new calls for proposals closely coupled with the EU aviation policy. By continuing these efforts in cooperation with its Members and with other organisations involved in ATM-related research, the SESAR JU will progress towards delivering the research necessary to achieve the performance ambitions set out in the European ATM Master Plan.

While delivering on its strategic objectives, the SESAR JU will remain committed to strengthening its effective and efficient organisation by continually improving its processes, procedures, performance and risk management, and ICT infrastructure, as well as by investing in its talented people.

Florian Guillermet

Executive Director

SESAR Joint Undertaking

Document history

Edition	Date	Status	Justification
00.01	26.11.2018	Draft	Initial draft version circulated within the SESAR JU for internal review and comments
00.02	14.12.2018	Under review	Integration of comments from the internal review Submission to the Administrative Board for initial review and comments
00.03	23.01.2019	Under review	Integration of comments received from the Members of the Administrative Board Request of approval of the Administrative Board for submission of the document to the Budgetary Authority
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00.06	24.05.2019	Under review	Integration of comments from the internal review and updates: <ul style="list-style-type: none"> • approach to the planning and preparation for the future of SESAR (Section II, paragraphs 1.2 and 2.7, and Section III, point 2.6.4.2), • alignment of the multi-annual budget figures with 2020 figures of the latest submitted budget request (Section II, point 3.2.2.2, and Annexes I and II), • refinement of the technical justifications of upcoming calls for proposals and the related conditions (Section III, sub-paragraph 2.6.1), • update of the Staff Establishment Plan presentation (Annex III, Table 2).
00.07	31.10.2019	Under review	Integration of comments in response to the feedback received from the European Commission and to internal review: <ul style="list-style-type: none"> • alignment of the Mission Statement and SESAR 2020 Programme objectives with new elements of the EU ATM policy, with the new ATM Master Plan (2020 edition), the Airspace Architecture Study and its transition plan (Section I, sub-paragraphs 1.1.1 and 1.1.2),

			<ul style="list-style-type: none"> • update of the description of expected scenarios for the Future of ATM Research and of the multi-annual and annual planning of related activities (Section I, paragraph 1.2; Section II, paragraph 2.7 and Section III, point 2.6.4.2), • Update of multi-annual and annual planning elements of the Strategic Steering of the SESAR programme (Section II, sub-paragraphs 2.2.1 to 2.2.3 and 2.2.5; Section III, paragraph 2.1) and inclusion of U-space integration and European ATM Architecture activities (Section II, sub-paragraph 2.2.4), • update of tables presenting (candidate) SESAR Solutions being delivered by IR Wave 1 and Wave 2 projects (Section II, points 2.4.1.1 to 2.4.1.4), • update of VLD Open 2 and IR-VLD Wave 3 call conditions (Section II, sub-paragraph 2.4.2 and point 2.5.1.2 and Section III, points 2.6.1.2 and 2.6.1.3), • update of multi-annual and annual planning elements of the SESAR Outreach (Section II, paragraph 2.6 and Section III, paragraph 2.5), • update of annual planning elements of corporate management activities in the fields of legal and procurement support, corporate support, audits and data protection (Section III, sub-paragraphs 2.6.3 and 2.6.7 to 2.6.9), • update of the 2018 executed budget and 2020 draft budget figures (Section II, sub-paragraph 3.2.2; Annexes I and II), • update of annexes related to evaluations, risk management and procurement activities planned in 2020 (Annexes VII to IX), • minor editorial and non-substantial adjustments of the text, figures and tables throughout the document.
00.08	26.11.2019	Under review	<p>Integration of comments from final review by Administrative Board Members and submission to the Administrative Board in view of adoption:</p> <ul style="list-style-type: none"> • update of Figure 9 to replace the 'Future European ATM skilled work-force' research area by the 'SESAR Digital Academy' (Section II, sub-paragraph 2.1.3) and removal of the same research area from transversal areas of research (Section II, paragraph 2.1), all in line with the update of ER research areas introduced by the ER 3 call for proposals, • update of figures 11, 15, 17 and 19 presenting the SESAR 2020 Programme portfolio of projects to indicate expected finalisation of additional projects by

			<p>the end of 2019 (Section II, sub-paragraphs 2.1.4, 2.3.1 and 2.4.1 and paragraph 2.5),</p> <ul style="list-style-type: none"> • insertion of the Figure 17 on the status of SESAR Solutions contributing to the SESAR vision (Section II, paragraph 2.3), • restoration of activities and objectives related to the SESAR Digital Academy (Section II, sub-paragraph 2.3.3; Section III, paragraph 2.2 and Figure 9 in sub-paragraph 2.1.4), • insertion of the Figure 21 on the SESAR JU's specific stakeholder groups within the ATM value chain and adjustment of the accompanying text (Section II, paragraph 2.6), • adjustment of the SESAR 2020 Programme expenditure outlook for SAoO's 1, 3 and 4 for the 2020-2022 period in the corresponding Table 17 (Section II, point 3.2.2.2) and in Annex I for year 2020), • update of the Procurement plan for 2020 in line with the most recent available information (Annex IX), • minor editorial and non-substantial adjustments of the text, figures and tables throughout the document.
00.09	12.12.2019	Under review	<p>Integration of adjustments in response to supplementary European Commission's comments and editorial adjustments:</p> <ul style="list-style-type: none"> • insertion of clarifications regarding the opt-out from the Horizon 2020 conditions related to open access to research data (Section II, sub-paragraphs 2.4.1 and 2.5.1; Section III, sub-paragraph 2.5.2 and sub-point 2.6.1.1.7), • insertion of a paragraph on ensuring appropriate complementarity with collaborative research activities (Section II, paragraph 2.6), • insertion of clarifications in response to Commission's comments (Section II, points 3.2.2.1 and 3.2.2.2; Section III, sub-points 2.6.1.2.10 and 2.6.1.3.12; Annex I, Table 1), • removal of references to the EU 2020 Draft Budget following the approval of the EU 2020 Budget on 27/11/2019 by the Budgetary Authority (Section II, point 3.2.2.1; Annex III, Tables 1 and 2), • minor editorial and non-substantial adjustments of the text, figures and tables throughout the document.
01.00	17.12.2019	Approved	Adoption by the Administrative Board

List of acronyms and definitions

Acronym	Long name/definition
4D	four-dimension
AAS	Airspace Architecture Study
ABAC	accrual-based accounting
ACAS	Airborne Collision Avoidance System
ADB	Administrative Board of the SESAR JU
ADS-B	automatic dependent surveillance — broadcast
ADS-C	automatic dependent surveillance — contract
AeroMACS	Aeronautical Mobile Airport Communications System
A/G	air/ground
AI	artificial intelligence
AIM	aeronautical information management
AMAN	arrival management
AMQP	advanced message queuing protocol
ANSP	air navigation service provider
A-PNT	alternative position, navigation and timing
AR	assigned revenue
ASBU	aviation system block upgrade
ATC	air traffic control
ATFCM	air traffic flow and capacity management
ATM	air traffic management
ATN	aeronautical telecommunication network
ATS	air traffic services
ATSU	Air Traffic System Unit
AU	airspace users (civil)
BVLOS	beyond visual line of sight
CA	contractual agent

CAS	Common Audit Service of the Directorate-General for Research and Innovation of the European Commission
CCO	continuous climb operations
CDO	continuous descent operations
CDTI	cockpit display of traffic information
CEF	Connecting Europe Facility
CNS	communication, navigation and surveillance
Conops	Concept of operations
CSA	coordination and support action
DART	data-driven aircraft trajectory
DCB	demand and capacity balancing
DFMC	dual-frequency multi-constellation
DMAN	departure management
DMSC	Delivery Management Sub-Committee
DME	distance measurement equipment
EASA	European Union Aviation Safety Agency
EDA	European Defence Agency
E-OCVM	European operational concept validation methodology
E-TMA	extended TMA (terminal manoeuvring area)
EATMA	European ATM (air traffic management) architecture
eFPL	extended flight plan (flight and flow information for the collaborative environment/flight information exchange model-based flight plan)
EGNOS	European Geostationary Navigation Overlay Service
ER	exploratory research
EU	European Union (also referred to as 'the Union')
EUR	Euro (currency)
EUROCAE	European Organisation for Civil Aviation Equipment
FAA	US Federal Aviation Administration
FCI	future communication infrastructure

Flightpath 2050	report of the High Level Group on Aviation and Aeronautics Research established by the European Commission in December 2010, setting out a new vision for the aviation sector by 2050
GA	general aviation
GA/R	general aviation and rotorcraft
GANP	global air navigation plan (from the International Civil Aviation Organisation)
GAP	Grant Agreement Preparation
GAST	GBAS approach service type (of different types GAST-C, GAST-D, GAST-F)
GBAS	Ground-Based Augmentation System
G/G	ground/ground
GNSS	global navigation satellite system
GSA	European GNSS Agency
H2020	Horizon 2020 framework programme
HMI	human-machine interface
IA	innovation action
IAS	Internal Audit Service of the European Commission
ICAO	International Civil Aviation Organisation
ICT	information and communication technologies
IFR	instrument flight rules
IGS	increased glide slope
INAP	integrated network management and extended ATC planning function
IOP	interoperability
IPS	internet protocol suite
IR	industrial research and validation
JU	joint undertaking
KTN	Knowledge Transfer Network
L-DACS	L-band Digital Aeronautical Communications System
LPV	localiser performance with vertical guidance
LVC	low visibility conditions

MAWP	Multi-annual work programme of the SESAR 2020 Programme, as adopted by the SESAR JU Administrative Board through decision ADB(D)-05-2015
MC/MF	multi constellation/multi frequency
Members	Two founding members (the European Union and EUROCONTROL) and 19 stakeholder members, of which all apart from the EU are signatory to a membership agreement or accession agreement
MET	meteorological/meteorology
MGA	SESAR JU Model Grant Agreement
MoC	memorandum of cooperation
MPC	ATM Master Planning Committee
MSP	multi-sector planner
MUAC	Maastricht Upper Area Control Centre
NAA	National Aviation Authorities
NM	network manager
NMf	network management function (organised as integrated regional/subregional/local layers and supporting collaborative network management)
NMOC	network manager operations centre
NOP	network operations plan
OSI	open systems interconnection
OTSC	Operations and Technical Sub-Committee
PC	Programme Committee
PCP	pilot common project
PinS	point in space
PWS	pairwise separation
R & D	research and development
R & I	research and innovation
RBT	reference business trajectory
RIA	research and innovation action
RNP	required navigation performance
ROT	runway occupancy time
RPAS	Remotely Piloted Aircraft System

RSP	required surveillance performance
SBAS	Satellite-Based Augmentation System
SC	Scientific Committee
SE	system engineering
SES	Single European Sky
SESAR	Single European Sky ATM (Air Traffic Management) Research
SESAR 2020	<p>The SESAR 2020 R & I programme, also referred to as the ‘SESAR 2020 Programme’ or ‘SESAR 2020 R & I Programme’</p> <p>It is the coordinated set of activities described in this document, being undertaken by the SESAR JU Members and managed by the SESAR JU</p>
SESAR JU	Single European Sky ATM Research Joint Undertaking established as a Joint Undertaking within the meaning of article 187 of the Treaty on the Functioning of the European Union, established under the SESAR JU constituent act
SESAR JU constituent act	Council Regulation (EC) No 219/2007 of 27 February 2007 (OJ L 64, 2.3.2007, p. 1) on the establishment of a Joint Undertaking to develop the new generation European air traffic management system (SESAR) as amended by Council Regulation (EC) No 1361/2008 of 16 December 2008 (OJ L 352, 31.12.2008, p. 12) and by Council Regulation (EU) No 721/2014 of 16 June 2014 (OJ L 192, 1.7.2014, p. 1)
SMO	standard-making organisation
SNE	seconded national expert
SNI	simultaneous non-interfering
SWIM	system wide information management
TA	temporary agent
TBO	trajectory-based operations
TMA	terminal manoeuvring area
TRL	technology readiness level
UAS	unmanned aerial system
UDPP	user-driven prioritisation process
U-space	A set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for a large numbers of drones, with an initial look at very low-level operations
UTM	unmanned traffic management
VFR	visual flight rules

VLD	very large-scale demonstration
VLL	very low-level
VLOS	visual line of sight
WOC	wing operations centre

Table 1: List of acronyms and definitions

Mission Statement

The mission of the Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU), created under Article 171 of the Treaty establishing the European Community⁵, is to develop a modernised air traffic management (ATM) system for Europe, which will prevent crippling congestion of the European sky and reduce the environmental impact of air transport. Established in 2007 as a joint undertaking (JU), the SESAR JU is responsible for the modernisation of the European ATM system by coordinating and concentrating all relevant ATM research and innovation efforts in the EU. The SESAR Joint Undertaking is also responsible for the execution of the European ATM Master Plan, which provides the basis for reporting by stakeholders and key institutions on the execution of SESAR. It aims to define and develop the next generation of ATM systems capable of ensuring the worldwide safety and fluidity of air transport by 2050. Finally, the SESAR JU is responsible for ensuring international collaboration on ATM modernisation, under the principles established by the European Union.

The figure below depicts the central role of the SESAR JU in driving and coordinating ATM research and innovation in relation to the Union Policy:

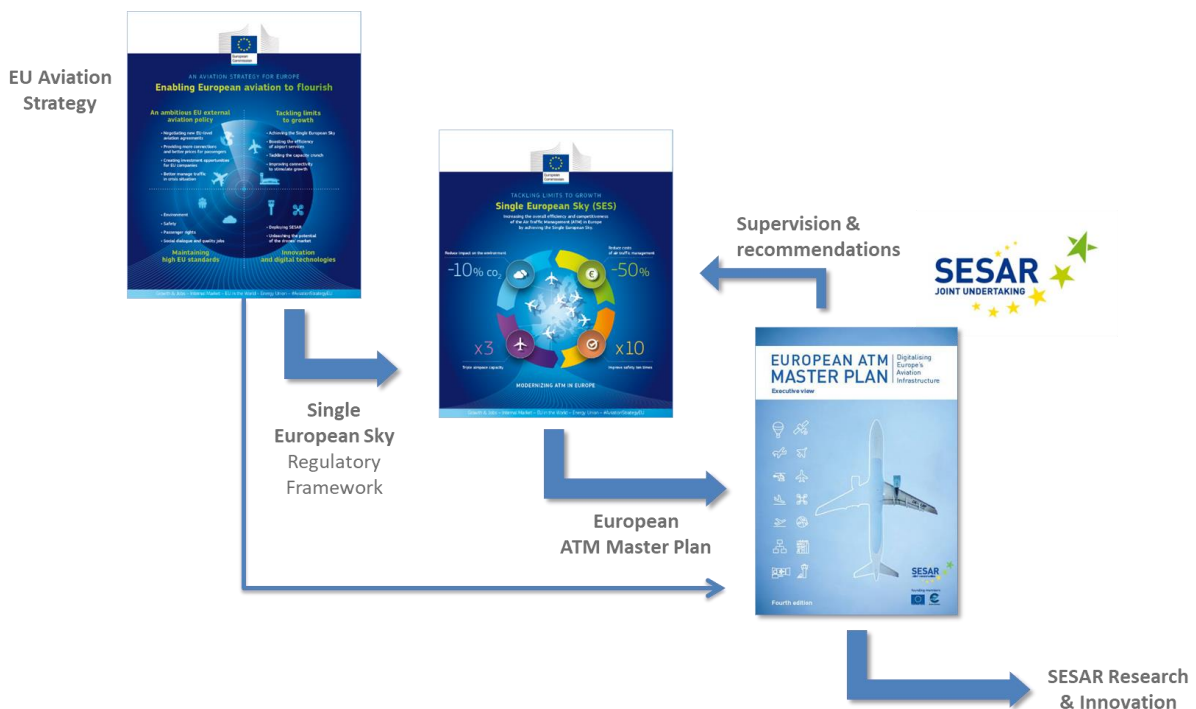


Figure 1: The central role of the SESAR JU in driving and coordinating ATM research in the Union

Founded by the European Union and EUROCONTROL, in 2009 the SESAR JU became a Community Body. It was initially augmented by 15 stakeholder Members and then in 2016 a further four members acceded to membership, all committing to underpin the mission of the JU up to 2024. Together with their partners and affiliate associations, the Members represent over 100 organisations from across

⁵ Now Article 187 of the Treaty on the Functioning of the European Union (TFEU) (OJ C 202, 7.6.2016) following the entry into force of the Treaty of Lisbon, amending the Treaty on European Union and the Treaty establishing the European Community on 1 December 2009.

the ATM community, from civil and military air navigation service providers (ANSPs) to airports, civil and military airspace users (AUs), staff associations, academia and research centres. Through these partnerships and further collaboration with staff associations, regulators and the wider scientific community, the SESAR JU unites the skills of more than 3.000 experts to fast-track research, leading to change in European ATM in accordance with the Master Plan while ensuring alignment with the EU Aviation Strategy and the Single European Sky (SES) regulation⁶.

As an integral part of the SESAR project, the SESAR JU is the technological pillar of the SES policy and contributes to the SES targets by defining, developing and validating innovative technological and operational solutions for managing air traffic in a more efficient manner. With an initial budget of EUR 2,1 billion, of which EUR 700 million comes from the EU⁷ (until 2016) and then an additional ca. EUR 1,6 billion, of which EUR 596,3 million comes from the EU⁸ (until 2024), the SESAR JU has established a contiguous research ‘pipeline to innovation’. This comprises three distinct strands of activities with the aim to see a flow of research and innovation activities meeting stakeholder needs and citizen expectations: Exploratory Research, Industrial Research & Validation, and Very Large-Scale Demonstrations (VLDs).

The SESAR JU is linked to the European Commission’s Mobility and Transport policy and makes a substantial positive contribution to its objectives in terms of ‘Decarbonisation, Digitalisation, Investment and People’.

In addition, the SESAR JU operates in close coordination with other European organisations with direct links to the SESAR Project, including EUROCONTROL (founding Member), the European Union Aviation Safety Agency (EASA), the European Organisation for Civil Aviation Equipment (EUROCAE) and the SESAR Deployment Manager.

Vision

The objective of SESAR is to coordinate research that delivers solutions that can modernise European ATM by defining, developing and delivering new or improved technologies and procedures (SESAR Solutions).

⁶ Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation) (OJ L 96, 31.3.2004, p. 1) as amended by Regulation (EC) No 1070/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system (OJ L 300, 14.11.2009, p. 34).

⁷ The EU contribution of EUR 700 million up to 2016 was established for EUR 350 million under FP7 (the seventh EU Framework Programme for Research and Innovation) and TEN-T (the EU programme for the upgrade of transport infrastructure).

⁸ The EU contribution of EUR 585 million until 2024 is established under the Horizon 2020 programme.

In addition, following the delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2016-669/SI2.743803 signed on 06 December 2016, SESAR JU was entrusted in 2016 with the implementation of an action ‘Integrating remotely piloted aircraft systems (RPAS) in European airspace with an active geo-fencing service (AGS)’ and received EUR 500 000 on budget line 06.027712 (see Section II, sub-paragraph 3.2.1).

Furthermore, the SESAR JU has been mandated by the European Commission to procure a study to develop a proposal for the future architecture of European airspace (delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2017-477/SI2.766828 signed on 10 November 2017), with a delegated budget of EUR 800 000.

The European Commission has given an additional mandate to the SESAR JU to organise U-space demonstrations, through delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2017-564/si2.771010 signed on 13 December 2016 with a delegated budget of EUR 10 million from the Connecting Europe Facility (CEF) fund.

SESAR's vision builds on the notion of trajectory-based operations' and relies on the provision of air navigation services (ANS) in support of the execution of the business or mission trajectory — meaning that aircraft can fly their preferred (optimal performance and environmental) trajectories without being constrained by airspace configurations.

This vision is enabled by a progressive increase of the level of automation support, the implementation of virtualisation technologies for improved resilience and the use of standardised and interoperable systems. The system infrastructure will gradually evolve with digitalisation technology, allowing air navigation service providers (ANSPs), irrespective of national borders, to plug in their operations where needed, supported by a range of information services. Airports will be fully integrated into the ATM network level, which will facilitate and optimise airspace user operations and enable efficient links to other modes of transport.

Going beyond 2035 towards 2050, performance-based operations will be implemented across Europe, with multiple options envisaged, such as seamless (borderless) coordination between ANSPs or full end-to-end ANS provided at network level. Furthermore, it is widely recognised that to increase performance, ATM modernisation should look at the flight as a whole, within a flow and network context, rather than at segmented portions of its trajectory, as is the case today. With this in mind, the vision will be realised across the entire ATM system, offering improvements at every stage of the flight.

European ATM Master Plan

ATM is a critical element in the European air transport value chain and key to connecting regions and making Europe a global hub for mobility and prosperity. ATM modernisation therefore needs to reflect a greater focus on increased efficiency and effectiveness while sustaining or even improving the levels of safety, security and environmental performance. At the same time, it must also recognise the need to provide solutions to address critical capacity bottlenecks.

Within the framework of the EU Aviation Strategy and of the SES, the European ATM Master Plan is the main planning tool for defining the SESAR project. The Master Plan defines the vision and the objectives of the SESAR project, ensuring that priorities and commitments made for SESAR development and deployment activities remain strongly connected to EU policy priorities.

All SES Research and Innovation activities (Exploratory Research, Industrial Research and Validation, Very Large-Scale Demonstrations) are carried out in line with the European ATM Master Plan. The Master Plan is an evolving roadmap that builds on SESAR results and solutions and on a strong collaboration between all European ATM stakeholders, beyond the Members of the SESAR JU. Not only does it set out a high-level view of actions needed to deliver a high performing ATM system and, ultimately, a 'digital European sky', it also explains why and by when. The critical path towards the vision of a digitalised aviation infrastructure is based on a few key components that are presented in Figure 2 below.

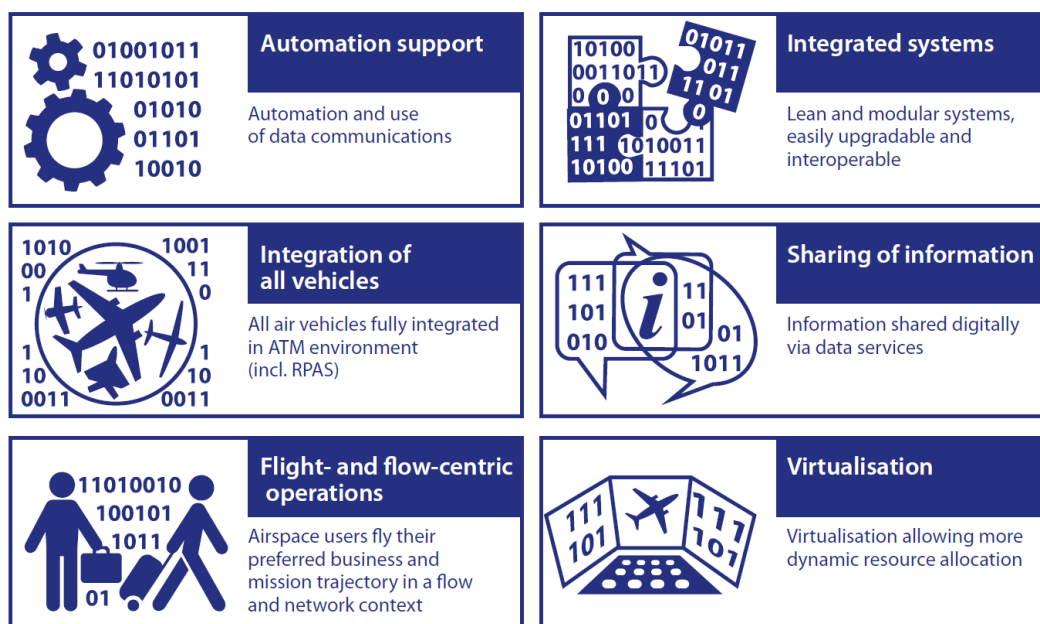


Figure 2: Components of the SESAR Vision

The 2020 edition of the Master Plan, submitted to the SESAR JU Administrative Board for adoption in December 2019, is the fourth edition of this document. It develops an ambitious vision for the future of SESAR:

- It describes for the first time the vision beyond the existing SESAR 2020 Programme. It explains what SESAR 2020 will have the ambition to deliver, by when and for which benefits. Beyond this, it also describes what will still be needed to achieve the ultimate goal of a fully digitalised aviation infrastructure; delivering by 2040 a fully scalable and digitalised system able to handle all traffic in a safe, efficient and environmentally friendly way. This paves the way to the detailed identification of the additional R&D needs beyond the current SESAR 2020 Programme,
- It incorporates the R&D needed for a full, safe and performing integration of all aerial vehicles, manned and unmanned, into all categories of airspace. It internalises and describes the different phases for delivering U-Space services, including a preliminary business case, and describes the emerging R&D planned and needed to enable this concept,
- It structures the R&D into nine newly defined ‘Essential Operational Changes’ – the ‘game changers’ that are necessary to deliver the SESAR vision,
- It contains a more integrated air/ground roadmap for enabling a rationalised and gradually digitalised aviation infrastructure, and in particular a critical path towards a performance and service-oriented CNS infrastructure,
- It updates the macroeconomic impact of SESAR from the 2012 edition, confirming the weight of aviation for the European economy and the importance of a performing ATM for passengers and European citizens,
- It builds explicit links with the recommendations of the Airspace Architecture Study and its transition plan and shows that the Master Plan contains the technological elements needed to implement their recommendations where and when they will be decided.

Section I – General Context

1 High-level policy objectives: achieving the EU Aviation Strategy goals

In December 2015, the publication of ‘An Aviation Strategy for Europe’⁹ provided additional focus on and momentum towards completion of the SES, aiming to generate faster growth for the European economy, foster innovation and allow passengers to profit from safer, cleaner and cheaper flights while offering more connections. The strategy contributes directly to the European Commission’s priorities in particular in relation to preparing aviation for the digital age and contributing to its decarbonisation, as well as fostering the EU leadership as a global actor in this domain.

The Aviation Strategy poses challenges and enablers as represented in the figure below.



Figure 3: Key infographics from ‘An Aviation Strategy for Europe’

In this framework, the SESAR JU acknowledges the objectives for the modernisation of ATM. To this end, SESAR also remains a flagship project identified within the European Commission’s ‘Flightpath 2050’, a roadmap for the provision of a clean, competitive, safe and secure European aviation industry. SESAR’s positive contribution to meeting the needs of citizens and markets and to maintaining a competitive advantage for Europe is key to the continued successful evolution of ATM.

Within the SES legislative framework, the SESAR JU contributes to achieving the SES’s High-Level Goals, formulated in 2005 with a vision to deliver the following performance improvements by 2035:

⁹ <http://ec.europa.eu/transport/modes/air/aviation-strategy>.

- Enable a three-fold increase in capacity which will also reduce delays both on the ground and in the air,
- Improve safety by a factor of 10,
- Enable a 10 % reduction of the environmental impact of flights,
- Reduce the cost per flight by 50 %.

The SESAR JU transfers the result of its ATM research and innovation activities in the form of SESAR Solutions¹⁰ made available for implementation, and therefore makes a positive contribution to the achievement of the SES as well as to the wider ambition of Flightpath 2050 and the EU Aviation Strategy. The contribution of the SESAR programme to achieving the SES's High-Level Goals appears in Figure 7, found later in this document.

2 Drivers shaping the European aviation landscape: towards a digital European sky

Aviation, in particular air transport supported by ATM, is a key driver of EU economic growth, jobs creation and trade expansion. It is essential for the life and mobility of its citizens. However, the current ATM system is still highly fragmented and largely reliant on ageing technology, leading to inefficiencies of approximately EUR 4 billion annually. The role of the SESAR JU in steering the SESAR R&I programme, is to define and develop solutions needed to build a more connected, greener and safer ATM system while ensuring that the latter is standardised and globally interoperable.

This work is undertaken through the SESAR R&I programme ('the SESAR 2020 Programme' for the period from 2015 to 2022), coordinated by the SESAR JU and performed by the industry at large. The activities performed by the industry are funded mostly through the Horizon 2020 Framework Programme (H2020), which means that the SESAR JU operates in accordance with H2020 rules and processes for all its activities relating to the awarding and management of these grants. The European Commission also grants the SESAR JU additional tasks under a variety of legislative frameworks; all of the activities are integrated into the SESAR 2020 Programme.

Besides the role of technology and innovation, the EU Aviation Strategy also recognises the need to secure Europe's leading role in international aviation. To this end, the SESAR JU also works closely with the European Commission and EUROCONTROL on building and executing a coordinated plan of action involving non-EU countries and the international aviation body known as the International Civil Aviation Organisation (ICAO).

The challenges for ATM are captured and maintained in the European ATM Master Plan. The 2015 edition as well as the new 2020 edition describe the SESAR performance ambitions for 2035, the 'Essential Operational Changes' across four Key Features of the ATM System and the relationship to the supporting key R&D activities. Some of these challenges and solutions are described below. Major developments require a more profound transformation of ATM technology to support safe operations in both controlled and uncontrolled airspace; growth in the volume and diversity of air traffic;

¹⁰ SESAR Solutions are referred to as 'candidate SESAR Solutions' as long as they are under development in the Industrial Research phase of the SESAR innovation pipeline (see Figure 6). Once validated at V3 level of maturity, they are packaged and referred to as 'SESAR Solutions'.

evolution towards automation in the ATM sector; parallel evolution towards automation in other transport sectors; and increasing reliance on digitally-shared information.

- Growth in the volume and diversity of air traffic.** By 2050, air traffic will consist of tens of millions of annual flights. As shown in the figure below, the vast majority of this traffic will originate from new types of vehicles (such as drones) operating in airspace previously not used – very low level (VLL) airspace (initially below 150m or 500ft) away from aerodromes. In the airspace at and above 500ft, which includes both controlled and uncontrolled airspace, in 2050 manned traffic will still outnumber unmanned aviation, but this airspace will be profoundly different from today’s due to the increased density and diversity of traffic. In addition, the interactions between the various types of traffic will not necessarily be driven entirely by humans (e.g. single pilot operations leading to an increased degree of airborne automation, unmanned cargo requiring fully automated ATM interactions). The most significant entries into service of these new types of aircraft are foreseen to gradually scale up as from 2030, the time at which the supporting infrastructure needs to be ready to accommodate this new air traffic. Demand for access to lower level airspace is already growing rapidly as more and more drones are taking to the sky every day for leisure but also increasingly to deliver professional services (e.g. inspections and data collection, and public safety and security but soon also for parcel delivery and urban air mobility). Two key implications follow. First, managing this level of air traffic at current productivity levels will be unsustainable given the cost implications and limited gains in efficiency achieved through further splitting of sectors (airspace elasticity). Second, increased traffic levels and new forms of traffic (including military traffic such as RPAS and fifth generation fighter aircraft) with diverse communication technologies, flight and speed patterns, etc. will lead to unprecedented levels of heterogeneity and complexity in vehicles requiring further automation, connectivity and interoperability. For both, the uncertainty of timing and magnitude of change requires the future ATM system to be fully scalable to ensure a cost-efficient ATM system with safety above the current levels.

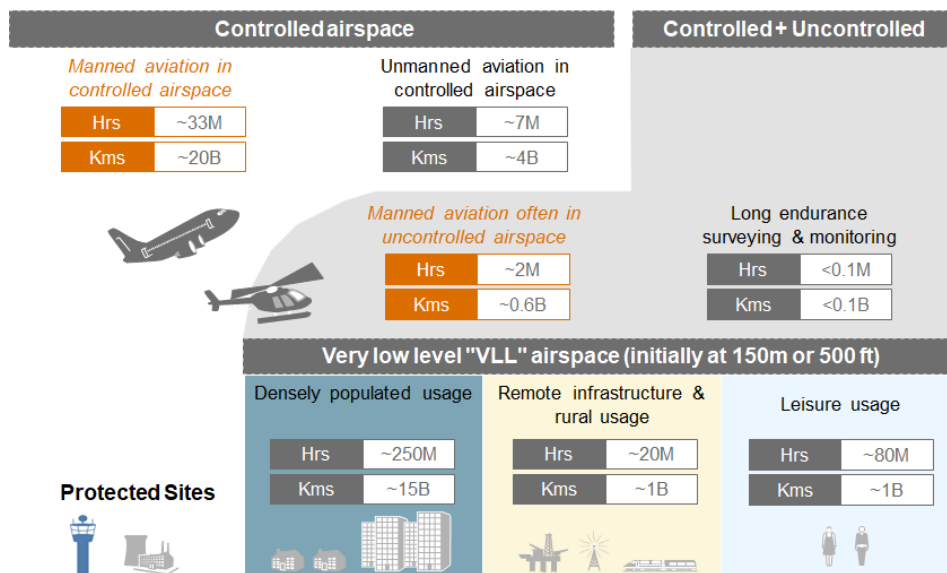


Figure 4: Impact of manned versus unmanned operations in airspace by 2050¹¹

¹¹ Source: Drones Outlook Study, 2016, SESAR JU.

- **Growing challenge for the environment in the years to come.** While the benefits of continued growth in air traffic for EU citizens are clear in terms of mobility, connectivity and availability of new services (such as the ones enabled by drones), this growth represents a significant challenge for the environment in the years to come. These concerns in Europe and worldwide are prompting the aviation industry to step up its efforts to address the environmental sustainability of air travel to reach the EU's carbon-neutral goal by 2050. In support of this goal, the SESAR project will gradually contribute to the elimination of environmental inefficiencies caused by the underlying aviation infrastructure, by ensuring that it offers solutions that will fully exploit the potential offered by next generation aircraft for cleaner and quieter flight.
- **Evolution towards automation in other sectors will also shape the future of flight.** The convenience of using a technology or a service increases with the number of users that adopt it. Public acceptance for change and the aviation technology landscape at large will therefore increasingly be influenced by evolutions towards automation stemming from other safety- and security-critical sectors (such as automotive, energy and banking), as has already been observed for the rapidly expanding leisure or semi-professional drone sector.
- **Increasing reliance on digitally shared information.** The evolution of technology will make it possible for companies to collect, store, and use large amounts of data to deliver new, innovative services whose relevance for flight safety will also continue to increase. This increased reliance on digitally shared information will further affirm the need for strong cybersecurity systems.

Primarily driven by the growth in the volume and diversity of air traffic, these additional evolutions call for the ATM sector to set the performance ambition to deliver a fully scalable system that is even safer than today's system while contributing to the elimination of environmental inefficiencies due to the underlying aviation infrastructure.

The evolution of today's aviation ecosystem towards a new (digital) ecosystem covering all aviation operations can be depicted in the following figure:

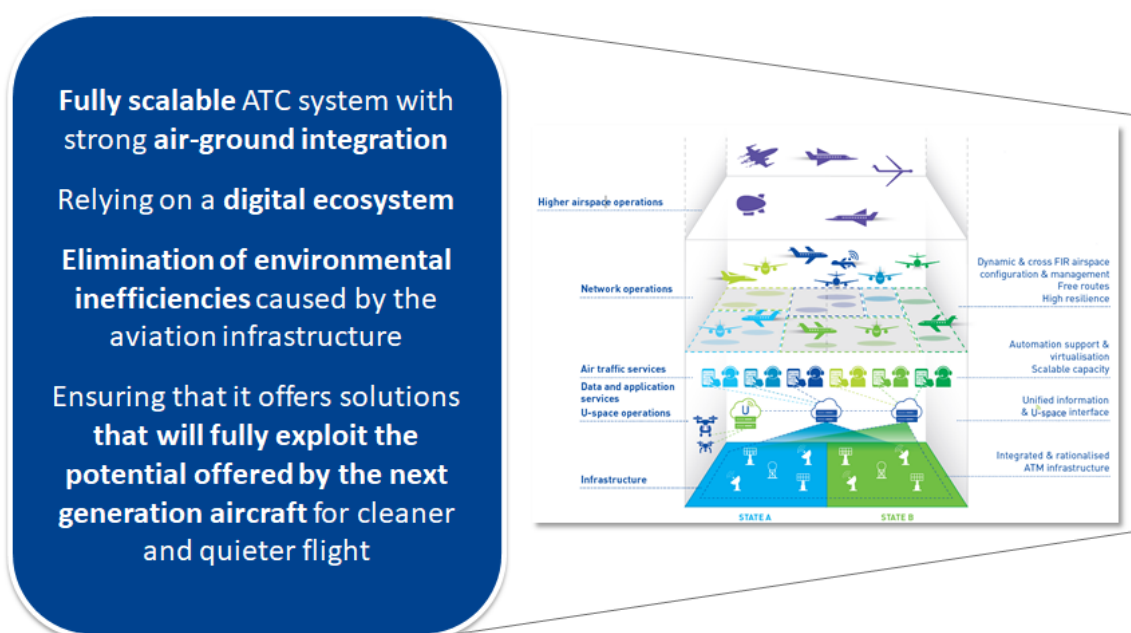


Figure 5: A new ecosystem for aviation

Section II – Multi-Annual Programming 2020-2022

This section provides stakeholders with a general overview of the activities planned by the SESAR JU in order to fully execute its mandate and deliver its long-term strategy. It is structured around the multi-annual objectives for the period from 2020 to 2022 that reflect the mandate of the SESAR JU and its priorities. This section is updated on an annual basis as a rolling plan, giving due consideration of the EU frameworks the SESAR JU operates within. It replaces the *Single Programming Document 2019-2021* insofar as it refers to the years 2020 and 2021.

1 Multi-annual objectives

1.1 SESAR 2020 Programme objectives

1.1.1 The SESAR innovation pipeline

As depicted in Figure 1, the SESAR Joint Undertaking plays a central role in driving and coordinating ATM research in the European Union. This role materialises mostly in the maintenance of the European ATM Master Plan and in the SESAR research and innovation programme.

The second SESAR research and innovation (R&I) programme for the period from 2016 to 2022, the SESAR 2020 Programme is structured in three main research and innovation phases that aim to deliver a pipeline of innovation. This matures operational and technology solutions through the European Operational Concept Validation Methodology (E-OCVM) well-established control and monitoring process, which is linked to Technology Readiness Level (TRL).

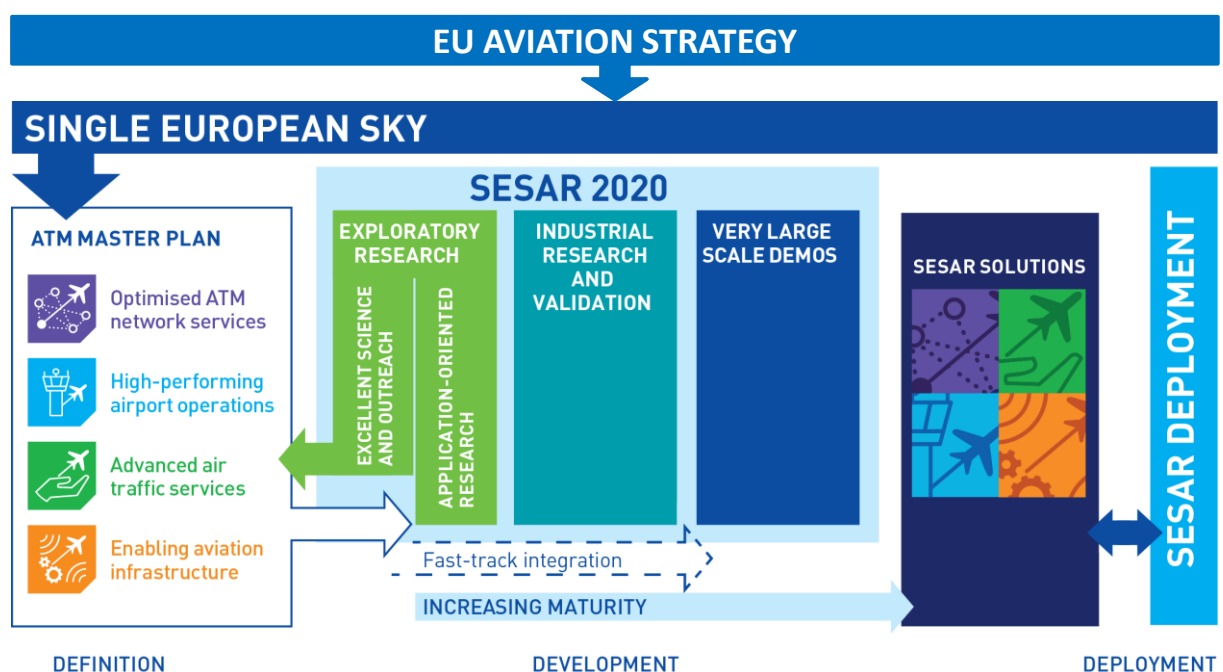


Figure 6: SESAR's innovation pipeline – from the EU Aviation Strategy to SESAR Solutions

This pipeline starts with the EU Aviation Strategy and the SES objectives (see Chapter 1) which feed into the European ATM Master Plan, the main planning tool that defines the ATM modernisation

roadmap and priorities that are maintained and updated on a regular basis. Exploratory Research (ER) addresses both transversal topics for future ATM evolution and application-oriented research. According to the four Key Features defined in the Master Plan, it is then expanded with contribution from the SESAR JU Members other than the Union that undertake Industrial Research and Validation (IR). As per the European ATM Master Plan, this will ultimately deliver results in the form of SESAR Solutions that will contribute to firmly establishing the performance benefits in preparation for deployment. The SESAR JU then further exploits the benefits of the partnership in demonstrating on a large-scale the concepts and technologies in representative environments (VLD for Very Large-Scale Demonstration activities).

In some cases, for instance where technology is mature in sectors other than ATM, fast-track integration from Application-Oriented Research to Demonstration activities is possible provided that it includes a proper validation in the context of ATM. This is in particular the case when the focus is more on the adaptation of that mature technology for ATM than on developing the technology (for instance, activities related to U-space, mentioned in the annual work programme section).

1.1.2 The European Master Plan: main planning tool for the modernisation of the European ATM

Within the framework of the EU Aviation Strategy and of the SES, the European ATM Master Plan is the main planning tool for the modernisation of European ATM.

The Master Plan is an evolving roadmap building on SESAR results and solutions and a strong collaboration between all European ATM stakeholders beyond just the Members of the SESAR JU. The major update in preparation for 2020 develops the SESAR Target Vision (the ‘Digital European Sky’) and introduces nine Essential Operational Changes for 2035 and beyond which are the conceptual game changers that are needed to achieve it. A transition towards orienting with the new Essential Operational Changes in the 2020 edition of the Master Plan will begin during 2020, in preparation for the work to be performed in the context of a future partnership in ATM.

The 2015 Master Plan introduced a structure of key ATM areas (the four ‘SESAR Key Features’ are structuring elements in the new 2020 edition as well), a performance framework and the sequence of delivery of the Target Vision. The 2015 edition is the performance reference for the SESAR 2020 Programme.

1.1.2.1 The four SESAR Key Features

In the European ATM Master Plan, SESAR Solutions have been categorised according to four Key Features, which form a coherent way to present the solutions over the time span of the multi-annual work programme and across all ATM in Europe as explained in Section II, Chapter 2 and in Section III of this document:

High-performing airport operations



The future European ATM system relies on the full integration of airports as nodes into the network. This implies enhancing airport operations, ensuring a seamless process through collaborative decision-making (CDM) and developing collaborative recovery procedures in adverse conditions. In this context, this Feature mainly addresses the need for increasing airport capacity through the enhancement of runway throughput, integrated surface management, total airport management and airport safety nets.

Advanced air traffic services



The future European ATM system will be characterised by advanced service provision, underpinned by the development of automation tools to support controllers in routine tasks allowing to better address the traffic demand with an increased en-route available capacity. This Feature reflects this move towards further automation with activities addressing enhanced arrivals and departures, separation management, enhanced air and ground safety nets and trajectory and performance-based free routing.

Optimised ATM network services



An optimised ATM network must be robust and resilient to a whole range of disruptions, including meteorological and unplanned events relying on a dynamic and collaborative mechanism. This will allow for a common, updated, consistent and accurate plan that provides reference information to all planning and executing ATM actors. This enables better considering the expected traffic demand in advance with the aim of making the required en-route capacity available. It also enables linking the en-route and airport plans and capabilities to consider traffic demand from gate to gate and to optimise the network capacity accordingly.

This Feature includes activities in the areas of advanced airspace management, advanced dynamic capacity balancing (DCB) and optimised airspace user operations, as well as optimised ATM network management through a fully integrated network operations plan (NOP) and airport operations plans (AOPs) via system-wide information management (SWIM).

Enabling aviation infrastructure



The enhancements described in the first three Key Features will be underpinned by an advanced, integrated and rationalised aviation infrastructure, providing the required technical capabilities in a resource-efficient manner. This feature will rely on enhanced integration and interfacing between aircraft and ground systems, communications, navigation and surveillance (CNS) systems, SWIM, trajectory management and Common Support Services. Furthermore, the safe integration of drones in all categories of airspace and the development of U-space is a new policy priority that is reflected in the dedicated roadmap delivered in 2017¹² and in a dedicated call for proposals organised by the SESAR JU in 2018 (see sub-point 2.5.1.2.1 below and Section III, paragraph 2.4). The drones roadmap's key findings and results are incorporated in the 2020 edition of the European ATM Master Plan to achieve the overall goal of securing integration of all air vehicles into the airspace.

1.1.2.2 The European ATM Master Plan performance framework

The SESAR JU results in the 2020-2022 period will continue to contribute to the achievement of the SES and the European ATM Master Plan (2015 edition) performance ambition milestone for 2035, as well as its ambition across the six main performance areas illustrated below.

¹² European ATM Master Plan: *Roadmap for the safe integration of drones into all classes of operations*. This document is available on the [SESAR JU website](#).

Key Performance Area	SES high-level goals vs. 2005	Key Performance Indicator	Performance ambition vs. baseline			
			Baseline value (2012)	Ambition value (2035)	Absolute improvement	Relative improvement
Capacity	Enable 3-fold increase in ATM capacity	Departure delay ¹ , min/dep	9.5 min	6.5-8.5 min	1-3 min	10-30%
		IFR movements at most congested airports ² , million	4 million	4.2-4.4 million	0.2-0.4 million	5-10%
		Network throughput IFR flights ³ , million	9.7 million	~15.7 million	~6.0 million	~60%
		Network throughput IFR flight hours ³ , million	15.2 million	~26.7 million	~11.5 million	~75%
Cost efficiency	Reduce ATM services unit cost by 50% or more	Gate-to-gate direct ANS cost per flight ⁴ , EUR(2012)	EUR 960	EUR 580-670	EUR 290-380	30-40%
		Gate-to-gate fuel burn per flight, kg/flight	5280 kg	4780-5030 kg	250-500 kg	5-10%
Operational efficiency		Additional gate-to-gate flight time per flight ⁵ , min/flight	8.2 min	3.7-4.1 min	4.1-4.5 min	50-55%
		(Within the: Gate-to-gate flight time per flight ⁵ , min/flight)	(111 min)	(116 min)		
Environment	Enable 10% reduction in the effects flights have on the environment	Gate-to-gate CO ₂ emissions, tonnes/flight	16.6 tonnes	15-15.8 tonnes	0.8-1.6 tonnes	5-10%
Safety	Improve safety by factor 10	Accidents with direct ATM contribution ⁶ , #/year Includes in-flight accidents as well as accidents during surface movement (during taxi and on the runway)	0.7 (long-term average)	no ATM related accidents	0.7	100%
Security	-	ATM related security incidents resulting in traffic disruptions	unknown	no significant disruption due to cyber-security vulnerabilities	unknown	-

¹ Unit rate savings will be larger because the average number of Service Units per flight continues to increase.
² "Additional" here means the average flight time extension caused by ATM inefficiencies.
³ Average flight time increases because the number of long-distance flights is forecast to grow faster than the number of short-distance flights.
⁴ All primary and secondary (reactionary) delay, including ATM and non-ATM causes.
⁵ Includes all non-segregated unmanned traffic flying IFR, but not the drone traffic flying in airspace below 500 feet or the new entrants flying above FL 600.
⁶ In accordance with the PRR definition: where at least one ATM event or item was judged to be DIRECTLY in the causal chain of events leading to the accident. Without that ATM event, it is considered that the accident would not have happened.

Figure 7: The six performance areas of SESAR, including the four Key Performance Areas of the Single European Sky¹³

The realisation of the SESAR Target Vision will not only bring significant direct and quantifiable performance gains to ATM, air transport and aviation, but it is also expected to deliver wider benefits for the EU economy and society in general.

1.1.2.3 SESAR delivery: upgrade phases of the European ATM system

The delivery of these results in the form of SESAR Solutions, as defined above in paragraph 1.1, will contribute to the various phases of the upgrade of the ATM system as outlined in the Master Plan. These phases are depicted in the figure below.

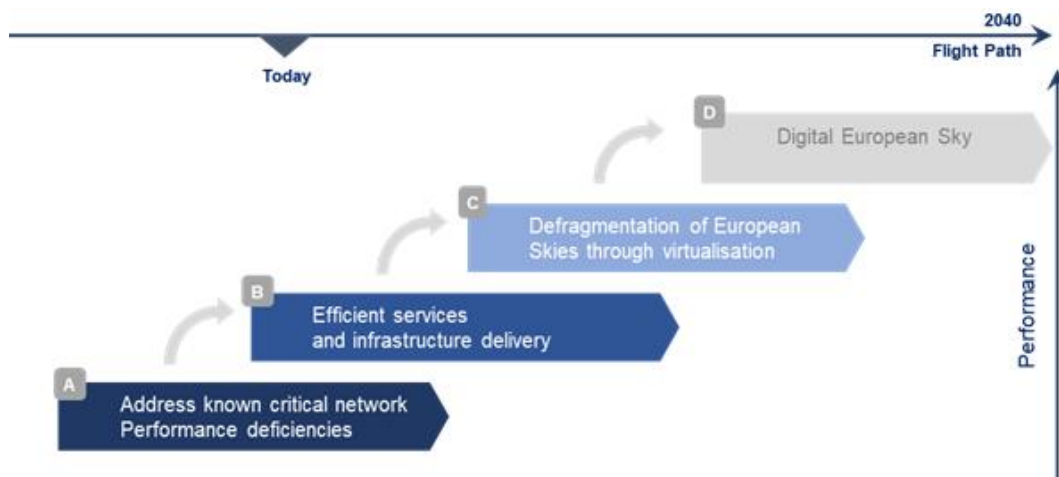


Figure 8: European ATM system upgrade phases as per ATM Master Plan

¹³ Source: European ATM Master Plan (performance improvement ambitions are baselined against the situation in 2012).

Until 2018, the primary objective of the SESAR Solutions delivered was to contribute to phases A and B, while preparing the ground for those Solutions that will be further developed in the next period. Driven by the 2020 update of the ATM Master Plan and building on the results of Wave 1 and the Exploratory Research outcome, candidate SESAR Solutions will be delivered under Wave 2 of the SESAR 2020 Programme from 2019 to 2022. A mix of these will be further developed up to pre-industrialisation (V3 or TRL6 then recognising SESAR Solutions, covering phase C) in continuation of those delivered under Wave 1, and will bring new topics with new concepts developed within the Exploratory Research projects. For the latter, development may be required beyond SESAR 2020 for the further maturation of the scientific and technical challenges of the SESAR Target Vision (phase D).

Section II, paragraph 2.4 provides the list of candidate SESAR Solutions under development as well as their contribution to the European ATM system upgrade phases, to the SESAR Vision and to the Performance Areas of the Single European Sky.

1.2 Future of ATM research

In accordance with its current mandate, the SESAR JU will cease to exist in its present organisational form on 31 December 2024, as stipulated in Article 1(2) of the amended SESAR JU constituent act. In the meantime, the European Commission has launched activities to determine options for an integrated ATM partnership in the following financing period (2021-2027).

In light of these ongoing discussions initiated and led by the European Commission and as a result of the Administrative Board's responsibility for proposing to the Commission the extension and/or the dissolution of the Joint Undertaking¹⁴, the SESAR JU is, as much as possible, anticipating and assessing the potential consequences of the changing regulatory conditions governing the SESAR programme. This approach aims at quickly and efficiently adapting to any changes once the future regulatory situation will become clear.

Two main scenarios have been identified:

- A future partnership for integrated air traffic management: formally based on a proposal from the Administrative Board to the European Commission to technically extend the SESAR programme activities¹⁵, the European Commission would issue a legislative proposal in Q1 2020 for the adoption of a new Council regulation in Q4 2020 (timeframe to be confirmed). This regulation would lay down legal provisions for the establishment of a new partnership. The activities of this new legal entity would encompass all European ATM-related research and funding activities as of 2021. This new regulation would also establish the terms and conditions of the transition of the current SESAR JU activities and resources to the new legal entity,
- Termination of the SESAR JU: by Q1 2021, the Administrative Board will have issued a proposal to the European Commission on the dissolution of the SESAR JU¹⁵ and on the

¹⁴ As per Article 5(1)(k) of the SESAR JU Statutes annexed to the SESAR JU constituent act, the Administrative Board is responsible for 'deciding on proposals to the European Commission on the extension and the dissolution of the Joint Undertaking'. However, the legislative initiative in this regard remains with the European Commission.

¹⁵ As per Article 5(1)(k) of the SESAR JU Statutes annexed to the SESAR JU constituent act.

appointment of liquidators for conducting the proceedings involved in winding up the SESAR JU¹⁶. Upon approval from the European Commission, the SESAR JU will wind up and liquidate its activities leading to their cessation by 31 December 2024.

The activities needed for the transition to a new legal entity and for the termination of the SESAR JU are not mutually exclusive. Therefore, it is important to develop roadmaps for the two scenarios in parallel. Each roadmap will lay out the high-level approach to each scenario, will define and document key components of their related implementation plans as well as assess their impacts and will propose solutions in order to facilitate the chosen scenario execution as of 2021.

While the European Commission operates the required process to establish the future partnership, the SESAR JU will provide support as requested under the supervision of its Administrative Board in order to adequately answer to any final decision from the European Union. Thus, during 2020, building on the European Commission's initial statement towards a future partnership for ATM research¹⁷, the SESAR JU is ready to establish a high-level draft technical work programme for the new period starting in 2021.

Further information on related proceedings from a multi-annual perspective is available in Section II, paragraph 2.7. More detailed information on the activities planned in 2020 is available in Section III, point 2.6.4.2.

¹⁶ As per Article 25 of the SESAR JU Statutes annexed to the SESAR JU constituent act.

¹⁷ As presented at the Administrative Board meeting dated 10 October 2019.

2 Multi-annual programme

2.1 Introduction

The SESAR JU's multi-annual programme aims for the continued effective delivery of the SESAR 2020 R&I programme. As outlined in the SESAR JU's multi-annual work programme (MAWP) adopted by the SESAR JU Administrative Board in July 2015¹⁸, the SESAR 2020 Programme has been designed to encourage the implementation of the SESAR innovation pipeline outlined in paragraph 1.1.

This chapter provides information on the Strategic Areas of Operation according to which the SESAR JU multi-annual work programme is established. In the following paragraphs, the activities, source and structure of funding and governance of each Strategic Area of Operation are described. This structure also allows for the reporting provided during the year at Administrative Board level and ultimately in the Consolidated Annual Activity Report.

2.1.1 Six Strategic Areas of Operation

In continuity with the plan established in 2018 and building on the structure of the SESAR 2020 Programme set in the multi-annual work programme, the following six Strategic Areas of Operation each constitute a strategic objective the SESAR JU will follow in the period from 2020 to 2022:

- **Strategic Area of Operation #1 – Provide Strategic Steering to the SESAR programme.** The SESAR JU will continue to provide strategic steering to the SESAR R&I programme and to contribute to the implementation of the EU Aviation Strategy, in particular through the links with the SES policy framework, with the maintenance of the European ATM Master Plan and with the provision of guidance on the SESAR concept, architecture and performance. This strategic area of operation is further presented in paragraph 2.2 of this section and in Section III, paragraph 2.1,
- **Strategic Area of Operation #2 – Deliver Exploratory Research.** Within the pipeline for innovation (see Figure 6 in sub-paragraph 1.1.1 above), the first phase concerns Exploratory Research (ER), further categorised into the elements/projects that deal with relevant fundamental scientific subjects (Excellent Science and Outreach) and those which investigate the initial applications of such science for the ATM sector (Application-oriented research). This strategic area of operation is further presented in paragraph 2.3 of this section and in Section III, paragraph 2.2,
- **Strategic Area of Operation #3 – Deliver Industrial Research & Validation.** The second phase of the pipeline for innovation is the Industrial Research & Validation (IR) which includes applied research, pre-industrial development and validation projects, and which is delivered by the Members of the SESAR JU other than the Union. This phase is further split into three waves: Wave 1 covers the 2016-2019 period, Wave 2 (launched in 2019) covers the period currently planned from 2019 to 2022 and Wave 3 covers the 2021-2022 period, i.e. the final years of the SESAR 2020 Programme. It aims for the progressive delivery of a number of specific operational or technical improvements – candidate SESAR Solutions – systematically validated to support the decision on their individual implementation and/or synchronised deployment. The three Waves will together cover the ambitions of the ATM Master Plan for

¹⁸ The multi-annual work programme was adopted by the Administrative Board in 2015 (decision [ADB\(D\)05-2015](#)).

the Development phase. Paragraph 2.4 below and paragraph 2.3 in Section III further present this strategic area of operation,

- **Strategic Area of Operation #4 – Deliver Very Large-Scale Demonstration activities.** The third phase of the pipeline for innovation deals with Very Large-Scale Demonstrations (VLDs) which are designed as demonstrations of particular programme concept elements and SESAR Solutions. These demonstrations provide the bridge between the development and deployment phases of SESAR and are delivered through work undertaken by SESAR JU Members other than the Union, supplemented by open calls for proposals to ensure the widest possible stakeholder participation.

In some cases, results of Application-oriented Exploratory Research can be passed to this third phase after a proper validation process in the context of ATM but without a full development process. This is particularly the case when a technology is mature in sectors other than ATM and when the focus is more on the adaptation of that mature technology for ATM than on developing the technology (for instance, activities related to U-space, mentioned in the annual work programme section).

This strategic area of operation is further presented in paragraph 2.5 of this section and in Section III, paragraph 2.4,

- **Strategic Area of Operation #5 – Deliver SESAR Outreach:** the SESAR JU ensures global outreach relating to the ATM Master Plan and the ongoing and planned SESAR activities, in full coordination with the European Commission and EUROCONTROL. This strategic area of operation is described in paragraph 2.6 below and in Section III, paragraph 2.5,
- **Strategic Area of Operation #6 – Deliver effective financial, administrative and corporate management.** The SESAR JU must ensure it fully operates in accordance with its obligations, while also striving to continually improve its financial, administrative and corporate management as these elements of the SESAR JU’s operations remain an integral part of the delivery of its mission and values. This area also addresses the follow-up of audit recommendations and is outlined in further detail in paragraph 2.7 below and in Section III, paragraph 2.6.

2.1.2 Research topics to be addressed within the ‘innovation pipeline’

Within the ‘innovation pipeline’, the activities of the SESAR JU and its Members as well as other Programme participants are designed to cover the full spectrum of research topics to be addressed by the SESAR 2020 Programme, which, in its current state, is depicted in the following figure. Based on the initial description established as part of the SESAR 2020 multi-annual work programme (MAWP) in 2015, the SESAR JU is continuously maintaining this structure. It is expected that the ATM Master Plan maintenance, and in particular the Master Plan update campaign carried out in 2018-2019, might result in refinements of the structure of research topics.

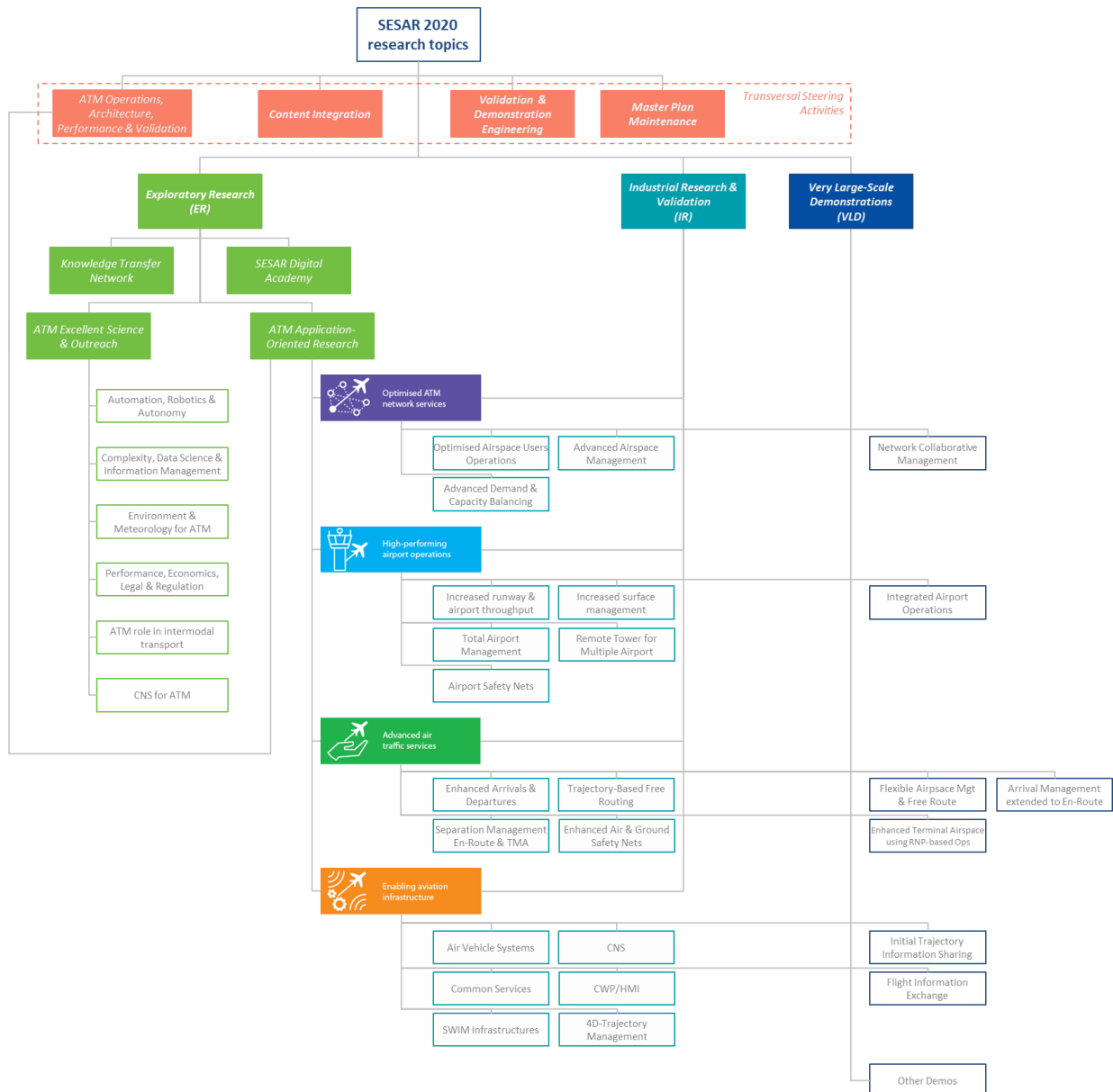


Figure 9: Structure of research topics covered by the SESAR 2020 Programme (as at the end of 2019)¹⁹

In addition to the activities mapped in the figure above, in 2017, the European Commission entrusted the SESAR JU with the management of U-space related activities at EU level²⁰.

2.1.3 Funding the ‘innovation pipeline’

The SESAR JU receives funds from various origins of the EU in order to execute the SESAR 2020 Programme. These funds have been delegated to the SESAR JU under four different legal frameworks,

¹⁹ Except for the SESAR Digital Academy which will be established by the SESAR JU in 2020.

²⁰ Letter from the European Commission to the Members of the Administrative Board of the SESAR Joint Undertaking dated 26 July 2007 with reference MOVE.DDG2.E3/OV – nd/ Ares(2017).

namely Horizon 2020²¹, the CEF (Connecting Europe Facility)²² and two types of assigned revenues²³, each allowing execution of either grants (following calls for proposals) or studies (following calls for tender).

The three phases of the pipeline and the steering of the programme will be delivered using the following instruments: Exploratory Research and part of the Very Large-Scale Demonstrations being secured using open calls for proposals, and the Industrial Research & Validation and remaining part of Very Large-Scale Demonstrations using calls restricted to the Members of the SESAR JU other than the Union. The relationship between the various programme phases of the SESAR 2020 Programme and the various call activities is outlined in the following figure and is further detailed in paragraphs 2.2 to 2.5 of this section.

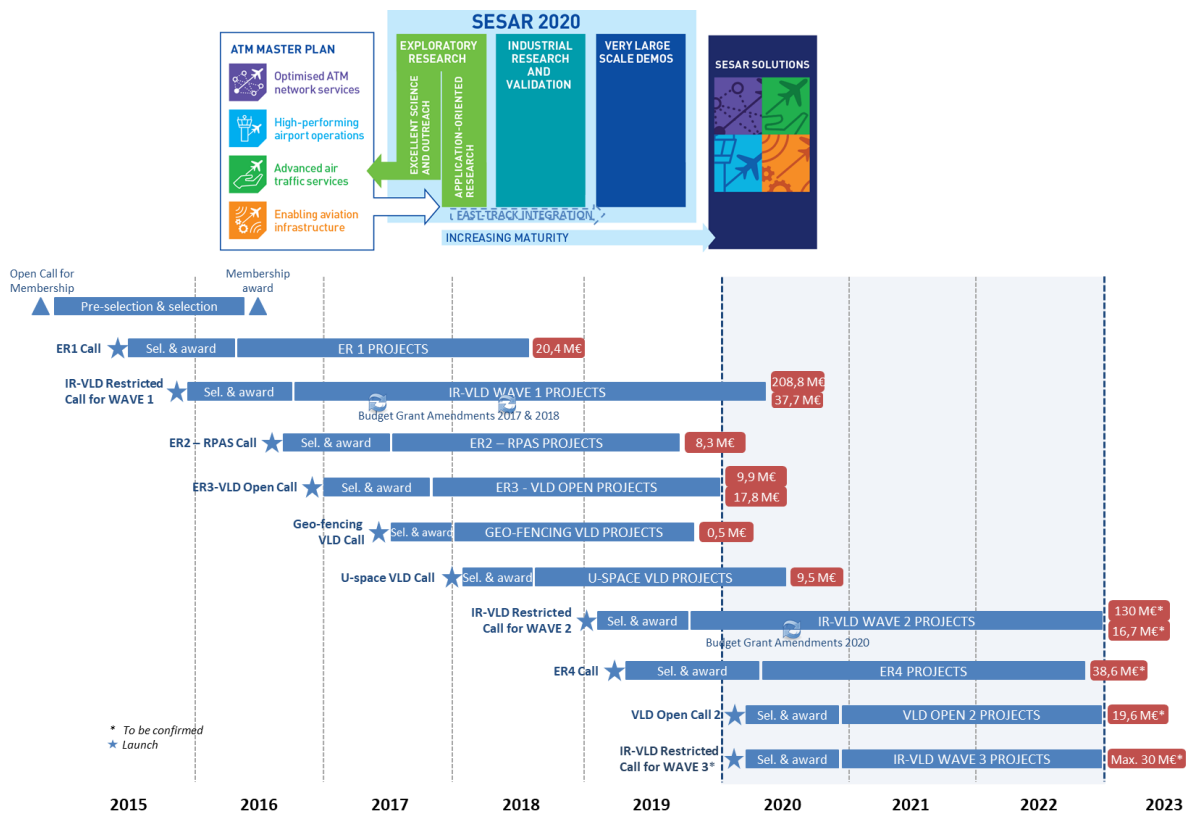


Figure 10: Call activities of the SESAR 2020 Programme over the period 2015-2022

²¹ The rules applicable to the grants co-funded by the SESAR JU under the Horizon 2020 programme are defined in Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in 'Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)' (OJ L 347, 20.12.2013 p.81).

²² The rules applicable to the grants co-funded by the SESAR JU under the CEF programme are defined in Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010 Text with EEA relevance (OJ L 348, 20.12.2013, p. 129–171).

²³ The rules applicable to the grants co-funded by SESAR JU through use of the assigned revenue are defined in the Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union (EU Financial Regulation) (OJ L 193, 30.7.2018, p. 1).

The implementation of these calls for proposals is subject to the availability of the corresponding EU budget in due time. In particular, the sequence of calls for proposals may be impacted by the occurrence of risk CORP06 ‘Brexit may have an impact on SESAR JU objectives’ as exposed in Annex VIII of the present document²⁴.

In addition to the calls for proposals listed above, the SESAR JU undertakes studies in relation to technical topics that are relevant for the technological pillar of the Single European Sky. Of these, the list of procurement actions related to studies the SESAR JU will undertake in 2020 appears in Annex IX ‘Procurement plan for 2020’.

2.1.4 Overview of the SESAR 2020 Programme portfolio of projects at the end of 2019

As a result of the calls for proposals already completed by the end of 2019, the SESAR 2020 Programme is composed of the following 86 projects which implement the research topics presented in subparagraph 2.1.2 (Figure 9). Each topic of the Exploratory Research is covered by one or several projects, while in general topics of the IR and VLD are covered by one project each.

²⁴ As noticed in the General Introduction of Horizon 2020 Work Programme 2018-2020, it should be noted that until the United Kingdom leaves the EU, EU law continues to apply to and within the United Kingdom, when it comes to rights and obligations; this includes the eligibility of United Kingdom legal entities to fully participate and receive funding in Horizon 2020 actions such as those called for in this work programme. Please be aware however that the eligibility criteria must be complied with for the entire duration of the grant. If the United Kingdom withdraws from the EU during the grant period without concluding an agreement with the EU ensuring in particular that British applicants continue to be eligible, they will no longer be eligible to receive EU funding and their participation may be terminated on the basis of Article 50 of the grant agreement.

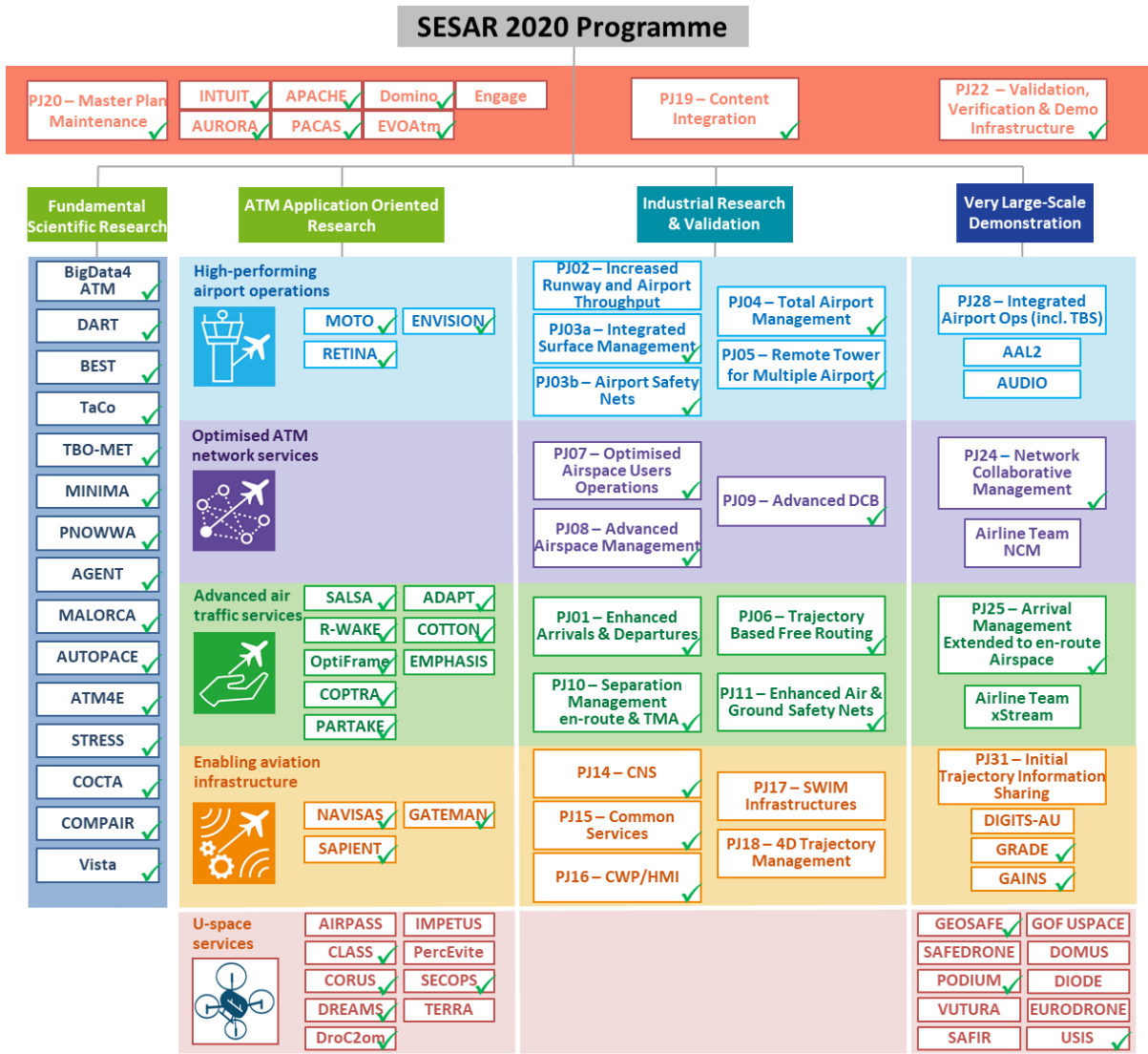


Figure 11: SESAR 2020 Programme portfolio of projects matching the research topics at the end of 2019 (projects in execution or closed)

As can be seen in the figure above and in relation with Figure 9, most of the research topics of the SESAR 2020 Programme are covered by projects in execution or projects that are closed (closed projects, i.e. the ones which have already completed their activities at the end of 2019, are marked with the symbol ✓). The approach to cover the remaining part of the topics is presented in Section III, paragraphs 2.1 to 2.6.

2.1.5 Governance of the SESAR 2020 Programme

The governance of the SESAR 2020 Programme is as follows:

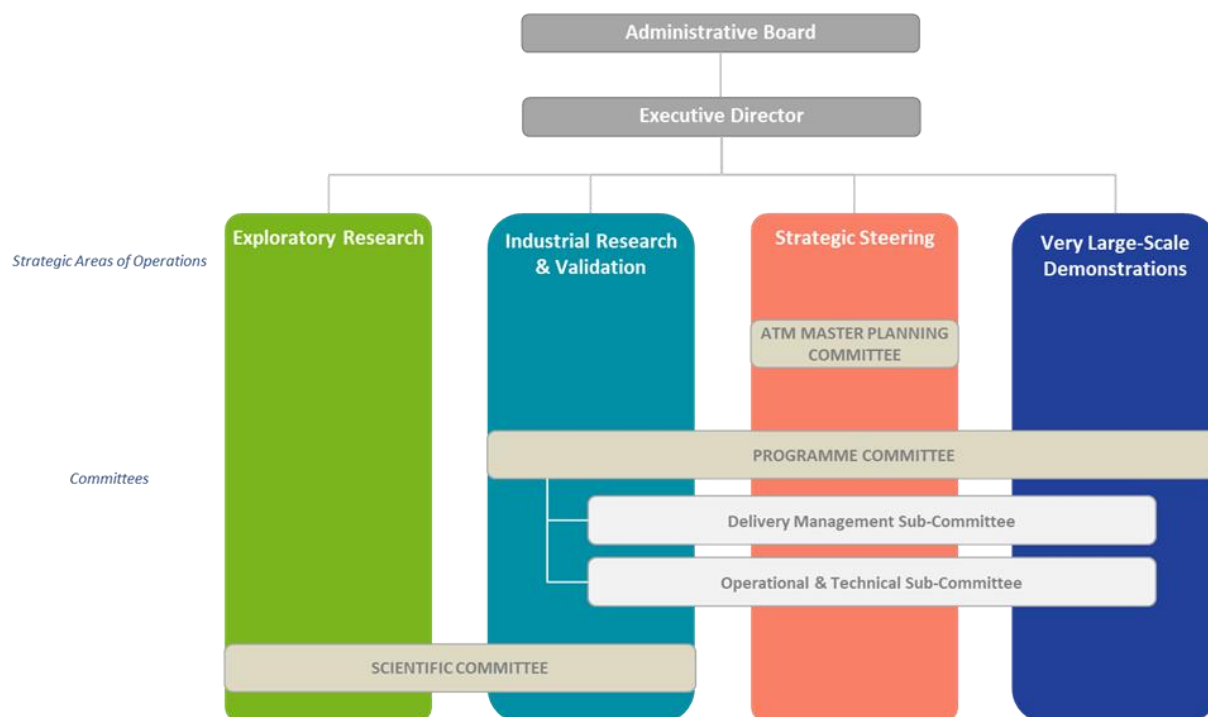


Figure 12: Governance of the SESAR 2020 Programme

2.1.5.1 Administrative Board

The Administrative Board (ADB) is the main governance body of the SESAR JU. It is responsible for the strategic orientation and effective operation of the SESAR JU and supervises the implementation of its activities in accordance with Article 5 of the Statutes of the Joint Undertaking. In accordance with the SESAR JU constituent act, the ADB is chaired by the European Commission, representing the EU, and with the EUROCONTROL representative acting as a vice-chairperson. It is constituted of one representative from each Member of the Joint Undertaking²⁵, the Military, Civil Airspace Users, ANSPs, Equipment Manufacturers, Airports, ATM Staff and the scientific institutions/community.

2.1.5.2 Executive Director

Appointed by the Administrative Board, the SESAR JU Executive Director (ED) is responsible for the day-to-day management of the Joint Undertaking and is its legal representative. He or she directs the execution of the SESAR 2020 Programme within the guidelines established by the Administrative Board to which he or she is responsible. He or she provides the Administrative Board with all information necessary for the performance of its functions. This in particular includes the drawing up of and regular update on the global and annual work programme of the Joint Undertaking, including an estimate on programme costs and the assurance that the activities of the Joint Undertaking are being carried out with complete independence and without any conflicts of interest. He or she also submits any proposal involving changes in the design of the SESAR project to the Administrative Board.

²⁵ The list of Members of the SESAR JU is provided in Annex XI.

2.1.5.3 Programme Committee

The Programme Committee (PC) is composed of representatives of each of the Members of the SESAR JU other than the Union. In addition to this, there is one representative of civil Airspace Users and one of the European Commission acting as permanent observers. The secretariat and the chair are performed by the SESAR JU.

By representing their organisations, the PC members commit to implement decisions taken by the PC affecting the SESAR programme on technical and contractual matters.

The Programme Committee supports the SESAR JU ED in the delivery of the SESAR 2020 Programme, covering the IR and VLD phases of the programme.

The Programme Committee is supported by two subcommittees: a Delivery Management Sub-Committee (DMSC), which focuses on the management of the programme and of the various contributions, and an Operations and Technical Sub-Committee (OTSC), which focuses on the content steering of the activities.

2.1.5.4 ATM Master Planning Committee

This Committee is composed of representatives of the European Commission, EUROCONTROL, Civil Airspace Users, the EDA representing the military, Air Navigation Service Providers, ground and airborne equipment manufacturers, airports, professional staff organisations in the ATM sector, EASA, Eurocae, the SES Network Manager and the SESAR Deployment Manager.

These representatives were put forward to the ED by the relevant Members of the SESAR JU Administrative Board for formal appointment to the Committee. The Committee provides advice to the ED on the progress of the implementation of the European ATM Master Plan and monitors coherence between its three levels²⁶. In particular, it identifies potential gaps or opportunities for improving the Master Plan priorities and advises the ED on measures it considers are needed.

2.1.5.5 Scientific Committee

The Scientific Committee supports the SESAR JU ED in ensuring the scientific excellence of the SESAR 2020 Programme. In particular, under the chair of the SESAR JU, this Committee will take a monitoring view (content and results) over the Exploratory Research activities of the SESAR 2020 Programme and transition to Industrial Research and Validation. It also provides the ED with scientific advice covering the whole range of SESAR JU's research activities under the SESAR 2020 Programme.

The committee member seats are filled by an open call for scientists and researchers from across the research community and by one representative from each of the founding members (the European Commission on behalf of the EU and EUROCONTROL). The current membership has been extended to February 2021.

In order to foster the transition between Exploratory Research and Industrial Research, an observer seat is reserved for a representative of the Programme Committee.

²⁶ Level 1 – Executive view; Level 2 – Planning and architecture view; Level 3 – Implementation view.

2.2 Strategic Area of Operation 1: Provide strategic steering to the SESAR programme

Under the leadership of the SESAR JU, all SESAR 2020 R&I activities are undertaken under a common framework. As introduced with the SESAR 2020 Programme research topics diagram (Figure 9), this framework applicable to the industrial research and validation relies on the following elements:

- Maintenance of the European ATM Master Plan,
- Content Integration activities aiming for transversal steering of the programme through the Concept of Operations, Architecture activities, and the Performance framework.

In continuation of the activities carried out in the 2016-2019 period and subject to the outcome of the 2019 IR-VLD Wave 2 call for proposals, the following projects should support the execution of this framework in the 2020-2022 period, as depicted in Figure 11: PJ.20 W2 'Master Plan maintenance', covering the maintenance of the ATM Master Plan and PJ.19 W2 'Content integration', covering the required coordination of IR projects to develop the concept of operations, architecture and performance, and alignment with the ATM Master Plan.

Furthermore, considering discussions held in the Programme Committee and calling for a reduction of the budget for Transversal Steering projects, a new approach has been agreed based on the following key principles:

- Overall effort to be reduced,
- Top-down approach with strategic steering to be continued,
- Programme execution/Solutions development in line with the ATM Master Plan to be ensured,
- Continuous activities to be distinguished from specific (ad-hoc) needs.

As a result, the SESAR JU has identified the following three management modes for strategic steering activities:

- Mode 1 for the Transversal Activities with H2020 projects (i.e. PJ.19 W2 Content Integration, Performance management and Business Case development and PJ.20 W2 'Master Plan maintenance'),
- Mode 2 for ad-hoc activities organised by the SESAR JU for the execution of specific tasks when required and in a short period of time (e.g. the evolution of validation strategy, evolution of methodologies such as cyber security, and the management of operational issues across the programme),
- Mode 3 for service requests, using the provision of the SESAR JU-EUROCONTROL agreement (see explanations on EUROCONTROL's types of contributions in point 3.2.2.1 of this Section). The services would cover the maintenance and support of the architecture framework to fit the needs of the SESAR 2020 Programme (e.g. EATMA release, guidance, access to the repository) and the delivery of training and coaching to EATMA practisers working in solution projects (modelisation of operational and technical content).

The strategic steering projects work very closely with the SESAR JU in order to provide an additional level of independence and external assistance to de-risk the delivery of candidate SESAR Solutions.

In this role, the SESAR JU benefits from additional support from Airspace Users, Professional Staff Organisations and National Aviation Authorities (see sub-paragraph 2.2.5). They mainly provide the SESAR JU with reports about validation exercises or candidate SESAR Solutions deliverables.

In addition to these projects, in continuation with the work done in previous years and upon request of the European Commission, the SESAR JU may carry out additional activities in the period from 2020 to 2022 to assist stakeholders in other areas related to the technological pillar of the SES.

2.2.1 ATM Master Plan maintenance

The Master Plan update campaign conducted in 2018-2019 has enabled defining the vision towards a 'Digital European Sky' and highlighting the R&D that supports the digital transformation of the ATM industry through increased connectivity, virtualisation and automation. This supported the study mandated to the SESAR JU by the European Commission on a 'proposal for the future architecture of the European Airspace', the final report that was delivered to the European Commission in March 2019. It also allowed strengthening the link between the performance ambitions of SESAR and the SES performance scheme. Contact has been made with the SES Performance Review Body, allowing convergence between Master Planning tasks and the SES performance target setting. In the next period, the SESAR JU will seek to maintain and further develop such collaboration.

The ATM Master Plan maintenance activities therefore consist in:

1. Maintaining the consistency of the three levels of the European ATM Master Plan: level 1 – Executive View, level 2 – Planning and Architecture View, and level 3 – Implementation View;
2. Updating the Master Plan on the basis of the results of the Research and Innovation activities, through major updates every two to three years approximately;
3. Monitoring the implementation of the Master Plan and the leverage of opportunities and emerging ideas
4. In addition to these standard and periodical activities, the adoption of the 2020 edition of the Master Plan will be followed in 2020 by a revision of the Master Plan updates process as well as its scope and relations with other strategic plans (such as EASA's EPAS, NM's NSP etc.), to better meet the expectations of the SESAR programme's governing bodies and of the stakeholders' decision-makers (see also Section III, paragraph 2.1).

The governance of the ATM Master Plan maintenance is ensured by the support provided to the SESAR JU Executive Director by the ATM Master Planning Committee as described in point 2.1.5.4.

Providing input to the Executive Director and facilitating his consultation of the ATM Master Planning Committee, in continuation with project PJ.20 over the 2016-2019 period, in 2020-2022 project PJ.20 W2 should support the SESAR JU in the maintenance of the ATM Master Plan (depending on the successful completion of the Wave 2 call for proposal and subsequent grant agreement signature). The expected delivery of the PJ.20 W2 transversal activities is the following:

PJ.20 W2 transversal deliverables	2020	2021	2022
Update of Master Plan Level 2		X	X
Update of Master Plan Level 3 (Plan & report)	X	X	X
Update to Standardisation needs			X

PJ.20 W2 transversal deliverables	2020	2021	2022
Update to Regulatory needs			X
Update of the Business View			X

Table 2: Transversal deliverables of PJ.20 W2 supporting the Master Plan maintenance

Further information on the follow-on activities of the update of the European ATM Master Plan conducted in 2018 and delivered in the first part of 2019 is provided in Section III, paragraph 2.1.

2.2.2 Content Integration and Transversal Programme Steering

The SESAR 2020 Programme requires guidance and steering to achieve the objectives of the European ATM Master Plan. While the decisions are taken by the SESAR JU in coordination with the SESAR governance, content integration activities, supported by PJ.19 W2, coordinate and integrate operational and technical solutions, and as such support and guide the execution of the transversal processes (e.g. safety, security assessment, cost-benefit analysis) to ensure their completeness, consistency and coherence from a holistic perspective. The content integration activities also cover the maintenance and support of the performance framework and ensure its implementation by the SESAR 2020 projects. These activities provide support to the activities that monitor the programme and that lead to the SESAR JU's necessary further decision-making.

The objective of the project PJ.19 W2 is to support Programme execution and IR project developments for the delivery of the SESAR Solutions in line with the ATM Master Plan. To achieve that objective, the project will support the SESAR JU in:

- Organising and executing Content Integration Change process,
- Organising on a continuous basis the activities needed at Programme level aiming to coordinate and consolidate the ATM architectural content elements,
- Contributing to the Solution maturity assessment,
- Ensuring the translation of the Master Plan performance ambition into validation targets,
- Supporting Solution projects in their performance evaluation and aggregate performance results into business cases, which will then be consolidated by PJ.20 W2 as part of its Master Planning maintenance activities,
- Proposing concept of operations (CONOPS) evolutions aligned with the SESAR Target Vision and the European ATM Master Plan performance ambitions,
- Enabling and supporting the system engineering data management framework allowing to capture SE data (requirements and validation/demonstrations objectives and results) in a structured way and ensuring consistency, coherence and coverage analysis at Programme level.

The expected delivery of the PJ.19 transversal activities is the following:

PJ.19 Transversal deliverables 2020-2022	2020	2021	2022
Operational Concept Document	X		X
Architecture Description Document	X		X

PJ.19 Transversal deliverables 2020-2022	2020	2021	2022
Performance Framework		Major update	
Validation Targets	X		
Consolidated Performance Assessment and Gap Analysis		X	X
Consolidated Business Case	X	X	X
Integrated Roadmap Data Set	X	X	X

Table 3: Concept, Architecture and Performance steering activities deliverables in 2020-2022

2.2.3 Transversal and Strategic Steering activities funding

Strategic Steering activities are supported by projects funded through Exploratory Research and Industrial Research & Validation calls for proposals – see paragraphs 2.3 and 2.4 – as follows:

Ref.	Title	Short project description	Call for proposals	Status (2019)	Max. total co-financing value (in EUR)
PJ.19	Content Integration	'Content Integration' (CI) activities aim to coordinate and integrate operational and technical solutions, and as such to support and guide the processes to ensure their completeness, consistency and coherency from a holistic perspective as expressed in the SESAR CONOPS.	H2020-SESAR-2015-2	Ongoing during the year, closed by the end of 2019	7.227.142
PJ.19 W2			H2020-SESAR-2019-1	Grant agreement preparation	4.500.702 (requested EU contribution)
PJ.20	Master Plan maintenance	The European ATM Master Plan has three levels (Executive, Planning and Implementation) that require synchronised monitoring and alignment. The work consists in maintaining, updating and publishing as and when necessary the Master Plan, as well as in managing the Master Plan update campaigns.	H2020-SESAR-2015-2	Ongoing during the year, closed by the end of 2019	3.327.676
PJ.20 W2			H2020-SESAR-2019-1	Grant agreement preparation	2.088.795 (requested EU contribution)
PJ.22	Validation and Demonstration Engineering	Development of the Validation & Verification Infrastructures (V&VI) and Platforms (V&VP) development required for supporting SESAR Validation Exercises.	H2020-SESAR-2015-2	Ongoing during the year, closed at the end of September 2019	2.051.334

Ref.	Title	Short project description	Call for proposals	Status (2019)	Max. total co-financing value (in EUR)
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Four ER projects (**APACHE, AURORA, INTUIT, PACAS**) under the open ER 1 call (with reference H2020-SESAR-2015-1)²⁷ and two ER projects (**EVOAtm, Domino**) under the open ER 3 call (with reference H2020-SESAR-2016-1)²⁷, expected to be completed at the end of 2019.

One transversal project addressing knowledge transfer network (**Engage**) under the open ER 3 call (with reference H2020-SESAR-2016-1)²⁷ expected to be completed by the end of 2021.

Additional ER projects resulting from the open ER4 call (with reference H2020-SESAR-2019-2)²⁸ to be awarded in Q1 2020.

Table 4: SESAR 2020 Programme Transversal and Strategic Steering activities with related co-financing

Furthermore, as introduced in Section II, point 3.2.2.2, in addition to direct funding (Title III – Operational expenditure), the SESAR JU also dedicates a proportion of its running costs (Title I – Staff expenditure and Title II – Infrastructure and operating expenditure) to carry out the programme steering activities. The overall funding of Strategic Area of Operation #1 is indicated in Annex I. Support contracts / agreements / working arrangements with additional stakeholder groups are funded through dedicated budget subject to procurement actions.

2.2.4 Other activities carried out to assist stakeholders in matters related to the technological pillar of the SES

Following the delivery of the tasks entrusted to the SESAR JU in relation to the Airspace Architecture Study and its Transition Plan, the SESAR JU will carry out R&D tasks in the 2020-2022 period in the context of the IR-VLD Wave 3 call (outlined below in paragraph 2.4.2).

On the other hand, in the 2020-2022 period, other tasks could include support to the European Commission in its development of partnership initiatives and in securing the future for ATM leadership, technological excellence and SES research as part of the new EU Multi-Annual Financial Framework 2021-2027.

2.2.4.1 U-space integration activities

On top of the SESAR 2020 Programme delivery, the SESAR JU will in 2020 continue assisting the European Commission on the integration of new air vehicles into the ATM environment and U-space.

Indeed, the Vilnius and Helsinki Conferences have clearly highlighted that unlocking drone operations in Europe has become an urgent priority for Europe, with the hard deadline of 2019 for U-space foundation services (also referred to as U1 services)²⁹. The European Commission entrusted the SESAR

²⁷ See point 2.3.1.

²⁸ See point 2.3.2.

²⁹ For more information on levels of U-space services please refer to the [U-space Blueprint](#), p.5, SESAR JU, 2017.

JU the task of managing U-space related activities at EU level³⁰ and signed a specific delegation agreement³¹ to perform demonstration activities to validate systems that support U-space services.

Following this mandate, the SESAR JU launched a U-space call for proposals (with reference CEF-SESAR-2018-1) in early 2018, which resulted in six projects relating to U-space that will complete their demonstration activities in Q1-Q2 2020 (see Section II paragraph 2.5.2). Furthermore, to encourage close cooperation with several bodies and institutions, a supporting role as a U-space Content Integrator has been set up with the aim of providing support to the SESAR JU in:

- Defining a ‘fast track’ methodology for validation, and monitoring of its application,
- Contributing to the support of the delivery of the U-space SESAR Solutions,
- Providing coordination support for the definition of proposed harmonised standards and regulation for U-space services across Europe,
- Consolidating the U-space results into a state-of-the-art report.

This U-space content integration function is supported by EUROCONTROL under specific service request from the SESAR JU based on the ‘SESAR JU-EUROCONTROL Agreement’. This function is performed in the context of an ‘EU Demonstrators Network’ led by the European Commission. The figure below depicts the overall relationship between this set of services, provided in support of the SESAR JU coordination of U-space, and drone integration projects.

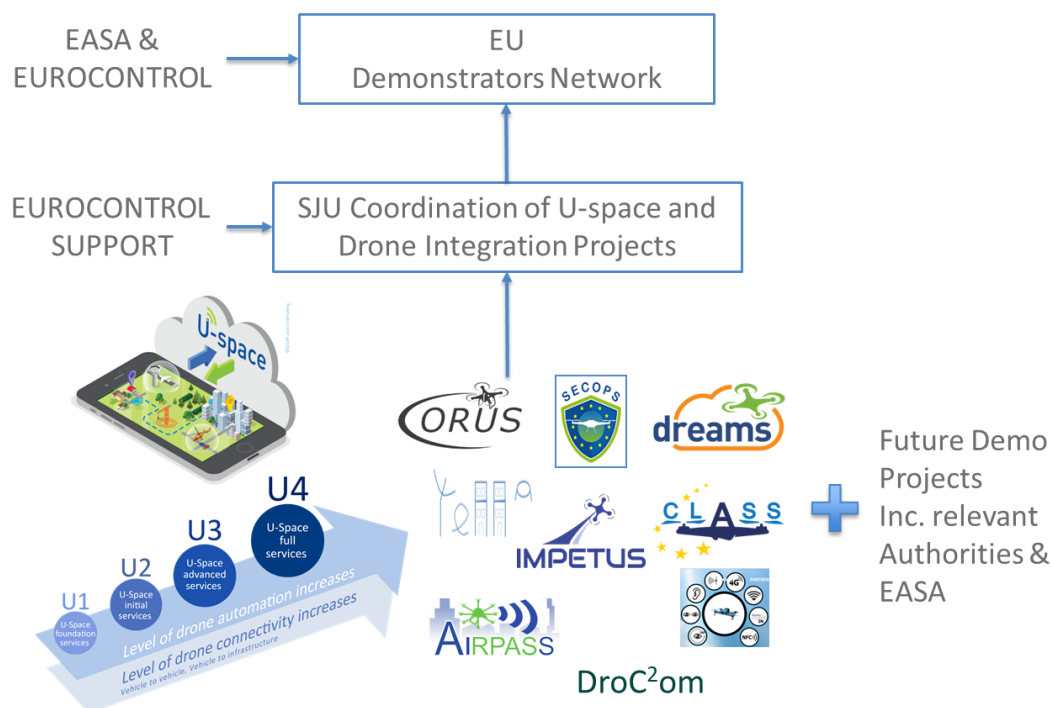


Figure 13: Coordination and integration of U-space integrated initiatives at EU level

³⁰ Letter to the Members of the Administrative Board of the SESAR Joint Undertaking - MOVE.DDG2.E3/OV-nd/Ares(2017).

³¹ The European Commission has given an mandate to the SESAR JU to organise U-space demonstrations through delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2017-564/si2.771010 signed on 13/12/2016 with a delegated budget of EUR 10 million from the Connecting Europe Facility (CEF) fund.

2.2.4.2 European ATM Architecture

The SESAR 2020 Programme aims at modernising and harmonising the European ATM System from operational and technological perspective. It will develop and validate different ATM solutions that will contribute to achieving its high-level performance objectives and as such the objectives of the Master Plan.

In this complex context, a dedicated transversal activity under the responsibility of the Wave 2 projects PJ.19 and PJ.20 should be set up to generate and report upon the consolidated big picture of the future European ATM System. The activities executed by projects PJ.19 and PJ.20 need the availability of an architectural framework (EATMA – European ATM Architecture) and a reporting facility (European ATM Portal, called eATM Portal) to ensure the collaboration, content integration and change management, including reporting, take place and are applied by all projects. The main tasks under that dedicated EATMA transversal activity will consist in:

- Maintaining and supporting the infrastructure to make the EATMA framework available and fit to the needs of the SESAR 2020 Programme,
- Maintaining and supporting the evolution of the eATM Portal for both its working and public versions,
- Delivering training and coaching to EATMA practitioners working on solution projects and delivering user guidance for the portal user community.

This EATMA activity would be supported by EUROCONTROL under specific service request from the SESAR JU based on the ‘SESAR JU-EUROCONTROL Agreement’.

2.2.5 Support contracts and agreements / working arrangements

In addition, until the end of 2020, the SESAR JU will benefit from four main agreements with additional stakeholder groups to provide strategic advice to the SESAR JU:

- The Airspace Users support contracts (with civil AUs),
- The Professional Staff Organisations working arrangements,
- The Authorities working arrangements (with National Aviation Authorities),
- The Airports support contract.

The continued support from these stakeholders under new or renewed agreements from 2021 onwards is dependent on the decision to be made by the European Commission on the future partnership for ATM research (see above in Section 1, paragraph 1.2).

In addition, the SESAR JU has set up an external support contract to help in steering the SESAR 2020 Programme: the SESAR Development Support Service contract covering industrial support, programme management support and the provision of a collaborative programme management platform. The current contract, which expires at the end of 2020, will be renewed to ensure programme management support to all technical activities until the end of December 2022.

Furthermore, with the European Commission, the SESAR JU is exploring the possibility to place an inter-institutional service level agreement³² with EASA for the provision of services³³ in support of the execution of the European ATM Master Plan that are currently not covered by the EASA fees and charges nor by a financial contribution from the EU.

Lastly, in steering the SESAR 2020 Programme, the SESAR JU devotes a significant effort to playing an active role in the inter-agency networks, H2020 networks and transversal implementation of EU regulations.

³² In accordance with Article 42 of the SESAR JU Financial Rules, ref. ADB(D)21-2019, and referred to in Article 59 of Regulation (EU, Euratom) of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 (OJ-L 193/30.07.2018, p.1).

³³ E.g. experts participation in the SESAR maturity gates for key solutions identified in the Airspace Architecture Study, contribution to the development of SESAR Solutions Regulatory overview for SESAR programme Wave 1, provision of technical and regulatory expertise to consolidate V4 gap assessment foreseen in the Airspace Architecture Study Transition Plan, contribution in analysis for final U-Space projects recommendations and to sector independent controller validations project, Wave 3 candidate solution.

2.3 Strategic Area of Operation 2: Deliver Exploratory Research (ER)

The transversal projects of the Exploratory Research phase that are related to ATM operations, architecture, performance and validation will have delivered their results and will be closed. The projects resulting from the ER4 call will start in 2020 and their outcome should be known by the end of 2022.

As outlined in the SESAR 2020 Programme, ER topics presented in the introduction to Chapter 2 (Figure 9), are structured around three areas:

- One transversal area: the **'Knowledge Transfer Network'** will assess and coordinate project results to contribute to spotting innovative ideas, concepts and models that can support the identification of ATM system concept trade-offs, a new technology validation at system level and requirements definition and consolidation. The ATM research community will be able to share research results.
- Two research areas:
 - **ATM Excellent Science and Outreach.** This will help to develop new concepts for ATM beyond those identified in the European ATM Master Plan as well as help to develop emerging technologies and methods to the level of maturity required to feed the applied research conducted in the SESAR JU. This part of Exploratory Research will be structured around the four Key Features and the transversal needs of the programme to ensure there is a flow of ideas and results in a structured manner across the whole programme:
 - Automation and Autonomy,
 - Complexity, Data Science and Information Management,
 - Environment and Meteorology for ATM,
 - Performance, Economics, Legal and Regulation,
 - ATM role in intermodal transport,
 - CNS for ATM,
 - **ATM application-oriented research.** This aims at bridging ATM research with the wider research community and providing the necessary scientific support to ATM change with a particular focus on bringing the ATM capacity to the level required to comply with the expected traffic growth, either directly or through connection to other funded research areas in other disciplines or sectors, under the following topics.

The above-mentioned three areas of the Exploratory Research will be further complemented as of 2020 by the SESAR Digital Academy, described in more detail below in point 2.3.3.2 of this section.

Exploratory Research is fully funded by the European Union under the H2020 framework and has a total funding of EUR 85 million which includes a dedicated proportion of direct funding (Title III – Operational expenditure through open calls for proposals) and a proportion of SESAR JU running costs (Title I – Staff expenditure and Title II – Infrastructure and operating expenditure). The overall funding of Strategic Area of Operation #2 for the period from 2020 to 2022 is indicated in Annex I.

A sequence of four calls for proposals covers the full spectrum of Exploratory Research activities over the period from 2015 to 2022, as depicted in the following figure:

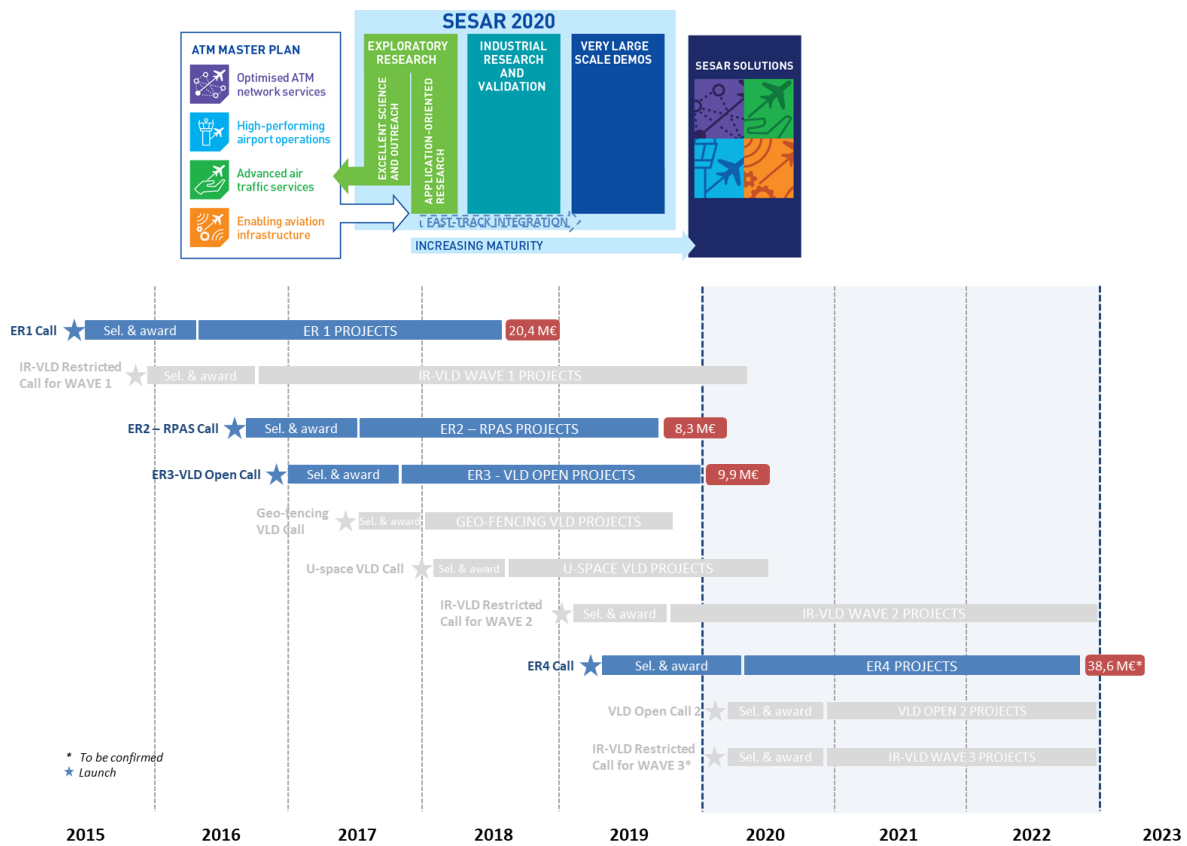


Figure 14: Sequence of ER calls and related funding over the 2015-2022 period

As depicted in this figure, during the 2020-2022 period, the SESAR JU will, for Exploratory Research activities:

- Supervise and ensure the delivery of results by the projects launched under the ER4 call for proposals (with reference H2020-SESAR-2019-2) and
- Execute (in 2020) the transfer of results of the ER1 projects into IR Wave 2 projects (as defined in the SPD 2019-2021, Section III, sub-paragraph 2.1.1).

2.3.1 Calls for proposals launched in previous years

As outlined in the SESAR 2020 Programme research topics presented in the introduction to Chapter 2, Exploratory Research activities cover Application-oriented research focusing on the four Key Features of the ATM Master Plan, as well as Fundamental Scientific Research activities:

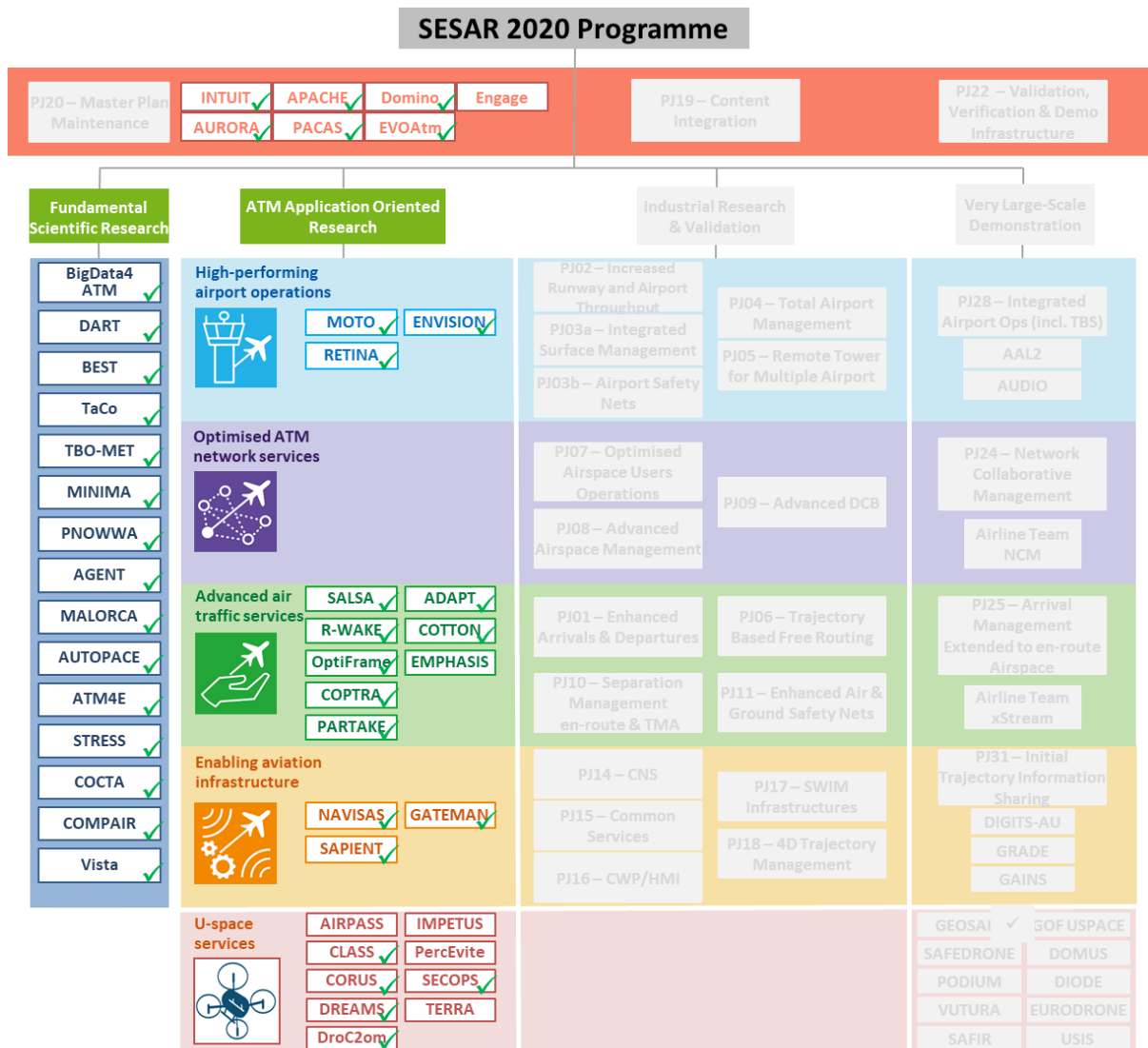


Figure 15: SESAR 2020 Programme portfolio of projects for Exploratory Research at the end of 2019

For the grants related to ER1 and ER2-RPAS, the SESAR JU will comply with all provisions of the *Horizon 2020 Work Programme 2016-2017*³⁴. For the grants related to ER3 and ER4, the SESAR JU will comply with all provisions of the *Horizon 2020 Work Programme 2018-2020*³⁵.

In 2015, the first call of the Exploratory Research within the SESAR 2020 Programme (with reference H2020-SESAR-2015-1), fully funded under Horizon 2020, was launched to enable continued work on conducting and consolidating innovative activities in order to achieve tangible results under the scope of ATM Excellence Science & Outreach and ATM application-oriented research (see ER research topics in Figure 9). The 28 projects awarded were closed in 2018.


In 2016, the second call related to Exploratory Research within the SESAR 2020 Programme (with reference H2020-SESAR-2016-1), fully funded under Horizon 2020, was launched to address the

³⁴ European Commission Decision C(2016) 4614 final of 25 July 2016.

³⁵ European Commission Decision C(2017) 7124 of 27 October 2017.

domain of Remotely Piloted Aircraft Systems (RPAS) and unmanned vehicles (UAS). Nine ER2-RPAS projects were launched into execution until the beginning of 2018. Three of these projects were closed by the end of September 2019, while the remaining six will be closed by early 2020.

The third call related to Exploratory Research (within the call for proposals with reference H2020-SESAR-2016-2 ER/VLD Open) was launched at the end of 2016. A total of six projects are expected to be finalised by December 2019; only the finalisation of the 'Engage' and 'Emphasis' projects described in the table below are scheduled for Q4 2021 and Q1 2020 respectively.

Project reference	Project title	Short project description	Max. total co-financing value (in EUR)
Transversal Steering			
Engage	Knowledge Transfer Network	The network aims to stimulate the transfer of exploratory research results towards ATM application-oriented research. The network will establish a knowledge hub, in which members across the research community are continuously involved. This will include an observatory and undertake the role of devising and maintaining the long-term roadmap development of innovative and interdisciplinary ATM concepts beyond SESAR 2020. The knowledge hub will be the one-stop, go-to source for information in Europe This project should close in end 2021	3.971.875
 Enabling aviation infrastructure			
EMPHASIS	EMPowering Heterogeneous Aviation through cellular Signals	The project aims to increase safety, reliability and interoperability of general aviation/rotorcraft (GA/R) operations both with commercial aviation and with emerging drones operations. These aspects are foreseen as critical elements to secure and improve airspace access for GA/R users in future airspace environment and improve operational safety of their operations This project should close in Q1 2020	937.130

**Table 5: Ongoing ER3 projects in the 2020-2022 period
(within the call for proposals with reference H2020-SESAR-2016-2)**

A summary of the results of ER projects already completed and closed will be available in the next SESAR JU Consolidated Annual Activity Report.

2.3.2 Calls for proposals in execution: ER4 call for proposals with reference H2020-SESAR-2019-2

A further Exploratory Research call was launched in 2019 ('ER4 call'). After completion of the call procedure and successful awarding of grants, the Exploratory Research projects will be launched into execution in Q2 2020 with an expected closure by the end of 2022. This call is building on and complementing the research topics already included in the earlier ER calls launched in 2015 and 2016 (see above). Topics covered under this call are indicated in the conditions which are documented in the SPD 2019-2021, Section III, point 2.6.1.3.

Additionally, as in 2019, the SESAR JU will in 2020 use the outcomes of Exploratory Research calls as well as the priorities set in the updated European ATM Master Plan to identify the future research streams and Concept Elements. In particular, those that require the development of new and innovative SESAR Solutions. This will add to the ones already identified as part of the SESAR 2020 Programme, and will support the execution of the EU Aviation Strategy's long-term vision and the modernisation of Aviation beyond SESAR 2020, securing continuity in the development of knowledge and in the maintenance of the innovation pipeline.

2.3.3 Other activities related to Exploratory Research

2.3.3.1 SESAR Innovation Days

Since their creation in 2010, the SESAR Innovation Days (SIDs) have become a landmark event in the European aviation research calendar. The SIDs focus on exploratory research in the field of ATM. The event is not only a vehicle for the SESAR JU to share progress and disseminate results of its exploratory research programme but it is also for the wider research community to present their work.

As in previous years, the 2020 event will be shaped by scientific papers and presentations, selected based on an open call for contributions. The event will also feature a poster exhibition and a networking event, which will provide participants with opportunities to learn about other interesting projects and to meet like-minded researchers and key industry, airport and airline players (see Table 23).

The SESAR Young Scientist Award, which aims to recognise young scientists with high potential who contribute to the scientific research in the field of ATM and aviation, is also granted during the SIDs.

2.3.3.2 SESAR Digital Academy

The SESAR JU will establish in 2020 the SESAR Digital Academy, which seeks to bring together under one umbrella, access to the SESAR exploratory research activities and outreach, as well as professional learning opportunities offered by research centres, universities, industry partners and other entities within the ATM/aviation domain. Linked with the Knowledge Transfer Network (addressed by the ER3 project 'Engage') and making use of a dedicated portal on the SESAR JU website the initiative will increase accessibility and visibility of existing SESAR outreach in the field of ATM research. The SESAR Digital Academy and the Knowledge Transfer Network are the means of realising the objectives of Future ATM skilled workforce research activities described in more detail in technical specifications of the ER3 call for proposals (call with reference H2020-SESAR-2016-2).

2.4 Strategic Area of Operation 3: Deliver Industrial Research & Validation (IR)

During the reporting period, SESAR 2020 Industrial Research and Validation (IR) activities will facilitate the migration of ideas from Exploratory Research and have them further extended in the applied research and finally in the pre-industrial development stage, validation, large-scale demonstration and then final preparation for deployment. Therefore, the main objective of this Strategic Area of Operation is to deliver SESAR Solutions that are derived from the ATM Master Plan and identified in the SESAR JU's multi-annual work programme.

This is done through projects run under a maximum of three calls for proposals restricted to the 19 SESAR JU Members other than the Union and EUROCONTROL. The total EU funding available for these calls under H2020 is EUR 398 million in direct costs (Title III – Operational expenditure, of which EUR 319,7 million for IR and EUR 20,1 million for Strategic Steering activities – see paragraph 2.1 above; the remaining being for Very Large-Scale Demonstration activities – see paragraph 2.5), as depicted in the figure below.

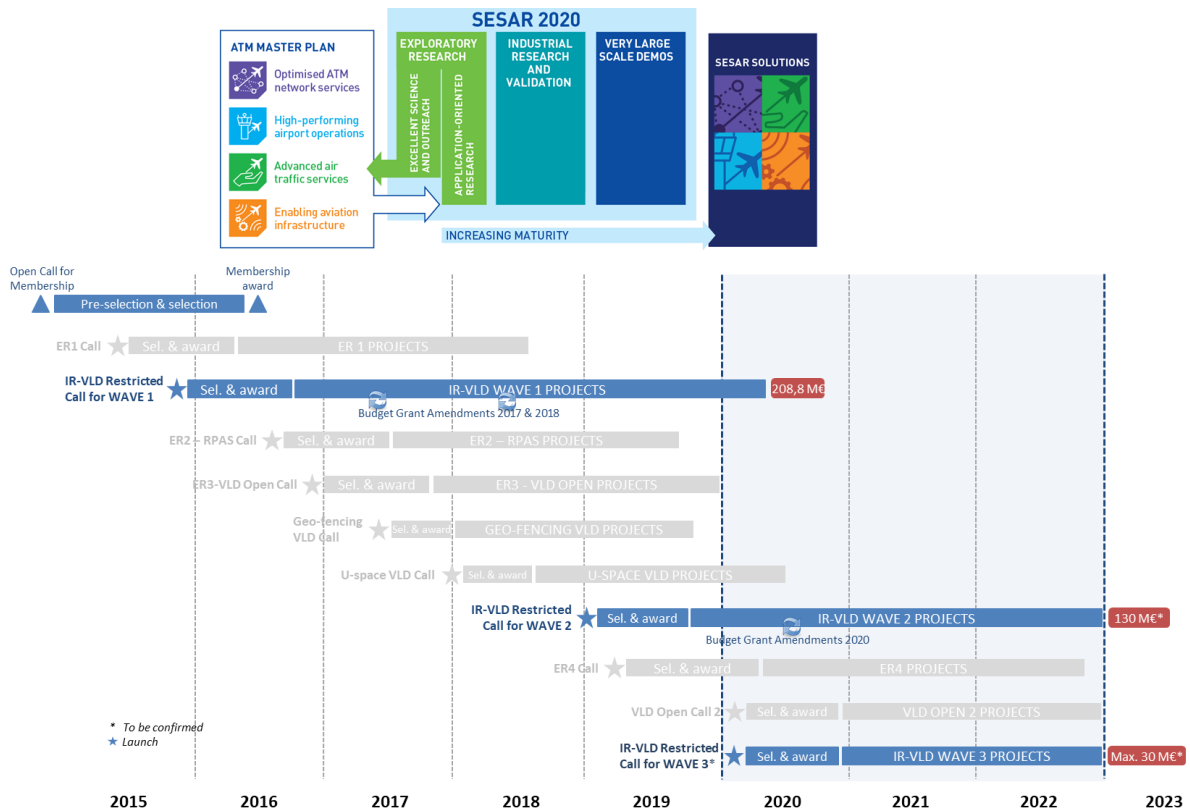


Figure 16: Sequence of IR calls and related funding over the 2015-2022 period

The exact amount of each call is to be confirmed, especially taking into account results of the call for proposals with reference H2020-SESAR-2019-1 (IR-VLD Wave 2 call) and unspent budget made available at the end of Wave 1. The last restricted call for proposals (Wave 3 with reference H2020-SESAR-2020-2) will be launched in Q1 2020, with project start by the end of 2020 and to be completed by the end of 2022. The last year for launching commitments under the Horizon 2020 programme is therefore planned to be 2020, and the last year for executing payments under the Horizon 2020 programme is planned to be 2023.

In addition, a proportion of SESAR JU running costs (Title I – Staff expenditure and Title II – Infrastructure and operating expenditure) is used to carry out the Industrial Research & Validation activities. The overall funding of Strategic Area of Operation #3 (Industrial Research & Validation) for the 2020-2022 period is indicated in Annex I.

During the period from 2020 to 2022, the SESAR JU will, in the context of Industrial Research & Validation activities:

- Supervise and ensure the final delivery of Solutions by the IR Wave 1 projects that will have gotten a duration extension (end result: the SESAR Solution Packs) as planned for in the *SESAR JU Single Programming Document 2019-2021*, as well as in the related grant agreements,
- Supervise and ensure the delivery of (candidate) SESAR Solutions by the IR Wave 2 projects (end result: the SESAR Solution Packs), as well as the related grant agreements. The same grant budget amendment procedure as for Wave 1 will be applied to Wave 2 in 2020,
- Launch the IR Wave 3 call for proposals (with reference H2020-SESAR-2020-2), evaluate the proposals received and subsequently award the grants, then sign the related grant agreements and launch and supervise the projects. The IR projects under the Wave 3 call are expected to be launched in late 2020 with a planned closure by the end of 2022.

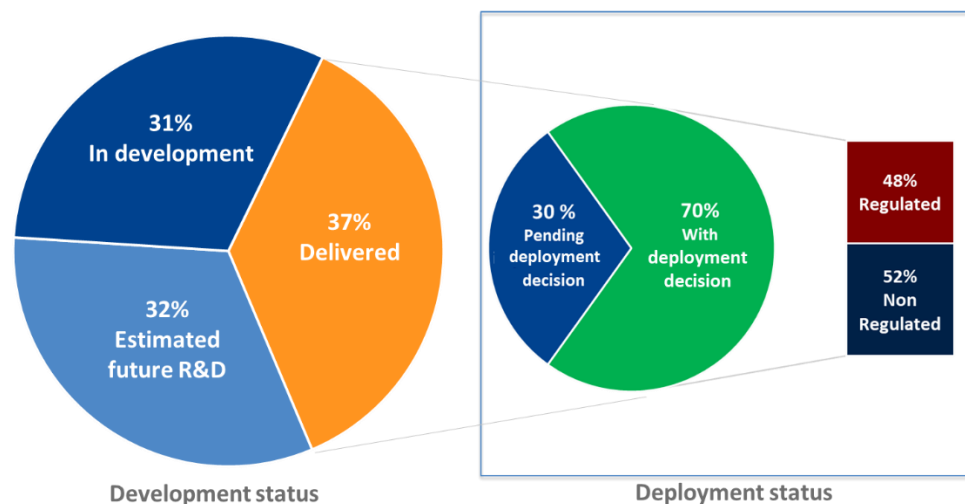


Figure 17: Status of SESAR Solutions contributing to the SESAR vision at the end of 2019

2.4.1 IR Wave 1 (from 2016 to 2020) and Wave 2 (from 2019 to 2022)

A few Wave 1 projects were authorised a grant duration extension as a result of exceptional circumstances that prevent the completion of the candidate SESAR Solution validation according to the initial plan. These extensions respecting Article 55 of the annotated model grant agreement, were supported by the Programme Committee at its eighth session (September 2018). Therefore, the few remaining Wave 1 SESAR Solutions will be delivered in 2020, allowing the completion of the planned Wave 1 delivery. Particular attention will be paid to closely monitor the final validation of the IOP solution planned for delivery by October 2020. To secure the IOP solution delivery, the specific Decision and Analysis Teams set up in 2017 will continue ensuring the allocation of the required resources, the execution of the planned IOP development activities and the steering and decision-making process in order to take corrective actions if required.

The IR Wave 2 call for proposals (within the restricted call with reference H2020-SESAR-2019-1 also covering VLD activities) was launched in Q1 2019. The evaluation of the proposals was performed, the beneficiaries were selected and the grants are planned to be awarded by the end of 2019. The finalisation of the grant agreement signature procedure is planned for the end of 2019. This will enable the launch into execution of the first Wave 2 IR projects during Q4 2019 and the delivery of the Wave 2 SESAR Solutions in the 2020-2022 period.

The IR Wave 2 call aims to enable the flexibility needed to align future research with the results of Wave 1, re-assess relative priorities and ensure the best value-for-money for the EU and delivery against SES goals. This call will also allow for the completion of those candidate SESAR Solutions that were not planned to be delivered to V3 maturity level within Wave 1. It will also allow for strategic input to scope new projects from the Master Plan update as well as build on the results of the outcome of Exploratory Research projects from the ER1 call to increase the maturity of the research towards future Solutions.

As outlined in the SESAR 2020 Programme research topics presented in the introduction to Chapter 2, Industrial Research & Validation (IR) is structured around the four Key Features of the ATM Master Plan:

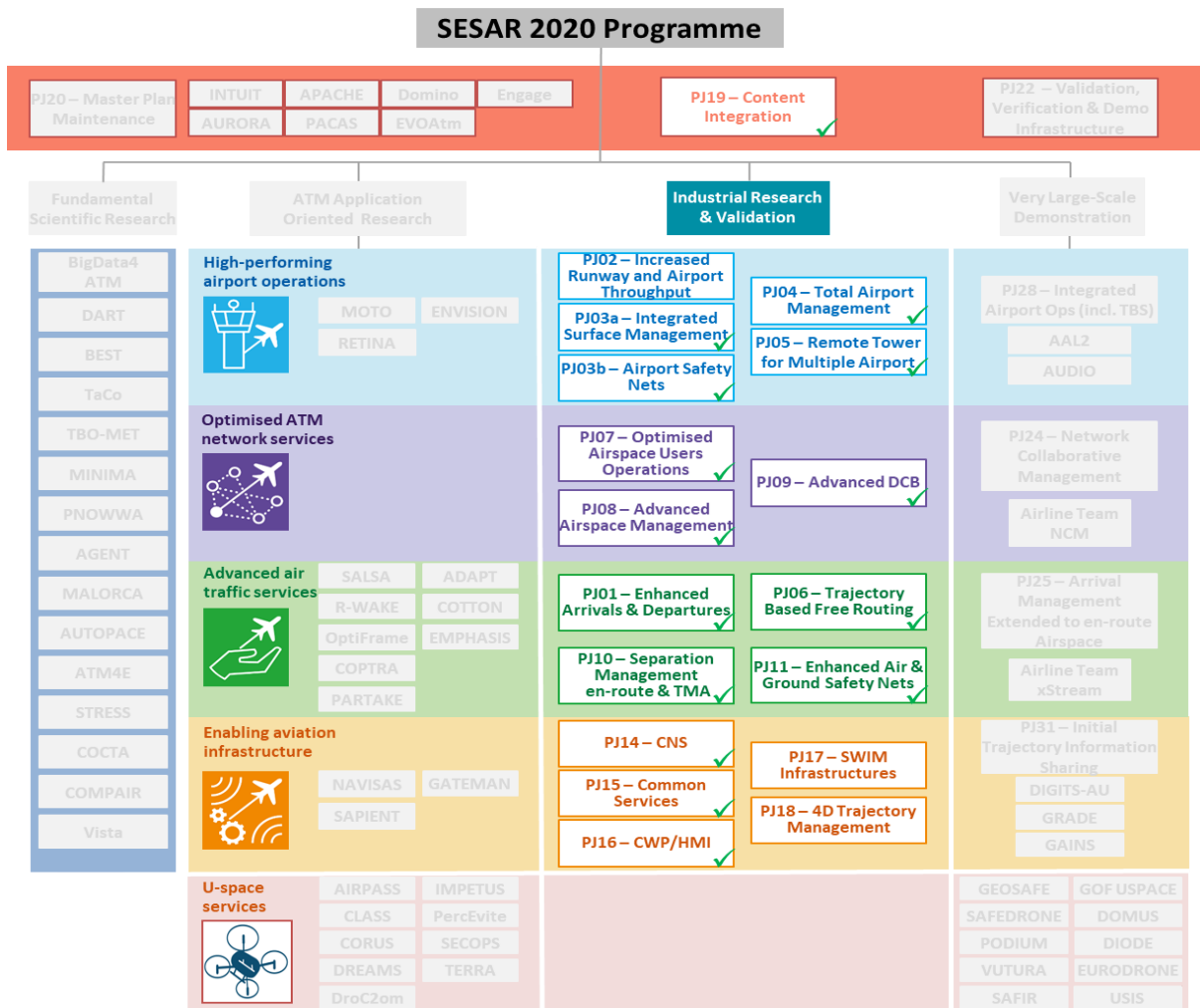


Figure 18: SESAR 2020 Programme portfolio of projects for Industrial Research & Validation at the end of 2019

The following paragraphs indicate the remaining candidate SESAR Solutions that will be delivered by the above listed projects through the SESAR Release process. Each entry represents the targeted achievement of an E-OCVM maturity level (V1, V2, or V3); an 'S' representing the target availability date of the SESAR Solution. The mapping of these candidate SESAR Solutions with the nine Essential Operational Changes (see above in paragraph 1.1.2) is provided in Annex A of the 2020 edition of the European ATM Master Plan.

The results expected from Wave 1 and Wave 2 (the latter being dependent on the closure of the grant agreement preparation phase, which was not yet concluded at the time of drafting this document) will cover the objectives set for the Development phase of the SESAR programme in the ATM Master Plan. In order to guarantee a stable link between Waves 1 and 2 projects, the option on complementarity of grants has been activated for the Wave 2 call for proposals (with reference H2020-SESAR-2019-1). The link between candidate SESAR Solutions funded through Wave 1 and the projects covering the same solutions which are continued in Wave 2 appears in Annex A of the 2020 edition of the European ATM Master Plan.

Furthermore, the results from the IR-VLD Wave 2 call for proposals will provide the basis to set up a changed ecosystem for aviation and more specifically to modernise the underlying air traffic management infrastructure. This ecosystem will mainly be built upon ATM solutions characterised by:

- Higher levels of autonomy and connectivity of all air vehicles coupled with a more automated management of the traffic,
- Digital and automated tools provided on board of the air vehicle itself or as part of the ground-based infrastructure,
- Virtual technologies to decouple the physical infrastructure such as sensors, communication or navigation devices from the services that are provided to manage the airspace,
- Big data analytics and open source data usage to encourage the creation of new services,
- System modularity to allow scalable and easier upgrades and greater interoperability.

For the definition of the candidate SESAR Solutions, the SESAR JU paid a particular attention to ensure path towards achieving the SESAR Target Vision given in the European ATM Master Plan, updated and refined in the 2018-2019 campaign to develop the 'Digital European Sky' vision, and its performance ambition. This approach relied on the use of prioritisation criteria:

- ATM Performance Improvement Potential: demonstrating performance gains in Capacity (at Airport, en-route and in TMA), Cost Efficiency, Operational Efficiency, Safety, Security and Environment,
- ATM Digitalisation Potential: advancing Automation, Connectivity/Sharing of information, Virtualisation, Integration of all vehicles, Flight- and flow-centric operations, Lean and modular systems.

The SESAR 2020 Programme complies with all provisions of the *Horizon 2020 Work Programme 2016-2017* for IR Wave 1 projects and with all provisions of the *Horizon 2020 Work Programme 2018-2020* for IR Waves 2 and 3 projects. However, it should be noted that the SESAR 2020 Programme delivers results through the SESAR Solutions and not project by project. Therefore, it is not necessary for all IR projects (receiving co-financing following restricted calls for proposals defined in Section III, point 2.6.1.1.3) to provide open access to all research data, and they may decide to opt out of the provisions of Annex L 'Conditions related to open access to research data' contained in General Annexes of a

related Horizon 2020 work programme³⁶. This opt-out, if used, would aim to protect results that are expected to be commercially or industrially exploited and/or to protect the project's main aim³⁷ to contribute to a programme, comprising of two or more projects, which jointly contribute to the delivery of one or more SESAR Solutions.

A summary of closed IR projects and their results is available in the latest SESAR JU Consolidated Annual Activity Report.

2.4.1.1 IR Wave 1 and Wave 2 projects delivering candidate SESAR Solutions within the 'High-Performing Airport Operations' Key Feature



The 'High-performing airport operations' Industrial Research and Validation projects are delivering the following results (candidate SESAR Solutions) over the 2020-2022 period:

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
PJ.02-01 (Wave 1)	Wake turbulence separation optimisation	V2	V3-S (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Operational efficiency Resilience Safety
PJ.02-02 (Wave 1)	Enhanced arrival procedures	V2	V3-S (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Operational efficiency Cost-efficiency
PJ.02-03 (Wave 1)	Minimum-Pair separations based on RSP	V2	V3-S (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Operational efficiency

³⁶ Part 20. General Annexes to the *Horizon 2020 Work Programme 2016-2017* (European Commission Decision C(2016)4614 of 25 July 2016) or Part 19. General Annexes to the *Horizon 2020 Work Programme 2018-2020* (European Commission Decision C(2019)4575 of 2 July 2019).

³⁷ In line with General Annexes, Annex L, second paragraph, points (a) and (d) of the of the Horizon 2020 Work Programme 2016-2017.

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
PJ.02-06 (Wave 1)	Improved access into secondary airports in low visibility conditions	V1	V2			Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Predictability Safety
PJ.02-W2-14 (Wave 2)	Evolution of separation minima for increased runway throughput	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Operational efficiency Resilience Safety Human Performance
PJ.02-W2-21 (Wave 2)	Digital evolution of integrated surface management	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Predictability Safety Human Performance
PJ.02-W2-04 (Wave 2)	Advanced geometric GNSS based procedures in the TMA	V1			V2	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Operational efficiency Predictability Safety Cost-efficiency Flexibility
PJ.02-W2-17 (Wave 2)	Improved access to secondary airports	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Predictability Safety
PJ.02-W2-25 (Wave 2)	Safety support tools for avoiding runway excursions	V2			V3-S	Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Safety Human Performance Interoperability

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
							<ul style="list-style-type: none"> • Cost-efficiency • Capacity
PJ.04-W2-28 (Wave 2)	Enhanced Collaborative Airport Performance Planning and Monitoring	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Predictability • Punctuality • Operational efficiency • Resilience
PJ.04-W2-29 (Wave 2)	Digital Collaborative Airport Performance Management	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Predictability • Punctuality • Operational efficiency
PJ.05-W2-35 (Wave 2)	Multiple Remote Tower and Remote Tower Centre	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Cost-efficiency • Access and Equity • Human Performance
PJ.05-W2-97 (Wave 2)	HMI Interaction modes for Airport Tower	TRL2			TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Cost efficiency • Safety

Table 6: Candidate SESAR Solutions delivery within the ‘High-performing airport operations’ Key Feature from 2020 to 2022

2.4.1.2 IR Wave 2 projects delivering candidate SESAR Solutions within the ‘Optimised ATM Network Services’ Key Feature



The ‘Optimised ATM network services’ Industrial Research and Validation projects are delivering the following results (candidate SESAR Solutions) over the 2020-2022 period:

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
PJ.07-W2-38 (Wave 2)	Enhanced integration of AU trajectory definition and network management processes	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Operational efficiency Predictability Flexibility Access and Equity
PJ.07-W2-40 (Wave 2)	Mission trajectories management with integrated Dynamic Mobile Areas Type 1 and Type 2	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Cost-efficiency Safety Operational efficiency Capacity Predictability Human Performance Cost-efficiency Flexibility Civil/Military Cooperation and Coordination Access and Equity
PJ.07-W2-39 (Wave 2)	Collaborative framework managing delay constraints on arrivals	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Predictability Flexibility Access and Equity
PJ.09-W2-44 (Wave 2)	Dynamic Airspace Configurations (DAC)	V2			V3 on-going	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Cost-efficiency Safety Operational efficiency Capacity Predictability

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
							<ul style="list-style-type: none"> • Human Performance • Cost-efficiency • Flexibility • Civil/Military Cooperation and Coordination • Access and Equity
PJ.09-W2-49 (Wave 2)	Collaborative Network Performance Management	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Safety • Operational efficiency • Predictability • Cost-efficiency • Capacity • Flexibility • Security • Access and Equity
PJ.09-W2-45 (Wave 2)	Enhanced Network Traffic Prediction and shared complexity representation	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Safety • Operational efficiency • Capacity • Cost-efficiency • Predictability • Flexibility • Access and Equity

Table 7: Solutions delivery within the ‘Optimised ATM network services’ Key Feature from 2020 to 2022

2.4.1.3 IR Wave 2 projects delivering candidate SESAR Solutions within the ‘Advanced air traffic services’ Key Feature



Advanced air traffic services

The ‘Advanced air traffic services’ Industrial Research and Validation projects are delivering the following results (candidate SESAR Solutions) over the 2020-2022 period:

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
PJ.01-W2-08 (Wave 2)	Dynamic E-TMA for Advanced Continuous Climb and Descent Operations and improved Arrival and Departure Operations	V2			V3-S	Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Predictability Safety Cost-efficiency Operational efficiency Flexibility
PJ.01-W2-06 (Wave 2)	Advanced rotorcraft operations in the TMA	V1			V2	Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> Capacity Predictability Safety Operational efficiency
PJ.10-W2-73 (Wave 2)	Flight-centric ATC and Improved Distribution of Separation Responsibility in ATC	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Flexibility Cost-efficiency Human Performance Operational efficiency Predictability
PJ.10-W2-93 (Wave 2)	Delegation of airspace amongst ATSUs	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> Capacity Operational efficiency Safety Human Performance

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
							<ul style="list-style-type: none"> • Cost-efficiency
PJ.10-W2-96 (Wave 2)	HMI Interaction modes for ATC centre	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Safety • Human Performance • Cost-efficiency
PJ.13-W2-111 (Wave 2)	Collision avoidance for IFR RPAS	V2			V3-S	Phase B – efficient services and infrastructure delivery	<ul style="list-style-type: none"> • Safety • Interoperability
PJ.13-W2-115 (Wave 2)	IFR RPAS accommodation in Airspace Class A to C	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Safety • Interoperability
PJ.13-W2-117 (Wave 2)	IFR RPAS integration in Airspace Class A to C	V1			V2	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Safety • Interoperability
PJ.18-W2-53 (Wave 2)	Improved Ground Trajectory Predictions enabling future automation tools	V2			V3-S	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Operational efficiency • Predictability • Safety • Human Performance • Cost-efficiency
PJ.18-W2-56 (Wave 2)	Improved vertical profiles through enhanced vertical clearances	V1			V2	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Operational efficiency • Predictability

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase	ATM Master Plan KPAs contributed to
							<ul style="list-style-type: none"> • Safety • Human Performance
PJ.18-W2-57 (Wave 2)	RBT revision supported by datalink and increased automation	V1			V2	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Capacity • Operational efficiency • Predictability • Safety • Human Performance
PJ.18-W2-88 (Wave 2)	Trajectory Prediction Service	TRL2			TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations	<ul style="list-style-type: none"> • Cost efficiency • Interoperability

Table 8: Candidate SESAR Solutions delivery within the ‘Advanced air traffic services’ Key Feature from 2020 to 2022

2.4.1.4 IR Wave 1 and Wave 2 projects delivering candidate SESAR Solutions within the ‘Enabling aviation infrastructure’ Key Feature



The ‘Enabling aviation infrastructure’ Industrial Research and Validation projects will be delivering the following results over the 2020-2022 period. Enabling aviation infrastructure projects are not mapped with ATM Master Plan Key Performance Areas as their role in the work programme is to support the achievement of performance targets through operational projects. Similarly, the maturity of the Enabling aviation infrastructure candidate Solutions is indicated according to the TRL (Technology Readiness Level) criteria and not according to the E-OCVM as for other Key Features:

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase
PJ.17-01 (Wave 1)	SWIM TI Purple Profile for Air/Ground Advisory Information Sharing	TRL4	TRL6 (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase
PJ.17.03 (Wave 1)	SWIM TI Green profile for G/G Civil Military Information Sharing	TRL2	TRL4			Phase B – efficient services and infrastructure delivery
PJ.18-02b (Wave 1)	Flight object interoperability	TRL4	TRL6 (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery
PJ.18-04a (Wave 1)	Improved AIM Information	TRL4	TRL6 (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery
PJ.18-04b (Wave 1)	Improved MET Information	TRL4	TRL6 (to be delivered in 2020 – grant extension duration)			Phase B – efficient services and infrastructure delivery
PJ.18-04c (Wave 1)	Improved use of MET and AIM in Cockpit	TRL2	TRL4			Phase B – efficient services and infrastructure delivery
PJ.18-06a (Wave 1)	ATC Planned Trajectory Performance Improvement	TRL4	TRL6 (to be delivered in 2020 – grant extension duration)			Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.18-06b (Wave 1)	Tactical and NM Trajectory performance improvement	TRL2	TRL4			Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-76 (Wave 2)	Integrated CNS and Spectrum	TRL2			TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-77 (Wave 2)	FCI Services	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations

Candidate SESAR Solution ref.	Candidate SESAR Solution title	Maturity level reached at the end of 2019	Expected maturity level in 2020	Expected maturity level in 2021	Expected maturity level in 2022	ATM system upgrade phase
PJ.14-W2-60 (Wave 2)	FCI Terrestrial Data Link and A-PNT enabler (L-DACS)	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-107 (Wave 2)	Future Satellite Communications Data link	TRL4			TRL6 on-going	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-61 (Wave 2)	Hyper Connected ATM	TRL0		TRL2	TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-81 (Wave 2)	Long-term alternative Position, Navigation and Timing (A-PNT)	TRL2			TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-79 (Wave 2)	Dual Frequency / Multi Constellation DFMC GNSS/SBAS and GBAS	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-110 (Wave 2)	Aircraft as an AIM/MET sensor and consumer	TRL0		TRL2	TRL4	Phase B – efficient services and infrastructure delivery
PJ.14-W2-83 (Wave 2)	Surveillance Performance Monitoring	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.14-W2-84 (Wave 2)	New use and evolution of Cooperative and Non-Cooperative Surveillance	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.17-W2-100 (Wave 2)	SWIM TI Purple Profile for Air/Ground Safety-Critical Information Sharing	TRL0	TRL2		TRL4	Phase C – Regional, trajectory-based, flight- and flow-centric operations
PJ.17-W2-101 (Wave 2)	SWIM TI Green profile for G/G Civil Military Information Sharing	TRL4			TRL6	Phase C – Regional, trajectory-based, flight- and flow-centric operations

Table 9: Candidate SESAR Solutions delivery within the ‘Enabling aviation infrastructure’ Key Feature from 2020 to 2022

2.4.2 IR-VLD Wave 3 (from 2020 to 2022) – call with reference H2020-SESAR-2020-2

Considering that unspent budget was made available through the Wave 1 grant award and grant amendment processes in previous years (2018 and 2019), and that the result of the evaluation of the Wave 2 proposals in 2019 also resulted in unspent budget, the SESAR JU plans to organise the last restricted IR-VLD call (Wave 3 with reference H2020-SESAR-2020-2) in 2020. The objective of this

activity is to optimise the coverage of the research and innovation topics of the SESAR 2020 Programme, responding to the ATM Master Plan Phase C (see Figure 8 in point 1.1.2.3) taking due account of the outcome of the Airspace Architecture Study. In preparation for this, as planned in the *Single Programming Document 2019-2021*, in 2019 the SESAR JU performed a consultation process for the definition of the call content and objectives. After the closure of the consultation process in October 2019, in the beginning of 2020 the SESAR JU will finalise activities required to define the detailed content and conditions of this IR-VLD Wave 3 call, and launch the call by the end of Q1 2020. This approach will enable the launch into execution of the IR-VLD Wave 3 projects in Q4 2020 or in Q1 2021 at latest, with delivery of candidate SESAR Solutions in 2021 and 2022. IR-VLD Wave 3 is the last call covering Industrial Research & Validation, securing the commitment of the SESAR JU Members until the end of the SESAR 2020 Programme operations.

The total available funding for the Wave 3 call is dependent on the closure of Wave 1, the final award of Wave 2 projects and other decisions related to the future of the SESAR JU. The amount currently estimated (see Section III, sub-point 2.6.1.3.3) is subject to refinement and the SESAR JU will aim to optimise the usage of available funds for this call. The exact allocation of funding is laid out in Section III, sub-point 2.6.1.3.6.

This third IR-VLD call will enable the flexibility needed to align future research with the results of Wave 1, re-assess relative priorities and ensure the best value-for-money for the EU and delivery against SES goals. This call would also allow to address Airspace Architecture Study elements not already fully covered in Wave 2 and to build on results of the outcome of Exploratory Research projects from the ER1, ER2-RPAS and ER3 calls for proposals (see paragraph 2.3) to increase the maturity of the research towards future SESAR Solutions.

Finally, the Wave 3 call might be an opportunity to complete the scope of the Wave 2 call to cover topics not awarded or solutions not covered (or only partially covered) in the awarded grants.

The candidate SESAR Solutions would be developed (and, in some cases, delivered) by Wave 3 projects through the SESAR Release process. The list of Solutions developed under IR-VLD Wave 3 will be available following the completion of the Wave 3 grant award procedure. Section III, point 2.6.1.3 provides specific conditions of the Wave 3 call, which includes the list of candidate topics to be developed in the context of Wave 3.

2.5 Strategic Area of Operation 4: Deliver Very Large-Scale Demonstration activities (VLD)

Very Large-Scale Demonstrations are designed to help bridge the gap between the development and deployment phases of the SESAR programme, and not to replace either type of activity. VLDs use early versions of end-user systems and include the integration of new technology elements into existing systems when needed and when possible. As such, VLDs will mostly derive from work matured through an earlier phase of Industrial Research & Validation.

Very Large-Scale Demonstrations are conducted either as a result of restricted calls for proposals by the SESAR JU Members other than the Union, or through open calls for proposals by SESAR JU Members other than the Union or other entities. VLD activities are run under up to seven calls and have an overall direct funding (Title III – Operational expenditure) of EUR 107,6 million, broken down as it is depicted in the figure below. In addition, a proportion of SESAR JU running costs (Title I – Staff expenditure and Title II – Infrastructure and operating expenditure) is used to carry out the Very Large-Scale Demonstration activities. The overall funding of Strategic Area of Operation #4 for the period from 2015 to 2022 is indicated in Annex I.

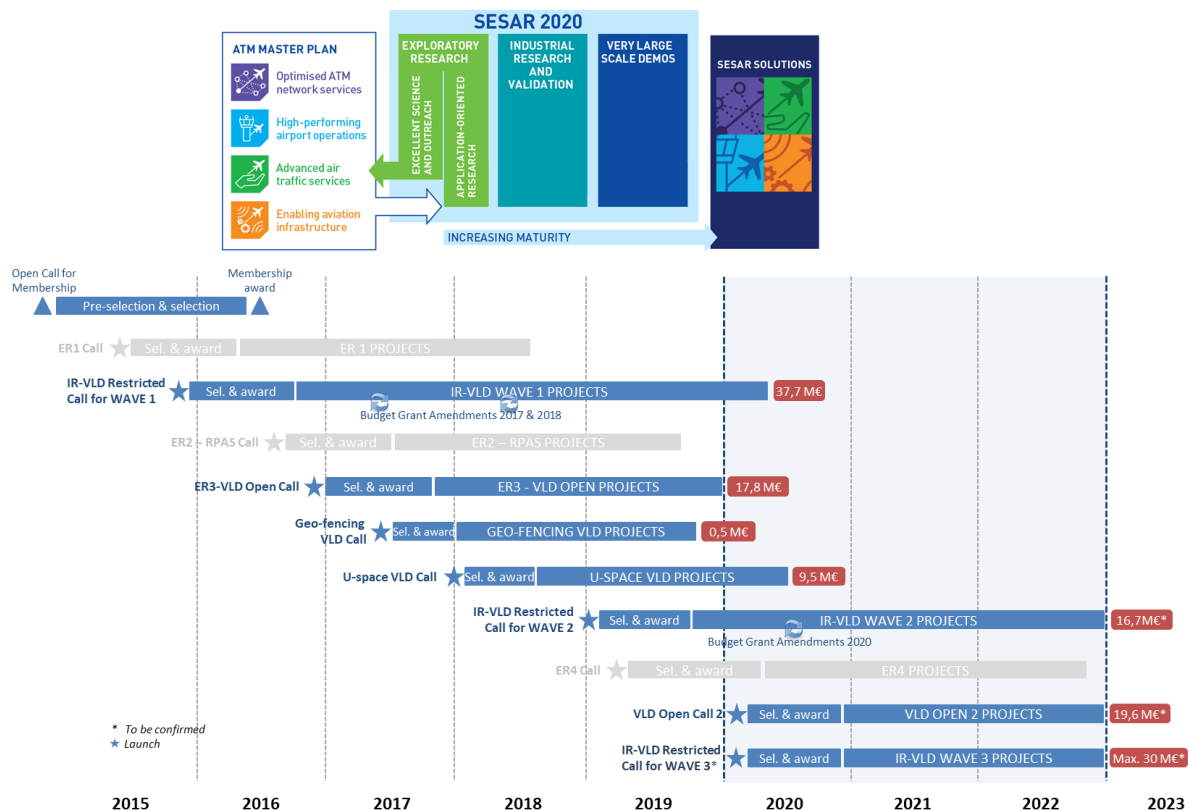


Figure 19: Sequence of VLD calls and related funding over the 2015-2022 period

Therefore, during the 2020-2022 period, the SESAR JU will, in the context of Very Large-Scale Demonstration (VLD) activities:

- Supervise and ensure the delivery of VLD projects stemming from the VLD Wave 1 (two projects closing in 2020) and U-space VLD calls (with reference H2020-SESAR-2015-2 and CEF-SESAR-2018-1 respectively), as well as the related grant agreements, then close these projects,

- Supervise the launch and ensure the delivery of projects resulting from the VLD Wave 2 call (within the call with reference H2020-SESAR-2019-1); the VLD activities under the Wave 2 call are expected to close by the end of 2022. The same grant budget amendment procedure as for Wave 1 will be applied for Wave 2 in 2020,
- Launch the VLD Open 2 call for proposals (with reference H2020-SESAR-2020-1), in view of conducting the evaluation of the proposals received and the award and signature of the grant agreements in 2020. The VLD activities under the VLD Open 2 call are expected to close by the end of 2022,
- Execute (in 2020 and 2021) the transfer of results of the IR Wave 1 into VLD Open 2 projects.

As outlined in the SESAR 2020 Programme research topics presented in the introduction to Chapter 2, Very Large-Scale Demonstration activities cover the four Key Features of the European ATM Master Plan and U-space as well as other high priority policy areas:

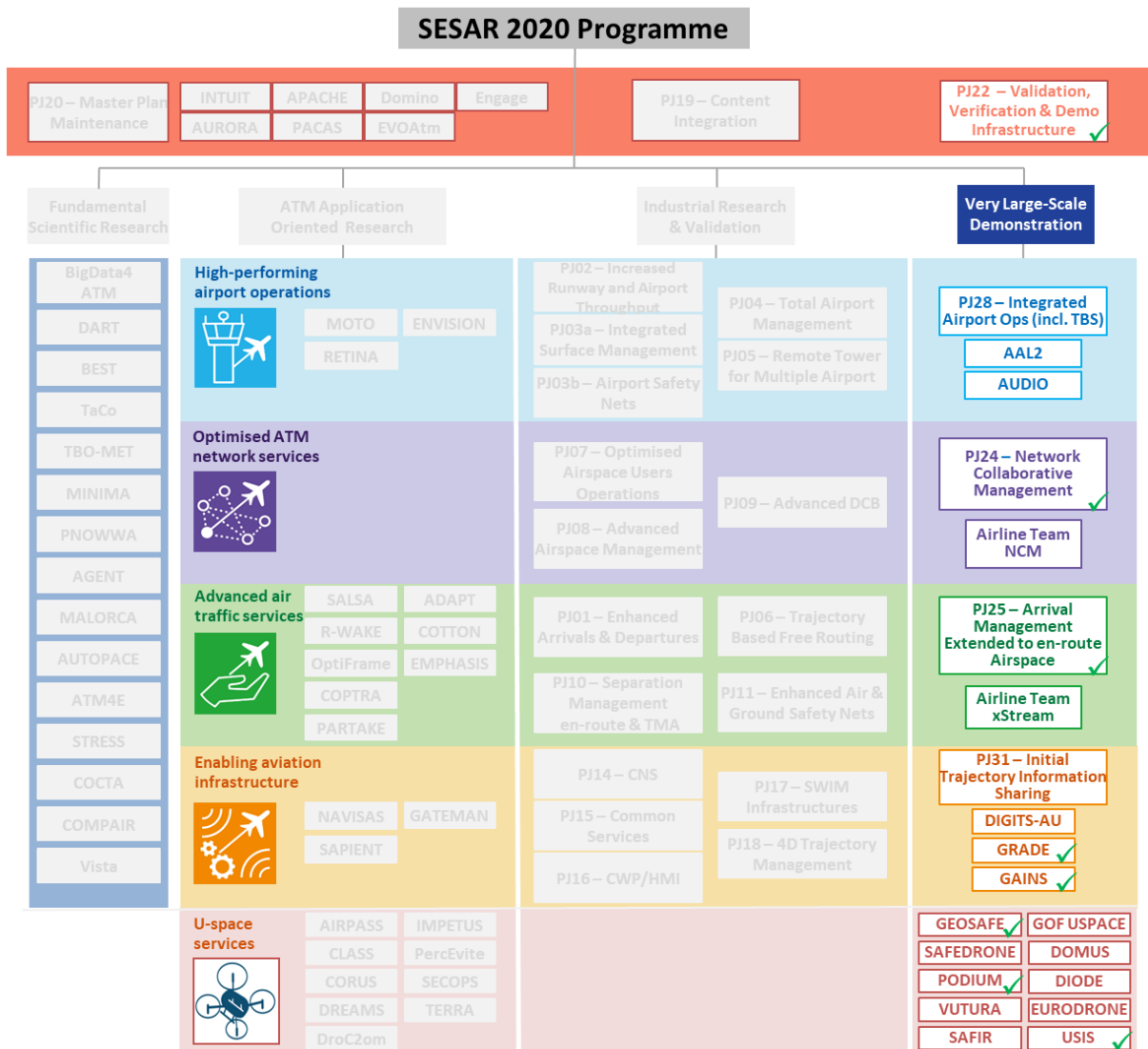


Figure 20: SESAR 2020 Programme portfolio of projects for Very Large-Scale Demonstrations at the end of 2019

2.5.1 Management of calls within the Horizon 2020 set of rules

The SESAR 2020 Programme complies with all provisions of the *Horizon 2020 Work Programme 2016-2017* for VLD Wave 1 projects and with all provisions of the *Horizon 2020 Work Programme 2018-2020* for VLD Waves 2 and 3 projects. However, it should be noted that the SESAR 2020 Programme delivers results through the SESAR Solutions and not project by project. Therefore, it is not necessary for all VLD projects (receiving co-financing following restricted calls for proposals defined in Section III, point 2.6.1.1.3) to provide open access to all research data, and they may decide to opt out of the provisions of Annex L ‘Conditions related to open access to research data’ contained in General Annexes of a related Horizon 2020 work programme³⁸. This opt-out, if used, would aim to protect results that are expected to be commercially or industrially exploited and/or to protect the project’s main aim³⁹ to contribute to a programme, comprising of two or more projects, which jointly contribute to the delivery of one or more SESAR Solutions. For the grants related to VLD Open 1 and 2 calls, the SESAR JU will comply with all provisions of the *Horizon 2020 Work Programme 2018-2020*⁴⁰, including Annex L ‘Conditions related to open access to research data’ within Part 19. General Annexes.

2.5.1.1 Calls for proposals launched in previous years

In the period from 2016 to 2019, four VLD projects have been conducted under IR-VLD Wave 1 within the call with reference H2020-SESAR-2015-2, covering the four Key Features. Two of these VLD projects (PJ.28 and PJ.31) will remain in execution until the end of February 2020 and the end of June 2020 respectively, as agreed by the Programme Committee at its eighth session in September 2018. They will deliver the following outcomes by their closure in 2020:

Ref.	Wave 1 VLD deliverables in 2020	Max. total co-financing value (in EUR)
PJ.28 IAO	Demonstration Report for Integrated Airport Operations	3.546.846
PJ.31 DIGITS	Demonstration Report for ATM Improvements Generated by Initial Trajectory Sharing (Extended Projected Profile)	18.955.106

**Table 10: Ongoing Wave 1 VLD projects in execution in 2020
(within the call for proposals with reference H2020-SESAR-2015-2)**

To complement that call for proposals restricted to SESAR JU Members other than the Union, an open call related to Very Large-Scale Demonstration activities (‘Open VLD call’ within the call for proposals with reference H2020-SESAR-2016-2) was launched at the end of 2016. Out of the total maximum co-financing level of EUR 18 million for Very Large-Scale Demonstrations, the outcome of the call was an award of EUR 17,8 million and the selection of ten VLD activities⁴¹. The activities were launched into execution during the course of 2018, each delivering a Demonstration Plan and a Demonstration Report within the indicative project duration of 2 years, thus delivering results by the end of 2020. The projects resulting from this call for proposals which will still be in execution in 2020 are the following:

³⁸ Part 20. General Annexes to the *Horizon 2020 Work Programme 2016-2017* (European Commission Decision C(2016) 4614 final of 25 July 2016) or Part 19. General Annexes to the *Horizon 2020 Work Programme 2018-2020* (European Commission Decision C(2019)4575 of 2 July 2019).

³⁹ In line with General Annexes, Annex L, second paragraph, points (a) and (d) of the of the Horizon 2020 Work Programme 2016-2017.

⁴⁰ European Commission Decision C(2017) 7124 of 27 October 2017.

⁴¹ A total of seventeen grant agreements were signed as a result of the call with reference H2020-SESAR-2016-2 comprising both ER and Open VLD, and one additional grant agreement is in the grant agreement preparation phase on VLD.

Topic / project acronym	Project title	Short project description	Max. total co-financing value (in EUR)
Arrival management extended to En-route airspace			
Airline Team xStream	Airspace User Support to Arrival Management	<p>The project will demonstrate the benefits for AUs in the operation of cross-border Arrival Management (AMAN systems) with an extended horizon in accordance with the Pilot Common Project first ATM Functionality (AF#1), as well as the demonstration of AU involvement in the operation of two AMAN-related advanced concepts: the Target Time management concept and the Arrival Flexibility (A-FLEX) concept, which connect the Extended AMAN concept to the PCP Fourth ATM Functionality (AF#4).</p> <p>The consortium will ensure the required operational capabilities of European AUs to contribute to the overall project objectives of SESAR 2020 PJ.25.</p>	1.800.963
Network Collaborative Management			
Airline Team NCM	Airspace User support to the development of Network Collaborative Management	<p>The future ATM system concerns the entire ATM community. ATM is seen as a critical element in the air transport value chain and is the key to connecting Europe's regions while making it a global hub for mobility and prosperity. The focus of ATM modernisation therefore needs to reflect a greater focus towards increased efficiency and effectiveness while sustaining or even improving levels of safety and security. At the same time, it must also recognise the need to provide solutions to address critical capacity bottlenecks. ATM modernisation should continue to look at the flight as a whole, for instance end to end, within a flow and network context, and not in segmented portions of its trajectory, as is still the case today. With this in mind, the vision will be realised across the entire ATM system, offering improvements at every phase of a flight from early planning to complete execution. This vision is building on the notion of 'Trajectory Based Operations' (TBO) and relies on the provision of Air Navigation Services in support of the execution of the business or mission trajectory - meaning that AUs can fly their preferred trajectories without being constrained by airspace configurations.</p> <p>This vision is enabled by a progressive increase in the level of automation support, the implementation of virtualisation technologies and the use of standardised and interoperable systems.</p>	2.008.650

Topic / project acronym	Project title	Short project description	Max. total co-financing value (in EUR)
Initial Trajectory Information Sharing			
DIGITS-AU	Demonstration of ATM Improvements Generated by Initial Trajectory Sharing - Airspace User Part	<p>DIGITS-AU is the essential AU complement to the DIGITS project (Demonstration of ATM Improvements Generated by Initial Trajectory Sharing). DIGITS-AU brings together AUs</p> <ul style="list-style-type: none"> - who operate (even partially) in the airspace of ANSPs participating in DIGITS - who will receive new on-board avionics capabilities, making it possible to downlink trajectory predictions, the so-called Extended Projected Profile (EPP), for sharing with ATC. 	4.527.147
Increase access to airports for low visibility mixed fleet operations			
AAL2	Augmented Approaches to Land 2	<p>The proposed Augmented Approaches to Land 2 (AAL2) project addresses increased access to airports for low visibility mixed fleet operations. It builds upon the results from the former award winning SESAR project AAL, and will demonstrate augmented approach and landing operations based on the following candidate SESAR solutions:</p> <ul style="list-style-type: none"> - Ground Based Augmentation System (GBAS) CAT II with CAT I airborne and ground equipment, enabling lower decision heights to CAT II minima (decision height 100ft) (addresses hubs and medium size airports), - Enhanced Flight Vision System (EFVS) to land using Head Up /or Mounted Display, with operational credit down to 300 m RVR in non- CAT II/III airports (addresses medium-sized and small airports). 	2.110.729
Safe integration of drones			
SAFEDRONE	Activities on drone integration and demonstration in VLL operations	<p>Aims to demonstrate how to integrate general aviation, state aviation, optionally piloted aircraft and drones into non-segregated airspace in a multi-aircraft and manned flight environment. The project will perform a large number of demonstrations at the ATLAS flight test centre in Villacarrillo (Jaén, Spain) in order to accumulate evidence and experience about the required services and procedures necessary to operate drones in a safe, efficient and secure way within U-space.</p> <p>The demonstration is about U1 and U2 services, and a limited version of U3 advanced services including automated detect & avoid technologies.</p>	1.169.074

Table 11: Initial outline of VLD Open 1 projects (call for proposals with reference H2020-SESAR-2016-2)

A summary of closed VLD projects and their results is available in the latest SESAR JU Consolidated Annual Activity Report.

2.5.1.2 Calls for proposals in execution and to be launched in 2020

2.5.1.2.1 VLD Wave 2 (from 2019 to 2022) within the call for proposals with reference H2020-SESAR-2019-1

In Q1 2019, the SESAR JU launched the restricted call for proposals with reference H2020-SESAR-2019-1 covering IR and VLD. The evaluation of the proposals received was performed, the beneficiaries were selected and the grants are planned to be awarded by the end of 2019. The finalisation of the VLD grant agreement signature procedure is planned for the end of 2019. This would enable the launch into execution of first Wave 2 VLD projects during Q4 2019 and the delivery of Wave 2 demonstration results in the 2020-2022 period.

The list of VLD activities to be addressed under this call will be known at the end of 2019 or in the beginning of 2020, following the grant agreement signature related to Wave 2 VLD grants.

2.5.1.2.2 VLD Open 2 (from 2020 to 2022) call for proposals with reference H2020-SESAR-2020-1

In 2020, to complement that call for proposals restricted to SESAR JU Members other than the Union, the SESAR JU will launch the second VLD open call for proposals (with reference H2020-SESAR-2020-1). Subject to the successful completion of the grant award procedure in Q3 2020 and of the subsequent grant agreement signature procedure, the launch into execution of related project activities is expected in Q4 2020 with closure activities in Q3-Q4 2022. This call is intended to be the last open call for Very Large-Scale Demonstrations, optimising the usage of funds available to bridge the gap between development and deployment and secure the achievement of policy priorities such as the implementation of the Airspace Architecture Study transition plan. Call conditions are defined in Section III, point 2.6.1.2.

2.5.2 Management of calls for proposals falling within sets of rules other than H2020

The geo-fencing specific VLD call for proposals (with reference SESAR-2017-1) was launched in 2017 through European Parliament's and the European Commission's funds, in accordance with the EU Financial Regulation⁴². The call procedure resulted in the signature of a grant agreement under which one project (GEOSAFE) delivered its results during 2018 and 2019:

Ref.	Short Project Description	Max. total co-financing value (in EUR)
GEOSAFE	Complementing the work done in the context of the call for proposals H2020-SESAR-2016-2 on the topic 'Integrating Remotely Piloted Aircraft Systems (RPAS) in European airspace using an Active Geo-fencing Service (AGS)'.	497.403

**Table 12: Geo-fencing demonstration activities outline
(under the call for proposals with reference SESAR-2017-1)**

⁴² [Regulation \(EU, Euratom\) 2018/1046](#) of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012 (OJ L 193, 30.7.2018, p. 1).

Furthermore, in light of discussions held in June 2017 with the European Commission, and driven by the concept of U-space being further developed in U-space blueprint, the SESAR JU has been mandated to manage a call for proposals under the CEF programme for a value of EUR 9,5 million: the U-space demonstration call for proposals. This call, with reference CEF-SESAR-2018-1, was related to the performance of a number of large-scale demonstration activities to validate systems that support U-space services against the relevant requirements and standards. The SESAR JU launched this open call for proposals in early 2018. As a result of the evaluation of received proposals, six grant agreements were signed and the related projects were launched. These projects delivered results in 2019, with demonstration activities taking place in Q3-Q4 2019, and are expected to close by mid-2020.

Ref.	Project Title	Short Project Description	Max. total co-financing value (in EUR)
VUTURA	Validation of U-Space by Tests in Urban and Rural Areas	Aims to show how a common U-space framework (based on system-wide information management) with U1 and U2 services can enable multiple U-space service providers and multiple operators to execute commercially feasible BVLOS operations. The demonstration will showcase these operations in a rural, urban and smart city environment. Each of the scenarios involve two service providers that have to coordinate their services and demonstrate many realistic elements: manned aviation, different levels of automation, off-the-shelf drones versus tailor-made drones, commercial and leisure drones. The flight demonstrations will be performed at different locations in The Netherlands (Delft, Enschede and in the Flevoland Province), in close cooperation with the civil aviation authorities.	1.088.950
SAFIR	Safe And Flexible Integration of Initial U-space Services in a Real Environment	The demonstration will showcase an application for multiple drone operations that is viable, robust and ready-to-implement throughout Europe. A broad range of operations and services up to U3 linking to smart mobility will be demonstrated, including flights in both controlled and uncontrolled very low level (VLL) airspace; flights in both VLOS and BVLOS; and flights interacting with both manned aircraft and other unmanned aircraft. The operations will take place in Belgium at three locations: Antwerp, Port of Antwerp and a DronePort Test Facility in Sint-Truiden.	1.328.441
GOF USPACE	Finnish-Estonian 'Gulf of Finland' Very Large U-Space Demonstration	Aims to establish a pre-operational flight information management system (FIMS) with an architecture capable of integrating existing commercial-off-the-shelf UTM components. The capabilities of the FIMS will be demonstrated in different live cases representing the most typical	1.617.098

Ref.	Project Title	Short Project Description	Max. total co-financing value (in EUR)
		<p>visual line of sight (VLOS) and beyond visual line of sight (BVLOS) missions:</p> <ul style="list-style-type: none"> • International parcel delivery between Helsinki and Tallinn • Dense urban drone fleet operations in Helsinki with Police intervention • Dense urban drone fleet operations in Tallinn in controlled airspace • 100km+ BVLOS multisensory inspection flights in forestry and utility inspection • Co-operation with general aviation and recreational users at uncontrolled airport • Maritime traffic surveillance combined with search-and-rescue over Gulf of Finland • Drone Taxi flight from Helsinki-Vantaa airport to downtown Helsinki. 	
DOMUS	Demonstration Of Multiple U-Space Suppliers	Aims to illustrate the full set of core U2 services, as well the demonstration of specific U3 services, such as tactical de-confliction and collaboration with ATM. The demonstration will involve three U-space service providers interacting with an ecosystem manager and several drone operators that will fly drones from different manufacturers. The planned operations will take place in Andalucía in Spain.	1.989.400
DIODE	D-flight Internet of Drones Environment	Aims to demonstrate how the implementation of the full set of the U-space services up to U3 ensures a safe flow of drones that pursue specific business or recreational intents, fully integrated with manned aviation, and in all types of environment. Live demonstrations will take place in Rieti, a small province, close to Rome, known as 'umbilicus italiae' with several different geographical situations, including rural, mountain and remote territories, industrial, urban and semi-urban. These demonstrations will cover a wide range of operations: parcel delivery, road traffic patrol, professional photography, railway and power lines surveillance, search and rescue, airport operations, interaction with general aviation and firefighting.	1.978.443
EuroDRONE	A European UTM Testbed for U-Space	Aims to connect various stakeholders (operators, regulators, law enforcement agencies, product developers) and different systems in a unified	1.400.000

Ref.	Project Title	Short Project Description	Max. total co-financing value (in EUR)
		<p>environment. Specifically, the demonstration will test U-space functionalities up to U3 in Missolonghi, Greece. The EuroDRONE drone architecture is made up of cloud software (DroNav) and hardware (transponder) to be installed on drones. It is a sophisticated self-learning system based on software and hardware elements, operating in a distributed computing environment, offering multiple levels of redundancy, fail-safe algorithms for conflict prevention/resolution and assets management.</p>	

Table 13: Outline of U-space demonstration activities (under the call for proposals with reference CEF-SESAR-2018-1)

2.6 Strategic Area of Operation 5: Deliver SESAR outreach

As indicated in the SESAR JU constituent act, the JU is responsible for securing the support and buy-in from all stakeholders in the ATM value chain for the definition (European ATM Master Plan) and development of SESAR technologies and procedures (SESAR Solutions). This requires continued and extensive outreach in the form of communications and external relations (including international affairs), supported by the core SESAR membership, and cooperative arrangements and contracts with specific stakeholder groups.



Figure 21: SESAR JU’s specific stakeholder groups within the ATM value chain

In the period from 2020 to 2022, the SESAR JU will conduct outreach to further establish and underline the enduring and successful power of the SESAR JU public-private partnership in helping to accelerate the delivery of operationally-relevant/mission-oriented services and solutions in Europe and worldwide through ICAO and non-European States and regions. Through outreach, the SESAR JU will seek to underline the importance of embedding the full innovation pipeline in State and regional ATM modernisation programmes like SESAR. As the SES/SESAR brand is a well-recognised world leading partnership programme, the SESAR JU’s research and innovation programme is relevant and supports the policy orientations in Europe and globally through ICAO. This will further strengthen the European SESAR approach to the benefit of the European and global aviation system. Supported by the European ATM Master Plan and SESAR Solution development and uptake, it will continue to steer the further evolution of the Global Air Navigation Plan (GANP) and the Global Aviation Safety Plan (GASP) as complementing documents as agreed by the 192 ICAO States in the recent ICAO Air Navigation Conference 13 and the ICAO General Assembly 40.

This outreach work will target and involve a wide range of SESAR JU member and partner organisations (see Figure 21). It will also mean continued engagement with stakeholders managing implementations of SESAR Solutions, including SESAR JU Members and partners. Finally, it will require activities targeting

institutional stakeholders in the European Parliament, the European Council and the European Commission as well as with EUROCONTROL (also founding member of the SESAR JU together with the EU represented by the European Commission). Activities will include participating in and organising events in Europe and elsewhere in the world, producing targeted publications and press editorials, and promoting SESAR results through e-news, websites and social media. Moreover, to fulfil its mission to 'ensure the modernisation of the European air traffic management system by coordinating and concentrating all relevant research and development efforts in the Community', as set forth in Article 5 of the SESAR JU constituent act, the SESAR JU establishes active cooperation with all ATM-related research and innovation bodies and organisations both within and outside the European Union. In years 2020-2022, this includes, for instance, ensuring the appropriate complementarity with collaborative research activities managed by the European Union's Innovative Network Executive Agency (INEA)⁴³.

The SESAR JU will continue to conduct outreach activities with international partners as mandated and according to EU external aviation policies to support global aviation and ATM interoperability and harmonisation, recognising these as vital prerequisites for a safe, secure, efficient and sustainable global ATM system. In this respect, the SESAR JU will build on established cooperative arrangements with partners worldwide. These include the U.S. Federal Aviation Administration/NextGen Programme under the EU/U.S. MoC; China under the EASA-led EU-China Aviation Partnership Project; Japan under its MoC with the European Commission; and Georgia, Qatar and Singapore under the SESAR JU's own cooperative arrangements endorsed by the European Commission. Collaboration with international partners under EU technical cooperation projects in the field of aviation will also continue. Conducted within the framework of the EU's external aviation policy, these arrangements cover sharing of lessons learnt, knowledge and expertise, and cooperation activities related to ATM modernisation towards ICAO.

As mentioned earlier, the SESAR JU will continue to work closely with the European Commission and other European institutions and partners in support of ICAO and the evolution of the GANP with the Aviation System Block Upgrades (ASBUs). This ensures an alignment of priorities in relation to SESAR, the European ATM Master Plan and industry standardisation initiatives with the relevant ICAO provisions. These activities help maintain and further strengthen SESAR's position as a global leader in aviation and ATM modernisation, which also serves to promote the competitiveness and global market shares of the European aviation and ATM industry.

Furthermore, the SESAR JU will, continue to foster the strong ties with all European and global key stakeholder groups, the details of which are included below:

- European airports - the SESAR JU will work closely with European Airports and ACI through the SESAR work programme as well on airport activities such as roadshows and conferences etc. with SESAR specific inputs for securing awareness, buy-in and commitment; the continued cooperation from 2021 onwards is dependent on the decision to be made by the European Commission on the future partnership for ATM research;
- Civil Airspace Users - the SESAR JU will continue to reach out to the airspace user categories on activities relevant and necessary to secure, awareness, buy-in and commitment to the

⁴³ This is particularly relevant in the areas of drones geo-fencing (MoniFly), drones airworthiness (AW-Drones), drones applications for transport safety (call topic MG-2-8-2019), climate impact and greener trajectories (call sub-topic LC-MG-1-6-2019/C), supersonic aviation environmental regulation (LC-MG-1-15-2020, which include optimisation of trajectories) and urban air mobility (call topic MG-3-6-2020).

SESAR work and activities; the continued cooperation from 2021 onwards is dependent on the decision to be made by the European Commission on the future partnership for ATM research;

- Professional Staff Organisations – the SESAR JU will secure support from the different professional staff associations in the provision of operational expertise across the tasks of the SESAR JU. Moreover, this cooperative arrangement serves to enhance the buy-in of front-end users to the new ATM developments. Furthermore, the SESAR JU will support the professional staff organisations in their respective activities as agreed relevant and necessary to secure inclusion in developments and commitment to the SESAR solutions. The continued cooperation from 2021 onwards is dependent on the decision to be made by the European Commission on the future partnership for ATM research;
- National Aviation Authorities (NAAs) - the SESAR JU will work under the established memoranda of cooperation with the European national authorities⁴⁴ to secure support to the SESAR JU from the different national authorities and to de-risk SESAR solutions readiness for deployment; the continued cooperation from 2021 onwards is dependent on the decision to be made by the European Commission on the future partnership for ATM research;
- New innovative airspace user entrants and organisations in the field of UTM/U-space and Unmanned Aviation Systems (UAS) and high-level operations will be approached based on relevant EU strategies and on a case-by-case basis to find the most efficient mechanism of cooperation for the benefit of SESAR JU tasks and activities,
- European Union Aviation Safety Agency (EASA) – the SESAR JU will collaborate under the established memorandum of cooperation with the EASA⁴⁵ to secure early involvement and inputs for awareness and readiness of SESAR activities for industrialisation and subsequent deployments. The MoC will, at the same time, cater for the direct support of the SESAR JU to EASA in European and international activities that relate to securing the necessary safety, security and regulatory arrangements,
- Clean Sky 2 Joint Undertaking – the established memorandum of cooperation⁴⁶ caters for the sharing of best practices and for identifying gaps and synergies in areas where a joint vision and approach is beneficial for both programmes. The cooperation will also align on performance targets in general and on environmental targets in particular,
- EUROCAE - the participation of the SESAR JU in the Council and Technical Advisory Committee (TAC) will continue in 2020-2022 period securing close collaboration between SESAR JU Members and the availability of SESAR material in support of standardisation. The alignment of priorities will be important in relation to the ATM Master Plan and the ICAO GANP,

⁴⁴ Six Memoranda of cooperation signed on 9 June 2017 between the Single European Sky ATM Research Joint Undertaking and: Directorate General Civil Aviation of Bulgaria; Croatian Civil Aviation Agency; Civil Aviation Authority of the Czech Republic; German Federal Supervisory Authority for Air Navigation Services; Irish Aviation Authority and Swiss Federal Office of Civil Aviation.

⁴⁵ Memorandum of cooperation between the European Aviation Safety Agency and the SESAR Joint Undertaking signed on 23 November 2016 to establish the general terms of cooperation between the Parties.

⁴⁶ Memorandum of cooperation between the Clean Sky 2 Joint Undertaking and the Single European Sky ATM Research Joint Undertaking signed on 10 December 2015 to establish a cooperative framework between the Parties.

- Advisory Council for Aviation Research and Innovation in Europe (ACARE) — the SESAR JU participates in ACARE to ensure the appropriate representation of ATM in the European strategic innovation and research agenda and to secure the link with Flightpath 2050,
- European ATM Standardisation Coordination Group — the SESAR JU continue its involvement in this group to ensure that a consistent and credible plan for the development of ATM standards is maintained, aligned with the priorities of SESAR 2020, the ATM Master Plan and the ICAO GANP,
- European Strategic Coordination Platform (ESCP) – The SESAR JU will actively participate in the activities under the EASA-led ESCP for the coordination of the definition and implementation of the European Strategy for Cybersecurity in Aviation,
- European Defence Agency (EDA) – the established memorandum of cooperation with the EDA⁴⁷ will continue with the aim of securing support and buy-in from the military community (in their roles as ANSP, Airport operator, AUs and regulators) to SESAR JU activities and the ATM Master Plan. In particular, areas of common interest include the ATM Master Plan, regulations, space-based systems, UAS integration, cyber-security threats and vulnerabilities to ATM and aviation/ATM standards development,
- European Space Agency – the established memorandum of cooperation⁴⁸ will make it possible to focus on strategic cooperation to coordinate roadmaps specifically in relation to the integrated CNS strategy and the ATM Master Plan, defining the role of satellite communication as an element of importance for the future enabling CNS infrastructure of ATM.

As introduced in Section II, paragraph 3.2, in addition to direct funding (from Title II and Title III), the SESAR JU also dedicates a proportion of SESAR JU running costs (Title I – Staff expenditure and Title II – Infrastructure and operating expenditure) to carry out SESAR outreach activities. The overall funding of Strategic Area of Operation #5 is indicated in Annex I.

⁴⁷ Memorandum of cooperation between the European Defence Agency and the Single European Sky ATM Research Joint Undertaking signed on 19 December 2016 to establish the general terms of cooperation between the Parties.

⁴⁸ Memorandum of cooperation between the European Space Agency and the Single European Sky ATM Research Joint Undertaking signed on 15 September 2016 to establish a cooperative framework between the Parties.

2.7 Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management

Management and administrative services are brought together primarily under this area of operation to ensure that the core horizontal activities of the SESAR JU are planned, implemented, monitored and reported in a coherent and consistent way. Its main objectives are to facilitate the efficient and effective delivery of the SESAR JU's work programme and to ensure sound financial and resource management. The effectiveness of the organisation based on the mission, vision and values of the SESAR JU will continue, aligning the capabilities of the organisation, technology and the extensive competencies of its human capital in order to maximise its added value.

To that end, in the period from 2020 to 2022, the SESAR JU will continually align operational and strategic planning activities with the capabilities of the organisation to best serve stakeholders' needs and to ensure full regulatory compliance with all the obligations stemming from the various legal frameworks it operates under, namely Horizon 2020, CEF and general EU funds⁴⁹. The SESAR JU's internal audit capability function will continue to objectively examine, evaluate and report on the adequacy of the SESAR JU's internal controls as a contribution to the proper, economic and effective use of its resources.

Furthermore, in an effort to continually align resource allocation to strategic priorities through the introduction of best practices and standards, the SESAR JU will identify key business areas and processes that need improvement, diagnose and analyse the reasons behind poor performance where necessary, and plan and implement the changes required to improve performance in a quantifiable or measurable way.

Additionally, having in mind Article 1(2) of the amended SESAR JU constituent act, which stipulates that the JU shall cease to exist on 31 December 2024, as well as ongoing discussions on the future of the EU public-private partnerships, the SESAR JU will conduct the necessary proceedings over the 2020-2024 period to ensure effective and timely implementation of one or both scenarios of the future of SESAR set forth above in paragraph 1.2. These proceedings are planned as follows:

- In 2020:
 - update and further detail as necessary the planning for the controlled winding up and liquidation of the SESAR JU and/or the transition to a new legal entity in alignment with the work initiated and led by the European Commission, as described in sub-paragraph 2.2.4 related to the future of ATM research under the Multi-Annual Financial Framework 2021-2027,
 - As part of the SPD 2021-2023, develop and present for approval a detailed implementation plan based on a scenario for the future of SESAR,
- In 2021: update, if necessary, or implement the approved scenario in accordance with the most recent and relevant developments (e.g. in case of transition of SESAR JU activities to an

⁴⁹ The SESAR JU receives funds from the EU that vary in origin in order to execute the SESAR 2020 Programme. These funds have been delegated to the SESAR JU under four different legal frameworks (see sub-paragraph 3.2.2 below), namely Horizon 2020, CEF and two types of AR, each referring to the execution of grants (following calls for proposals) or studies (following calls for tender). The diversity of the applicable legal frameworks under which the SESAR JU operates, each with its own templates and obligations, also comes with a high degree of complexity due to the number of derogations to the legal frameworks which have been defined in the corresponding delegation agreements.

extended or new ATM partnership, to align the plan with the provisions of the new Council regulation establishing an institutional partnership on ATM) and start implementing the plan,

- In 2022:
 - depending on the approved scenario, the SESAR JU will either be operating as a new ATM partnership or be continuing its existing mandate leading to a fully defined termination scenario (which includes finalising the preparation of the detailed planning of the winding-up of SESAR JU corporate and administrative activities and starting the detailed planning of the SESAR JU final liquidation, as defined in the roadmap updated and finalised in 2020 for this particular scenario),
 - irrespectively of the approved scenario, the SESAR JU will finalise the winding-up of the main SESAR 2020 Programme activities (allowing final payments for the last finalised projects to be made in 2023),
- In 2023: if the termination of the SESAR JU will have to be carried out under any scenario and especially under the termination scenario, the SESAR JU will fully finalise the remaining financial and administrative activities under the SESAR 2020 Programme, start the implementation of the winding-up of the corporate and administrative activities, and, in parallel, plan the liquidation activities, all based on the detailed implementation plan approved in 2020 and subsequently updated,
- In 2024: if the termination of the SESAR JU will have to be carried out under any scenario and especially under the termination scenario, the SESAR JU will finalise the implementation of the winding-up of the corporate and administrative activities and run the liquidation activities with a view to completing all winding-up and liquidation activities by the end of 2024.

The roadmap of the approved scenario and the related detailed implementation plan will be fully integrated with SESAR JU's multi-annual and annual work programmes as part of all the SPD's covering the related period. During the whole process, the SESAR JU will focus on the timely and complete fulfilment of its overall mission and programme and on meeting the expectations of SESAR JU's stakeholders, while ensuring appropriate levels of its corporate activities to fulfil all its obligations and fully respecting any budgetary and human resources constraint derived from the application of the legislation.

As introduced in Section II, paragraph 3.2, the SESAR JU dedicates a proportion of its running costs (from Title I and Title II) to carrying out financial, administrative and corporate activities. The overall funding of Strategic Area of Operation #6 is indicated in Annex I.

3 Human and financial resource outlook for years 2020-2022

3.1 Overview of the past and current situation

At the end of 2018 and during 2019, in line with the situation reported in 2018, the Staff Establishment Plan contains 39 temporary agent (TA) posts and 3 seconded national expert (SNE) posts where Member States' experience is requested (as authorised by the SESAR JU Administrative Board). For detailed data on the different staff categories, please refer to Annex III, Table 1.

From 2018 to 2019, Title III expenditure has increased compared to previous years due to the launch of SESAR 2020 projects in progress and the ongoing signature of new grant agreements and grant budget amendments (see paragraphs 2.1 to 2.4 related to Strategic Areas of Operations 1 to 4 in the Single Programming Document for 2018-2020):

	Executed Budget for 2018 ⁵⁰	Budget for 2019
Title I	5.355.693	6.044.372
Title II	3.263.224	3.612.935
Title III	123.659.172	140.901.014
TOTAL	132.278.089	150.558.321

Table 14: SESAR JU budget overview for 2018 (commitments made) and 2019 (commitment appropriations)

3.2 Resource programming for the years 2020-2022

The EU financial contribution to the SESAR JU for the 2020-2022 period and 2020-2022 staff numbers are indicative, subject to the outcome of the EU's future budgetary procedures.

3.2.1 Human resources

Staff Establishment Plan

In the period from 2020 to 2022, the number of posts in the Staff Establishment Plan remains unchanged, i.e. 39 TAs and 3 SNEs.

As explained in paragraph 2.7 above, the SESAR JU operates under four different legal frameworks, namely Horizon 2020, CEF and two types of assigned revenues, each referring to the execution of grants (following calls for proposals) or studies (following calls for tender). The diversity of the applicable legal frameworks, each with its own templates and obligations, also comes with a high degree of complexity due to the legal frameworks that have been defined in the corresponding delegation agreements.

⁵⁰ The figures of the executed budget for 2018 are the final ones. The information contained in the Fifi 2020 for the executed budget 2018 was still an estimate based on an assumption of that the commitment appropriations would be executed at 100%.

Efficiency gains

To cope with that complexity and despite the fact that the number of staff allowed in the Staff Establishment Plan has not been adapted accordingly, the SESAR JU will continue its efforts towards further efficiency gains. These will contribute to the mitigation of major risks with reference CORP05 'The SESAR JU may not be able to take up new challenges due to limited human resources' (see Annex VIII).

Some examples are the reduced number of staff missions, enabled through the increased use of video conferences, especially for recurring monitoring activities such as project reviews. Typically, for meetings relating to ER, IR and VLD and except for critical meetings such as kick-off meetings and critical reviews, the SESAR JU has opted for web conferences to coordinate with grant beneficiaries by preference, which represents a significant benefit in terms of environmental footprint, efficiency and work-life balance.

In addition, the SESAR JU undertakes regular process improvement initiatives in the context of the SESAR JU Quality Management System (QMS, see Section III, sub-paragraph 2.6.5) monitored by the Quality, Information and Communication Technology Committee (QICT Committee), in order to use the resources most efficiently and on value added activities. The QICT Committee also supervises the implementation and continuous improvement of the SESAR JU's Information and Document Management System (IDMS), which aims at streamlining the management of information and documentation within the organisation. The IDMS has materialised in a software implemented in 2017 and under constant improvement since then. In that regard, the SESAR JU is also considering the implementation of Ares modules that will streamline the communication with the European Commission services.

Moreover, in 2020 the SESAR JU will finalise the implementation of the human resources information system 'Sysper for Agencies', in order to streamline the management of human resources-related transactions and reporting.

Finally, ICT opportunities will also be used in the field of procurement as the SESAR JU is finalising the implementation of the e-procurement suite provided by the European Commission, which will be in full operation as of the beginning of 2020.

For detailed data on the different staff categories, please refer to Annex III, Table 1.

3.2.2 Financial resources

3.2.2.1 Revenues

In accordance with Article 4 of the SESAR JU constituent act and the Statutes annexed to it, all revenue of the SESAR JU shall come from contributions from its Members and can be financial or in kind. The SESAR JU constituent act extending the SESAR JU and setting the sources of financing over the 2014-2020 period sets the overall EU funding of EUR 585 million from the Horizon 2020 programme (of which EUR 29,25 million for the running costs (staff expenditure, infrastructure and operating expenditure) and EUR 555,75 million for operational expenditure). However, in the draft budget 2020, the SESAR JU requested only the amount needed for running costs covering the period from 2020 until 2024 (i.e. EUR 3,35 million per year). That budget request leads to a total amount requested for running costs of EUR 16,73 million for the period from 2020 to 2024, and to an amount of EUR 26,71 million in total for the SESAR 2020 programme, instead of the EUR 29,25 million foreseen in the SESAR JU constituent act, hence a decrease of EUR 2,54 million of the EU contribution to running costs. This

decrease is a direct consequence of the use of SESAR 1 funds to cover 2016 running costs instead of the foreseen SESAR 2020 funds. The corresponding amount of EUR 2,54 million is thus available through EU Contribution to operational activities. This ensures that the overall EU funding of EUR 585 million, as defined in the SESAR JU's constituent act, is maintained. In addition, the SESAR JU has been provided:

- under delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2016-669/SI2.743803 signed on 6 December 2016⁵¹, with EUR 500.000 in assigned revenue to organise a call for proposals for a geo-fencing demonstration,
- under delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2017-477/SI2.766828 signed on 10 November 2017, with an additional EUR 800 000 in assigned revenue from the European Commission to procure a study to develop a proposal for the future architecture of European airspace,
- under delegation agreement EC/SESAR JU ref. MOVE/E3/DA/2017-564/si2.771010 signed on 13 December 2016, with an additional EUR 10 million in assigned revenue from the European Commission from the CEF funds to organise a call for proposals on U-space demonstrations.

The last year to request the remaining EU entitlements (EUR 585 million less the funds already requested) is 2020⁵².

All SESAR JU Members other than the European Commission (representing the EU) contribute to the SESAR JU as follows:

- Financial contributions: 5% of each Member's contribution shall be in cash in order to finance the running costs of the Joint Undertaking (i.e. staff, infrastructure and operating expenditure),
- In-kind contributions, consisting of the operational activities carried out by the stakeholder Members for developing, both jointly and under the SESAR JU's supervision, the next generation of the ATM system in Europe,
- As a Founding Member, pursuant to Article 9.2 (b) of the SESAR JU Statutes and the SESAR JU-EUROCONTROL Agreement, EUROCONTROL shall, in particular, contribute to the SESAR JU work programme⁵³ through a set of activities under the authority of the SESAR JU, which may include the following:

⁵¹ In accordance with Articles 54(2)(a) and 58(1)(c)(iv) of the Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union (EU Financial Regulation) (OJ L 193, 30.7.2018, p. 1).

⁵² Article 4(3) of the amended SESAR JU constituent act stipulates that 'All Union financial contributions to the Joint Undertaking shall cease upon expiry of the 2014-2020 financial framework unless otherwise decided by the Council on the basis of a Commission proposal'. The expiry of the 2014-2020 financial framework is the 31 December 2020.

⁵³ In accordance with Schedule 2 of SESAR JU-EUROCONTROL Agreement, the EUROCONTROL financial contribution shall comprise: '(a) An estimated amount of EUR 25 Million (corresponding to 5% of the total contribution of EUROCONTROL), as a contribution for the SJU's running costs. This amount shall consist of: i) an estimated amount of EUR 10 Million (ten-million-EURO) for IT support provided in accordance with the terms and conditions in Schedule 4, ii) the remaining estimated amount of EUR 15 Million (fifteen-million-EURO) cash contribution to be transferred to the SESAR JU according to a time schedule duly justified by the actual needs of the SJU.' Therefore, the level of cash contribution is highly dependent on the level of actuals EUROCONTROL Gross In-Kind Contribution, and can fluctuate up or down.

- Through research, development and validation activities under the SESAR 2020 Programme, subject to the award of grants (in-kind contribution),
- Through external coordination and adaptation of the relevant EUROCONTROL consultation mechanisms (in-kind contribution),
- Through detachment of the Programme Management Unit (PMU) (in-kind contribution),
- Through the provision of ICT support to the SESAR JU in accordance with Schedule 4 of this agreement (in-kind and financial contribution),
- Upon request of the SESAR JU, through the execution of other ATM-related studies necessary to support SESAR JU in the achievement of its objectives, complementary to the SESAR 2020 Programme (in-kind contribution).

Before the SESAR JU Administrative Board accepted the accession of 19 stakeholder Members other than the Union, the value and the utility of the in-kind contributions that were offered by each Candidate Member for carrying out the tasks of the JU were assessed. Following that assessment, the contribution of each Member was contractually established (as estimates) in a unique Membership Agreement signed by the SESAR JU and all Members (excluding EUROCONTROL which signed a specific SESAR JU-EUROCONTROL Agreement). These are as follows:

(EUR)

Members	Estimated total net Contribution ⁵⁴	of which financial contribution	of which net in-kind contribution
European Union	585.000.000,00	585.000.000,00	
EUROCONTROL	492.256.781,00	25.000.000,00	467.256.781,00
Other Members in total	325.838.461,65	18.466.058,00	307.372.403,65
AIRBUS	26.761.006,00	1.667.271,00	25.093.735,00
AT-ONE Consortium	12.495.693,00	627.887,00	11.867.806,00
B4 Consortium	2.382.455,00	397.076,00	1.985.379,00
COOPANS Consortium	9.275.779,00	599.718,00	8.676.061,00
DASSAULT Aviation	5.247.567,00	290.928,00	4.956.639,00
DFS	8.483.712,00	672.725,00	7.810.987,00
DSNA	9.831.224,62	641.023,00	9.190.201,62
ENAIRE	16.452.269,00	834.917,00	15.617.352,00

⁵⁴ In accordance with Article 10.2.2 of the Membership Agreement: 'Cash Contributions shall correspond to 5% of each Member's Gross In-Kind Contribution after deduction of the SJU Co-Financing. For the sole purpose of calculating the amount of Cash Contribution due by each Member under this Agreement, the SJU Co-Financing shall be considered as capped to 50% of each Member Gross In-Kind Contribution'. Therefore, the level of cash contribution is highly dependent on the level of actual Member's Gross In-Kind Contribution, and can fluctuate up or down.

Members	Estimated total net Contribution ⁵⁴	of which financial contribution	of which net in-kind contribution
ENAV	8.143.260,00	643.950,00	7.499.310,00
FREQUENTIS Consortium	6.885.998,00	475.866,00	6.410.132,00
HONEYWELL AEROSPACE	15.324.183,38	777.926,00	14.546.257,38
INDRA	21.534.500,00	1.656.500,00	19.878.000,00
Leonardo	48.127.619,53	2.291.791,00	45.835.828,53
NATMIG Consortium	10.472.227,00	511.804,00	9.960.423,00
NATS	9.363.535,00	655.208,00	8.708.327,00
SEAC2020 Consortium	3.485.625,00	222.625,00	3.263.000,00
SKYGUIDE	1.637.165,12	263.860,00	1.373.305,12
THALES AIR SYSTEMS	75.585.799,00	3.599.324,00	71.986.475,00
THALES AVIONICS	34.348.844,00	1.635.659,00	32.713.185,00
TOTAL	1.403.095.242,65	628.466.058,00	774.629.184,65

Table 15: SESAR JU financial resources overview for the period 2014-2024

This overall budget was broken down into annual commitment and payment instalments over the lifetime of the SESAR 2020 Programme.

3.2.2.2 Expenditure

For the 2020-2022 period, once SESAR JU running costs are taken into account, the overall estimated expenditure is EUR 143,3 million in commitment appropriations, broken down as follows:

	Budget 2020	Budget 2021	Budget 2022
Title I	6.157.360	6.280.507	6.406.117
Title II	3.417.079	3.465.671	3.440.552
Title III	112.035.660	1.467.500 ⁵⁵	652.500 ⁵⁵
TOTAL	121.610.099	11.213.678	10.499.169

⁵⁵ Title III commitments in 2021 and 2022 will be financed through budget outturn of unused appropriations in previous years.

Unused appropriations in current year ⁵⁶	13.383.404		
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Table 16: SESAR JU financial resource outlook (commitment appropriations) for the 2020-2022 period

The presentation of budget figures for 2020 in the table above differs from the latest SESAR JU's budget request document for the year 2020 (commonly referred to as 'Fifi 2020') but the figures are consistent with the mentioned document. The figures presented above provide the breakdown of the multi-annual budget (in commitment appropriations) across years 2020 to 2022, while the Fifi 2020 presents the lump sum of annual figures for that period, with amounts for years 2021-2024 frontloaded in 2020. The total figures of Title I, II and III for the whole period are the same in both documents.

Title III (Operational expenditure) is planned as follows:

- For grants, subject to the successful conclusion of calls for proposals launched in 2019 and 2020, it is planned to maintain the expenditure at levels comparable to previous years for 2020, and that it will decrease significantly as from 2021 due to the end of H2020 actions. Indeed, the financial plan for the calls for proposals launched in 2020 (see sub-paragraph 2.1.3 above and the annual work programme for 2020 in Section III) is the following:
 - New Level-2 commitments in relation to grants signed in 2020 under the two calls for proposals launched in 2019 (namely, the remaining part of the IR-VLD Wave 2 call and the totality of the ER4 call),
 - Adjustment of level-2 commitments established in 2019 in relation to the grant budget amendment procedure in Q1 or Q2 2020 for grant agreements signed in 2019 under the IR-VLD Wave 2 restricted call,
 - New Level-2 commitments in relation to grants to be signed under the two calls for proposals to be launched in 2020 (VLD Open 2 and restricted IR-VLD Wave 3):
 - in the period from Q3 to Q4 2020 for grant agreements under the 'VLD Open 2' call (open call, see sub-point 2.5.1.2.2),
 - in Q4 2020 for grant agreements under the IR 'Wave 3' restricted call (see sub-paragraph 2.4.2),
- Unused commitment and payment appropriations for the level-2 commitments of 2020 will be carried over into 2021 and 2022 to cover other operational expenditure (procurement procedures). It is anticipated that the amount of unused commitment and payment appropriations for operational expenditure will be relatively high in 2020, due to the two following factors:
 - In 2020, the SESAR JU will receive the totality of remaining SESAR 2020 Programme funds from the EU which will also be used to cover expenditure in years 2021-2024 (e.g. experts fees for deliverables review, project audits, studies, etc.), and
 - The SESAR JU plans to commit in 2020 the amount received for calls for proposals launched in 2020 (namely, VLD Open 2 and IR-VLD Wave 3 calls) in relation with the signature of grant agreements; however, it should be noted that 2020 commitment

⁵⁶ This budget line represents the amount frontloaded in 2020 for years 2021-2024 (EUR 13.383.404; not included in the 2020 total expenditure) which will be used to cover running costs during the 2021-2024 period redistributed for an amount of EUR 3.345.851 per year.

implementation rate may be impacted if the signatures of some grant agreements would have to be postponed to 2021. Payments in relation with grant agreements signed in 2020 will be executed over the 2020-2023 period.

- The global budgetary envelope for procurement appears in Annex IX (2020 only).

The overall planned expenditure of the SESAR JU for the 2020-2022 period, in commitment appropriations, is broken down per Strategic Areas of Operation in the following table:

Strategic Area of Operation	Types of procedure	Call and support activities budget	
		In EUR	In % of total
Strategic Areas of Operation 1 – Strategic Steering	Restricted H2020 calls for proposals	7.549.312	5,27%
	Procurement of support services		
Strategic Area of Operation 2 – Exploratory Research	Open H2020 calls for proposals	3.129.634	2,18%
Strategic Area of Operation 3 – Industrial Research & Validation	Restricted H2020 calls for proposals	89.875.767	62,71%
	Procurement of support services		
Strategic Area of Operation 4 – Very Large-Scale Demonstrations	Open and Restricted H2020 calls for proposals	33.230.265	23,19%
	Procurement of support services		
Strategic Areas of Operation 5 – SESAR Outreach	Procurement of support services	3.287.837	2,29%
Strategic Areas of Operation 6 – Deliver effective financial, administrative and corporate management	Procurement of support services	6.250.133	4,36%
TOTAL		143.322.947	100,00%
Unused appropriations in year 2020		13.383.404	

Table 17: SESAR 2020 Programme expenditure outlook for the 2020-2022 period

All expenditure planned as of 2021 will be funded from the budget result (outturn) of the previous year (e.g. 2021 budget will be funded from 2020 budget result) which will include pre-2021 unused or re-inscribed financial EU contributions to SESAR JU's administrative and operational expenditure and new financial contributions of EUROCONTROL and Members other than the Union to SESAR JU's administrative expenditure.

3.2.2.3 Budget outturn and cancellation of appropriations

The 2019 surplus that remains within the Joint Undertaking will be established at the beginning of 2020.

Given the multi-annual nature of the SESAR 2020 Programme, and in line with the SESAR JU Financial Rules, cancelled appropriations may be entered in the estimates of revenue and expenditure up to the following three financial years. Even more, according to Commission Decision C(2019)5447 of 16/07/2019, the new Financial Rules foresee that, in order to ensure the continuity of the SESAR JU operation until its termination, appropriations related to administrative expenditure may be entered in the estimates of revenue and expenditure up to the four financial years following the last payment of the EU financial contributions as per Article 4(3) of SESAR JU constituent act. Therefore, the commitment appropriations unused by the end of 2019 will be carried over to 2020. The payment appropriations that are unused by the end 2019 for Title I and Title II expenditure will be carried over automatically into 2020 budget. Any commitment and payment appropriations that are left after the closure of the contractual obligations and considered unneeded in the following years (if eligible for carry-over) would be cancelled in 2020 (see Annex II, Table 3).

Section III – Work Programme year 2020⁵⁷

As noticed in the General Introduction of Horizon 2020 Work Programme 2018-2020, it should be noted that until the United Kingdom leaves the EU, EU law continues to apply to and within the United Kingdom, when it comes to rights and obligations; this includes the eligibility of United Kingdom legal entities to fully participate and receive funding in Horizon 2020 actions such as those called for in this work programme. Please be aware however that the eligibility criteria must be complied with for the entire duration of the grant. If the United Kingdom withdraws from the EU during the grant period without concluding an agreement with the EU ensuring in particular that British applicants continue to be eligible, they will no longer be eligible to receive EU funding and their participation may be terminated on the basis of Article 50 of the grant agreement.

1 Executive summary

In 2020, the SESAR JU will continue to steer and manage the innovation pipeline delivered through the SESAR 2020 Programme by the SESAR JU Members other than the Union and other organisations involved in ATM-related research and demonstration activities. Furthermore, 2020 is the last year of commitments under the Horizon 2020 programme.

Therefore, the activities in 2020 are as follows:

- Follow-on activities laid out in the 2019 release of the European ATM Master Plan and in particular in its level 3 (the ‘Implementation view’),
- The completion of the Release 9 (by September 2020) in line with the Release Plan published in 2018, the execution of the Release 10 and start of the planning and preparation of Release 11 to be conducted in 2021,
- The closure of projects under:
 - the IR-VLD Wave 1 restricted call for proposals (H2020-SESAR-2015-2) – last seven projects not closed in 2019, and
 - the U-space VLD open call for proposals (CEF-SESAR-2018-1),
- The finalisation of the grant agreement signature and subsequent management of the related grant agreements for ongoing projects under the IR-VLD Wave 2 restricted call for proposals, opened in early 2019 (H2020-SESAR-2019-1); this includes the execution of the grant budget amendment procedure for these grants,
- The finalisation of the grant agreement preparation, the grant agreement signature and subsequent management of the related grant agreements for ongoing projects under the ER4 open call for proposals, opened at the end of Q1 2019 (H2020-SESAR-2019-2),

⁵⁷ The content of the SPD annual Work Programme section includes the required content as set out in Article 16(1)(b) of Annex to Council Regulation (EC) No 219/2007 (Statutes of the Joint Undertaking), as amended. The term ‘Work Programme’ of the SESAR JU corresponds to the term ‘work plan’ defined in Article 2(1)(22) of Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in ‘Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)’ (OJ L 347, 20.12.2013 p.81) which defines the ‘work plan’ as ‘the document similar to the Commission work programme adopted by funding bodies entrusted with part of the implementation of Horizon 2020 in accordance with Article 9(2) of Regulation (EU) No 1291/2013’ (OJ L 347, 20.12.2013, p. 104).

- The launch of the following two last calls for proposals (subject to the availability of funding), subsequent evaluation of proposals, grant award and grant agreement signature for:
 - the second VLD open call for proposals (H2020-SESAR-2020-1) and
 - the Wave 3 restricted call for proposals for IR and VLD (H2020-SESAR-2020-2).
- The further preparation for the future of SESAR according to two non-exclusive scenarios: the continuation of the SESAR activities and/or the termination of the SESAR JU. This preparation will be carried out through the further definition of the roadmaps for each scenario, which will be approved in their first version by the SESAR JU Administrative Board in Q4 2019. Each roadmap will lay out the high-level approach to a designated scenario and define key components of the related implementation plan, as defined in Section II, paragraph 2.7. Subsequently, the detailed implementation plans (one for each scenario) will be developed and elaborated during 2020, with a view to get the final decision on the scenario(s) to be implemented from the European Commission by the end of 2020 at the latest, immediately followed by the preparation for full-scale implementation of the approved scenario(s) as of 2021.

In addition, the SESAR JU will process payments in accordance with the financial circuit for the grant agreements where reporting periods become due and/or projects close their work and final payment is due.

Stakeholder engagement beyond the Members is critical to the successful delivery of the SESAR JU's mandated goals. As such, there will be a continuing need to embed a strategic and systematic approach to civil and military stakeholder engagement and management across the SESAR JU in 2020. To do this, the SESAR JU will continue to engage in partnerships with relevant actors in order to foster operational and policy coherence and have a positive benefit on the execution of the SESAR JU's mandate and that of its main stakeholders. Such partnerships will include, *inter alia*, EU institutions and decentralised bodies, ICAO, other regional R&D programmes, standardisation bodies and other third-party organisations. The SESAR JU will also continue to undertake effective outreach through the delivery of clear, targeted and effective communications on the SESAR JU's activities to all its external stakeholders, increasing the visibility, credibility and accurate understanding of the SESAR JU's work and mandate, leading to a significantly increased visibility of the SESAR JU as an important stakeholder in the modernisation of the European ATM system. Interaction with the European GNSS Agency (GSA) will also be strengthened in order to assure coordination on activities relevant for the EU GNSS (EGNOS/Galileo).

During the course of the year, the SESAR JU will also continue to align the capabilities of the corporate services elements of its organisation to support the delivery of the SESAR 2020 Programme and activities. The objective for the SESAR JU in 2020 is the continued development and consolidation of SESAR JU support processes, with an emphasis on further developing their efficiency and effectiveness in line with best practices, standards and applicable regulatory frameworks.

Regarding the SESAR 1 Programme, the last planned *ex-post* audit activities will be finalised in 2019.

2 Activities in 2020

In this chapter, each Strategic Area of Operation is described with a focus on activities to be conducted in 2020, associated with objectives, indicators and the 2020 targets/metrics.

All the SESAR JU activities will be supervised by the Administrative Board (see above in Section II subparagraph 2.1.5) which plans to hold three meetings during 2020. The key decisions and documents to be adopted during the course of 2020 are expected to be the following:

Q1	Adopt operating decisions required for 2020 and beyond Adopt decision on Internal Audit Capability 2020 Work Plan Adopt decision on 2020 voting rights allocation
Q2	Adopt the <i>Consolidated Annual Activity Report 2019</i> and the decision on its assessment
Q4	Adopt decision on Final Accounts 2019 Adopt the <i>Single Programming Document 2021-2023</i>

Table 18: Provisional timetable for key Administrative Board activities and decisions in 2020

2.1 Strategic Area of Operation 1 (operational activity): Provide Strategic Steering to the SESAR programme

In 2020, the SESAR JU will, in the context of the Strategic Steering activities:

- Launch and supervise the Wave 2 Transversal Activities subsequent to the call procedure conclusion in 2019,
- Execute the transition between ER1 and IR Wave 1 on the one hand, and IR-VLD Wave 2 on the other, according to the process set out in the SPD 2019-2021, Section III, sub-paragraph 2.1.1.

Indicators and measurements applicable for the Strategic Area of Operation #1 in 2020 are the following:

Objectives	Indicators	Target for 2020
Call with reference H2020-SESAR-2019-1 (IR-VLD Wave 2 call for proposals): launch of Transversal Activities	Percentage of Transversal Activities launched in execution by the end of Q1 2020	100%
Secure alignment of Level 2 of the Master Plan with Level 1	Accompany each delivery of a new Dataset (Level 2 of the Master Plan) with a contextual note highlighting the 'significant changes', if any, that may have an impact on Level 1. In this way, any significant change to Level 1 will be transparent, approved, and logged in view of the next update.	100%
Strengthen the annual reporting on Master Plan Level 3 yearly implementation, including the deployment	Master Plan Level 3 annual report providing an exhaustive view of the state of deployment of all mature Solutions composing the SESAR programme and highlighting their contribution to the achievement of the SESAR vision	100%
Revise the process for future updates of the Master Plan as well as its scope and relations with other strategic plans	Develop a position paper with a view to ensuring that the next update of the Master Plan will be thoroughly and timely prepared, its connections with other strategic documents will be clear and seamless, and its content will be adapted to decision-makers and European institutions' needs and expectations	100%
Ensure effective and efficient SESAR 2020 Programme governance meetings	Meetings of the Programme Committee and DMSC	Four meetings of the PC Four meetings of the DMSC

Objectives	Indicators	Target for 2020
	Meetings of the Master Planning Committee	At least two
	Meetings of the Scientific Committee	At least three

Table 19: Objectives, indicators and targets for Strategic Steering activities in 2020

2.2 Strategic Area of Operation 2 (operational activity): Deliver Exploratory Research

In the context of Exploratory Research activities, in 2020, the SESAR JU will:

- Finalise the grant agreement preparation and the grant agreement signature following the evaluation of proposals received in response to the ER4 call for proposals (H2020-SESAR-2019-2),
- Subsequently, supervise the projects launched in 2019 under the ER4 call for proposals, as well as the related grant agreements (see SPD 2019-2021, Section III, point 2.6.1.3 for call conditions),
- Organise the SESAR Innovation Days (see sub-paragraph 2.5.1 and Section II, sub-paragraph 2.3.3),
- Explore through the SESAR Digital Academy initiative how to link existing SESAR output with the development of new educational and continuing professional development services using existing contractual arrangements and communications channels;
- In continuation of activities conducted in previous years, organise the Young Scientist Award, which is the annual prize of EUR 5 000 to be awarded to a successful young scientist applicant or to be split among several successful applicants, following an open call for applications and in line with the evaluation conducted by the appointed evaluation committee.

Accordingly, and in addition to those specific ER deliverables outlined within the multi-annual section of the SPD, the SESAR JU has identified a number of other objectives to be delivered during 2020 as outlined in the table below:

Objectives	Indicators	Target for 2020
Call with reference H2020-SESAR-2019-2 (ER4 call for proposals): award of projects and supervision of projects	Percentage of the targeted number of grant agreements signed for ER4 projects by May 2020	100%
	Percentage of the ER4 projects having their PMP approved by the SESAR JU by the end of 2020	100%
Ensure commitment of the scientific community around the SESAR topics	Organisation of Young Scientist Award by the end of 2020	100%
Establish the SESAR Digital Academy into operation	Portal publicly available and at least four organisations signed up across Academia, Industry, Standards and Regulation	100%

Table 20: Objectives, indicators and targets for Exploratory Research in 2020

2.3 Strategic Area of Operation 3 (operational activity): Deliver Industrial Research & Validation

In the context of Industrial Research and Validation activities, in 2020, the SESAR JU will:

- Supervise the remaining ongoing IR projects launched under the IR-VLD Wave 1 call for proposals, as well as the related grant agreements, in particular through the finalisation of Release 9,
- Subsequently, close those projects (most IR Wave 1 projects were closed by the end of 2019, with some exceptions granted on the basis of recommendations from the Programme Committee – see Section II, paragraph 2.4),
- Finalise the grant agreement preparation and grant agreement signature of the remaining IR Wave 2 projects,
- Supervise the IR projects launched in 2019 under the IR-VLD Wave 2 call for proposals, as well as the related grant agreements (see SPD 2019-2021, Section III, point 2.6.1.2 for call conditions), plan and execute Release 10 and plan Release 11,
- Run the specific grant budget amendment procedure for the IR projects launched in 2019 under the IR-VLD Wave 2 call for proposals according to the process agreed by the Administrative Board and documented in the AWP 2016,
- Launch the IR Wave 3 projects into execution as a result of the launch of the restricted call for proposals (with reference H2020-SESAR-2020-2), the evaluation of the proposals received and the award and signature of the grant agreements (see point 2.6.1.3 for call conditions) The projects under the IR-VLD Wave 3 call are expected to close by the end of 2022 the latest,
- Execute the transition between ER1, ER2-RPAS, ER3 on the one hand, and IR Wave 3 on the other, in content, process and timing.

In addition to those specific deliverables outlined within the corresponding multi-annual section, the SESAR JU has identified a number of other objectives to be delivered during 2020 as outlined in the table below:

Objectives	Indicators	Target for 2020
Execute validation exercises of Release 9	Percentage of Release 9 Solutions validation exercises completed in 2020	100 %
Close Release 9	Delivery of the Release 9 close out report, including coverage of last Pilot Common Project (PCP) solutions	Release 9 close out report available and approved by the Programme Committee by mid-2020
Prepare Release 10	Delivery of the Release 10 Plan, including coverage of the last PCP solutions	Release 10 Plan available and approved by the Programme Committee by Q1 2020
Execute validation exercises of Release 10	Percentage of Release 10 Solutions validation exercises completed in 2020	60%

Prepare Release 11	Delivery of the Release 11 Plan	Release 11 Plan available and approved by the Programme Committee by the year end
Call with reference H2020-SESAR-2015-2 (IR-VLD Wave 1 call for proposals): delivery of results of IR Wave 1 projects	Percentage of IR Wave 1 projects having delivered their Final Project Report and performed a project and grant agreement closure	100 %
Call with reference H2020-SESAR-2019-1 (IR-VLD Wave 2 call for proposals): delivery of results of IR Wave 2 projects	Percentage of IR Wave 2 projects having their PMP approved by the SESAR JU by the end of 2020	100%
Call with reference H2020-SESAR-2019-1 (IR-VLD Wave 2 call for proposals): grant budget amendment of IR Wave 2 projects	Percentage of IR Wave 2 projects having performed a specific budget amendment of their grant agreements by the end of 2020	100%
Call with reference H2020-SESAR-2020-2: launch IR Wave 3 projects into execution	Percentage of the targeted number of grant agreements signed for IR Wave 3 projects (see call conditions in point 2.6.1.3)	100%

Table 21: Objectives, indicators and targets for Industrial Research & Validation in 2020

2.4 Strategic Area of Operation 4 (operational activity): Deliver Very Large-Scale Demonstrations Activities

In the context of Very Large-Scale Demonstrations activities, in 2020, the SESAR JU will:

- Supervise and ensure the final delivery of VLD projects under the IR-VLD Wave 1 and U-space VLD call (with reference CEF-SESAR-2018-1 respectively),
- Subsequently, close these projects,
- Finalise the grant agreement preparation and grant agreement signature of the remaining VLD Wave 2 projects,
- Supervise the VLD projects launched in 2019 under the IR-VLD Wave 2 call for proposals, as well as the related grant agreements (see SPD 2019-2021, Section III, point 2.6.1.2 for call conditions), plan and execute Release 10 and plan Release 11,
- Run the specific grant budget amendment procedure for the VLD projects launched in 2019 under the IR-VLD Wave 2 call for proposals according to the process agreed by the Administrative Board and documented in the AWP 2016,
- Launch the VLD Wave 3 projects into execution as a result of the launch of the restricted call for proposals (with reference H2020-SESAR-2020-2), the evaluation of the proposals received and the award and signature of the grant agreements (see point 2.6.1.3 for call conditions). The projects under the IR-VLD Wave 3 call are expected to close by the end of 2022 at the latest,
- Launch the VLD Open 2 projects in execution as a result of the launch of the open call for proposals (with reference H2020-SESAR-2020-1), the evaluation of the proposals received and the award and signature of the grant agreements (see point 2.6.1.2 for call conditions). The VLD projects under the VLD Open 2 call are expected to close by the end of 2022 at the latest,
- Execute (in 2020 and 2021) the transfer of results of the IR Wave 1 into VLD Open 2 activities.

In addition to the specific deliverables outlined within the corresponding multi-annual section, the SESAR JU has identified a number of other objectives to be delivered during 2020, as outlined in the table below:

Objectives	Indicators	Target for 2020
Call with reference H2020-SESAR-2016-2 (VLD Open 1 call for proposals): delivery of results	Percentage of VLD Open 1 projects having delivered their Final Project Report and performed a project and grant agreement closure	100 %
Call with reference CEF-SESAR-2018-1 (U-space call for proposals): delivery of results	Percentage of U-space demonstration activities having conducted their main demonstration activity and subsequently delivered their Final Project Report and performed a project and grant agreement closure	100 %

Call with reference H2020-SESAR-2015-2 (IR-VLD Wave 1 call for proposals): delivery of results of VLD Wave 1 projects	Percentage of VLD Wave 1 projects having delivered their Final Project Report and performed a project and grant agreement closure	100 %
Call with reference H2020-SESAR-2019-1 (VLD Wave 2 call for proposals): launch of the VLD projects into execution	Percentage of the VLD Wave 2 projects having their PMP approved by the SESAR JU by the end of 2020	100%
Call with reference H2020-SESAR-2019-1 (IR-VLD Wave 2 call for proposals): grant budget amendment of VLD Wave 2 call	Percentage of the VLD Wave 2 projects having performed a budget amendment of their grant agreements by the end of 2020	100%
Call with reference H2020-SESAR-2020-1: launch VLD Open 2 projects into execution	Percentage of the targeted number of grant agreements signed for VLD Open 2 projects (see call conditions in point 2.6.1.2)	100%
Call with reference H2020-SESAR-2020-2: launch VLD Wave 3 projects into execution	Percentage of the targeted number of grant agreements signed for VLD Wave 3 projects (see call conditions in point 2.6.1.3)	100%

Table 22: Objectives, indicators and targets for Very Large-Scale Demonstrations in 2020

2.5 Strategic Area of Operation 5 (operational activity): Deliver SESAR Outreach

SESAR Outreach plays an integral role in engaging with the wider aviation community and informing them about the SESAR JU's work and results. The Outreach also encourages wider international commitment to the SESAR approach to ATM modernisation, and contributes to maintaining the momentum around SESAR research and innovation.

For 2020, the following key messages will be the focus of the SESAR JU's outreach activities:

- The unique SESAR JU public-private partnership is delivering solutions that drive aviation performance, in support of EU transport and mobility policy objectives,
- The SESAR JU model pools resources and expertise from Europe's aviation community and beyond to deliver efficient and value-for-money R&D,
- Embracing new trends and opportunities through cutting-edge R&D is a prerequisite for maintaining Europe's global leadership and competitiveness in aviation.

2.5.1 Communication and promotion activities

In 2020, SESAR JU communication activities will support the activities of SESAR 2020 through the application of the following targeted objectives, in accordance with the SESAR JU 2015-2020 Communications Strategy:

- Continue to regularly illustrate and showcase SESAR solutions that are mature and ready for industrialisation and deployment, showing tangible benefits for aviation and society as a whole,
- Continue the awareness and outreach activities on SESAR directly with stakeholders and at European and global events/conferences to promote SESAR results, raising awareness and securing European and global stakeholders' commitment,
- Promote SESAR as an integral part of the 'day-to-day' air transport and ATM domain, both in Europe and globally,
- Enhance the arrangements of the SESAR JU with its Members.

To meet these objectives, the SESAR JU will carry out the following activities:

- Promote and market the SESAR brand, the benefits that can be realised through SESAR Solutions and the availability of industrial products to deliver results in international fora, both in Europe and other regions including ICAO,
- Create and disseminate appropriately targeted printed materials and digital communications in general and as needed based on SESAR 2020 project results and specifically in relation to the events listed below,
- Provide effective press and media outreach.

The following table provides an overview of the major events and conferences in 2020 where SESAR will invest significant resources. However, please note that various other conferences and events organised by the EU, European and international stakeholders may require SESAR JU participation with speakers, workshops or exhibition stands.

EVENT NAME	LOCATION	DATE	ORGANISER	COMMENTS
World ATM Congress	Madrid	10-12 March 2020	CANSO/ATCA	Walking tours and theatre presentations
Berlin Air Show (incl. AERODays)	Berlin	13-17 May 2020	BDLI	Exhibition stand and possibly speaking interventions
SESAR Innovation Days	(to be confirmed)	Q4 2020	SESAR JU	A week-long conference with exhibition, networking and other activities (e.g. poster pitches, site visits to industry, etc.)
SESAR Showcase (to be confirmed)	(to be confirmed)	Q4 2020/Q2 2021	SESAR JU	A showcase of SESAR 2020 results
TRA2020 (to be confirmed)	Helsinki	27-30 April 2020	European Commission & Finnish Transport Ministry	Speaking opportunities and space on the European Commission's stand
Events in collaboration with institutional and stakeholder partners (up to 4)	Brussels	Q1-Q4 2020	Brussels	Exhibition and/or workshops to promote the value of the public-private partnership approach and the results from SESAR to target stakeholder and institutional audiences

Table 23: Key events and conferences for SESAR JU

The following represents the publications/digital communications/on-line communications and communications coordination currently foreseen for 2020:

Publications	When
Application of SESAR 2020 visual identity (print material: posters, visual graphics)	Q1-Q4 2020
2020 SESAR innovation pipeline - R&D highlights	Q1 2020
SESAR Solutions Catalogue – 4 th edition	Q4 2020
U-space brochure	Q1 2020
Exploratory research results brochure - 2 nd edition	Q2 2020
Various brochures/factsheets on SESAR JU R&D (e.g. performance, environment, solutions, results)	Q1-Q4 2020
Digital communication	When
2020 highlights	Q4 2020
Digital tools (incl. VR, AR and gaming)	Q1-Q4 2020
Digital media interviews with members and stakeholders (e.g. vox pops)	Q1-Q2 2020

Social media messaging	Q1-Q4 2020
Videos (e.g. U-space)	Q1-Q4 2020
Online communication	When
E-news (Interviews and project news)	10 e-news per annum
Contributions to external magazines	12-16 articles per annum
Press relations	Q1-Q4 2020
Social media campaigns	Q1-Q4 2020
Communications coordination	When
Review SESAR 2020 project plans and activities	Q1-Q4 2020
Organise WebEx and face-to-face meetings with the Communications Coordination Group	Q1-Q4 2020

Table 24: Main publications and communication activities in 2020

2.5.2 Dissemination of information about projects results

The SESAR JU will systematically collate and disseminate data from completed and ongoing projects with the aim of obtaining a comprehensive view of the progress achieved in each financed project against targets outlined in the SESAR JU's annual and multi-annual work plans. Such data collection will enable a holistic view of SESAR 2020 activities and their impact. Output from projects, such as standardisation material, publications and patents, will be made available on the SESAR JU website (either via uploaded documents or links to relevant websites) as well as direct dissemination of material to the appropriate bodies in support of the preparation for deployment. Information on H2020 calls for proposals and projects will continue to be made available through the H2020 portal and other H2020 reporting mechanisms. In addition, the SESAR JU will continue to publish and promulgate SESAR Solutions once available and validated through the Release process.

The SESAR 2020 Programme will comply with all provisions of the H2020 programme. However, while ER and VLD Open projects will comply with all the provisions of the H2020 work programme Annex L related to open access to research data, IR and VLD projects receiving co-financing following restricted calls for proposals defined in Section III, point 2.6.1.1.3 may decide to opt out of these provisions in order to protect results that are expected to be commercially or industrially exploited and/or to protect the project's main aim, as explained in Section II, sub-paragraphs 2.4.1 and 2.5.1. In addition, the justification for project-by-project opt-out by IR and VLD projects can be further reinforced due to the complementary nature of co-financed projects; meaning that their results, including the research data, shall be published and accessible as SESAR Solutions, rather than individual project-by-project results and/or research data. The publication of SESAR Solutions is coordinated and carried out by the SESAR JU.

2.5.3 International Affairs

The SESAR JU will continue to engage actively with key international partners in support of global interoperability and harmonisation. At global level in relation to ICAO, the SESAR JU will maintain its active participation and collaboration under the leadership of the European Commission, in particular through participation in the newly-established ICAO GANP Study Group which will oversee the future evolution of the GANP, following up on the outcome of the 40th ICAO General Assembly. The alignment between the ICAO GANP, the ATM Master Plan and the SESAR 2020 Programme is essential

to de-risk development towards deployment. The SESAR JU will in this respect continue to coordinate in the European ICAO ATM Coordination Group under the European Commission's chair.

The close collaboration with the U.S. FAA and its NextGen programme will continue and be reviewed in conjunction with the European Commission to take account of changing priorities and emerging issues, in particular in view of future ATM research needs. Priorities for the collaboration will be set by the Executive Committee (EXCOM) under the EU-U.S. MoC, chaired on the European side by the Commission. The focus will nevertheless remain on identifying and mitigating international harmonisation and global interoperability risks.

The existing cooperative arrangements with other international partners covering the ATM domain, whether of the SESAR JU or at the level of the European Commission or European Union, will be further enhanced during 2020 as the SESAR Solutions evolve and are being deployed. This includes arrangements with Georgia, Japan, Qatar, or Singapore. The SESAR JU will also work closely with the European Commission and other SESAR Members to identify and leverage opportunities to extend and deepen international collaboration, including under EU technical cooperation projects with China, Latin America, South Asia and South East Asia. In doing so, the SESAR JU will follow closely the policies of the EU and the needs of the EU Aviation Strategy and of the SES framework.

2.5.4 Indicators and measurements applicable for the Strategic Area of Operation 5

The outcome of these activities will be measured according to the metrics indicated in the 2015-2020 Communications Strategy (e.g. level of participation of stakeholders, website analytics, social media analytics, etc.).

Objectives	Indicators	Target for 2020
Strengthen global interoperability activities aligned with the European Commission's expectations, especially towards ICAO in close collaboration with U.S. FAA/NextGen and other ATM modernisation initiatives	Coverage of GANP ASBU modules aligned and agreed with NextGen. Transparent progress steps towards agreed interoperable and harmonised timelines between SESAR and Next Gen,	Active participation in GANP working group
Strengthen links towards Standards Making Organisations like EUROCAE, RTCA etc. with the involvement of SESAR JU Members and the availability of SESAR material in support of standardisation	Alignment of priorities in standards developments with the ATM Master Plan and SESAR 2020 needs	Well aligned and supporting roadmaps relevant for standards among SESAR, SMO's, international bodies and ICAO
		SESAR JU active participation in EASCG, the EUROCAE Council and TAC to ensure alignment of the work programmes
		SESAR Member/Project contribution to standards development groups
Strengthen dissemination of SESAR Solutions/ demonstrations/ER activities and results through SESAR	SESAR dissemination and demonstration events <hr/> SESAR participation to relevant ATM events	See above in Table 23

Objectives	Indicators	Target for 2020
publications, workshops and communications events	SESAR publications	See above in Table 24
Active cooperative arrangements with all European (Member States and Regions), international actors and other modernisation initiatives in aviation relating to SESAR Definition and Development phases	Active cooperative arrangements or agreements with European (Member States and Regions) actors	Actors and initiatives to be addressed as priority: <ul style="list-style-type: none"> - NAAs - ACI - Clean Sky JU - EASA - EDA - ESA - EUROCAE - PSOs
	Active cooperative arrangements or agreements with international actors and other ATM modernisation initiatives	Actors and initiatives to be addressed as priority: <ul style="list-style-type: none"> - ICAO (see also the above-mentioned objective for year 2020 in relation with GANP) - China - Qatar - Singapore - USA (FAA)

Table 25: Objectives, indicators and targets for SESAR Outreach in 2020

2.6 Strategic Area of Operation 6 (transversal activity): Deliver effective financial, administrative and corporate management

This chapter outlines the activities that will be carried out to deliver the objectives of the SESAR JU related to financial, administrative and corporate management. These objectives are summarised in sub-paragraph 2.6.10 and are associated with relevant indicators and 2020 targets.

2.6.1 Calls for proposals and grant management

Article 189 of the Regulation (EU, Euratom) 2018/1046 provides that: ‘Grants shall be awarded following a publication of calls for proposals, except in the cases referred to in Article 195’.

The following activities are scheduled to take place during 2020 in relation to the calls for proposals mentioned earlier in this document⁵⁸:

- Managing grant agreements and execution of payments in accordance with the financial circuit for the grant agreements within the H2020 set of rules where reporting periods become due and/or projects close their work and final payment is due, namely:
 - The last IR-VLD Wave 1 grants resulting from the call for proposals with reference H2020-SESAR-2015-2, which includes the closure of the grants,
 - The IR-VLD Wave 2 grants resulting from the call for proposals with reference H2020-SESAR-2019-1; this includes the execution of the grant budget amendment procedure as described in the SESAR JU Annual Work Programme 2016 and complemented by the grants budget amendment procedure for adjustment of maximum grant budget amount and associated EU contribution⁵⁹. This procedure is further detailed in the Annual Work Programme 2016 and is now fully documented in an SESAR JU document entitled ‘Specific Amendment Procedure based on Budgetary Grounds – SESAR 2020 IR-VLD Wave 1’, dated December 2016,
 - The ER4 grants resulting from the call for proposals with reference H2020-SESAR-2019-2,
- Managing grant agreements and execution of payments in accordance with the financial circuit for the grant agreements within the CEF set of rules⁶⁰ where reporting periods become due and/or projects close their work and final payment is due, namely the U-space grants (resulting from the call for proposals with reference CEF-SESAR-2018-1). This includes the closure of the grants,
- Launching, evaluating, awarding, preparing and signing grant agreements, and managing the grant agreements of two calls for proposals within the H2020 set of rules, the conditions of which are defined in points 2.6.1.2 and 2.6.1.3 below:

⁵⁸ In accordance with Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in ‘Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)’ (OJ L 347, 20.12.2013) only applies to Horizon 2020 funding.

⁵⁹ SESAR JU Annual Work Programme 2016 Amendment n.1, pages 35-36.

⁶⁰ In accordance with Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010 Text with EEA relevance (OJ L 348, 20.12.2013, p. 129–171).

- The VLD Open 2 call for proposals (with reference H2020-SESAR-2020-1),
- The restricted call for proposals for IR-VLD Wave 3 (with reference H2020-SESAR-2020-2), depending on the availability of funds released from earlier IR and VLD Waves by the SESAR JU Members other than the Union, and on the outcome of the IR-VLD Wave 2 call in 2019.

2.6.1.1 General conditions for the two H2020 calls for proposals to be launched in 2020

The provisions of this point have been established in accordance with Council Regulation (EU) No 721/2014 of 16 June 2014⁶¹, recital 16, and Article 5(m), Article 9 (paragraph 1) and Article 10 of the Statutes of the JU, and with Article 25 of the Horizon 2020 Framework Regulation⁶². In line with these legal texts, ‘public-private partnerships shall make public funds accessible through transparent processes and mainly through competitive calls, governed by rules for participation in compliance with those of Horizon 2020’ (Horizon 2020 regulation Article 25). Exceptions to the use of competitive calls should be duly justified. The SESAR JU shall financially support research and innovation actions through grants awarded as a result of calls for proposals in accordance with the Horizon 2020 Rules for Participation⁶³.

In light of this, and considering that by the end of the duration of the H2020 financial framework, the entire financial contribution to the SESAR JU shall be allocated by the EU, the SESAR JU will publish two calls for proposals in 2020 (with references H2020-SESAR-2020-1 and H2020-SESAR-2020-2). For these H2020 calls for proposals, the SESAR JU will comply with all provisions of the H2020 Work Programme 2018-2020⁶⁴ part 19. General Annexes, under the conditions defined in the following sub-points. These General Annexes are complemented by conditions specific to the two aforementioned calls for proposals which are set out in points 2.6.1.2 and 2.6.1.3 respectively.

2.6.1.1.1 List of countries, and applicable rules for funding

Part A of the General Annexes to the *Horizon 2020 Work Programme 2018-2020* applies with specific additional provision to cases in which the SESAR JU, upon specific advice of independent experts evaluating the proposals on a case-by-case basis, deems participation of the entity essential for carrying out the action funded through Horizon 2020. This means in particular for SESAR when the following apply:

- The non-EU country concerned has signed at least one aviation agreement with the European Union,
- The participation of the entity concerned adds value to SESAR 2020 and to the European Union actions. Such added value shall be assessed on the basis of the following elements:

⁶¹ Council Regulation (EU) No 721/2014 amending Council Regulation (EC) No 219/2007 of 27 February 2007 on the establishment of a Joint Undertaking to develop the new generation European air traffic management system, modified by Council Regulation (EC) No 1361/2008 (SESAR JU constituent act) (OJ L 64, 2.3.2007, p. 1).

⁶² Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC (OJ L 347, 20.12.2013, p. 104).

⁶³ Regulation (EU) No 1290/2013 of the European Parliament and the Council of 11 December 2013 laying down the rules for participation and dissemination in ‘Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020) and repealing Regulation (EC) No 1906/2006 (OJ L 347, 20.12.2013, p. 81).

⁶⁴ The H2020 Work Programme 2018-2020 was adopted on 27 October 2017 and published on the Funding and Tenders Portal (European Commission Decision C(2017)7124 of 27 October 2017).

- Operational and technical continuity of European airspace (in particular in, but not limited to, the context of Functional Airspace Blocks – FABs) mainly concerns countries which have signed the European Common Aviation Area (ECAA) Agreement and Iceland, Morocco, Norway and Switzerland. These countries are part of the SES and therefore they should be fully part of SESAR,
 - Technological partnerships mainly concerns countries that participate in Research Framework Programmes, and that are natural technological partners of Europe; Organisations or undertakings around the world which have a technological partnership with European industry should also be considered in this category, in order to promote global interoperability,
 - Market access mainly concerns emerging countries which will need to invest in new technologies; These countries represent considerable market opportunities for the European aviation industry,
 - Competence/expertise of the non-EU country entity,
 - Access to research infrastructure, to particular geographical environments and to data.
- A programme equivalent to SESAR exists in the non-EU country and reciprocity in terms of access for the European industry to equivalent funding possibilities is an absolute necessity.
 - The transfer of technological know-how should benefit European society in terms of building European technological competence and creating jobs in Europe. Transfers of know-how to non-EU country members should be managed by the European members.

As noticed in the General Introduction of Horizon 2020 Work Programme 2018-2020, it should be noted that until the United Kingdom leaves the EU, EU law continues to apply to and within the United Kingdom, when it comes to rights and obligations; this includes the eligibility of United Kingdom legal entities to fully participate and receive funding in Horizon 2020 actions such as those called for in this work programme. Please be aware however that the eligibility criteria must be complied with for the entire duration of the grant. If the United Kingdom withdraws from the EU during the grant period without concluding an agreement with the EU ensuring in particular that British applicants continue to be eligible, they will no longer be eligible to receive EU funding and their participation may be terminated on the basis of Article 50 of the grant agreement.

2.6.1.1.2 Standard admissibility conditions

All proposals must comply with the conditions set out in the Rules of Participation and to the provisions of the H2020 Work Programme 2018-2020, Part 19. General Annexes, section B. ‘Standard admissibility conditions, page limits and supporting documents’.

The topic description used as reference is provided in the paragraph entitled ‘Activities covered by this call for proposals’ of the respective call below.

2.6.1.1.3 Eligibility conditions for grant proposals and related requirements, specific provisions and funding rates

Please refer to H2020 Work Programme 2018-2020, Part 19. General Annexes, sections C. ‘Standard eligibility conditions’ and D. ‘Types of action: specific provisions and funding rates’.

Types of actions considered under the aforementioned calls for proposals are:

- Research & innovation actions (RIA),

- Innovation actions (IA).

Funding rates depend on the type of action and, for Innovation actions, on the type of entity applying.

Furthermore, the SESAR JU will distinguish between two types of calls for proposals (open and restricted) and grant agreements with specific eligibility conditions:

- Open, competitive calls for proposals that, pursuant to Article 9.5 of H2020 Rules for participation (Regulation (EU) No 1290/2013), will be addressed to any eligible entity;
- Restricted calls for proposals that will limit the type of beneficiary to the SESAR JU Members other than the Union (listed in Annex XI).

The type of the 2020 calls for proposals is indicated in sub-point 'Eligibility conditions' for each call under specific conditions below.

2.6.1.1.4 Evaluation rules

Please refer to H2020 Work Programme 2018-2020, Part 19. General Annexes, section H. 'Evaluation rules'. The full evaluation procedure is described in the relevant guide published on the Funding and Tenders Portal.

Use of internal experts for the evaluation

Moreover, the SESAR JU will make use of internal experts for the evaluation. Indeed, the SESAR JU was established by its constituent act as a body that has its own technical expertise and competence in the domain of ATM, and that is responsible for coordination with regard to content and across a wide programme of grants awarded to both members and other beneficiaries, enabling a 'pipeline of innovation' and securing the delivery of operational procedures and technologies leading to performance improvements for SES. The skills needed to undertake this specificity are formalised in the Organisation Chart included as Annex X to this SPD and the staffing that includes ATM and programme experts is in accordance with the Human Resources Policy (Annex IV). These uniquely skilled and accountable SESAR JU expert staff and secondees (collectively referred to as '*intramuros*' staff) are then used to complement external independent experts and independently assess proposals and/or deliverables and reports, always subject to the confirmation of no conflict of interest. To ensure appropriate external scrutiny for calls for proposals, the SESAR JU will ensure that each proposal is evaluated by a minimum of three external independent experts selected from the H2020 database (i.e. following the H2020 call for experts, published in the *Official Journal of the EU* on 22 November 2013), and are secured using the appropriate IT tools. The SESAR JU may decide to complement this number with up to one additional internal expert per proposal.

The SESAR JU shall ensure that independent external experts are involved in all stages of the evaluation procedure and will also appoint an independent external observer to ensure that due process is respected and lessons learnt are captured to continuously improve the procedures.

Regardless of the internal or external nature of experts, the SESAR JU shall always ensure absence of conflict of interest for all experts involved in the process by means of a specific declaration signed by each expert before having access to the proposals.

Evaluation in light of selection criteria

Provisions set out in section H. of the *Work Programme 2018-2020* on financial capacity and operational capacity apply.

Evaluation in light of award criteria

Award criteria are specifically defined for each call for proposals and therefore are indicated in the sub-point 'Award criteria' within each call specific conditions. Provisions set in these sub-points comply with the general conditions set out in the aforementioned section of the annex to Work Programme 2018-2020.

2.6.1.1.5 Budget flexibility

Please refer to the *Horizon 2020 Work Programme 2018-2020*, Part 19. General Annexes, section I. 'Budget flexibility'.

2.6.1.1.6 Actions involving financial support to third parties

Please refer to the *Horizon 2020 Work Programme 2018-2020*, Part 19. General Annexes, section K. 'Actions involving financial support to third parties'.

2.6.1.1.7 Conditions related to open access to research data

Please refer to the *Horizon 2020 Work Programme 2018-2020*, Part 19. General Annexes, section L. 'Conditions related to open access to research data'.

However, for the same reasons as explained in sub-paragraph 2.5.2, IR and VLD projects under restricted calls for proposals (as defined above in sub-point 2.6.1.1.3) may decide to opt out of the provisions of said annex. This opt-out would aim to protect results that are expected to be commercially or industrially exploited and/or to protect the project's main aim⁶⁵ to contribute to a programme, comprising of two or more projects, which jointly contribute to the delivery of one or more SESAR Solutions.

2.6.1.1.8 Complementarity of grants

In addition, and as already used in the call for proposals H2020-SESAR-2015-2 restricted to SESAR JU members that are not the Union, and in the call for proposals H2020-SESAR-2019-1, the grants awarded may include the possibility of enabling the options regarding 'complementary grants' of the SESAR JU Model Grant Agreement for Members (MGAM) and the SESAR JU Model Grant Agreement (MGA) in force at the time of the call as well as the associated provisions therein. This includes additional access rights to background and results for the purpose of the complementary grant(s) and will ensure that the complementarity of the activities performed in the calls are coordinated in the wider interest of the SESAR JU in its role in coordinating research and of the SESAR 2020 Programme, as it is independent from the direct interests of the beneficiaries. This approach is consistent with the partnership established under the SESAR JU membership agreement. In this respect, the SESAR JU may implement the 'complementary' concept between calls launched in different years if deemed necessary for the overall achievement of the objectives of the IPs and/or CCAs.

2.6.1.1.9 Consortium agreement

The legal entities wishing to participate in a project may form a consortium and appoint one of its consortium members to act as its coordinator depending on whether other partnering arrangements

⁶⁵ In line with General Annexes, Annex L, second paragraph, points (a) and (d) of the of the Horizon 2020 Work Programme 2016-2017.

exist at SESAR JU membership level and whether they are deemed suitable by the applicant. Consequently, applications from SESAR JU Members shall submit a coordinated proposal but are not required to conclude a Consortium Agreement, in accordance with Article 24 (2) of the Rules of Participation. In other cases, entities wishing to participate in a project shall conclude a Consortium agreement among themselves prior to the signature of a grant agreement.

2.6.1.2 Specific conditions for the VLD Open 2 call (with reference H2020-SESAR-2020-1)

The role of Very Large-Scale Demonstrations (VLDs) is to bridge the Research & Innovation with deployment, and not to replace either type of activity. VLDs use early versions of end-user systems and include the integration of new technology elements into existing systems when needed and when possible. In many cases, Airspace Users and/or other key stakeholder participation to VLDs is essential to achieve the goals of the demonstrations and secure stakeholder commitment to deployment.

As Very Large-Scale Demonstrations are primarily designed to help bridge the gap between the development and deployment phases, they are at the border in terms of maturity transition from the Industrial Research & Validation and the industrialisation and to the subsequent deployment. As such, they will mostly derive from work matured through an earlier phase of Industrial Research & Validation while taking the opportunity to trial innovation close to the market to help secure a short time to market.

The VLDs described in this section are either stand-alone or follow on projects, they are not being established to complement the VLDs in the IR-VLD Wave 2 or 3 call. The VLDs described here may also be a vehicle to promote SESAR Solutions outside Europe and contribute to global de-carbonisation/fuel efficiency.

Candidate projects should have the possibility to address one or more topics described in sub-point 2.6.1.2.4.

These call conditions will be further defined in the call specifications during the course of 2020.

2.6.1.2.1 Call identifier

This open call for proposals has the call reference H2020-SESAR-2020-1.

2.6.1.2.2 Indicative call timetable

Publication date	Q1 2020
Opening date	Q1 2020
Final date for submission	Q2 2020
Information on the outcome of the evaluation	Maximum 5 months from the final date for submission
Signing of grant agreements	Q4 2020

Table 26: Indicative timetable for the VLD Open 2 call with reference H2020-SESAR-2020-1

2.6.1.2.3 Indicative call budget

The maximum indicative budget for this call is estimated at EUR 19.551.361, which includes the amount of EUR 19.300.000 initially planned and the unused appropriations of EUR 251.361 from the VLD Open 1 call (with reference H2020-SESAR-2016-2) remaining after the award of grants.

Commitment (indicative)	Payment (indicative)
In 2020: EUR 19.551.361	In 2020: EUR 3.860.000 In 2021: EUR 5.230.454 In 2022: EUR 5.230.454 In 2023: EUR 5.230.453

Table 27: Indicative budget for the VLD Open 2 call with reference H2020-SESAR-2020-1

2.6.1.2.4 Activities covered by this call for proposals

The Demonstration activities within this call for proposals were defined using the priorities set out in the European ATM Master Plan and in particular the Essential Operational Changes. The latter have been significantly consulted on during the ATM Master Plan update campaign at Master Planning Committee level but also as part of the formal consultation phase initiated at SESAR JU Administrative Board level.

The call content will be structured in a number of topics that contribute to at least one of the following key focus areas derived from the European ATM Master Plan:

- Airspace optimisation: initialisation of the ‘Digital European Sky demonstrators’ as defined in the Airspace Architecture Study Transition Plan⁶⁶ (topics 1 and 2),
- Safe integration of drones: demonstration of U-space capabilities and services to enable Urban Air Mobility (topic 3),
- Environment: demonstrating ATM operations mitigating aviation’s environmental footprint and significantly contributing to the reduction of CO2 emissions (topic 4).

Proposals for demonstrations received as a result of this call shall build upon the SESAR results that are publicly available through the SESAR Joint Undertaking and CORDA websites (including but not limited to the European ATM Master Plan, the Airspace Architecture Study and the SESAR Solution descriptions). These shall show a significant contribution towards bridging the gap between development and deployment.

The following sections describe the list of topics in relation to the key focus areas listed above.

List of Topics

The demonstration activities within this call for proposals shall cover one or several of the following topics:

Topic 1: Optimised use of Airspace

Considering traffic hotspots identified in the Airspace Architecture Study Transition Plan, activities should aim at demonstrating an optimised and coordinated organisation of airspace activations and

⁶⁶ The transition plan identifies key measures that need to be implemented in the very short term (2020 to 2025) in order to set in motion the transformation changes outlined in the Airspace Architecture Study. <https://ec.europa.eu/transport/sites/transport/files/2019-09-high-level-conference-future-of-ses-aas-transition-plan.pdf>

reservations, able to support optimised traffic flows in a free route environment as well as other uses of airspace (e.g. military). With the integration of Airspace Management, ATC, ATFCM and CDM processes, activities should demonstrate dynamic airspace configuration (i.e. a higher level of modularity and flexibility up to the execution phase), supported by automated tools. The dynamic airspace also requires the development of new ATS working methods supported by automation and new tools.

Activities should in particular consider the following scope:

- **Dynamic Airspace Configurations:** Improving the use of airspace capacity for both civil and military users by increasing the granularity and the flexibility in the airspace configuration and management within and across ANSPs' areas of responsibility. This concept addresses the integration of concepts and procedures to allow flexible sectorisation boundaries to be dynamically modified based on demand. This includes potential implications for ATCO licences, international boundaries and potentially IOP and A/G multi-datalink communication capabilities.
- **Delegation of air traffic services amongst ATSU's and capacity-on-demand arrangements:** The low resilience of the current system is in part due to the fact that it relies on the provision of local ATM services for a defined geographical area. When disturbances occur, the system cannot use remote services to mitigate the impact of a disturbance, while recovering and resuming normal operations, unless traffic can be re-routed via providers with spare capacity. The capacity-on-demand service aims to ensure the continuity of air traffic service provision despite disruptions. It goes beyond the current static arrangements for the cross-border delegation of ATS. The aim is to ensure the continuity of air traffic services by more dynamically enabling a temporary delegation of the provision of air traffic services to an alternate centre with spare capacity arrangements for the cross-border delegation of ATS
- **Gradual transition towards higher levels of automation:** Automation support for controllers to enable the provision of ATC without the need for sector specific training and rating. Controller training and licensing to be based on traffic complexity, instead of on sector specificities.

Topic 2: Integrated Trajectory Management

The objective of this VLD is to demonstrate, in a consolidated and integrated manner, the real time synchronisation of trajectory information between all involved ground and air stakeholders.

This shall include trajectory-based operations that include the management of trajectories focussing on the flight needs in four dimensions through the lifecycle of planning, execution and post-flight analysis. The aim of demonstrating Trajectory Based Operation (TBO) is to show that when used as described in SESAR and ICAO an improved performance of air traffic operations and an increased overall predictability of the air traffic system are achieved. The 4D Trajectory (4DT) information set encompasses relevant trajectory flight data, including latitude, longitude, altitude and time and is available in different formats and in different parts of the ATM system (airborne, network, ANSP).

Activities should in particular consider the following scope:

- **Air/ Ground Trajectory Information Sharing:** The airborne trajectory prediction performed by the Flight Management System (FMS) takes into account flight performance data that are

updated in real time during the execution phase, such as descent planning information, aircraft weight, and the most updated temperature and wind predictions. This feature allows the downlinking of data based on the airborne trajectory prediction using the Extended Projected Profile (EPP), as defined by the Aeronautical Telecommunications Network Baseline 2 (ATN B2). The downlinked data is used by the ground systems to enrich their trajectory prediction.

- **eFPL supporting SBT transition to RBT:** The distribution of eFPL information to ATC systems, and at the possible improvements of the alignment of AUs' and NM's trajectories especially concerning the use of PTRs and Standard Instrument Departure (SID)/Standard Arrival Route (STAR) allocation.
- **Enhanced integration of AU trajectory definition and network management processes:** The objective of this feature is to reduce the impact of ATM planning on Airspace Users' costs of operations, by providing a better access to ATM resource management and allowing them to better cope with ATM constraints. This shall improve Airspace Users flight planning and network management through improved FOC participation into the ATM network collaborative processes in the context of FF-ICE and its potential evolutions.
- **Enhanced Network Traffic Prediction and shared complexity representation:** This concept aims at improving the accuracy of the traffic prediction from the medium-term planning phase to its execution, relying in particular on new trajectory management features such as the preliminary FPL. It includes adapting existing methodologies and algorithms for demand prediction and regional complexity assessment.
- **ATM data service provision:** supporting the progressive shift to a new service delivery model for ATM data, through the establishment of dedicated 'ATM data service providers' (ADSPs). The ATM data services make the data and applications required available to provide ATS and include flight data processing functions like flight correlation, trajectory prediction, conflict detection and conflict resolution, as well as arrival management planning. These rely on underlying integration services for weather, surveillance and aeronautical information. The maximum scope of service delivery by ADSPs covers the ATM data services (such as flight data processing) needed to realise the virtual de-fragmentation of European skies and includes the provision of AIS, MET and CNS services.

Topic 3: U-space capabilities and services to enable Urban Air Mobility

Urban Air Mobility (UAM) refers to the provision of mobility services in an urban environment using air vehicles. These vehicles encompass everything from manned helicopters, as currently flown, through small inspection and delivery drones to 'flying taxis', with or without a pilot. As this important and growing domain evolves, it is clear that new operational concepts, regulations and standards will be needed, underpinned by existing and new technologies. The whole environment will need to integrate safely with manned aviation and air traffic control.

SESAR's ongoing Exploratory Research (ER) programme into U-space is conducting detailed research into U-space in the Urban environment, and this VLD complements this by conducting flying demonstrations to demonstrate and test developments in UAM. Coordination between this VLD and the ongoing ER projects is an essential requirement. The results of the VLD will help to refine the safety, performance, standardisation and regulatory requirements to enable UAM.

Topic 4: Environmental sustainability

This VLD aims at demonstrating ATM operations mitigating aviation's environmental footprint and significantly contributing to the reduction of CO₂ emissions. Applicants are invited to demonstrate 'zero CO₂ waste' trajectories and to explore the possibilities for protecting green flights from unnecessary deviations or constraints.

Activities should in particular consider the following scope:

- Protect green flights: in the context of the best equipped – best served concept, prioritising low-emission aircraft (at airport, en-route or network level) in terms of trajectory, has the potential of accelerating the market uptake of green aircraft.
- 'Zero CO₂ waste' trajectories: this includes enabling aircraft to fly the most fuel efficient and environmentally efficient trajectories. Beyond the traditional Improvement of climb/descent profiles and performance-based navigation, the 'zero CO₂ waste' challenge consists in designing the 'perfect flights' from an emission perspective, then, during the execution, in eliminating all possible ATC interferences (with the perfect trajectories) that would result in a degradation of the optimum and thus would generate extra emissions.
- Synergies with promising decarbonisation initiatives: projects are encouraged to find synergies with promising initiatives (such as alternative fuel, electrification, etc.) as well as other EU initiatives (such as Clean Sky) that when combined with appropriate ATM measures could result in a significant decrease of emissions.

2.6.1.2.5 Expected results

The demonstration activities will aim at bridging the gap between development and deployment by accelerating market uptake of the next generation SESAR capabilities and services and serve as an acceleration platform for 'early movers'. Demonstrators shall include testing in live environment of concepts, services and technology supporting the achievements of the objectives outlined in the European ATM Master Plan. Projects should be focused at building confidence from the supervisory authorities and operational staff by building further performance and safety evidence.

For topics 1 and 2 alignment and complementarity with the measures foreseen in the Airspace Architecture Study Transition Plan are particularly sought after and need to be demonstrated taking due consideration for the role and task of the Network Manager as defined by Implementing Regulation (EU) 2019/123⁶⁷.

2.6.1.2.6 Duration and key milestones

The awarded projects should be starting to prepare the demonstration activities in Q3-Q4 2020 and shall end by no later than 31 December 2022. Only submitted applications for actions respecting that maximum end date shall be eligible.

⁶⁷ Commission Implementing Regulation (EU) 2019/123 laying down detailed rules for the implementation of air traffic management (ATM) network functions and repealing Commission Regulation (EU) No 677/2011 (OJ L 28, 31.1.2019, p. 1).

2.6.1.2.7 Budget-to-Scope allocation

Only submitted applications for actions with a total requested EU contribution superior or equal to EUR 1.500.000 and inferior or equal to EUR 4.000.000 shall be eligible.

2.6.1.2.8 Funding rate

In accordance with preamble (24) and Article 28(3) of the H2020 Rules for Participation, eligible costs of Innovation Actions (IAs) will be reimbursed according to a single reimbursement rate of 70%.

General conditions for the eligibility of costs are set in accordance with Article 26 of the H2020 Rules for Participation and Article 6 of the Model Grant Agreement.

Only equipment depreciation costs are eligible under this call for proposals. Costs related to the purchase of equipment are not eligible under this call for proposals.

2.6.1.2.9 Complementary grants

Complementarity with projects funded under call H2020-SESAR-2019-1 may be specified and activated once the call is published.

2.6.1.2.10 Eligibility conditions

For the VLD Open 2 call, this information is conform to the general conditions set out in point 2.6.1.1 above.

Additional eligibility conditions are indicated in sub-points 2.6.1.2.6 'Duration and key milestones' and 2.6.1.2.7 'Budget-to-Scope allocation' in order to:

- ensure that the projects co-financed under this call for proposals will be finalised by the final end date for projects conducted under the Horizon 2020 programme, i.e. by 31 December 2022,
- ensure the possibility to award multiple topics and avoid receiving a single proposal requesting a substantial part or total budget of the call.

2.6.1.2.11 Award criteria

Type of Actions	Excellence	Impact	Implementation
	<i>The following aspects will be taken into account in order to assess the extent to which the proposed work corresponds to the topic description</i>	<i>The following aspects will be taken into account in order to assess the extent to which the outputs of the project should impact at European and/or International level</i>	<i>The following aspects will be taken into account in order to assess the quality and efficiency of the implementation</i>
Innovation Actions (IAs)	1. Clarity and pertinence of the proposal: degree to which the objectives, scope, problem statement and requirements defined in the Technical Specifications are well	1. Impact on performance: degree to which the proposal is appropriate for bridging from R&I (i.e. identified Solutions) to deployment in generating buy-in and contributing to achieve the	1. Coherence and effectiveness of the Project Management Plan: degree to which the proposed plan is adequate (Compliance with Execution Guidance is required) including extent to which the resources

	<p>understood and fully addressed.</p> <p>2. Feasibility and adequacy of the proposed methodology: degree to which the proposed methodology is feasible and adequate to undertake the action.</p> <p>3. Level of awareness of the state-of-the-art: degree to which the proposal demonstrates knowledge of current operations and relevant previous R&D work (both in and outside of SESAR) and explains how their proposed work is beyond the state of the art, and demonstrates innovation potential.</p>	<p>performance benefits outlined in the European ATM Master</p> <p>2. Appropriateness of the contribution to standardization and regulation: the proposal demonstrates that the project will adequately contribute to the relevant standardization and regulatory activities (when relevant).</p> <p>3. Quality of the proposed measures to:</p> <ul style="list-style-type: none"> - Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. - Communicate the project activities to different target audiences 	<p>assigned to work packages are in line with their objectives and deliverables.</p> <p>2. Appropriateness of the management structure and procedures: degree to which the proposed management structure are appropriate, including complementarity of the participants within the Project.</p> <p>3. Appropriateness of the technical expertise: degree to which the technical expertise is appropriate for undertaking the proposed tasks (including quality of the CV of the proposed project manager) and for ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.</p> <p>4. Adequacy of the budget: Consistency between the proposed activities, the expected results and the estimated budget</p>
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Table 28: Award criteria for the VLD Open 2 call with reference H2020-SESAR-2020-1

The scoring scheme used to evaluate each criterion will be on a scale ranging from 0 to 5 with decimal points being valid. Pass thresholds per criterion and overall are established in the table below:

	Excellence	Impact	Implementation
Weight (%)	40	30	30
Threshold per criteria (n/5)	3	3	3
Overall Pass Threshold (%)	70		

Table 29: Scoring scheme and thresholds for the VLD Open 2 call with reference H2020-SESAR-2020-1

2.6.1.3 Specific conditions for the IR-VLD Wave 3 call for proposals (with reference H2020-SESAR-2020-2)

2.6.1.3.1 Call identifier

This restricted call for proposals has the call reference H2020-SESAR-2020-2.

2.6.1.3.2 Indicative call timetable

Publication date	Q1 2020
Opening date	Q1 2020
Final date for submission	Q2 2020
Information on the outcome of the evaluation	Maximum 5 months from the final date for submission
Signing of grant agreements	Q4 2020

Table 30: Indicative timetable for the IR-VLD Wave 3 call for proposals with reference H2020-SESAR-2020-2

This timeline enables the launch into execution of the Wave 3 IR-VLD projects during Q1 2021 and the development and delivery of Wave 3 SESAR Solutions during the years 2021 and 2022.

2.6.1.3.3 Indicative call budget

The maximum budget for this call is dependent on:

- The already known unused budget of the Wave 1 call (released through the last grant budget amendment procedure in 2018, i.e. EUR 8.071.487) and Wave 2 call (amount not awarded in 2019, i.e. EUR 4.267.168), amounting to EUR 12.338.655 in total,
- The outcome of the IR-VLD Wave 2 call by the end of 2019 and the total amount of grants awarded compared to the maximum budget of the Wave 2 call, still to be determined,
- The availability of funds released from earlier IR-VLD Wave 1 by the participating SESAR JU Members, that will be determined in the first half of 2020 with the final payments related to the grant agreements of nineteen Wave 1 projects.

The objective is to make available the maximum budget possible for the call in order to cover the widest scope of technical activities as described in paragraph 2.6.1.3.4. Other unknown decision factors related to the future of SESAR JU may need to be taken into account to determine the exact maximum budget allocated to the Wave 3 call.

The maximum indicative budget for this call is EUR 30 million.

Commitment (indicative)	Payment (indicative)
In 2020: maximum EUR 30.000.000	The amounts of payments are to be determined based on the exact amounts of grant agreements. In 2020: pre-financing payments In 2023: final payments

Table 31: Indicative budget for the IR-VLD Wave 3 call for proposals with reference H2020-SESAR-2020-2

The signature of grants resulting from this call will be subject to the availability of budget at the time of grant award, preparation and signature, up to that maximum amount (see above the ‘signing of grant agreement’ in the indicative timeline for this call).

This restricted call for proposals relies on the arrangements co-financed by contributions from both the Industry members and EUROCONTROL through in-kind contributions as per the SESAR JU Membership Agreement, and in accordance with the H2020 regulation and the SESAR JU Financial Rules. The indicative allocation of funds appearing in sub-point 2.6.1.3.5 (Budget-to-scope allocation) aims at providing appropriate funding across the Key Features.

2.6.1.3.4 Activities covered by this call for proposals

The content of the Wave 3 has been defined in 2019 in compliance with the process as described in the SPD 2019-2021, Section II, sub-paragraph 2.4.3 and in the SPD 2018-2020, Section III, sub-paragraph 2.1.2.

The Wave 3 content will be structured in a number of topics that contribute to the following key objectives:

- Complete ATM Master Plan 2015 key R&D needs,
- Address gaps in R&D to cover the Airspace Architecture Study (AAS) and/or new needs following the update of the ATM Master Plan 2020,
- Complement the activities in the scope of Wave 2.

The following table presents a mapping between the W3 topics and their main contributions to the above-mentioned key objectives.

Wave 3 topic	Key objective	
Virtual Centre	AAS	Complement W2
Increased flexibility in ATCO rating	ATM MP	AAS
Collaborative U-space-ATM SWIM interface	ATM MP	
Automated air/ground data synchronisation	AAS	
Collaborative management of TMA & Airport throughput	Complement W2	ATM MP
Integrated Runway Throughput and Terminal Efficiency	Complement W2	
Downlinking Flight Trajectory to improve ATM performance	ATM MP	AAS

Table 32: Mapping between the IR-VLD Wave 3 topics and their main contributions to key objectives of the call

The following sections describe the list of Wave 3 topics and concept elements that might be covered by the call. The final technical content of the call will be defined taking also due consideration of the progress of the currently ongoing research (IR Wave 1 finalisation, IR Wave 2 ramp-up and ER) between the time of writing this SPD and the time of finalising the call technical specifications. The call will include RIA (Research and Innovation Actions) and IA (Innovation Actions).

The following topics might be considered in the Wave 3 call:

The topic '**Virtual Centre**' (RIA):

The SESAR Solution Space

The Virtual Centre concept consists of an innovative Virtual Centre architecture between a Virtual Centre ATSU and ATM Data Service Provider (ADSP), enabling that a volume of airspace can be controlled by one ATSU or another, e.g. depending on the availability of resources, or in order to provide service in the case of contingency. This topic addresses the automation and digitalisation concepts as referred to in the AAS as the 'capacity-on-demand' service. The topic covers:

- ATFCM aspects of airspace delegation amongst ATSUs, making it possible for two neighbouring ATSUs (including ATSUs within the same ANSP) that can deliver service over the same volume of airspace to have a common cross-border rostering scheme. FMP support tools will consider the availability of ATCOs at any given time in both ATSUs when proposing a change of sectorization. This topic should also investigate the cross-border use of the Dynamic Airspace Configurations (DAC) concept. The objective is to make it possible to apply the DAC concept in a volume of airspace that is partly controlled by one ATSU and partly controlled by another ATSU, thereby increasing the number of potential configuration.
- The topic shall also develop the required technical infrastructure to support the validation activities planned to be performed by Wave 2 solution PJ.10-W2-93 on the ATC aspects of airspace delegation amongst ATSUs and the validation activities required on the ATFCM aspects of airspace delegation amongst ATSUs.

Performance expectations

The Solution is expected to have a positive impact on:

- Defragmentation of service provision: The use of Virtual Centre Architecture leads to an efficient use of ANSP infrastructure that tackles the issues presented by fragmented European ATM systems and country-specific architectures, enabling Europe to move to an interoperable, cost-efficient and flexible service provision infrastructure,
- Interoperability: The Virtual Centre ATSU needs to interface with one or more data service providers or consumers. This is possible with a service-oriented approach with a focus on the technical services and common interfaces. By using standard interfaces, interoperability increases significantly,
- Sharing of infrastructure: By sharing development in an ADSP, multiples ATSUs could access to innovative functions more rapidly,
- Scalability: Open architecture guarantees the long-term upgradability and scalability of the solution, and its ability to consider future services required from other R&D activities,
- Network performance: The Virtual Centre Concept helps dynamically adapting to changes in capacity e.g. in case of contingency in an ATSU in order to ensure keeping network capacity at its optimum level
- Deployment oriented outcome: The solution supports the automation and digitalisation concepts in support of the Airspace Architecture Study (AAS) and provides a solid foundation to the next generation of ATM provision and related methodologies.

The topic '**Increased flexibility in the allocation of ATCO resources**' (RIA) covers two solutions:

The SESAR Solution Space

- Increased flexibility in ATCO validation

The SESAR solution aims at developing and validating an initial concept that aims at increasing the flexibility in the ATCO validation. The solution will allow ATCOs to be allowed to work in a larger geographical area, number of sectors or sector configurations than they do today, increasing the flexibility of the controller-licensing scheme and optimising ATCO qualifications for a higher number of airspace configurations. This will be achieved by reducing the number of effective hours required to maintain his/her validation for working at full capacity. The solution also covers other use cases such as the consolidation of sector-groups or ATC facilities at night or other periods of low demand.

- Generic Controller Validations

This solution represents a fundamental change of paradigm. The generic controller validations concept proposes to completely move away from the concept of controller unit endorsements. In order to achieve this goal, the geo-specific aspects of air traffic control would need to be removed as much as possible, and for those that remain adequate mitigations would need to be put in place to allow ATCOs to maintain a safe, orderly and efficient flow of air traffic in spite of having no local knowledge. The concept would allow an ATCO to work any airspace, anywhere, in Europe (or the world), whether managed with traditional sectors or without sectors, according to the flight-centric ATC concept, provided the controller held the appropriate operational validation for the position. This solution will make it no longer required that ATCOs work a minimum number of hours on a specific sector or flight-centric area for him or her to be able to provide air traffic control; instead, it is expected that there would be a generic currency requirement, so that controllers would need to exercise their operational validation for a minimum number of hours per period in order to stay current as controllers with the set of tools associated to their rating, rather than current in a specific geographical area.

Performance expectations

The Solution is expected to have a positive impact on:

- Scalability: The solution aims at increasing the flexibility in rostering enabling the allocation of controllers to where there is traffic demand within a single ANSP and/or across ANSPs (through the capacity-on-demand concept in the AAS, as well as the consolidation of ATC facilities during periods of low demand).
- Network performance: The increased flexibility in rostering delivered by the solution is expected to finally result in increased capacity with the same ATCO resources,
- Deployment oriented outcome: The solution is one of the cornerstones of the Airspace Architecture Study (AAS); it represents a first step in the Sector Independent Controller Validations, and will enable the partial deployment of the 'Capacity-on-demand' service as foreseen in the AAS.

The topic '**Collaborative U-space-ATM interface**' (RIA):

The SESAR Solution Space

The solution validates the exchange of UTM information through harmonised SWIM information services between various UTM stakeholders such as drone operators, UTM service providers, ATM service providers, data service providers, aeronautical data providers and authorities. U-space information exchanges have been defined and (partly) validated / demonstrated in various demonstration projects but could result in diverging implementations, due to the lack of a harmonised approach amongst these initiatives. This jeopardises an interoperable and seamless UTM service provision.

It is the objective of this solution to bring U1, U2 and U3 services to the level of SWIM candidate information services. In addition, the solution will validate those services required by Advance Services Collaborative interfaces with ATM. As such, the solution proposes an end-to-end approach from data availability to data usage with the objective of ensuring interoperability between U-space and ATM for avoiding airspace fragmentation.

Performance expectations

The Solution is expected to have a positive impact on:

- Defragmentation of service provision: Harmonised U1-U2-U3 services form the cornerstone of the CORUS architecture and will enable a true seamless airspace as envisioned by the Airspace Architecture Study, for all airspace users including drone operators, for all type of operations in all airspace area(s) (from ground to upper class E operations). The seamless provision of the needed information services between stakeholders of the airspace management (both ATM and stakeholders USSP) is also an essential step for supporting large-scale operations and cross-border operations of drones in Europe,
- Interoperability: The solution enables the seamless exchange of information between systems: interoperability is ensured through SWIM U-space information services whose design and implementation are aligned with the applicable SWIM standards, including the information service payload being traced against AIRM,
- Scalability: With Harmonised U1-U2-U3 SWIM U-space services, traffic demand from drone operators and the number of USSP can be accommodated through making the services independent (Service Oriented Architecture) from the infrastructure, and through scalable resources (platforms, clouds, etc.),
- Network performance: The solution contributes to enable high-density operations with multiple automated drones under the supervision of fleet operators,
- Deployment oriented outcome: Delivering validated and harmonised U1-U2-U3 SWIM U-space information services will accelerate the deployment of the U-Space roadmap in Europe.

The topic '**Enhanced automated air/ground synchronisation**' covers three solutions (RIA):

The SESAR Solutions Space

- Enhanced operations through advanced digital voice and datalink controller/pilot communications:

This solution covers the operational dimension of how advanced digital voice and datalink controller/pilot communications (as well as their interactions) can improve ATM operations. The operational environments of interest are en-route airspace above and below flight level 285, TMA, approach and airport surface for operations at the apron after push-back and on the manoeuvring area. The solution addresses the use of datalink for clearance delivery and start-up clearance while the aircraft is still at the gate (before push-back). Wide area communication shall be considered for both traditional ATC service based on geographical sectors (to support band-boxing of sectors beyond the coverage of single antenna, as well as consolidation of ATC facilities at periods of low demand) and for flight-centric (sector-less) ATC.

- Improved operational efficiency through automatic air/ground data synchronisation:

The solution addresses the automatic air-ground trajectory synchronization, which is a cornerstone of the SESAR vision, beyond what can be achieved with ATN B2. In the context of future operations, the solution addresses the 'single connection to ATC' concept, so that the flight-crew needs to connect to ATC just once, with this connection including both CPDLC (for exchange of clearances, requests, etc.) and ADS-C (for air-ground automatic synchronization), and automatic handover between ATSUs (and also between controllers in the same ATSU) for digital voice and CPDLC. This will dramatically reduce the number of voice communications in sectorized ATC, by eliminating hand-over calls, and also decrease flight crew workload by eliminating the need for changes of frequency and data connection, i.e. CPDLC or ADS-C would only happen once every flight.

- L-DACS voice:

This solution delivers the required technical enablers to support 'Enhanced operations through advanced digital voice and datalink controller/pilot communications' and aims at moving from VHF frequencies to digital voice. The objective is to increase A/G connectivity, and avoid that traffic growth is blocked due to the lack of availability of VHF frequencies. Once digital voice is implemented, it is foreseen that part of the spectrum currently allocated to ATC will could be available for other aeronautical applications. The solution should bring as well a potential increase of the level of security compared to current operations, e.g. by using technical means to identify where a transmission comes from for verification purposes.

Performance expectations

The Solutions are expected to have a positive impact on:

- Defragmentation of service provision: The solutions promote a common service architecture across the European ATM system,
- Interoperability: The solutions enable the seamless exchange of information between systems,

- Scalability: The objective is to increase A/G connectivity, and avoid that traffic growth is blocked due to the lack of availability of VHF frequencies,
- Network performance: The solutions are required enablers for the TBO concept providing the demanded capacity for 2035,
- Deployment oriented outcome: The solutions support the automation and digitalisation concepts in support of the Airspace Architecture Study (AAS).

The topic '**Collaborative management of TMA & Airport throughput**' covers two solutions (RIA):

The SESAR Solutions Space

- Collaborative framework managing delay constraints on arrivals

The solution's main objective is to define and validate a collaborative framework for the coordination and collaboration between different ATM processes (including the so-called User Driven Prioritisation Process - UDPP), dealing with delay constraints on arrivals (considered the most important contributor to performance issues).

This collaborative framework shall enable the coordination and integration of 4D trajectory constraints for various stakeholders (Airports, ANSPs, AUs and Network Manager) in order to ensure the continued stability and capacity performance of the ATM network, at regional and local level, while taking into account the AU business needs..

- Dynamic E-TMA for Advanced Continuous Climb and Descent Operations and improved Arrival and Departure Operations

Continuous Climb Operations (CCO) at optimum thrust and Continuous Descent Operations (CDO) at near idle thrust are environmentally friendly, because they are more fuel efficient and also minimize the time that aircraft have to be at low altitude, thereby reducing their noise impact. However, controllers often need to use intermediate level-offs in order to ensure separation. The objective of this solution is to improve descent and climb profiles in busy airspace (as close as possible to near idle CDOs and optimised CCOs), as well as the horizontal flight efficiency of arrivals and departures, while at the same time ensuring traffic synchronization (for optimum use of runway capacity), short-term DCB (to ensure best use of ATC capacity) and separation. This challenging objective requires a very broad scope, which includes advances in airspace design, development of ground and airborne tools, and development of ATC and airborne procedures.

Performance expectations

The Solutions are expected to have a positive impact on:

- Interoperability: The Solutions address the need for harmonization at European level of arrival prioritisation processes. The solution will strongly improve interoperability as the result of the increased common situation awareness for all concerned stakeholders: sharing network situation including DCB constraints and opportunities, provision and sharing of flights' priorities from AUs for an agreed process and set of measures resolving Local Demand/Capacity imbalances on arrivals.

- **Scalability:** The solution focuses on more integrated Network/Airport processes, beyond the current AOP/NOP integration that relies on simple data exchange.
- **Network performance:** The solution will contribute to improve network capacity by providing AUs, Flow Managers and Airport Operators with means to better exploit opportunities and use available capacity. The Solution will also contribute to minimize the financial impact of capacity constraints on AUs. Environmental efficiency will be increased by a better management of the arrival flows via sector load balancing in the E-TMA resulting in shorter routes and slower aircraft speeds when delay needs to be absorbed. Continuous descent operations will enable saving fuel burnt and CO² emissions.
- **Deployment oriented outcome:** The solutions contribute to complete the V3 maturity level for solution PJ.07-W2-39 and solution PJ.01-W2-08, thus transition for industrialization and deployment.

The topic '**Integrated Runway Throughput and Terminal Efficiency**' (IA):

The SESAR Solution Space

This topic includes demonstration activities that address, in preparation for deployment, the integration of a series of individually validated solutions in SESAR 1 and SESAR 2020 Wave 1 contributing to increasing runway throughput, environmental sustainability and terminal airspace efficiency: extended arrival management, time based separation, interval management, RNP procedures, etc. As the different solutions have been independently validated they are likely to be sub-optimal when considering the performance of the whole arrival/departure value chain. Integrated procedures, requirements and safety cases are required to cover the transition from TMA, Final Approach to landing for the independent solutions in preparation for deployment.

Performance expectations

The Solution is expected to have a positive impact on:

- **Scalability** – the demonstration addresses the integration of different solutions in different type of airports allowing defining guidelines for the deployment of the best possible combinations of SESAR solutions depending on the local airport needs,
- The solutions under the scope of the demonstration contribute to increase runway throughput in congested airports allowing alleviating capacity bottlenecks in the European network,
- **Deployment oriented outcome** – The demonstration contributes to accelerate transition into deployment of AF-1 and AF-2 related functionalities (Essential operational changes 'Time-based separation (TBS) for final approach', 'Arrival management extended to en-route airspace' (E-AMAN) and 'Enhanced terminal airspace using RNP-based operations').

The topic '**Downlinking Flight Trajectory for improved ATM performance**' (IA):

The SESAR Solution Space

This VLD will continue the work performed by projects PEGASE (SESAR 1) and DIGITS/DIGITS-AU (SESAR 2020 Wave 1/OPEN VLDs 1) to demonstrate the ATM benefits from further usage of ADS-C reports, including EPP data, that are downlinked from aircraft operating routine revenue (airline) flights across Europe to the ground systems. In Wave 3, the objectives of this demonstration would be to:

- Complete the progressive integration of more ADS-C data in operational ground ATC systems,
- Derive deeper analysis of the associated operational benefits,
- Demonstrate the feasibility of an efficient capture and distribution of ADS-C data to multiple ground consumers, in support of the Service Oriented Architecture vision in the ATM Master Plan,
- Demonstrate the use of SATCOM capabilities to for the downlink of 4D trajectory data in ground systems.

Performance expectations

The Solution is expected to have a positive impact on:

- Defragmentation of service provision: The VLD demonstrates the feasibility of an efficient capture and distribution of ADS-C data to multiple ground consumers, in support of the Service Oriented Architecture vision in the ATM Master Plan,
- Interoperability: Complete the progressive integration of ADS-C data in operational ground ATC systems,
- Sharing of infrastructure: Common infrastructure to capture and distribute ADS-C data,
- Network performance: Reduction in controller intervention through more accurate conflict detection would lead to increase ATCO productivity and then increase airspace capacity,
- Deployment oriented outcome: The demonstration continues the work under the current DIGITS and DIGITS-AU projects beyond mid-2020 in order to accelerate the readiness for the deployment. The VLD objectives support the objectives of PCP regulation e.g. AF-6.

2.6.1.3.5 Expected results

The results from the IR-VLD Wave 3 will complete the provision of the basis to set up a changed ecosystem for aviation and more specifically modernising the underlying air traffic management infrastructure. This ecosystem will be mainly built upon ATM solutions characterised by:

- Higher levels of autonomy and connectivity of all air vehicles coupled with a more automated management of the traffic,
- Digital and automated tools provided on board of the air vehicle itself or as part of the ground-based infrastructure,
- Virtual technologies to decouple the physical infrastructure such as sensors, communication or navigation devices from the services that are provided to manage the airspace,
- Big data analytics and open source data usage to encourage the creation of new services,

- System modularity to allow scalable and easier upgrades and greater interoperability.

2.6.1.3.6 *Budget-to-Scope allocation*

A maximum co-financing value per proposal (between EUR 4 and 8 million, depending on the final Wave 3 budget available) will be allowed to ensure the possibility to award multiple topics and avoid receiving a single proposal requesting a substantial part or total budget.

During the evaluation process, and taking into account the award criteria (see below in sub-point 2.6.1.3.13), the SESAR JU will assess the best value-for-money of proposals submitted by the Members and award the grants according to the ranking made in consequence, up to the available budget.

2.6.1.3.7 *Duration and key milestones*

The awarded projects should be starting preparing and executing between Q4 2020 and Q2 2021, and shall end no later than 31 December 2022. Only submitted applications for actions respecting that maximum end date shall be eligible..

2.6.1.3.8 *Funding rate, number of contracts and location*

Research and Innovation Actions (RIAs): in accordance with preamble (24) and Article 28(3) of the H2020 Rules for Participation, eligible costs of RIAs will be reimbursed according to a single reimbursement rate of 70%.

This single co-financing rate will also apply to non-profit entities.

Innovation Actions (IAs): in accordance with preamble (24) and Article 28 (3) of the H2020 Rules for Participation, eligible costs of IAs will be reimbursed according to a single reimbursement rate of 70%.

This single co-financing rate will also apply to non-profit entities.

The expected number of projects that will be funded through this call for proposals is to be determined based on the final list of topics and available budget.

2.6.1.3.9 *Grant conditions*

General conditions for the eligibility of costs are set in accordance with Article 26 of the H2020 Rules for Participation and Article 6 of the Model Grant Agreement.

Only equipment depreciation costs are eligible under this call for proposals. Costs related to the purchase of equipment are not eligible under this call for proposals.

2.6.1.3.10 *Complementary grants*

Complementarity between particular topics will be specified within their scope, in the topics description. The SESAR JU shall receive in particular access rights for:

1. technical specifications (documents approved by the SESAR JU upon recommendation of the Programme Committee which provides the necessary details about a specific operational and technical requirement for repeated or continuous application, with which compliance is not compulsory),
2. validation reports (i.e. deliverables which contributes to the validation of operational threads ensuring overall consistency with the Programme) as well as on
3. standards and norms proposals: i.e. documents which define, amongst other, uniform technical and/or operational Specifications for engineering or technical criteria,

configurations, materials, equipment, methods, procedures and practices, and aim ultimately at ensuring interoperability of air traffic management systems in Europe and at enhancing Air Traffic Management capabilities in Europe, such as safety, capacity, security, environment, which may become compulsory upon approval and adoption of the duly empowered authority.

The participating SESAR JU Members and beneficiaries of grants awarded by the SESAR JU shall give each other access on a royalty free basis the declared background and results needed to implement their own tasks under an SESAR JU Action for the full duration of the SESAR Project. The SESAR JU shall also anticipate and allow for coordination with the Deployment phase activities taking into account the role of the Deployment Manager. The required elements of this arrangement will be explicitly included within the appropriate Grant Agreement.

2.6.1.3.11 Evaluation rules

The SESAR JU will make use of internal experts for the evaluation of proposals received in response to this call for proposals, as described in sub-paragraph 2.6.1 above.

2.6.1.3.12 Eligibility conditions

As a result of Administrative Board decision with ref. ADB(D)13-2014 of 4 November 2014 and decision ADB(D)02-2016 of 17 February 2016, only the SESAR JU Members other than the Union are eligible under this call for proposals. The list of SESAR JU Members appears in Annex XI.

Admissibility and Eligibility conditions for participation are set out in the Rules of Participation and in the provisions of H2020 Work Programme 2018-2020, Part 19. General Annexes, sections B. and C.

Additional eligibility conditions are indicated in sub-point 2.6.1.3.7 'Duration and key milestones' in order to ensure that the projects co-financed under this call for proposals will be finalised by the final end date for projects conducted under the Horizon 2020 programme, i.e. by 31 December 2022.

2.6.1.3.13 Award criteria

Type of Actions	Excellence <i>The following aspects will be taken into account in order to assess the extent to which the proposed work corresponds to the topic description</i>	Impact <i>The following aspects will be taken into account in order to assess the extent to which the outputs of the project should impact at European and/or International level</i>	Implementation <i>The following aspects will be taken into account in order to assess the quality and efficiency of the implementation</i>
Research Innovation Actions (RIAs)	1. Clarity and pertinence of the proposal: degree to which the objectives, scope, and requirements defined in the Technical Specifications are well understood and fully addressed. 2. Feasibility and adequacy of the proposed methodology: degree to which the proposed methodology is feasible and	1. Impact on performance: degree to which the proposal demonstrates that the research will contribute to achieve the performance benefits outlined in the European ATM Master according to the justification principles.	1. Quality and effectiveness of the Project Management Plan: degree to which the proposed plan is adequate considering its integration within the overall Programme lifecycle (Compliance with SESAR 2020 PMP and Programme Execution Guidance is required) including extent to which the resources assigned to

	<p>adequate to mature the candidate SESAR solutions from their initial to their target maturity level.</p> <p>3. Level of awareness of the state-of-the-art: degree to which the proposal demonstrates knowledge of current operations and relevant previous R&D work (both in and outside of SESAR) and explains how their proposed work is beyond the state of the art, and demonstrates innovation potential.</p>	<p>2. Appropriateness of the contribution to standardization and regulation: the proposal demonstrates that the project will adequately contribute to the relevant standardization and regulatory activities (when relevant).</p> <p>3. Quality of the proposed measures to:</p> <ul style="list-style-type: none"> - Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. - Communicate the project activities to different target audiences 	<p>work packages are in line with their objectives and deliverables.</p> <p>2. Appropriateness of the management structure and procedures: degree to which the proposed management structure are appropriate, including complementarity of the participants within the Project.</p> <p>3. Appropriateness of the technical expertise: degree to which the technical expertise is appropriate for undertaking the proposed tasks (including quality of the CV of the proposed project manager and solution managers) and for ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.</p>
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Type of Actions	<p style="text-align: center;">Excellence</p> <p style="text-align: center;"><i>The following aspects will be taken into account in order to assess the extent to which the proposed work corresponds to the topic description</i></p>	<p style="text-align: center;">Impact</p> <p style="text-align: center;"><i>The following aspects will be taken into account in order to assess the extent to which the outputs of the project should impact at European and/or International level</i></p>	<p style="text-align: center;">Implementation</p> <p style="text-align: center;"><i>The following aspects will be taken into account in order to assess the quality and efficiency of the implementation</i></p>
Innovation Actions (IAs)	<p>1. Clarity and pertinence of the proposal: degree to which the objectives, scope and requirements defined in the Technical Specifications are well understood and fully addressed.</p> <p>2. Feasibility and adequacy of the proposed methodology: degree to which the proposed methodology is feasible and adequate to undertake the action.</p> <p>3. Level of awareness of the state-of-the-art: degree to which the proposal demonstrates knowledge of</p>	<p>1. Impact on performance: degree to which the proposal is appropriate for bridging from R&I (i.e. identified Solutions) to deployment in generating buy-in and contributing to achieve the performance benefits outlined in the European ATM Master</p> <p>2. Appropriateness of the contribution to standardisation and regulation: the proposal demonstrates that the project will adequately contribute to the relevant standardisation and</p>	<p>1. Quality and effectiveness of the Project Management Plan: degree to which the proposed plan is adequate considering its integration within the overall Programme lifecycle (Compliance with SESAR 2020 PMP and Programme Execution Guidance is required) including extent to which the resources assigned to work packages are in line with their objectives and deliverables.</p> <p>2. Appropriateness of the management structure and procedures: degree to which the proposed management structure are appropriate,</p>

	current operations and relevant previous R&D work (both in and outside of SESAR) and explains how their proposed work is beyond the state of the art, and demonstrates innovation potential	regulatory activities (when relevant). 3. Quality of the proposed measures to: - Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. - Communicate the project activities to different target audiences	including complementarity of the participants within the Project. 3. Appropriateness of the technical expertise: degree to which the technical expertise is appropriate for undertaking the proposed tasks (including quality of the CV of the proposed project manager) and for ensuring that all participants have a valid role and adequate resources in the project to fulfil that role. 4. Adequacy of the budget: Consistency between the proposed activities, the expected results and the estimated budget
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Table 33: Award criteria for the IR-VLD Wave 3 call for proposals with reference H2020-SESAR-2020-2

The scoring scheme used to evaluate each criterion will be on a scale ranging from 0 to 5 with decimal points being valid. Pass thresholds per criterion and overall are established in the table below:

	Excellence	Impact	Implementation
Weight (%)	40	30	30
Threshold per criteria (n/5)	3	3	3
Overall Pass Threshold (%)	70		

Table 34: Scoring scheme and thresholds for the IR-VLD Wave 3 call for proposals (with reference H2020-SESAR-2020-2)

2.6.2 Financial Management

The SESAR JU will continue to work with a pro-active approach to ensure the transparent and effective management of financial resources and a high level of budget implementation (both in terms of commitments and payments).

During the course of 2020, the SESAR JU will:

- reinforce its financial management system by implementing the SESAR JU Budget Control Committee (established in 2019), with the aim to provide appropriate scrutiny and quality control on the budget figures for future periods of the SPD horizon (N, N+1 and N+2) with an outlook beyond (multi-annual budget),

- finalise the recruitment procedure for the new position of a Chief Financial Officer (CFO), effectively introduce the CFO function into the SESAR JU organisational structure and provide support to the CFO in taking over and executing his or her responsibilities,
- continue to streamline workflows within the SESAR JU's finance-related IT systems (ABAC/SAP) and with regards to the Horizon 2020 IT tools (SYGMA/COMPASS) and to maintain a high level of accuracy in budgetary forecasting.

Up to 2019, the provision of services that the SESAR Joint Undertaking has contracted to European Commission's DG BUDGET have reached full maturity. The procedures and tools at the SESAR JU related to those services will continue to be fully adapted to this new scenario. Those services are: Treasury, Accounting, Central Budgetary Framework, Recovery Actions, Validation of Local Systems and Financial Reporting.

2.6.3 Legal and Procurement Support to Operations

In the field of Legal and Procurement support to operations, and in continuation with activities carried out over the past years, in 2020 the SESAR JU will:

For Legal Affairs:

- Develop legal analysis on various matters requiring so. Such analysis could take the form of legal advices, opinions, legal risk assessments and the related mitigation actions, participation in SESAR JU technical and administrative projects, SESAR JU staff training activities, guidelines or other material on legal matters, drafting, review and/or update of the SESAR JU's internal rules and procedures. They aim to ensure:
 - regularity and legality of all SESAR JU's binding agreements, contracts, grants, decisions, processes, measures,
 - compliance with the agreements with SESAR JU's Members (Membership Agreement),
 - compliance with the agreements concluded with SESAR JU's founding members (Delegation Agreements with European Commission, agreement with EUROCONTROL),
 - appropriate support to the activities aiming at defining the future of SESAR,
- Coordinate with the European Commission and relevant SESAR JU's external stakeholders with regard to legal aspects of:
 - the implementation of the SESAR 2020 Programme activities,
 - any transition to the new Multi-Annual Financial Framework implementation and future of SESAR,
 - development and implementation of the programme and administrative closure/transition scenarios (including potential liquidation of the SESAR JU in its current format, transfer of tangible and intangible assets and any other topic requiring legal expertise,
 - Brexit-related decision-making,
- Participate to inter-agency legal and procurement networks (IALN and NAPO) as well as to H2020 legal networks (LMIG and CIC ad hoc meetings) and contribute to the implementation of these networks' annual work programmes and development of concerted guidance, processes and templates.

For Procurement:

- Provide legal and procedural support and advice for the effective implementation of the procurement plan for 2020 (Annex IX of this document): preparation, launch and administration of procurement procedure files and contracts,
- Develop legal and procedural analysis on various matters requiring so in the field of procurement in light of the rules and regulatory framework applicable to procurement and contract management of the SESAR JU. Such analysis could take the form of legal advices, legal risk assessments and the related mitigation actions, SESAR JU staff training activities, guidelines or other material on procurement matters, drafting, review and/or update of the SESAR JU's internal rules and procedures related to procurement activities,
- Promote automation in the management of procurement and contracts (i.e. e-procurement),
- Liaise with other Joint Undertakings and EU agencies in inter-institutional and joint procurement.

2.6.4 Corporate Planning and Reporting activities

2.6.4.1 Corporate Planning and Reporting documents preparation and adoption

By 31 January 2020, the SESAR JU will prepare the first amended version of the Single Programming Document 2020-2022, aiming for the adoption of the budget outturn and transfer of unused 2019 appropriations into the 2020 budget by the Administrative Board.

By 31 January 2020, the SESAR JU will prepare and submit to the Budgetary Authority its Single Programming Document for the 2021-2023 period. This document will be further elaborated and submitted to the Administrative Board by the end of November 2020, for adoption during December 2020, subject to there being no transfer to a new legal entity on 1 January 2021.

Subject to there being no transfer to a new legal entity, the SESAR JU will, by the end of 2020, prepare and submit to the Administrative Board for review its Single Programming Document for the 2022-2024 period. The submission of this document to the European Commission, serving also as the SESAR JU's input for the EU draft budget 2022, will be prepared for 31 January 2021.

In addition, the SESAR JU will also prepare and submit its Consolidated Annual Activity Report for 2019, which will be ready for submission to the Budgetary Authorities by 30 June 2020.

2.6.4.2 Definition and preparation of scenario(s) for the future of ATM research

The outline of activities to be carried out in 2020 in relation with the future scenario(s) definition and preparation appears in Section II, paragraph 2.7.

2.6.5 Corporate Quality Management

In 2020, the SESAR JU will maintain its Quality Management System and monitor quality. Specific continuous improvement actions will be defined and followed up within the QICT Committee.

The SESAR JU will also run its Information & Document Management System and the supporting IDMS platform. Continuous improvement actions will be planned and undertaken, and will be followed up within the QICT Committee.

2.6.6 Human Resources

In 2020, the SESAR JU will seek to further raise staff competence and capability through adequate selection processes, effective training and adequate staff appraisal and reclassification exercises. Efficiency gains are presented in Section II, sub-paragraph 3.2.1 and will be monitored in 2020.

During 2020 the SESAR JU will ensure the implementation of all guidance material and procedures deriving from implementing rules and model decisions adopted during 2019, especially of the procedure for reclassification, the criteria to dimension the staff establishment plan for subsequent years, the procedures to manage the working hours and the learning and development policy.

SESAR JU will pay special attention to improving staff retention to reduce potentially high turnover rates. It is acknowledged that the uncertainty inherent to the future of SESAR is a challenge to this objective. Assessments will be performed to identify optimum staff profile distributions for the different scenarios of the future of SESAR. As a result, measures will be proposed to ensure these distributions are achieved in the light of the decisions taken on the future of SESAR.

Besides these above, HR activities will focus on the following objectives during 2020:

- Achieving and maintaining 42 posts filled throughout 2020 (39 TAs and 3 SNEs),
- Present to the Administrative Board for their adoption the relevant model decisions, implementing rules or alternatively requests for opt-outs relating to the Staff Regulation developed by the European Commission, where appropriate,
- Follow-up of the Service Level Agreement with the European Commission regarding the implementation of the 'Sysper for Agencies' software (HR information management system). This system is expected to be operational in Q1 2020.

2.6.7 Corporate support activities

Corporate support activities are related to the following administrative tasks and services:

- Facilities management coordination, supporting *intramuros* staff by providing facility coordination support in the Buildings and Logistics services,
- ICT coordination, supporting the corporate governance by providing expert advice and input in the fields ICT & Unified Communications,
- Missions coordination, supporting SESAR JU staff by providing core support for their travel bookings and execution of missions, as well as to the reimbursement of the travel expenses towards the travel agency's expenses and the traveller's claims,
- Insurance coordination, ensuring necessary coverage against recognised operational risks.

In 2020, in terms of Facilities management, work will continue on a number of initiatives in SESAR JU's premises in Brussels to sustain or improve the productivity, safety and efficiency of the working environment and facilities offered to SESAR JU staff. In particular, the SESAR JU will:

- Implement the recommendations, if any, of the Security Audit of the SESAR JU's premises carried out by the European Commission in 2019,
- Finalise the procurement procedure for Facility Maintenance and Renovation Services launched in 2019 with an objective to conclude a Framework Contract for purchases of related services during the of 2020-2024 period.

During the reporting period, a continuous care will be taken to ensure that the ICT infrastructure implemented and the operating environment are suitable to meet the needs and budget of the SESAR JU. The configuration is controlled through internal governance (QICT), with deviations described through Change Requests or in Transformation projects. Service level measurement and performance improvement activities will be safeguarded by Service Improvement Requests & Problem Management.

Ensuring continuity and interoperability of ICT service provided will require particular attention when renewing contracting elements of the infrastructure environment, of the centralised licencing portfolio (in particular due to new European Commission's framework contracts which are planned to be used in 2020), as well of for the ICT Coordination Services.

Missions support will also continue during 2020, consisting in mission process management and support to all staff across the SESAR JU while contributing to continuous improvement initiatives relating to the mission system or electronic workflow.

2.6.8 Internal Control and Audits

2.6.8.1 *Ex-ante & Ex-post controls*

Ex-ante controls

Ex-ante controls remain an important tool for the SESAR JU to prevent errors and avoid the need for ex-post corrective actions. In accordance with Article 74 of the EU Financial Regulation and Article 44 of the SESAR JU Financial Rules, 'each operation shall be subject at least to an ex ante control relating to the operational and financial aspects of the operation, on the basis of a multi-annual control strategy which takes risk into account'. The main objective of ex-ante controls therefore is to ensure that the principle of sound financial management is applied. In 2020 the following ex-ante activities will take place:

- Generate and check grant agreements,
- Initiate, check and verify invoices for administrative expenditure,
- Assessment of periodic reports from grants and the verification and payment of cost claims.

Ex-post controls

One of the other major pillars of assurance for SESAR JU is its ex-post audit activity. Its main objectives are to:

- Provide the Authorising Officer with the necessary elements of assurance in a timely manner on the operational expenditure,
- Assess the regularity and legality of the transactions,
- Attain residual error rates at an acceptable level at the closure of SESAR 2020 Programme, once the financial impact of all audits, correction and recovery measures has been taken into account,
- Determine the sound financial management of the transactions, with the support of the internal or external technical experts, with the overall objective to assess the value for money of the SESAR JU operations,

- Identify systemic errors through the analysis and synthesis of the results obtained and to formulate recommendations to address the issues,
- Provide the SESAR JU auditees with recommendations in order to improve the financial management, processes, procedures and practices applied to the activities related to the SESAR JU contracts, with the main purpose to ensure that recurrent errors are avoided by the SESAR JU beneficiaries.

In 2020, the audit activity will encompass (according to the H2020 Audit Strategy) audits in 29 participations, performed by the CAS, as well as follow-up and closure of any pending audits previously launched, regular meetings and exchange of information. For all these activities, the SESAR JU has an active participation in the CAS coordination mechanisms. 18 participations will be audited in 2021 and 15 in 2022.

The SESAR JU will also contribute to the Implementation Strategy for Horizon Europe, in particular by participating in discussions, making proposals for a common audit approach on common financial rules.

The enhanced communication campaign provided by the CAS will support external stakeholders when needed.

Additionally, in the 2020-2022 period audits are planned for grants signed in 2018, regarding the assigned revenue for Geo-fencing and U-Space projects. For the Airspace Architecture Study, the SESAR JU has counted on the review of the transactions done by the ECA during their audits on the 2018 year, which have had a positive result with no audit findings.

2.6.8.2 Audits

Internal Audit Capability (IAC)

The IAC will perform audit and consulting engagements based on risks identified in 2019 and will coordinate activities of the IAS and ECA as described below. The Annual Audit Plan 2020 of the IAC will be presented to the Administrative Board in December 2019.

Internal Audit Service (IAS) 2019 Audits

Internal audits are carried out by Internal Audit Service (IAS) of the European Commission in liaison with the SESAR JU's Internal Audit Capability (IAC).

In November 2018, the IAS conducted a Strategic Risk Assessment of the SESAR JU. This entails that the IAS analysed all operational, administrative, financial and IT processes of the SESAR JU with the aim of identifying areas of risk and future audit topics. This Strategic Risk Assessment was performed in coordination with the SESAR JU IAC and led to the Strategic Internal Audit Plan (SIAP) 2019-2021 which was published in May 2019. The main risks identified by the IAS are detailed in Annex VIII.

Based on the results of the risk assessment and considering the overall risk profile of SESAR JU, the IAS intends to perform three audit engagements in the next audit cycle 2019-2021:

- Topic 1: Grant implementation and programme management,
- Topic 2: In-kind contribution validation process,
- Topic 3: Human resources management.

The IAS identified two reserve audit topics: the implementation of the new internal control framework and Data Protection (following the entry into force of the new Data Protection Regulation).

European Court of Auditors (ECA) 2020 Audits

At this stage, the SESAR JU is not aware of the external audits to be conducted by the ECA in 2020, with the exception of the recurring Annual Audit of the accounts.

2.6.9 Data Protection

Since the entry into force of Regulation (EU) 2018/1725⁶⁸, the long-term commitment into a privacy practice and culture has been strengthened at the SESAR JU.

Whereas most of the novelties and requirements of Regulation (EU) 2018/1725 have been tackled by the SESAR JU, through the implementation and monitoring of the Action Plan, there is a number of ongoing actions to be performed within the upcoming years in line with the main principles of:

- Accountability and shift of responsibilities from a DPO to a 'Controller', as responsible for the compliance at three levels (insurance, demonstration and verification),
- Documentation and consultation obligations closely tied to the risks,
- Transparency and clear information to data subjects allowing for an effective exercise of data subject rights,
- New obligation of the SESAR JU to notify the personal data breach to the supervisory authority,
- Strict data protection clauses in contracts.

For this purpose, the SESAR JU will continue implementing the recurrent activities:

- Plan, provide advice and report to the Controller on accountability at three levels, participation in the QICT meetings,
- Constant monitoring of the SESAR JU Action Plan on data protection and regular reporting obligations to the European Commission and the European Data Protection Supervisor (EDPS),
- Update of the system of records and privacy notices,
- Implementation of data protection by design and by default in the definition of new services and tasks by introduction of data protection requirements for procurement procedures at three different levels (definition, evaluation and reporting) as well as on the resulting contracts,
- Drafting of SESAR JU policies on data protection such as DP Impact Assessments (DPIA), data breaches and notifications to EDPS, internal rules of the SESAR JU on DP, and internal rules on restriction of access to rights from data subjects. The drafting exercise will continue through 2020-2022,

⁶⁸ [Regulation \(EU\) 2018/1725](#) of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC (OJ L 295, 21.11.2018, p. 39).

- Contribution and follow up on the developments on Joint Controllership,
- Cooperation with EUROCONTROL Data Protection Officer,
- Dissemination and info sessions across the SESAR JU.

The following specific actions are planned during 2020:

- System of records: 1) Deployment of the online tool ('GDPR central') for a centralised management of the system of records as an outcome of a joint procurement procedure conducted during 2019 with the other six joint undertakings. Over the course of 2020, the tool GDPR central will undergo an inception phase and full deployment by the end of the year. The tool supports documenting the role of a processor, DPO and controller and contributes to implementation of accountability. 2) Comprehensive update of the Communications records on Website, SESAR new and SESAR apps, organisation of events and SESAR JU in social media. These updates will be published in the SESAR JU's website.
- Adoption of Internal rules on Restrictions based on Article 25 of Regulation (EU) 2018/1725. Adoption on the internal rules is subject to consultation of the data Protection Controller of DG MOVE and DG RTD, mandatory consultation of the EDPS, approval by the Board and publication in the Official Journal.
- Dissemination and info sessions: Training on the privacy aspects of organisation of events, pictures/videos management and social media.
- Joint Controllership: 1) Contribution to the European Commission's working group on Joint Controllership and finalisation of the drafting of the Memorandum on Joint Controllership for the use of corporate ICT tools of the Programmes of the Research family. 2) Coordination with the other JUs and network of DPOs on the clauses of Joint Controllership received from the European Commission.

2.6.10 Indicators and measurements applicable for the Strategic Area of Operation 6

The SESAR JU has the following objectives to be delivered during 2020 which are outlined in the table below and which will be tracked according to the following indicators:

Objectives	Indicators	Target for 2020
Implement the calls for proposals and grants management framework	Launch of the two calls for proposals under H2020: <ul style="list-style-type: none"> • VLD Open 2 call for proposals with reference H2020-SESAR-2020-1 • IR-VLD Wave 3 call for proposals with reference H2020-SESAR-2020-2 Evaluation, award and grant agreement signature procedures carried out in full compliance with H2020 regulation and within standard deadlines (TTI, TTG, TTS)	100% Full compliance
Ensure full compliance with programming and reporting requirements	Full compliance with programming obligations for JUs: <ul style="list-style-type: none"> • First amended version of the SPD 2020-2022 submitted to ADB for adoption by 31 January 2020 (transfer 	Full compliance 100%

Objectives	Indicators	Target for 2020
	of unused 2019 appropriations into the 2020 budget)	
	<ul style="list-style-type: none"> Draft SPD 2021-2023 submitted to the Budgetary Authority by 31 January 2020 	100%
	<ul style="list-style-type: none"> FiFi 2021 (budget request for 2021) submitted to the DG BUDG by 31 January 2020 	100%
	<ul style="list-style-type: none"> SPD 2021-2023 submitted to Administrative Board by end November 2020 for adoption in mid-December 2020 	100%
	Full compliance with reporting obligations for JUs:	Full compliance
	<ul style="list-style-type: none"> CAAR 2019 adopted by the ADB and sent to the Budgetary Authority by 30 June 2020 	100%
	<ul style="list-style-type: none"> Report on the implementation of the delegation agreements (see 3.2.2) submitted to European Commission by 15 February 2019 	100%
	Number of critical observation from auditors	0
Monitor Exception and Non-Compliance Events Register	Exceptions and non-compliance events per SESAR JU Area	The financial impact of error should be under the materiality error rate of the Court of Auditors (2%)
Monitor efficiency and effectiveness of SESAR JU's legal and procurement activities	Percentage of completed legal and procurement aspects of the contract action planning within deadlines	95%
	Provision of legal advice to the SESAR JU on: <ul style="list-style-type: none"> H2020 grants Non-H2020 grants Other matters in relation with European Network with Agencies and Common Support Centre 	In accordance with the plan agreed with the requestor
Monitor efficiency and effectiveness of SESAR JU's project audit activities	Percentage of SESAR 1 finalised project audits	100%
	H2020 project audits: provision of necessary inputs to CAS to execute audits in 2020	100%
	Deliver the plan for audits on non-H2020 activities: Geo-fencing, U-Space and Airspace Architecture	100%
Monitor efficiency and effectiveness of SESAR JU's	Full compliance with Internal Control Framework by the end of 2020 (to be documented in the CAAR 2020)	100%

Objectives	Indicators	Target for 2020
corporate and management activities	Discrepancies against processes, and their translation in QMS improvement actions	All process improvement actions are taken in accordance with the action plan
	Continuous registration of improvement actions as part of the SESAR JU QMS	
	Acceptable level of corporate risks as per risk management plan, and allow for leveraging of opportunities	All risk related actions implemented in accordance with the mitigation plan
	Effective staffing management: <ul style="list-style-type: none"> • Maximum turnover rate: • Minimum occupancy rate: 	10% 90%
	Implementation of CDR and promotion exercise	100%
	Percentage of implemented SYSPER phase 2	100%
	Implementation or opt-out of Commission implementing decisions and models	100%
Balance payments to Members and beneficiaries	Percentage of SESAR 2020 balancing payments executed timely	100% of requested payments made
	Budget execution: the commitment appropriations and payment appropriations are executed as planned in the 2020 Budget	90% for commitment appropriations 70% for payment appropriations
	Completion of 2019 annual accounts	100%
	Support to ECA audit and provision of relevant documentation leading to an unqualified opinion on the 2019 accounts	100%
Deliver infrastructure services to enable teams and the SESAR JU to operate smoothly	Quality of IT, infrastructure and facilities and existence of Business Continuity and Disaster Recovery planning	No major disruption of service unless triggered under business continuity & disaster planning
Define and prepare for the future of SESAR	Implementation plan(s) to be executed as of 2021 adopted by the end of 2020	100%

Table 35: Objectives, indicators and targets for financial, administrative and corporate management in 2020

3 Budget & Resource Information 2020

3.1 Budgetary Information 2020

Annexes I and II provide detailed budgetary information for 2020.

Title I – Staff expenditure

Title I expenditure is maintained at comparable levels to previous years for 2020.

The total amount foreseen for Title I in the 2020 budget is EUR 6,16 million.

A detailed breakdown by budget line for Title I items is included in Annex II (Financial Resources).

Any costs for increase of salaries, reclassifications and contract changes are sufficiently covered by the requested budget.

Title II – Infrastructure and operating expenditure

Title II expenditure is maintained at comparable levels to previous years for 2020.

The total amount foreseen for Title II in the 2020 budget is EUR 3,42 million. All Title II budget lines are kept at the same level of 2019.

A detailed breakdown by budget line for Title II items is included in Annex II (Financial Resources).

Title III – Operational expenditure

Title III includes operational activities directly conducted by the SESAR JU and those conducted by its Members.

These activities to be conducted in 2020 are detailed by Strategic Area of Operation, as detailed above in Chapter 2.

3.2 Staff Establishment 2020

The SESAR JU Staff Establishment Plan constitutes the document adopted by the Administrative Board defining the total number of posts by grade necessary to ensure the sound operational and financial management of the organisation and in order to execute its work programme.

The number of posts requested for 2020 will thus remain at 39 TAs and 3 SNE posts authorised by the SESAR JU Administrative Board.

Annexes

Annex I: Resource Allocation (Budget and Total HR) per Area of Operation

Budget Allocation

The table below provides information related to Titles I, II and III financial contributions broken down per Strategic Area of Operation, in accordance with chapters 3 of Sections II and III.

Multi-Annual Strategic Area of Operation	Estimate COMMITMENT Appropriations		Estimate PAYMENT Appropriations	
	million EUR	%	million EUR	%
2020				
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	5,13	4%	5,75	6%
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	1,06	1%	14,25	14%
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	81,72	67%	56,01	57%
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	30,48	25%	17,76	18%
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	1,17	1%	2,72	3%
Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	2,05	2%	2,05	2%
TOTAL 2020	121,6⁶⁹	100%	98,5⁷⁰	100%
2021				
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	1,22	11%	2,16	4%
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	1,06	9%	18,49	32%
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	4,22	38%	22,58	40%
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	1,44	13%	9,18	16%
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	1,18	11%	2,61	5%

⁶⁹ Not including unused commitment appropriations of EUR 13.383.404 in 2020 (frontloading of running costs for years 2021 to 2024).

⁷⁰ Not including unused payment appropriations of EUR 28.721.003 in 2020.

Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	2,09	19%	2,09	4%
TOTAL 2021	11,21	100%	57,11	100%
2022				
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	1,20	11%	1,58	4%
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	1,01	10%	12,32	34%
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	3,92	37%	11,59	32%
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	1,32	13%	7,49	21%
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	0,94	9%	1,39	4%
Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	2,11	20%	2,11	6%
TOTAL 2022	10,50	100%	36,48	100%

Table 36: Financial resource allocation per Strategic Area of Operation per year in the 2020-2022 period

Human Resources

The table below provides information related to human resources, broken down per Strategic Area of Operation, in accordance with chapters 3 of sections II and III.

Multi-Annual Strategic Area of Operation	Total HR (posts)	%
Estimate 2020		
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	5	12 %
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	4	9 %
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	15	37 %
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	5	12 %
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	4	9 %
Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	9	21 %
TOTAL 2020	42	100 %
Estimate 2021		
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	5	12 %
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	4	9 %
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	15	37 %
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	5	12 %
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	4	9 %
Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	9	21 %
TOTAL 2021	42	100 %
Estimate 2022		
Multi-Annual Strategic Area of Operation 1: Provide Strategic Steering to the SESAR programme	5	12 %
Multi-Annual Strategic Area of Operation 2: Deliver Exploratory Research	4	9 %
Multi-Annual Strategic Area of Operation 3: Deliver Industrial Research and Validation	15	37 %
Multi-Annual Strategic Area of Operation 4: Deliver Very Large-Scale Demonstrations	5	12 %
Multi-Annual Strategic Area of Operation 5: Deliver SESAR Outreach	4	9 %

Multi-Annual Strategic Area of Operation	Total HR (posts)	%
Multi-Annual Strategic Area of Operation 6: Deliver effective financial, administrative and corporate management	9	21 %
TOTAL 2022	42	100 %

Table 37: Human resource allocation per Strategic Area of Operation per year in the 2020-2022 period

Annex II: Financial Resources (tables) 2020-2022

In this annex, the financial resources are presented for the whole SESAR JU.

Table 1 – Expenditure

SJU Expenditure Budget per Title in (year N) and (year N+1) – Commitment & Payment appropriations

(EUR)

Expenditure	N (2019)		N+1 (2020)	
	Commitment appropriations	Payment appropriations	Commitment appropriations	Payment appropriations
Title I	6.044.372,00	6.044.372,00	6.157.360,00	6.157.360,00
Title II	3.612.934,68	3.612.934,68	3.417.079,00	3.417.079,00
Title III	140.901.014,37	160.199.890,85	112.035.660,20	88.972.260,18
Title IV	-	-	13.383.404,00	28.721.002,82
Total expenditure	150.558.321,05	169.857.197,53	134.993.503,20	127.267.702,00

Table 38: SESAR JU Expenditure Budget per Title in 2019 (year N) and 2020 (year N+1) – Commitment & Payment appropriations

Note: the total expenditure for 2020 amounts to EUR 121.610.099 (commitment appropriations) and EUR 98.546.699 (payment appropriations), which includes Titles I, II and III appropriations. These amounts do not include Title IV appropriations (respectively EUR 13.383.404 and EUR 28.721.003, as shown in the table above) which will be received from the European Commission in 2020, not used for expenditure related to activities under the SESAR JU's work programme for year 2020, and carried over to cover the operational expenditures in years 2021 to 2024.

Detailed SJU Expenditure Budget over the period – (N-1 to N+3) – Commitment appropriations

(EUR)

EXPENDITURE	Commitment appropriations						
	Executed Budget N-1 (2018)	Budget N (2019)	Budget N+1 (2020)		VAR N+1 / N	Budget N+2 (2021)	Budget N+3 (2022)
			Agency request	Budget Forecast			
Title I - Staff Expenditure	5.355.692,58	6.044.372,00	6.157.360,00	6.157.360,00		6.280.507,20	6.406.117,08
11 Salaries & allowances	4.820.394,98	5.517.372,00	5.630.360,00	5.630.360,00	2,0%	5.742.967,20	5.857.826,28
- of which establishment plan posts	4.249.012,40	4.913.132,00	5.013.635,00	5.013.635,00	2,0%	5.113.907,70	5.216.185,60
- of which external personnel	571.382,58	604.240,00	616.725,00	616.725,00	2,1%	629.059,50	641.640,68
12 Expenditure relating to Staff recruitment	15.000,00	15.000,00	15.000,00	15.000,00	-	15.300,00	15.606,00
13 Mission expenses	300.000,00	335.000,00	300.000,00	300.000,00	(10,4)%	306.000,00	312.120,00
14 Socio-medical infrastructure	-	-	-	-	-	-	-
15 Training	50.000,00	50.000,00	85.000,00	85.000,00	70,0%	86.700,00	88.434,00
16 External Services	140.000,00	92.000,00	92.000,00	92.000,00	-	93.840,00	95.716,80
17 Receptions and events	-	-	-	-	-	-	-
19 Other Staff related expenditure	30.297,60	35.000,00	35.000,00	35.000,00	-	35.700,00	36.414,00
Title II - Infrastructure and operating expenditure	3.263.224,38	3.612.934,68	3.417.079,00	3.417.079,00		3.465.671,32	3.440.552,42
20 Rental of buildings and associated costs ^[1]	964.953,32	918.880,00	900.944,00	900.944,00	(2,0)%	918.962,88	937.342,14
21 Information and communication technology	1.435.443,06	1.562.720,00	1.564.948,40	1.564.948,40	0,1%	1.570.747,37	1.602.162,32
22 Movable property and associated costs	62.018,00	10.000,00	10.200,00	10.200,00	2,0%	10.404,00	10.612,08
23 Current administrative expenditure	383.110,00	713.334,68	530.986,60	530.986,60	(25,6)%	547.357,07	463.871,88
24 Postage / Telecommunications	-	-	-	-	-	-	-
25 Meeting expenses	19.700,00	10.000,00	10.000,00	10.000,00	-	10.200,00	10.404,00
26 Running costs in connection with operational activities	-	-	-	-	-	-	-
27 Information and publishing	398.000,00	398.000,00	400.000,00	400.000,00	0,5%	408.000,00	416.160,00
28 Studies	-	-	-	-	-	-	-

Title III - Operational expenditure	123.659.172,13	140.901.014,37	112.035.660,20	112.035.660,20		1.467.500,00	652.500,00
SESAR 1 - 3.1 Studies/Development Conducted By the SJU	-	-	-	-	-	-	-
SESAR 1 - 3.2 Studies/Development Conducted By EUROCONTROL	-	-	-	-	-	-	-
SESAR 1 - 3.3 Studies/Development Conducted By Other Members	-	-	-	-	-	-	-
SESAR 2020 3.1 - Providing Strategic Steering to the SESAR programme	6.197.506,36	7.747.959,85	5.913.493,88	5.913.493,88	(23,7)%	1.212.500,00	652.500,00
SESAR 2020 3.2 - Deliver Exploratory Research	104.500,00	40.908.586,98	-	-	(100,0)%	-	-
SESAR 2020 3.3 - Deliver Industrial Research and Validation	83.670.107,38	61.029.044,51	73.477.567,05	73.477.567,05	20,4%	-	-
SESAR 2020 3.4 - Deliver Very Large-Scale Demonstration activities	31.943.598,39	28.900.023,03	32.389.599,27	32.389.599,27	12,1%	-	-
SESAR 2020 3.5 - Deliver SESAR Outreach	1.743.460,00	2.315.400,00	255.000,00	255.000,00	(89,0)%	255.000,00	-
Title IV - Unused appropriations not required in current Year	-	-	13.383.404,00	13.383.404,00	-	-	-
TOTAL EXPENDITURE	132.278.089,09	150.558.321,05	134.993.503,20	134.993.503,20		11.213.678,52	10.499.169,50
[¹] Including possible repayment of interest; detailed information as regards building policy can be found in Annex V							
BUDGET RESULT (COMMITMENTS)	22.591.280,47	-	-	-	-	-	-

Table 39: Detailed SESAR JU whole Expenditure Budget over the 2018-2022 period (N-1 to N+3) – Commitment appropriations

Notes:

- the budget result (outturn) is the difference between commitments established in revenues and commitments made in expenditure, i.e. unused appropriations. This amount was re-inscribed into year 2019 budget in the beginning of year 2019 through an amendment to the SPD 2019-2021. It should be noted that in 2018, EUROCONTROL's financial contribution actually established was higher than the commitment appropriation with an amount of EUR 1,5 million, which could not be used in expenditure during that year,
- the figures reported in the table above for year 2018 slightly differ from the ones reported in the SESAR JU's Consolidated Annual Activity Report for the year 2018 as the latter include commitments made in relation with SESAR 1,
- all expenditure planned as of 2021 will be funded from the budget result (outturn) of the previous year, which will include pre-2021 unused or re-inscribed financial EU contributions to SESAR JU's administrative and operational expenditure and new financial contributions of EUROCONTROL and Members other than the Union to SESAR JU's administrative expenditure.

Detailed SJU Expenditure Budget over the period – (N-1 to N+3) – Payment appropriations

(EUR)

EXPENDITURE	Payment appropriations						
	Executed Budget N-1 (2018)	Budget N (2019)	Budget N+1 (2020)		VAR N+1 / N	Budget N+2 (2021)	Budget N+3 (2022)
			Agency request	Budget Forecast			
Title I - Staff Expenditure	5.219.662,73	6.044.372,00	6.157.360,00	6.157.360,00		6.280.507,20	6.406.117,08
11 Salaries & allowances	4.755.261,17	5.517.372,00	5.630.360,00	5.630.360,00	2,0%	5.742.967,20	5.857.826,28
- of which establishment plan posts	4.249.012,40	4.913.132,00	5.013.635,00	5.013.635,00	2,0%	5.113.907,70	5.216.185,60
- of which external personnel	506.248,77	604.240,00	616.725,00	616.725,00	2,1%	629.059,50	641.640,68
12 Expenditure relating to Staff recruitment	5.196,51	15.000,00	15.000,00	15.000,00	-	15.300,00	15.606,00
13 Mission expenses	284.391,55	335.000,00	300.000,00	300.000,00	(10,4)%	306.000,00	312.120,00
14 Socio-medical infrastructure	-	-	-	-	-	-	-
15 Training	45.581,17	50.000,00	85.000,00	85.000,00	70,0%	86.700,00	88.434,00
16 External Services	108.939,93	92.000,00	92.000,00	92.000,00	-	93.840,00	95.716,80
17 Receptions and events	-	-	-	-	-	-	-
19 Other Staff related expenditure	20.292,40	35.000,00	35.000,00	35.000,00	-	35.700,00	36.414,00
Title II - Infrastructure and operating expenditure	4.050.475,13	3.612.934,68	3.417.079,00	3.417.079,00		3.465.671,32	3.440.552,42
20 Rental of buildings and associated costs[*]	834.640,57	918.880,00	900.944,00	900.944,00	(2,0)%	918.962,88	937.342,14
21 Information and communication technology	2.458.424,79	1.562.720,00	1.564.948,40	1.564.948,40	0,1%	1.570.747,37	1.602.162,32
22 Movable property and associated costs	169,00	10.000,00	10.200,00	10.200,00	2,0%	10.404,00	10.612,08
23 Current administrative expenditure	288.006,69	713.334,68	530.986,60	530.986,60	(25,6)%	547.357,07	463.871,88
24 Postage / Telecommunications	-	-	-	-	-	-	-
25 Meeting expenses	6.131,72	10.000,00	10.000,00	10.000,00	-	10.200,00	10.404,00
26 Running costs in connection with operational activities	-	-	-	-	-	-	-
27 Information and publishing	463.102,36	398.000,00	400.000,00	400.000,00	0,5%	408.000,00	416.160,00
28 Studies	-	-	-	-	-	-	-

Title III - Operational expenditure	88.510.665,25	160.199.890,85	88.972.260,18	88.972.260,18		47.367.621,57	26.636.813,90
SESAR 1 - 3.1 Studies/Development Conducted By the SJU	4.403.498,55	-	-	-	-	-	-
SESAR 1 - 3.2 Studies/Development Conducted By EUROCONTROL	-	-	-	-	0,0%	-	-
SESAR 1 - 3.3 Studies/Development Conducted By Other Members	16.591.794,08	-	-	-	-	-	-
SESAR 2020 3.1 - Providing Strategic Steering to the SESAR programme	4.165.588,20	8.677.883,32	5.862.100,07	5.862.100,07	(32,4)%	2.158.727,44	1.026.936,75
SESAR 2020 3.2 - Deliver Exploratory Research	3.156.553,66	5.034.925,06	13.165.046,75	13.165.046,75	161,5%	17.400.000,00	11.296.487,42
SESAR 2020 3.3 - Deliver Industrial Research and Validation	47.963.626,40	104.957.229,00	51.785.587,92	51.785.587,92	(50,7)%	18.348.658,33	7.671.557,83
SESAR 2020 3.4 - Deliver Very Large-Scale Demonstration activities	11.245.215,98	39.714.853,47	16.349.525,45	16.349.525,45	(58,8)%	7.775.235,80	6.186.831,89
SESAR 2020 3.5 - Deliver SESAR Outreach	984.388,38	1.815.000,00	1.810.000,00	1.810.000,00	(0,3)%	1.685.000,00	455.000,00
Title IV - Unused appropriations not required in current Year	-	-	28.721.002,82	28.721.002,82	0	-	-
TOTAL EXPENDITURE	97.780.803,11	169.857.197,53	127.267.702,00	127.267.702,00	-	57.113.800,08	36.483.483,39

[*] Including possible repayment of interest; detailed information as regards building policy can be found in Annex V

Table 40: Detailed Expenditure Budget over the 2018-2022 period (N-1 to N+3) – Payment appropriations

Note: the unused payment appropriations of 2020 will be carried over to cover the operational expenditures in years 2021 to 2024.



Table 2 – Revenue

The EU contribution post-2019 is indicative, subject to the outcome of future EU budgetary procedures.

SJU Revenues in (year N) and (year N+1)

(EUR)

Revenues	N (2019)	N+1 (2020)
	Revenues estimated by the agency	Budget Forecast
EU contribution (EFTA included)	112.618.000,00	123.671.000,00
Other revenue	37.940.321,04	11.322.503,20
Total revenues	150.558.321,04	134.993.503,20

Table 41: SESAR JU Revenues in 2019 (year N) and 2020 (year N+1)

IN-KIND CONTRIBUTION

all figures in Euro

<u>Title / Chapter</u>	Revenue Entitlements			
	Budget 2019	Budget 2020	Budget 2021	Budget 2022
1. In-Kind Contribution from the Founding Members	81.733.361	71.114.629	64.870.400	37.553.447
1.1 European Union				
1.2 EUROCONTROL	81.733.361	71.114.629	64.870.400	37.553.447
2. In-Kind Contribution from other Members	67.354.742	48.400.920	34.599.118	18.006.613
2.1 Other members	67.354.742	48.400.920	34.599.118	18.006.613
TOTAL REVENUE	149.088.103	119.515.549	99.469.518	55.560.060

Table 42: Detailed In-Kind Revenue Budget over the 2019-2022 period (N to N+3)

Detailed SJU Revenue Budget over the period – (N-1 to N+3)

(EUR)

REVENUES	N-1 (2018)	N (2019)	N+1 (2020)	N+1 (2020)	VAR N+1 / N	Envisaged N+2 (2021)	Envisaged N+3 (2022)
	Executed Budget	Revenues estimated by the agency	As requested by the agency	Budget Forecast			
1 REVENUE FROM FEES AND CHARGES	-	-	-	-	-	-	-
2 EU CONTRIBUTION	119.999.999,92	110.000.000,00	120.760.667,90	120.760.667,90	0,10	-	-
- of which Administrative (Title I and Title II) (Budget line 1100)	3.250.683,00	3.252.411,00	16.335.566,84	16.335.566,84	4,02	-	-
- of which Operational (Title III) (Budget line 1200 - EU)	106.749.316,92	106.747.589,00	104.425.101,06	104.425.101,06	- 0,02	-	-
- of which assigned revenues deriving from additional budget (Budget line 1300)	10.000.000,00	-	-	-	-	-	-
3 THIRD COUNTRIES CONTRIBUTION (incl. EFTA and candidate countries)	2.563.000,00	2.618.000,00	2.910.332,10	2.910.332,10	0,11	-	-
- of which EFTA (Budget line 1200 - EFTA)	2.563.000,00	2.618.000,00	2.910.332,10	2.910.332,10	0,11	-	-
- of which Candidate Countries							
4 OTHER CONTRIBUTIONS (Budget lines 2100 + 3100)	8.386.169,78	6.954.761,50	4.770.556,20	4.770.556,20	- 0,31	6.954.761,50	5.934.006,50
- of which delegation agreement, ad hoc grants							
5 ADMINISTRATIVE OPERATIONS					-		
6 REVENUES FROM SERVICES RENDERED AGAINST PAYMENT	-	-	-	-	-	-	-
7 CORRECTION OF BUDGETARY IMBALANCES	-	-	-	-	-	-	-
8 INTERESTS GENERATED	-	-	-	-	-	-	-
9 BUDGET OUTTURN AND UNUSED APPROPRIATIONS FROM PREVIOUS YEARS (Budget line 5100)	23.920.199,86	30.985.559,54	6.551.947,00	6.551.947,00	- 0,79	4.258.917,02	4.565.163,00
TOTAL REVENUES	154.869.369,56	150.558.321,04	134.993.503,20	134.993.503,20		11.213.678,52	10.499.169,50

Table 43: Detailed SESAR JU Revenue Budget (financial contribution) over the 2018-2022 period (N-1 to N+3)

Table 3 – Budget Outturn and Cancellation of Appropriations

	<i>(EUR)</i>		
Budget outturn	N-3 (2016)	N-2 (2017)	N-1 (2018)
Revenue actually received (+)	143.211.209	202.760.405	155.862.704
Payments made (-)	-102.973.228	-144.784.881	-78.625.670
Carry-over of appropriations (-)	-3.194.963	-374.682	-1.148.814
Cancellation of appropriations carried over (+)			
Adjustment for carry-over of assigned revenue appropriations from previous year (+)			
Exchange rate differences (+/-)			
Adjustment for negative balance from previous year (-)			
TOTAL	37.043.018	57.600.842	76.088.220

Table 44: Budget outturn and cancellation of appropriations (N-3 to N-1)

Annex III: Human Resources (tables) 2020-2022

The 2020-2022 staff numbers are indicative, subject to the outcome of the EU's future budgetary procedures.

Table 1 – Staff population and its evolution; Overview of all categories of staff (posts)

Staff population		Actually filled as of 31.12 N-2 (2017)	Authorised under EU budget N-1 (2018)	Actually filled as of 31.12.N-1 (31.12.2018)	Authorised under EU budget for year N (2019)	Budget for year N+1 (2020)	Envisaged in N+2 (2021)	Envisaged in N+3 (2022)
Officials	AD							
	AST							
	AST/SC							
TA	AD	29	33	32	33	33	33	33
	AST	6	6	5	6	6	6	6
	AST/SC							
Total Officials and TA		35	39	37	39	39	39	39
CA GF IV		2		2				
CA GF III								
CA GF II								
CA GFI								
Total CA		2	0	2	0	0	0	0

SNE	3	3	3	3	3	3	3
Structural service providers ⁷¹	2	3	3	3	3	3	3
TOTAL	42	45	45	45	45	45	45
External staff for occasional replacement ⁷²	4	4	4	4	4	4	4

Table 45: Staff population and its evolution 2017-2022 (N-2 to N+3)

⁷¹ Service providers are contracted by a private company and carry out specialised outsourced tasks of horizontal/support nature, for instance in the area of information technology or reception services.

⁷² Replacement due to maternity leave, long term absences, unfilled posts. Due to long-term absences of some statutory staff members out of the control of the SESAR JU, interim staff is hired to carry out the activities that correspond to these statutory staff positions. Furthermore, in the cases in which selection procedures for vacancies cannot be done in short time, and the functions of the vacant position are necessary for the SESAR JU, contractual agents have been engaged to perform such activities for the duration of the selection procedure.

Table 2 – Multi-annual staff policy plan Year 2020-2022 (posts)

Category and grade	Establishment plan in EU Budget N-1 (2018)		Filled as of 31/12/N-1 (31.12.2018)		Modifications in year N-1 (2018) in application of flexibility rule ⁷³		Establishment plan in voted EU Budget N (2019)		Modifications in year N (2019) in application of flexibility rule		Establishment plan in EU Budget N+1 (2020)		Modifications in year N+1 (2020) in application of flexibility rule		Establishment plan N+2 (2021)		Establishment plan N+3 (2022)	
	OF ⁷⁴	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA
AD 16																		
AD 15		1		1				1				1				1		1
AD 14																		
AD 13																		
AD 12		4		3				4				5				6		7
AD 11		3		1				3				3				3		3
AD 10		2		3				2				2				2		3
AD 9		3		3				4		+1		5				5		5
AD 8		6		7				6		-1		7				9		11
AD 7		6		6				7				6				5		2

⁷³ As provided in Article 37 of SESAR JU's Financial Rules.

⁷⁴ Officials (permanent posts).

Category and grade	Establishment plan in EU Budget N-1 (2018)		Filled as of 31/12/N-1 (31.12.2018)		Modifications in year N-1 (2018) in application of flexibility rule ⁷³		Establishment plan in voted EU Budget N (2019)		Modifications in year N (2019) in application of flexibility rule		Establishment plan in EU Budget N+1 (2020)		Modifications in year N+1 (2020) in application of flexibility rule		Establishment plan N+2 (2021)		Establishment plan N+3 (2022)	
	OF ⁷⁴	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA
AD 6		7		7				6				4				2		1
AD 5		1		1														
Total AD		33		32				33		0		33				33		33
AST 11																		
AST 10																		
AST 9		1		1				1				1				1		1
AST 8																		
AST 7		1						1				1				1		1
AST 6																		
AST 5												1				2		3
AST 4		2		2				2				2				2		1
AST 3		1		2				1		+1		1						
AST 2								1		-1								
AST 1		1																



Category and grade	Establishment plan in EU Budget N-1 (2018)		Filled as of 31/12/N-1 (31.12.2018)		Modifications in year N-1 (2018) in application of flexibility rule ⁷³		Establishment plan in voted EU Budget N (2019)		Modifications in year N (2019) in application of flexibility rule		Establishment plan in EU Budget N+1 (2020)		Modifications in year N+1 (2020) in application of flexibility rule		Establishment plan N+2 (2021)		Establishment plan N+3 (2022)	
	OF ⁷⁴	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA	OF	TA
Total AST		6		5				6		0		6				6		6
AST/SC 6																		
AST/SC 5																		
AST/SC 4																		
AST/SC 3																		
AST/SC 2																		
AST/SC 1																		
Total AST/SC																		
TOTAL		39		37				39		39		39				39		39

Table 46: Multi-annual staff policy plan Year 2018-2022 (N-1 to N+3)

Annex IV: Human Resources Policy

The main objective of the SESAR JU staff policy is to define the necessary framework for the recruitment, management and training of the SESAR JU staff members so that their collective skills and competencies which constitute an asset for the SESAR JU will contribute to the achievement of the SESAR JU mission and specific objectives.

The SESAR JU Staff Establishment Plan constitutes the document adopted by the Administrative Board defining the total number of posts by grade necessary to ensure the sound operational and financial management of the organisation and in order to execute its work programme. These posts are filled in by personnel recruited under the following types of contracts:

- TAs contracts, for duties requesting a long-term duration of the contract within the limit of the existence of the SESAR JU,
- CAs contracts to cover temporarily vacant TA positions until the recruitment process is finalised, when there is a justified need to ensure continuation of the work related to that vacant position.
- SNEs where the experience within Member States' organizations is desirable.

A. Recruitment and services procurement policy

As of the entry into force of Council Regulation (EC) 1361/2008, the Staff Regulations of Officials of the European Union, the Conditions of Employment of other servants of the European Union⁷⁵ (CEOS) and the rules adopted jointly by the Institutions of the European Union for the purpose of applying these Staff Regulations and the Conditions of Employment apply to the staff of the Joint Undertaking and its Executive Director.

Following the Council Regulation (EU) 721/2014 amending the Council Regulation (EC) 1361/2008, the staff of the Joint Undertaking consists of TAs and CAs recruited for a fixed period that may be renewed once for a fixed period up to 5 years. Any other renewal shall be for an indefinite period in accordance with the EU Staff Regulations. The total period of engagement shall not exceed in any case the duration of the Joint Undertaking.

The staff of the SESAR JU shall consist of highly specialized technical staff members in charge of the management and implementation of the SESAR programme and highly specialized and diversified administrative staff to ensure the functioning of the SESAR Joint Undertaking. In establishing the different job descriptions and the organization chart of the SESAR JU, particular attention is paid to preserve the adequate separation of functions, to manage the risk of conflict of interest, to ensure an efficient and cost-effective functioning of the organization.

It has to be recognized that it is difficult to attract highly skilled persons on TA contracts for a limited duration, given the time horizon indicated in the SESAR JU founding act.

⁷⁵ As last amended by Regulation (EU, EURATOM) No 1023/2013 of the European Parliament and of the Council of 22 October 2013 amending the Staff Regulations of Officials of the European Union and the Conditions of Employment of Other Servants of the European Union (OJ L 287, 29.10.2013, p. 15).

1. Statutory staff recruitment policy

1.1 Officials

The SESAR JU has currently no post occupied by an official from an Institution. Furthermore, the SESAR JU has no permanent posts in its establishment plan and, therefore, cannot appoint officials.

1.2 Temporary agents

On the basis of the missions and tasks set out by the SESAR JU constituent act, the SESAR JU considers that most of its existing workforce can be assigned to the posts of long term duration, within the limits of the existence of the SESAR JU, both in the operational areas and in the transversal areas.

Where the type of expertise requested for a certain post is not easily available on the free market and is retained by personnel working for one of its Members, the SESAR JU fills in these highly specialized posts with secondments from its Members, ensuring that proper measures to manage potential conflict of interest are in place (segregation of duties, annual declarations on conflict of interest, etc.).

All temporary agent posts have been identified as post of long duration and are offered a 5-year contract (except for staff who were under Belgian contracts at 1 January 2009, in accordance with the transition provisions of Council Regulation (EC) 1361/2008, who are indefinite duration contracts still subject to the end of functioning of the SESAR JU on 31 December 2024 at the latest).

The table under point A.4 of this annex provides the information on the key functions for which the posts have been filled in by TAs. The recruitment process followed complies with the SESAR JU Implementing Rules on the engagement and use of temporary staff.

The entry grades are determined in function of the complexity and level of responsibility of the tasks to be performed by the new staff member. These grades are compatible with provisions of Article 53 of the CEOS, with the corresponding implementing rules on the engagement of temporary agents 2(f) and with grades authorised by the European Commission in the SESAR JU's staff establishment plan.

1.3 Contract agents

The SESAR JU staff establishment plan does not contain positions of Contract agents. Nevertheless, Contract agents are occasionally engaged to cover vacant positions of temporary agents, either provisionally during the time required to cover the temporary agent vacancy through a recruitment procedure, or in very exceptional cases when it is considered necessary in the interest of service.

Contract agents are recruited for a fixed term contract, usually with a duration of one year, renewable once for a fixed period. Any other renewal shall be for an indefinite period in accordance with the Staff Regulations. In exceptional cases, the Appointing Authority could decide on a different duration of the contract. The total period of engagement shall not in any case exceed the duration of the SESAR JU (Article 2(a) of Council Regulation (EU) 721/2014).

1.4 Seconded national experts

For the need of specific expertise, the SESAR JU recruits SNEs from competent organisations in the EU or EUROCONTROL Member States, especially where expertise within Regulators, public authorities or other public bodies is desirable.

2. Services acquisition policy

2.1 Structural service providers

For the purpose of managing, plan and control reception services, the SESAR JU has signed in 2011 a 1 year renewable contract with a service provider called 'Receptel'. This service provider provides one to two FTE's as receptionist/Back – office reception. It is not always the same person providing the services. In terms of ICT coordination, one person is provided by an external service provider.

2.2 The Programme Management Unit

In 2008, EUROCONTROL established a Unit as Programme Support Office – hosted by the SESAR JU in order to provide the necessary support in the management of the SESAR programme and consisting of a contribution in kind to the SESAR JU. Under the current SESAR JU-EUROCONTROL Agreement for the duration of the SESAR 2020 Programme, this Unit is known as PMU (Programme Management Unit). PMU provides programme management support to the SESAR JU in strict coordination with the other SESAR JU Teams. The number of staff engaged in this function at the end of 2018 is 19 persons.

The PMU staff assigned to the SESAR JU for the execution of this Agreement shall remain subject to the EUROCONTROL's staff regulations and rules.

2.3 Seconded staff from SESAR JU Selected Members

At its meeting of 31 May 2017, the Administrative Board of the SESAR JU, having regard to Articles 5(1)(p) and 8 of the Annex to the SESAR JU constituent act and the SESAR Joint Undertaking Membership Agreement, which entered into force on 6 July and was signed by the SESAR JU, EUROCONTROL and the SESAR JU's 19 Selected Members by virtue of decision ADB(D)02-2016, decided:

- to adopt specific conditions on the secondment of staff of SESAR JU Selected Members, as detailed in Annex 1 to the decision ADB(D)07-2017,
- to delegate the power to the Executive Director to establish the necessary agreements in line with the aforementioned conditions.

The decision of the Administrative Board is also motivated by the nature of the SESAR JU with its Selected Members as public-private partnership, where public and private resources are commingled for the achievement of objectives.

The secondment from the Selected Members constitutes a highly flexible mechanism to attract skilled experts, with contracts with specific duration and a low risk scheme.

In compliance with the Administrative Board decision, the SESAR JU launches a call for expression of interest to its Selected Members, to establish a list of potential candidates for specific posts.

The secondment to the SESAR JU is subject to the signature of a secondment agreement that will complement the SESAR JU Membership Agreement and detail the selected member's contribution under the secondment.

Any secondment accepted by the SESAR JU shall be considered as Additional Contribution in the meaning of Article 10.4 of the Membership Agreement and will be fully reimbursed under the conditions defined in Annex 1 to the afore-mentioned decision of the SESAR JU Administrative Board.

3. Selection procedure

The SESAR JU launches recruitment procedures for Temporary Agents through the announcement of vacant posts on its website and the EPSO website. The SESAR JU may also recruit Contract Agents from the European Personnel Selection Office - EPSO's reserve lists, for the specific needs here above identified.

Generally vacancies are online for one month. During this time candidates can submit their applications. Exceptionally, this period may be extended. The exact deadline to apply for a job is indicated in each vacancy notice of the selection procedure that provides as well information on the job requirements and the conditions of employment. Candidates are requested to submit their application exclusively by means of a functional email address specific to each vacancy notice.

The SESAR JU has an equal opportunity approach and strongly encourages applications from all candidates who fulfil the eligibility and requirements without any distinction on the grounds of nationality, age, race, gender, political, philosophical or religious conviction or sexual orientation and regardless of disabilities, marital status or other family situation.

Eligibility of candidates is assessed according to compliance with all formal requirements by the closing date for the submission of applications. Eligible candidates whose application shows evidence of all essential selection criteria described in the vacancy notice may be invited for an interview, which is held for the most part in English. During the selection process candidates may be required to undergo a competency assessment exercise.

Candidates invited to an interview are requested to submit, on the day of the interview, a copy of their diploma(s) and evidence of their professional experience, clearly indicating the starting and finishing dates, the function(s) and the exact nature of the duties carried out. However, prior to contract signature, selected candidates are requested to provide SESAR JU with original or certified copies of all relevant documents proving the eligibility requirements.

As a result of the interviews, the Selection Panel recommends the most suitable candidates for the post in question. The list of suitable candidates established by the Selection Panel may also be used for the recruitment for a similar post depending on the needs of the SESAR JU. All candidates are informed by letter about the outcome of the selection procedure. Candidates are informed that inclusion on a reserve list does not guarantee recruitment.

Selection Panel's work and deliberations are strictly confidential and candidates are informed that any contact with its members is strictly forbidden.

The Executive Director, SESAR JU AIPN, takes the final decision to offer the job to a selected candidate from the reserve list established by the selection panel.

4. Table of 39 posts per area and activity on 31/12/2019:

In accordance with the revised organisation chart adopted by the SESAR JU Administrative Board in 2019⁷⁶, the 39 posts are the following:

Activity	Function / Job title	Contract Type / duration	Entry grade
Executive Director	Executive Director	TA fixed term + renewable	AD 14
(to be defined)	Chief Finance Officer (planned as of January 2020)	TA fixed term + renewable	AD 12
Audit	Internal Audit Capability	TA fixed term + renewable	AD 5
Executive secretariat	Assistant to the Executive Director	TA indefinite (*)	AST 1
Corporate Affairs including corporate support and corporate quality, planning and reporting	Deputy Executive Director Corporate Affairs ⁷⁷	TA indefinite (*)	AD 12
	Head of Corporate Support	TA indefinite (*)	AD 7
	Administrative Assistant	TA indefinite (*)	AST 3
	Administrative Assistant	TA fixed term + renewable	AST 1
	Head of Corporate Quality, Planning & Reporting	TA fixed term + renewable	AD 8
	Programming & Planning Officer	TA fixed term + renewable	AST 4
Strategies and relations with ICAO, follow up of MoC with third countries and communication	Chief Strategies & External Relations	TA indefinite (*)	AD 12
	Head of International Affairs	TA fixed term + renewable	AD 10
Relations with different stakeholders and coordination of ED activities	Head of Stakeholders and Institutional Relations	TA fixed term + renewable	AD 10
Communication internal/external, media	Senior Communications & Media Relations Officer	TA fixed term + renewable	AD 5
Implementation of the day-to-day communication strategy	Communications & Events Officer	TA fixed term + renewable	AD 5

⁷⁶ Decision ADB(D)11-2019 adopted through written procedure ADB(WP)2019-007 concluded on 6 June 2019.

⁷⁷ The position named 'Deputy Executive Director' is indeed classified as Head of Unit in accordance with the suggestion of the Commission. Within the specific tasks performed by the incumbent, some are derived directly from delegations of the Executive Director for certain areas and periods of time.

Activity	Function / Job title	Contract Type / duration	Entry grade
Development & delivery, Release and validation	Head of Release Management & Validation	TA fixed term + renewable	AD 7
Development & delivery, grant management and development framework	Call Coordinator	TA fixed term + renewable	AD 9
ATM	Grant Manager	TA fixed term + renewable	AD 6
	Grant Manager	TA fixed term + renewable	AD 6
	Grant Manager	TA fixed term + renewable	AD 6
	ATM Architecture Framework Expert	TA fixed term + renewable	AD 5
	Chief ATM	TA fixed term + renewable	AD 10
	ATM Expert – Architecture & Systems Engineering	TA fixed term + renewable	AD 8
	ATM Expert - Airport & Airspace User Operations	TA fixed term + renewable	AD 6
	ATM Expert - TMA, En-route & Network Operations	TA fixed term + renewable	AD 6
AU relations, business case, Master Planning	Chief Economist & Master Planning	TA indefinite (*)	AD 10
Digital transformation and innovation	Manager Digital Transformation & Innovation	TA fixed term + renewable	AD 8
General administration, Finance, legal and HR	Chief Administration Affairs	TA fixed term + renewable	AD 12
Project Audit	Project Auditor	TA fixed term + renewable	AD 5
Finance and Budget Coordination and responsibility for the follow up of the SESAR JU Budget	Head of Finance & Budget	TA fixed term + renewable	AD 8
Financial administration and budget	Financial Officer	TA fixed term + renewable	AD 6
	Financial Officer	TA fixed term + renewable	AD 5
	Financial assistant	TA fixed term + renewable	AST 3
Legal Affairs and Contract	Head of Legal Affairs and Procurement	TA indefinite (*)	AD 8

Activity	Function / Job title	Contract Type / duration	Entry grade
Procurement procedures, personal data protection, day-to-day legal issues	Legal & Procurement Officer, Data Protection Officer	TA fixed term + renewable	AD 5
	Legal & Procurement Officer	TA fixed term + renewable	AD 5
	Legal & Procurement Officer	TA fixed term + renewable	AD 5
HR Legal matters	HR Legal Officer	TA fixed term + renewable (**)	AD 7
Recruitment, HR Administration, staff development	HR Officer	TA indefinite (*)	AST 7

Table 47: List of the 39 SESAR JU posts (31/12/2019)

(*) Staff member eligible to Transitional Provisions Article 2 of Council Regulation (EC) 1361/2008 (8 staff)

(**) Posts currently covered by a CA with indefinite duration contract. These staff members are not additional to the 39 posts included in the Staff Establishment Plan approved by the Administrative Board of the SESAR Joint Undertaking, but they are contractual forms used by the SESAR JU to fill in specific posts taking into consideration the needs and expertise requested. The same is applicable for the staff seconded by the Members to the SESAR JU, in accordance with Article 8 of the SESAR JU Statutes.

B. Appraisal of performance and reclassification/promotions

Reclassification of temporary staff/promotion of officials

Category and grade	Staff in activity at 1.01.2017		How many staff members were promoted / reclassified in Year N-1 (2018)		Average number of years in grade of reclassified / promoted staff members
	officials	TA	Officials	TA	
AD 16					
AD 15		1			
AD 14					
AD 13					
AD 12		3			
AD 11		1			
AD 10		3			
AD 9		3			
AD 8		5		1	5
AD 7		3		1	4
AD 6		9		2	3,8
AD 5					
Total AD		28		4	4,2
AST 11					
AST 10					
AST 9					
AST 8		1		1	5
AST 7		1			
AST 6					
AST 5					
AST 4					
AST 3		2		1	3
AST 2					

Category and grade	Staff in activity at 1.01.2017		How many staff members were promoted / reclassified in Year N-1 (2018)		Average number of years in grade of reclassified / promoted staff members
	officials	TA	Officials	TA	
AST 1		1			
Total AST		5		2	4
AST/SC 6					
AST/SC 5					
AST/SC 4					
AST/SC 3					
AST/SC 2					
AST/SC 1					
Total AST/SC					
TOTAL		33		6	4.6

Table 48: Reclassification of temporary staff/promotion of officials

Reclassification of contract staff

Function Group	Grade	Staff in activity at 1.01.2017	How many staff members were reclassified in Year N-1 (2018)	Average number of years in grade of reclassified staff members
CA IV				
CA III				

CA II				
CA I				
TOTAL				

Table 49: Reclassification of contract staff

No contract staff members were reclassified during 2018.

C. Mobility policy (internal mobility, between EU Bodies and between EU Bodies and the institutions)

1. Mobility within the SESAR JU

Vacancy notices are accessible internally as well as externally and staff members are always given the opportunity to apply.

2. Mobility among EU Bodies

Until 2016, the SESAR JU's statutory staff was excluded from the possibility to benefit from mobility between the European Union agencies, limiting substantially one of the key elements of the career development of its staff. This situation has changed with the adoption of new implementing rules on the selection of temporary agents 2(f) in April 2016 under the new Staff Regulations.

3. Mobility between the SESAR JU and the Institutions

The SESAR JU has currently no post occupied by an official from an Institution⁷⁸; nevertheless, where appropriate the SESAR JU can consider favouring mobility with the Institutions.

D. Gender and geographical balance

Since its establishment, the SESAR JU has ensured equal opportunities for staff and has done its best to attract specialised technical staff of the highest calibre. The equal opportunities policy is applied to recruitments in order to secure gender and geographical balance in a domain of operations that appears to be highly unbalanced.

⁷⁸ There is one temporary agent (Liaison Officer) who is in secondment from the European Commission in its own interest respectively for 4 years.

Nationality	Total number of staff	Of which women
Belgium	5	3
Bulgaria	2	1
Croatia	1	-
France	5	3
Greece	2	1
Germany	1	-
Italy	4	3
Ireland	3	3
Lithuania	1	1
Netherlands	2	1
Portugal	1	1
Spain	5	3
Sweden	1	-
United Kingdom	4	-
TOTAL	37	20

Table 50: Gender and geographical balance (excluding 3 Seconded National Experts)

Gender/Categories	Male	Female	Total
AD	15	17	32
AST	2	3	5
TOTAL	17	20	37
AD	40,5%	46%	86,5%
AST	5,5%	8%	13,5%
TOTAL	46%	54%	100%

Table 51: Gender and staff category balance (excluding 3 Seconded National Experts)

E. Schooling

European Schools in Brussels should cover the SESAR JU staff needs in this respect, for the staff currently eligible.

Annex V: Buildings (table)

The SESAR JU has already established its location in Brussels through the rental of suitable office accommodation and ancillary space secured for the duration of the extended SESAR JU. There is no plan to acquire any property or buildings in the future.

Current building(s):

	Name, location and type of building	Comment
Information to be provided per building:	Avenue de Cortenbergh 100 – 1000 Brussels	Joint occupancy building with non-EU bodies.
Surface Area (m2)	1828	
Surface Area (m2): Office space	1765	
Surface Area (m2): Non-Office space	63	There are an additional 28 Car Parking Spaces (not measured in surface area)
Annual rent (in EUR)	427 925	Excluding gratuities and other reductions
Type and duration of rental contract	9 year lease from 2016	With Diplomatic Clause for rupture of rental contract with 6 months' notice.
Host country grant or support	N/A	
Present value of the building	N/A	

Table 52: Buildings

- Building projects in planning phase: n/a.
- Building projects submitted to the European Parliament and the Council: n/a.

Annex VI: Privileges and Immunities (table)

Agency privileges	Privileges granted to staff	
	Protocol of privileges and immunities / diplomatic status	Education / day care
VAT exemption as of 16.10.2008, Administrative Agreement with the Belgian Authorities since 30.03.2009	Protocol of Privileges and Immunities applicable to staff with regard to VAT.	N/A

Annex VII: Evaluations

In 2017, the SESAR JU was subject to two evaluations⁷⁹. The first concerned the closure of the SESAR 1 Programme (Final Evaluation of SESAR 1, 2007-2016), while the second focused on the ongoing research activities under the SESAR 2020 Programme (Interim Evaluation of SESAR 2020, 2014-2020).

The reports led to five recommendations in total. SESAR JU management considers that the action plan is fully implemented except for recommendation 5. The implementation of this recommendation is currently subject to validation at policy level on the future of the SESAR JU. Therefore, in agreement with the European Commission, the action is currently on hold. No further actions are planned for 2020.

No new evaluations of the SESAR programme have been announced to the SESAR JU for 2020.

⁷⁹ Both reports can be found here: https://ec.europa.eu/transport/transport-modes/news/2017-10-10-transport-joint-undertakings-are-delivering-expected-results_en. The full H2020 evaluation can be found here: http://ec.europa.eu/research/evaluations/index_en.cfm?pg=h2020evaluation.

Annex VIII: Risk Management in 2020

During 2017, following an audit from the IAS, the previous Risk Management Policy has been entirely revisited to be better aligned with the specificities of the SESAR 2020 Programme. In February 2017, the SESAR JU Executive Director adopted the new 'SESAR JU Risk Management Policy' (Executive Director's decision SESAR JU/ED/613). This decision repeals the 'Internal Control Framework and Risk Management Policy' (Executive Director's decision SESAR JU/ED/64) and the 'Risk, Issue and Opportunity Management Process' (Executive Director's decision SESAR JU/ED/305) both applicable at the time of the audit. The policy addresses 4 threads of risks: Corporate risks, Master Plan risks, SESAR JU internal risks and SESAR 2020 Programme Risks. In addition to this new Risk Management Policy, in May 2017, the SESAR JU formalised in the context of its Quality Management Process, 'the Corporate Risk Management Process' (SESAR JU Business Process no 14.2).

The revised SESAR JU Corporate Risk Management better integrates the bottom-up approach with the top-down approach. Indeed, the bottom-up approach comprises the risk management performed by SESAR 2020 participants who identify and manage risks at project level while Programme Managers are in charge of identifying and monitoring the critical risks at the programme level. The top-down approach consists in an analysis of risks linked to strategic objectives.

Care has been taken to streamline the current approach to reduce disproportionate requirements and to increase the focus on the management of **critical risks** defined as a risk that:

- endanger the realisation of objectives outlined in the European ATM Master Plan,
- cause serious damage to the SESAR partners (SESAR JU Members, broader stakeholder community involved in the execution of the European ATM Master Plan),
- result in critical intervention at political level (European Parliament / European Council / European Commission) regarding SESAR JU's performance,
- result in infringement of laws and regulations,
- result in misuse of public money,
- put the safety levels of aviation at stake,
- or in any way seriously impact the SESAR JU's image and reputation.



In November 2018, the IAS conducted a Strategic Risk Assessment of the SESAR JU. This entails that the IAS analysed all operational, administrative, financial and IT processes of the SESAR JU with the aim of identifying areas of risk and future audit topics. This Strategic Risk Assessment led to the Strategic Internal Audit Plan (SIAP) 2019-2021 (see Section III, point 2.6.8.2).

The IAS concluded that the most significant risks relate to the following three topics:

- Grant implementation and programme management: The SESAR JU's activities follow the standard H2020 grant management cycle from the preparation and launch of calls for proposals, via project implementation to closure. In its previous Strategic Internal Audit Plan, the IAS covered the risks of the initial phase of the grant management process. In the current risk assessment exercise, the IAS singled out the risks related to the grant implementation phase and programme management and will conduct an audit in this field.
- The in-kind contribution validation process: The majority of contributions from SESAR JU's private members and Eurocontrol are in-kind contributions. Taking into account the high amounts involved and the complexity and importance of the validation process, the IAS will conduct an audit on the in-kind contribution validation process.
- Human resources management: The staffing plan of the SESAR JU consists of 39 temporary and contract agent posts. In addition, there are staff members seconded from Eurocontrol, from industry members and seconded national experts from Member State authorities. The combination of 'traditional' HR related risks (HR planning and allocation, recruitment and career development) with the unique challenge of workforce that is subject to two different regulations (EU and Eurocontrol), led the IAS to plan an audit on HR management.

The IAS also identified two additional areas of risks which might be audited in the coming years.

- The new internal control framework: The SESAR JU completed the transition to the new internal control framework at the end of 2018. This entails a shift of focus from compliance towards an assessment of the effectiveness and efficiency of the control system which might result in risks to the organisation.
- The Internal Data Protection Regulation (IDPR): The IDPR lays down rules relating to the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies. If roles, responsibilities and processes of staff working with personal data are unclear or not defined or do not match the new data protection regulation, this may lead to personal data not being properly managed and to litigation and financial claims. This is a cross-cutting risk which applies to all EU Institutions and Bodies. In the case of the JUs most of the grant related personal data is managed by the Common Support Centre (CSC). There is therefore a joint ownership of the data and consequently of the risk.

Finally, the IAS identified a number of risks, which were brought to the attention of management even though these will not be covered by internal audit work of the IAS. The SESAR JU has already initiated actions to address these risks in 2019 and will continue to work on mitigating controls in 2020.

- An inherent risk for SESAR JU is the uncertainty derived from the fact that the next framework programme for research and innovation for the period 2021-2027, Horizon Europe, has not yet been adopted by the Council and the European Parliament. It is therefore unknown whether Horizon Europe will include a third generation of JUs. This entails a major factor of uncertainty for the JU and bears important risks to its continued existence. As the proposal and adoption of Horizon Europe falls outside of the JU's remit, this was considered as a non-auditable topic.
- The absence of an updated business continuity plan and lack of a tested disaster recovery plan increases SESAR JU's business continuity risk and should be addressed by SESAR JU's management. However, taking into account the higher priority of the core business of the JU and the limited IAS resources, this risk will not be audited.
- In the area of ICT the IAS identified two risks which are worth highlighting. First the risk that the lack of an IT strategy may lead to non-alignment between business and IT, and a sub-optimal value from projects and services portfolio. Second, the risk that SESAR's supplier management could lead to a lack of control of IT suppliers which could result in paying prices for IT services above the market prices. However, taking into account the higher priority of the other audit topics and the IAS' limited IT auditing resources, these risks will not be audited.

The next in-depth risk assessment performed by the IAS is planned for 2022.

Ref.	Risk description	Criticality	Risk owner	Impact on SESAR JU Objectives 2020	Mitigation actions
CORP01	R&D activities do not deliver solutions allowing to reach expected ATM performance	Moderate	SESAR JU	<ul style="list-style-type: none"> - Alignment of Level 2 and level 1 of the Master Plan - Master Plan Level 3 implementation - IR Wave 1 projects delivery of results - IR Wave 2 projects delivery of results 	<ul style="list-style-type: none"> - ATM Master Plan update to identify clear priorities for future investments with a focus on solutions that hold the potential to provide a step-change in ATM performance - Launch Wave 2 projects in 2019 (SPD 2019)
CORP03	IOP solution supporting the PCP and developed in SESAR 2020 may not be delivered on time for deployment	Moderate	SESAR JU	<ul style="list-style-type: none"> - Delivery of Wave 1 project results (sol candidate SESAR Solution PJ.18-02b) 	<ul style="list-style-type: none"> - Continuous close monitoring of the progress by a PC dedicated Decision Team (supported by an Analysis Team at technical level); this set-up established at end of SESAR 1 to secure recovery towards PCP objective will continue its operations until final solution delivery defining specific actions to put in place when necessary
CORP05	The SESAR JU may not be able to take up new challenges due to limited human resources	Moderate	SESAR JU	<ul style="list-style-type: none"> - Preparation of new cooperative arrangement with actors in Aviation - Preparation for the future ATM partnership 	<ul style="list-style-type: none"> - Re-assess need for support contracts to get additional expertise during peaks of workload not to endanger the realisation of core business activities - Assess gaps in required skills linked to new or known coming tasks and plan actions sufficiently in advance to let time to acquire new skills - Secure resources for SESAR JU core business
CORP06	The BREXIT may have an impact on SESAR JU objectives	High	European	<ul style="list-style-type: none"> - ER4 award of projects and supervision of projects - IR Wave 2 projects delivery of results 	<ul style="list-style-type: none"> - An impact assessment of the potential effects of Brexit on the membership, grants, procurements and experts contracts with the available information at that moment, both

			Commi ssion	<ul style="list-style-type: none"> - Launch, evaluation and award of the VLD open activities - Implement the calls for proposals and grants management framework - Balance payments to Members and beneficiaries 	<p>from the legal and from the financial p.o.w, and made it available to DG MOVE</p> <ul style="list-style-type: none"> - The assessment of the staff from the United Kingdom regarding their potential continuation at the SESAR JU after Brexit, following European Commission’s instructions and using templates and procedures harmonized with other agencies
CORP XX	<p>Risk on the Members’ contribution to running costs:</p> <p>Contrary to other JTIs, the amount of the contribution of non-EU members to the running costs of the SESAR JU is not fixed in the constituent act. This amount is defined as a percentage of the in-kind contribution in the Membership Agreement. As a consequence, if the non-EU Members’ in-kind contribution is lower than planned, their contribution to SESAR JU’s running costs will be lower too.</p> <p>In 2019, the exposure is estimated to be up to 6 M€.</p> <p>On the contrary, Title 1 and 2 expenditure is in most cases related to commitments with low adaptability (e.g. wages, rental fees, ICT system...)</p> <p>The impact of a lower contribution to running costs would be that the SESAR JU may lack financial resources</p>	High		<ul style="list-style-type: none"> - Monitor efficiency and effectiveness of SESAR JU’s financial activities - Carry out payments to Members and beneficiaries - Implement the calls and grants management framework 	<ul style="list-style-type: none"> - Maintain a reserve in the SESAR JU budget (estimate of the reserve amount in 2019: 9,5 M€, of which 0,5 M€ within Title 1, 2,2 M€ within Title 2 and 6,8 M€ within Title 3) - Monitor the effective contribution of non-EU members to the running costs of the SESAR JU regularly and mobilise funds from the reserve as required



	<p>to cover its planned expenditure and not be in a position to fulfil all its legal commitments until the end of 2024.</p> <p>In addition, the SESAR JU may have to face unexpected expenditure in Title 3 (for a maximum value of 3,5 M€).</p> <p>The total maximum risk exposure is 9,5 M€.</p>				
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Table 53: Main SESAR JU risks and related mitigation actions



Annex IX: Procurement plan for 2020

As per Article 110 of the EU Financial Regulation, ‘a budgetary commitment shall be preceded by a financing decision adopted by the Union institution or by the authority to which powers have been delegated by the Union institution’. This financing decision, which at the same time constitutes the annual or multi-annual work programme, shall in particular set out certain essential elements for an action involving expenditures from the budget for procurement and prizes.

Note: In accordance with Article 110 (5) of the EU Financial Regulation and the principle of sound financial management, the SESAR JU Authorising Officer may decide to make non-substantial changes and amend the indicative budget and/or timing identified above for a given procurement procedure if this allows for an improved adherence to SESAR JU objectives. A change of more than 20 % in the volume of appropriations, introduction of a new action or other changes affecting the political choices in the SPD are to be considered as substantial.

Operational expenditure

The maximum global budgetary envelope reserved for procurements covered by operational appropriations is estimated to be at a minimum of **EUR 7.325.000** in 2020.

Strategic Area of Operation #1 – Provide Strategic Steering to the SESAR programme

Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Op.1.1.	B034	Management support to the SESAR 2020 Programme operational and transversal strategic development	New Framework Contract	Q1 2020	Q2-Q3 2020	n.a.	Framework Contract / Open call for Tender	New call for tender– EUR 1.400.000 as maximum budget Specific Contracts.
Op.1.2.	B034	Management support to the SESAR 2020 Programme operational and transversal strategic development	Implementation of FWC for 2020 – SC1	Q2-Q3 2020	Q3 2020	250.000	Specific contract under SESAR JU Framework Contract	
Op.1.3.	B034	Management support to the SESAR 2020 Programme operational and	Implementation of FWC for 2020 – SC2	Q2-Q3 2020	Q3 2020	250.000	Specific contract under SESAR JU	



Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
		transversal strategic development					Framework Contract	
Op.1.4.	B034	Management support to the SESAR 2020 Programme operational and transversal strategic development	Implementation of FWC for 2020 – SC3	Q2-Q3 2020	Q3 2020	250.000	Specific contract under SESAR JU Framework Contract	
Op. 1.5.	B034	Inter-institutional agreement between the SESAR JU and EASA (to be confirmed)		Q1 2020 (to be confirmed)	Q3 2020	200.000	Inter-institutional agreement	
TOTAL for Strategic Area of Operation #1 – Provide Strategic Steering to the SESAR programme						950.000		

Strategic Area of Operation #2 – Deliver Exploratory Research

Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Op.2.1.	B038	Young Scientist Award	Award to young scientist(s) for exceptional achievements in the field of the ATM research	Q1 2020	Q4 2020	5.000	Prize	
TOTAL for Strategic Area of Operation #2 – Deliver Exploratory Research						5.000		

Strategic Area of Operation #3 - Deliver Industrial Research and Validation

Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Op.3.1.	B03600	Programme Support	SESAR Development Support Services (SDSS)	Q1 2020	Q4 2020	5.000.000	Direct Service Contract – Open call for tender	
TOTAL for Strategic Area of Operation #3 - Deliver Industrial Research and Validation						5.000.000		

Strategic Area of Operation #5 - Deliver SESAR Outreach

Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Op.5.1.	B038	Airspace Users Lot 1	Implementation of FWC for 2020 – SC 4	Q1 2020	Q2 2020	410.000	Specific contract under SESAR JU Framework Contract	FWC ref. SJU/LC/0321-CTR
Op.5.2.	B038	Airspace Users Lot 2	Implementation of FWC for 2020 – SC 4	Q1 2020	Q2 2020	140.000	Specific contract under SESAR JU Framework Contract	FWC ref. SJU/LC/0322-CTR
Op.5.3.	B038	Airspace Users Lot 3	Implementation of FWC for 2020 – SC 4	Q1 2020	Q2 2020	85.000	Specific contract under SESAR JU Framework Contract	FWC ref. SJU/LC/0323-CTR
Op.5.4.	B038	Airspace Users Lot 4	Implementation of FWC for 2020 – SC 4	Q1 2020	Q2 2020	85.000	Specific contract under SESAR JU Framework Contract	FWC ref. SJU/LC/0324-CTR
Op.5.5.	B038	Airports expertise support	Implementation of FWC for 2020 – SC 5	Early Q1 2020	Q1 2020	350.000	Specific contract under SESAR JU Framework Contract	FWC ref. SJU/LC/0308-CTR



Reference	Budget line	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Op.5.6.	B03800	Professional Staff Organisations support Lot 1	Implementation of FWC for 2020		Q1 2020	60.000	Specific contract under SESAR JU Framework Contract	
Op.5.7.	B03800	Professional Staff Organisations support Lot 2	Implementation of FWC for 2020		Q1 2020	60.000	Specific contract under SESAR JU Framework Contract	
Op.5.8.	B03800	Professional Staff Organisations support Lot 3	Implementation of FWC for 2020		Q1 2020	60.000	Specific contract under SESAR JU Framework Contract	
Op.5.9.	B03800	Professional Staff Organisations support Lot 4	Implementation of FWC for 2020		Q1 2020	60.000	Specific contract under SESAR JU Framework Contract	
Op.5.10.	B03800	Professional Staff Organisations support Lot 5	Implementation of FWC for 2020		Q1 2020	60.000	Specific contract under SESAR JU Framework Contract	
TOTAL for Strategic Area of Operation #5 - Deliver SESAR Outreach						1.370.000		

Table 54: Main procurement activities to be conducted in 2020 covered by operational appropriations

Administrative expenditure

Although not necessary in the case of administrative appropriations, SESAR JU decided to identify below its main Administrative Support Expenditures for transparency purposes. This list is for information purposes only and non-exhaustive.

Strategic Area of Operation #5 - Deliver SESAR Outreach

Reference	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Ad.5.1.	Realisation and PR activities/material (Lot 2 - Digital communications)	Implementation of FWC SC 2		Q1/Q2 2020	43.000	Specific contract under SESAR JU Framework Contract	
Ad.5.2.	Realisation and PR activities/material (Lot 3 - Event communications)	Implementation of FWC SC 2		Q1 2020	105.000	Specific contract under SESAR JU Framework Contract	
Ad.5.3.	Realisation and PR activities/material (Lot 3 - Event communications)	Implementation of FWC SC 3		Q2 2020	150.000	Specific contract under SESAR JU Framework Contract	
Ad.5.4.	Realisation and PR activities/material (Lot 1 - Strategic communications, editorial and graphic design)	Implementation of FWC SC 2		Q3 2020	80.000	Specific contract under SESAR JU Framework Contract	
Ad.5.5.	Realisation and PR activities/material			Ad-hoc	12.000	Service Contract – Middle value negotiated procedure	
Ad.5.6.	Realisation and PR activities/material			Ad-hoc	15.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract (Office of Publications)
TOTAL for Strategic Area of Operation #5 - Deliver SESAR Outreach					405.000		

Strategic Area of Operation #6 – Deliver effective financial, administrative and corporate management

Reference	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Ad.6.1.	Works and repairs	Facility Services for maintenance and renovation	Q4 2019	Q1 2020	100.000	Framework Service Contract - Negotiated call for tender	New call for tender
Ad.6.2.	Facility Coordination	Supply of furniture	Q2 2020	Q4 2020	5.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad.6.3.	Facility Coordination	Removal and recycling of decommissioned goods	Q2 2020	Q4 2020	1.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad.6.4.	Facility Coordination	Office Chairs	Q2 2020	Q4 2020	5.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad.6.5.	ICT - Software	ICT software – Adobe and VMware Maintenance renewal	Q4 2020	Q4 2020	10.500	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad. 6.6.	IT System maintenance and unified communication	ICT software – Microsoft Maintenance renewal	Q2 2020	Q2 2020	16.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad. 6.7.	IT System maintenance and unified communication	Testa-ng extension	Q2 2020	Q2 2020	10.000	Specific Contract under European Commission's Framework Contract	Implementation of European Commission's Framework Contract
Ad.6.8.	ICT - Software	ICT software – New Adobe Acrobat Pro subscription	Q1 2020	TBD	8.500	Specific Contract under European Commission's Framework Contract	SIDE II - DI/07720

Reference	Procurement title (incl. indicative Specific Contracts)	Procurement description	Indicative timeframe for launch	Target signature date	Total est. budget (EUR)	Type of contract / procedure	Comments
Ad.6.9.	Audit fiscal and accounting support	Audit of annual accounts 2020/2021	Q3 2020	Q3 2020	75.000	Specific Contract under European Commission's Framework Contract	
Ad.6.10.	Legal Support	Legal support to be required on a case-by-case basis	Q2 2020	Q2 2020	20.000	Service Contract / Open call for tender	New call for tender
Ad.6.11.	Data protection	Data protection support and development of an online register	Q2 2020	Q2-Q3 2020	8.000	Service Contract – Middle value negotiated procedure	Renewable every year, maximum until the end of 2024. Joint procurement procedure, led by S2R JU
TOTAL for Strategic Area of Operation #6 – Deliver effective financial, administrative and corporate management					259.000		

Table 55: Main procurement activities to be conducted in 2020 covered by administrative appropriations



Annex X: 2020 SESAR JU Organisation Chart

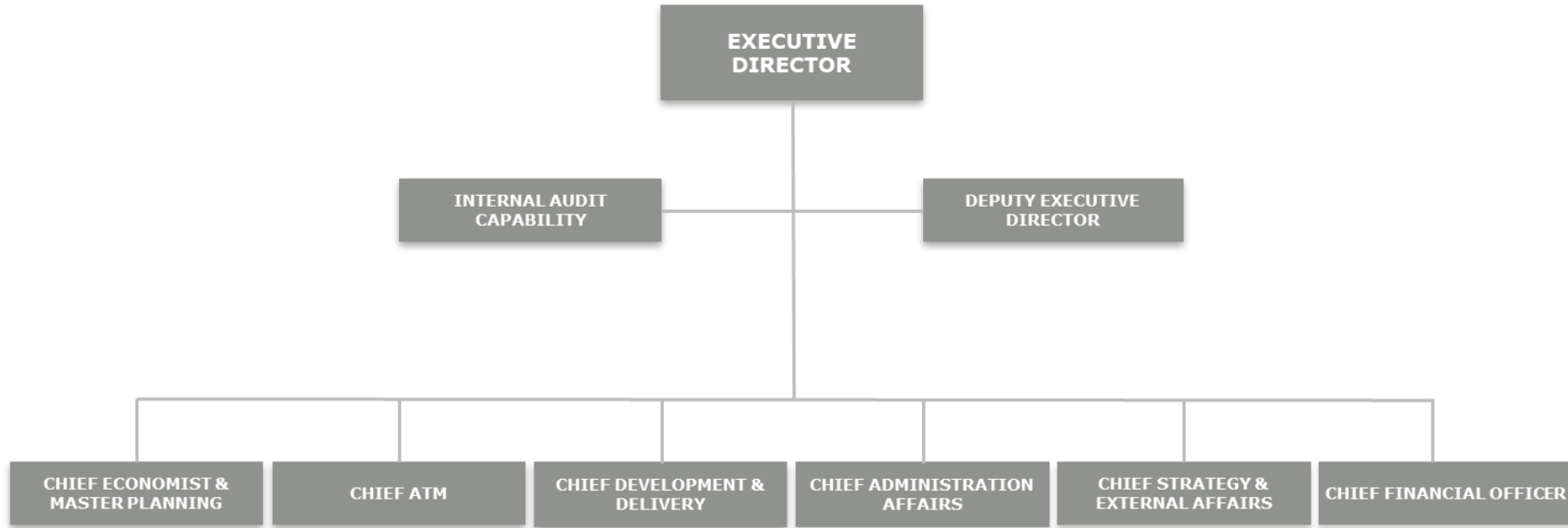


Figure 22: SESAR JU Organisation chart as of 6 June 2019



Annex XI: List of Members of the SESAR Joint Undertaking

The SESAR JU Members and their respective constituent entities are listed below:

Name of Member	Constituent Entities	Country
The European Union, represented by the European Commission (Founding Member)		
EUROCONTROL, the European Organisation for the Safety of Air Navigation, represented by its Agency (Founding Member)	Single Entity	
Airbus SAS	Single Entity	FR
AT-One Consortium	Deutsches Zentrum für Luft- und Raumfahrt e. V. (German Aerospace Center, DLR)	DE
	Stichting Nationaal Lucht- en Ruimtevaartlaboratorium (National Aerospace Centre, NLR)	NL
B4 Consortium	POLSKA AGENCJA ŻEGLUGI POWIETRZNEJ, the Polish Air Navigation Services Agency: (PANSA)	PL
	RIZENI LETOVEHO PROVOZU CESKE REPUBLIKY STATNI PODNIK, the Air Navigation Services of the Czech Republic: (ANS CR)	CZ
	Letové prevádzkové služby Slovenskej republiky, štátny podnik: (LPS SR s.p.) – State owned ANSP of Slovakia	SK
	Valstybes imone 'Oro navigacija', the State Enterprise 'Oro Navigacija' (ON) – State owned ANSP of Lithuania	LT
COOPANS Consortium	Naviar	DK
	Irish Aviation Authority: (IAA)	IE
	Croatia Control, Croatian Air Navigation Services Ltd: (CCL)	HR
	Austro Control Österreichische Gesellschaft für Zivilluftfahrt mbH: (ACG)	AT
	Luftfartsverket: (LFV)	SE
Dassault Aviation SA	Single Entity	FR
DFS Deutsche Flugsicherung GmbH: (DFS)	Single Entity	DE
République Française, Ministère de L'écologie, du Développement Durable, et de L'Énergie, acting via Direction Générale de L'Aviation civile, represented by Direction des Services de la Navigation Aérienne: (DSNA)	Single Entity	FR
ENAV S.p.A	Single Entity	IT

Entidad Pública Empresarial ENAIRE	Single Entity	ES
Leonardo	Single Entity	IT
Frequentis SESAR Partners (Consortium)	Frequentis AG	AT
	Hungarocontrol Zrt (HC)	HU
	Atos Belgium SA/NV	BE
Honeywell Aerospace SAS	Single Entity	FR
INDRA Sistemas, S.A.	Single Entity	ES
NATS (En Route) Plc	Single Entity	UK
North European ATM Industry Group NATMIG Consortium	Stiftelsen SINTEF	NO
	Saab AB	SE
	Airtel ATN Ltd.	IE
SESAR European Airports Consortium (SEAC 2020)	Heathrow Airport Limited	UK
	Aéroports de Paris S.A.	FR
	Flughafen München GmbH	DE
	Flughafen Zürich AG	CH
	Schiphol Nederland B.V.	NL
	Swedavia AB	SE
	Avinor AS	NO
Skyguide, Swiss civil and military Air Navigation Services Ltd	Single Entity	CH
Thales Air Systems SAS	Single Entity	FR
Thales Avionics SAS	Single Entity	FR

Table 56: List of SESAR JU Members