EUROCAE Technical Work Programme

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EXECUTIVE SUMMARY

The Technical Work Programme (TWP) 2026 is a strategic document which presents a comprehensive view of the EUROCAE scope of work. It provides insight into the context of current and potential future EUROCAE activities for aviation executives and stakeholders of standardisation in the broad field of aviation.

The TWP also briefly summarises the achievements in the context of the current aviation environment. A list of the EUROCAE Working Group activities can be found in the Appendix of this document.

The focus of this TWP is to provide guidance for future activities in a globally consistent and harmonised way. A clear view of planned activities for EUROCAE is given, with the understanding that EUROCAE, being a flexible organisation, may amend its plans as necessary at any point in time; in fact, as demonstrated in the recent past, EUROCAE is well-able to react on short notice and produce high-quality standards on demand.

The increasing importance of a more environmentally friendly aviation shapes this TWP by introducing standards on sustainability topics such as alternative jet fuel, new propulsion systems and emissions to support the global sustainability goal for net zero. The Programme also considers advanced air mobility, the need for the reduction of collision risks, for the dynamic configuration of airspace, for the increase of automation (including the efficient and interoperable use of artificial intelligence in aviation systems), for the transformation towards trajectory-based operation (TBO), for the virtualisation of operations, for the transition towards high performance of air-ground connectivity, for the CNS optimisation (including the use of spectrum), for the new technological platforms, and for the support to the European airspace strategy.

Complementing the activities description, the Programme describes the standardisation stakeholders and facilitates coordination between industry, research & development, operational users and the political framework. The standardisation programme is closely coordinated with the SESAR Digital European Sky Programme and its roadmap, the European ATM Master Plan 2025. The Programme also relates to the European Plan for Aviation Safety and to the Clean Aviation Joint Undertaking Work Programme. One principal pillar of this Programme is the introduction of the new service delivery model outlined in the ATM Master Plan 2025, and the supporting regulatory framework.

The document further provides a vision looking forward into future possible evolutions, encompassing topics such as autonomy, quantum computing and other evolving technologies and concepts likely to affect future aviation. It also reflects the key values of EUROCAE, being transparent, fostering collaboration and being up-to-date with regard to innovation, harmonisation and international presence.

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

The Technical Work Programme (TWP) serves the Technical Advisory Committee (TAC) as guidance for proposing new and strategically relevant Working Groups (WGs) to the EUROCAE Council, in order to appropriately organise the future of EUROCAE activities. It is also used as an input to the EUROCAE Business Plan.

To achieve its purpose, this document provides an overview of the ongoing technical standardisation activities currently undertaken by EUROCAE and a vision of activities to be potentially undertaken in the coming years.

The current and future activities are driven by sustainability, scalability, resilience and support of research and deployment. In particular, new technologies, automation, digitalisation, efficiency, and flexibility, as well as the impact on the environment become more prominent. This may also lead to a shift in the standardisation needs as perceived by the industry.

The TWP attempts to anticipate this shift in activities, in line with inputs received from the various stakeholders.

This document is organised in five chapters:

- Chapter 1: Executive summary and a brief introduction.
- Chapter 2: Insight into the development context of the TWP.
- Chapter 3: Presentation of the major stakeholders shaping the environment of EUROCAE activities.
- Chapter 4: Ongoing and foreseen activities of EUROCAE including:
  - new or revised tasks allocated to existing Working Groups (WG) within a 1 to 2-year timeframe,
  - the establishment of specific new activities or WGs.
- Chapter 5: Exploration of potential activities which are not expected to start in the short term but may become relevant in the future.

An overview of the EUROCAE domains and related Working Groups is provided in Appendix A. The EUROCAE Website[1] should be consulted for information on published and ongoing deliverables.

Appendix B lists all acronyms used in the document.

[1] https://eurocae.net/about-us/working-groups/

CHAPTER 2
TWP DEVELOPMENT CONTEXT

The TWP presents the organisations that are stakeholders of EUROCAE and explains their fields of activities. It derives their standardisation needs and puts them into the context of the activities of the EUROCAE Working Groups.

EUROCAE covers standardisation activities in all areas of civil aviation. Although EUROCAE has its roots in Europe, it is an internationally recognised Standards Developing Organisation (SDO), known for its high quality, safety critical standards for all areas of aviation. Therefore, the scope of standardisation activities considered in this TWP relates to airborne, ground and space systems, covering operational and functional considerations, systems architecture, hardware, software, databases, processes, services and operational aspects.

EUROCAE serves traditional aviation stakeholders as well as new subjects of relevance to the entire aviation community.

The resulting standards complement the regulatory and certification framework with a full set of standards, aiming to be recognised as Acceptable Means of Compliance (AMC).

The main EUROCAE activities consist of developing standards:

- in support of future regulatory requirements (e.g., ICAO, EASA, European Commission, FAA…),
- which could be recognised as AMC within the Aviation Safety and Security Regulations,
- which could be used as AMC in support of Single European Sky (SES) Regulations,
- in support of, and in strong coordination with, the Air Traffic Management (ATM) research, development and validation in Europe and globally,
- in support of the deployment (i.e. industrialisation followed by implementation) of SESAR and other R&D solutions, for example Common Project 1 (CP1),
- in support of the European and global aeronautical Industry.

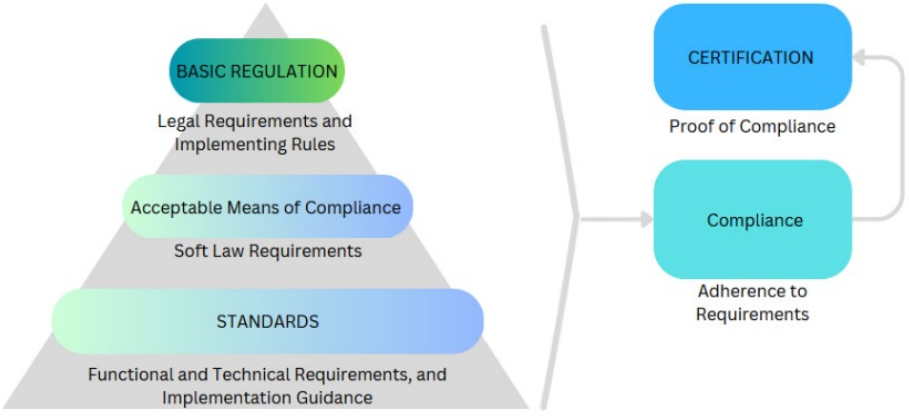

FIGURE 1: REGULATORY FRAMEWORK

The types of documents produced by EUROCAE are defined in the EUROCAE Handbook, the EUROCAE Document (ED) Development Process and supporting documentation, accessible via the EUROCAE Workspace and duly documented in the Quality Management System (QMS).

Standardisation and regulation are key tools to support research & development and industrialisation, in preparation for the implementation phase of new technology. Standardisation serves to codify the results of R&D programmes by exposing them to a wider group of experts, ensuring broad participation, openness, and transparency through the SDO processes, and delivering them into the public domain by publishing consensus-based standards.

When there is a regulatory requirement, this becomes even more important; industry, stakeholders and the SDO together define the “how to comply” with a regulation and effectively write the AMC, based on the latest state of the art R&D and on a consensus reached within the community. In quickly developing fields, standards can be developed in a more flexible way and faster than regulations. This enables the following of a more performance-based approach for the regulations, complemented by new or existing standards.

Commonly agreed standards also serve as an input to create a basis for deployment and for further R&D work. This is achieved through creating a level playing field for all stakeholders, by providing commonly agreed – standardised – levels of performance, test methods or procedures.

Standards are a very effective means to avoid divergences between the major ATM innovation programmes (e.g. SESAR) and they bridge regional and global initiatives for modernisation of aviation in support of the ICAO GANP/GASP. Developed standards provide the baseline of performance requirements which can also encourage innovation by industry players to build a competitive advantage, while not compromising interoperability.

Other regions have put in place similar R&D programmes and efforts (e.g. NextGen in US, CARATS in Japan), and it is important that EUROCAE remains aware of these efforts.

Recognising the importance of global harmonisation and interoperability, there is a need to have internationally harmonised standards wherever possible.

As part of its overall stakeholder engagement plan, EUROCAE is building and maintaining cooperation agreements or similar relationships with regulators, international and regional organisations, industry, air navigation service providers, airports, airlines, professional associations, other standardisation organisations, R&D and academia as well as other relevant stakeholders.

The international outreach activities and agreements concluded with organisations from regions other than Europe and the US (e.g., Asia (Japan, Korea, China, …), Middle-East, …) help to understand the structure of the aviation community in those regions and their priorities and challenges. This facilitates communication with them and their involvement in EUROCAE, which contributes greatly to the international nature, applicability and recognition of EUROCAE standards in support of global interoperability.

The strong relationship between EUROCAE and other SDOs, notably RTCA and SAE, but also ASTM and ISO, is important in this respect. This ensures a link with the FAA, which is also a full member of EUROCAE.

CHAPTER 3
STAKEHOLDERS SHAPING THE ENVIRONMENT OF EUROCAE TECHNICAL ACTIVITIES

EUROCAE is working in an ecosystem of many aviation stakeholders. It is important for the organisation to understand the community's needs and trends, to initiate the timely development of appropriate standards and prioritise activities. Building and maintaining strong collaborative relationships with our members and other key partners is therefore an important element of our work.

FIGURE 2: EUROCAE STAKEHOLDERS

The technical standardisation activities to be initiated in the future by EUROCAE have been identified from inputs coming from several different sources, namely:

- European Commission
- EASA
- ICAO
- EUROCONTROL
- SESAR 3 Joint Undertaking
- SESAR Deployment Manager
- Aeronautical industry
    - o Aircraft manufacturers
    - o Airborne equipment and system manufacturers
    - o Ground equipment and system manufacturers
- Air Navigation Services Providers
- Airports
- Conventional aviation
- Military
- Clean Aviation
- Standardisation Organisations
    - o RTCA
    - o SAE
    - o Other SDOs

All aviation stakeholders, and in particular EUROCAE Members, are free at any time to propose initiatives for EUROCAE standardisation work. In the recent past, we observed more non-members approaching us to initiate standardisation activities. These organisations normally join EUROCAE as members during the process. EUROCAE activities also encompass coordination with stakeholders developing or using systems and procedures coexisting with the aviation environment (e.g., the efficient use of spectrum).

CHAPTER 4
ONGOING AND FORESEEN EUROCAE TECHNICAL ACTIVITIES

EUROCAE activities have been classified into the 11 domains, as per the following figure:

FIGURE 3: EUROCAE TECHNICAL DOMAINS

The six upper (blue) domains represent *operational* aviation industry and user-based clusters. The standardisation activities in those domains are very closely related to operational processes and procedures defined by use cases of the various stakeholders. The five lower domains specifically address *technical* or *technological* aspects and therefore are closely related to systems with standardisation activities describing certain performances. The technical and technological domains are transversal by nature.

Each EUROCAE activity, and its related Working Groups, will be associated to one main domain, even if also related to another one. For example, Space Traffic Management or U-space are respectively under the Space and Advanced Air Mobility domains, even if they obviously address the (Air) Traffic Management topic. Similarly, almost all software related activities will be covered in the “IT & Software” domain, even if the equipment or system involved might belong more specifically to one of the operational domains.

4.1 Avionics

This domain encompasses all standardisation activities which are related to equipment and systems on board aircraft including Communication, Navigation and Surveillance (CNS) capability and supporting systems (interfaces, power, data sharing networks). Activities contributing to the system performance (safety, environmental performance, architecture) will be outlined in the dedicated “System Engineering” section.

4.1.1 Avionics architecture, infrastructure and networks

The next decade avionics architecture will have to cope with new avionics functions and new technologies associated to an increase of data exchanged: new propulsive and non-propulsive energy management, trajectory management, enhanced awareness, advanced automation, predictive maintenance, etc.

Such functional increase, associated to more complexity, tends to drastically increase the need for infrastructure and network resources compared to legacy and current state-of-the-art avionics.

Overall design and development of current solutions, as well as tomorrow ones, will require continued standardisation of industrial practices related to the safety aspects of aircraft systems development, certification, and continued airworthiness, as well as their in-service maintenance. This is the subject of EUROCAE WG-63 through the publication

of guidelines for development (ED-79B/SAE ARP-4754B) and safety assessment (ED-135/SAE ARP-4761A).

In this next generation architecture, connected and based on various technologies, security aspect has become mandatory. WG-72 is developing security guidelines specifying security objectives in order to ensure their stability over time, addressing airborne systems and interfacing ground systems in their end-to-end relationship.

4.1.1.1 Integrated Modular Avionics and associated architectures

For the avionics part, Integrated Modular Avionics (IMA) solutions are now installed on many types of aircraft, hosting a wide range of functions from flight controls to maintenance applications. Performance and incremental process are key factors to support standalone installation/qualification of various independent systems, following different lifecycles.

Modular approaches now go beyond the avionics core to address more and more functions within aircraft.

Architectures will be increasingly based on infrastructure assets providing:

- Several types of modular avionics platform, adapted to various uses: flight control, avionics, utilities or aircraft systems open-world applications.
- Large computing throughput using multicores to increase integration capability.
- Large storage capabilities and new services supporting big data and AI.
- Connectivity and cyber protections.
- Configurability and scalability to enlarge the capacity within each domain and foster its re-use.

The widespread adoption of multi-core processors and new SOC and SIP core processing architectures require adaptations to industry and certification standards.

4.1.1.2 High bandwidth buses and network

For high-speed networks, main trends in the short term are driven by higher and more optimised bandwidth for avionics communication buses. The increasing usage of data in the avionics with frequent updates, strains the performance of maintenance operations, thereby calling for larger bandwidth on the field communication buses involved. Next generation networks will also need to handle critical communication and support various levels of Quality of Service, ranging from full determinism to best effort.

New services such as clock reference distribution through the network will be also of increasing importance.

Furthermore, network protection against cyber-attack is also key for future networks in a context of growing cyber threat.

Finally, an effort is required to harmonise the various technologies in order to reduce design and industrialisation complexity.

ARINC sub-committee for Next-Generation Network Technology for Avionics Communication (NTAC) and Network Infrastructure and Security (NIS) was created to address these objectives.

4.1.1.3 Avionics wireless communication

Wireless communication is a novel approach to communicating between avionics components and systems installed on a single aircraft. A “MOPS for Wireless Avionics Intra-Communication System” (ED-319), published in July 2025, defines the radio RF characteristics for intra or inter-system communications and a reference system architecture with minimum equipment characteristics to comply with interferences, safety and cybersecurity objectives.

4.1.2 Aviate, flight control and auto flight

4.1.2.1 Flight Controls and Auto Flight

Regarding flight controls, Fly-By-Wire technology has gained in popularity in smaller aircraft. Fly-By-Wire technology widely used in Commercial Air Transport is now on the verge of a breakthrough in general aviation and is clearly favoured by the new VTOL,

High End General Aviation and UAS industry. Simplifying vehicle operation and unprecedented lift & thrust VTOL configuration requires automatic system protection and target control (as opposed to direct control) with a very high level of dependability.

Fail-safe Fly-By-Wire flight control systems are paving the way for autonomous functions and simplified operations. Coupling the Auto flight system with flight controls may lead to architectures significantly improving the availability of the auto-flight function, leaving thereby the crew in the position of monitoring the mission around strategic goals.

Fly-By-Wire equipment manufacturers also endeavour to reduce cost, size, weight and power, acknowledged as the key values for IAM platforms.

4.1.2.2 Air Data Sensors

One potential field is the development of a specific standard for air data sensors using LIDAR technology. Several initiatives perform R&D, looking at industrialisation of this technology at an attractive cost while demonstrating equivalent or better performance than current air data probe technology. A specific standard will be needed for such equipment, probably in coordination with SAE.

The future activities will be determined in coordination with other standardisation organisations particularly in domains where EUROCAE has competencies.

This activity supports strategic development in EASA in response to recommendations from accident investigations.

4.1.2.3 Computer Vision

Computer Vision refers to techniques used by a computer to extract useful information from images. Autonomous vehicles and robots may use computer vision to locate themselves, avoid obstacles, map their environment, detect specific targets or more generally extract information that could be used as inputs in decision-algorithms.

Computer Vision relies by nature on multi-dimensional signals that require analysis, making it more sensitive to false interpretation or performance reduction, while allowing for a wider range of applications.

The development of Innovative Aerial Services relies on more and more critical functions based on computer vision. In other applications like Remote Virtual Towers (RVT), extended Minimum Crew Operation (eMCO) or Single Pilot Operations (SiPO), computer vision systems might also be used to replace or complement humans. With respect to airport operations, computer vision can be used to create timestamps of the ground progress of aircraft, optimise the turnaround process of aircraft, feed input into complex flight planning and scheduling systems and track the supply chains.

Standardisation activities might be required to define minimum performance and AMC for computer vision systems used in both ground-based and aircraft systems.

4.1.3 Localisation, Navigation and Approach

4.1.3.1 Alternative/Complementary Position, Navigation and Timing (A-PNT/C-PNT)

This is a means to continue Performance Based Navigation (PBN) operations during periods when GNSS services are unavailable, due to interference or outage, by utilising alternates options independent of GNSS or utilization of other sensors in combination with GNSS.

As a short-term solution to the need for GNSS back up, WG-107 is working on a revision to ED-57 “MOPS for Distance Measuring Equipment (DME/N and DME/P) - Ground Equipment”, in order to establish criteria suitable to qualify DME infrastructure able to support Required Navigation Performance (RNP) with containment, in line with the ICAO PBN Manual. WG-107 works also on a new ED – MASPS (in alignment with the above MOPS) for DME Infrastructure supporting PBN Positioning.

In addition, WG-134 begins its work on updating the DME interrogator MOPS (ED-54A) which will contribute to WG-85/SC-227 work on standards to operate PBN using non-GNSS sensors.

4.1.3.2 True North Navigation

Air Navigation is currently organised and dependent on magnetic heading, though there are parts of the world where aviation safely operates in true track/heading thanks to the introduction of GNSS and Inertial technologies. In addition, the local magnetic variations are varying by a few degrees over a period between 5 and 10 years, sometimes accelerating locally with a shorter time scale. Since the technology appears to be available and is now equipping modern aircraft, an initiative led by Nav Canada and endorsed by ICAO is looking at the possibility to remove any reference to magnetic heading and to use a true north navigation.

The biggest challenges will be the transition phase and its duration, the acceptance by all ICAO states, the operational impacts for flight crews & ATC, the coexistence of equipped/non-equipped aircraft and the cost of evolutions. ICAO launched an Advisory Group early 2024 to develop a Concept of Operations and a transition plan, which will potentially lead to additional standardisation activities. ICAO decision is expected by 2027/2028. EUROCAE is currently assessing the impact of True North Navigation onto existing standards and if new standards will be needed. The EUROCAE Team is supporting the effort by assessing the impact on the current standards portfolio and the consequent need for revising affected documents.

4.1.3.3 4D Navigation

WG-85 is now working with SC-227 on a revision of ED-323A/DO-283D “MOPS Required Navigation Performance for Area Navigation”, to support Trajectory-Based Operations (TBO) and include lessons learned from previous MOPS versions. WG-85 is also working on a revision of MASPS ED-75G/DO-236F (expected by 2027) to ensure consistency with the changes introduced in the MOPS ED-323A/DO-283D and develop the standards enabling to perform PBN operations using DME sensors.

4.1.3.4 Radar Altimeter

To ensure compatibility of current and future Radar Altimeters (RA) with the Radio Frequency environment allocated for 5G Telecommunications, WG-119 has been launched jointly with RTCA SC-239 to develop an update of the Radar Altimeter MOPS ED-30A/DO-155A, with open consultation expected in September 2026 and a publication no later than March 2027. This release includes new requirements for ITM (Interference Threshold Mask), Antenna, as well as testing procedures. In addition to the RF rejection function, some security protections are also included.

4.1.4 Communications

Avionics communications are a key subject for the next decade to ensure reliable and secure exchanges between airborne and ground systems in an increasingly demanding context:

- Higher performances to support new functions such as 4D trajectory, SWIM, CPDLC, remote towers, unmanned aircrafts
- Cyber protection against evolving threats (integrity and loss)
- Compatibility with other communication actors

For L-band Digital Aeronautical Communications System (LDACS), the capacity study has demonstrated that the European ATM will require a new high bandwidth media around 2028 - 2030. The solution is being developed under the SESAR 3 programme and required EUROCAE work on standardisation aspects. WG-82 works on this topic to publish MOPS and MASPS in 2026, and an INTEROP in 2027.

To support VDL Mode 2 systems that will optimize the ATN/IPS operations, the WG-92 works on ED-92D update and a new MASPS for Advanced VHF Digital Data Communications, planned in 2026.

4.2.3In the long-term, “Beyond Line of sight” communication means in the C-Band may also be considered for use for RPAS and UAS.

4.1.5 On-board Surveillance and Awareness Systems

4.1.5.1 Terrain protection and surveillance

On aircraft side, upgrades regarding predictive alerting modes and vertical reference monitoring are managed by RTCA SC-231. When an update of the TAWS MOPS DO-367 will take place, WG-131 will be involved. Topics for the update include:

- Forward Looking Terrain Awareness function
- Premature Descent Alert sensitivity
- Lateral escape manoeuvre
- More resilience to GNSS interference.

4.1.5.2 Runway protection

Commission Implementing Regulation (EU) 2020/1159 mandated Runway Overrun Awareness and Alerting System from January 2025 for large commercial Aircraft (CS-25); the broad application of the recommendations of ED-250 MOPS (released in December 2017) may reveal the need adjust technical requirements and re-open the document. WG-101 *Runway Overrun Protection Systems* which developed ED-250 is currently dormant but may be considered for re-activation in the future.

Short range and regional operators, addressing remote destination on short runways with Short Take off and Landing capacities, may also benefit from additional protection against non-stabilised approach or detection of specific wind conditions.

4.1.5.3 Take-off Performance Monitoring

Take-Off performance is an important phase of flight, and recent safety investigations have highlighted the absence of standardised operational and performance requirements for monitoring and alerting systems. TOPM is intended to improve flight crew situational awareness during take-off and provide alerts in case of deviations that may compromise safety. To address this, WG-129, in joint collaboration with RTCA SC-244 has been established. The experts are tasked with developing MOPS to support Take Off Performance Awareness Alerting System (TOPAAS) implementation allowing authorities to establish equipment standards and functional requirements.

The objective is to define monitoring requirements for the performance provided by the systems supporting take-off preparation, when such systems are used. With contribution from multiple organisations including airframers and aviation authorities, the publication of the MOPS is expected by the end of 2026. EASA has published NPA 2025-01 on Take Off Performance Monitoring. The activity runs in parallel with the development of the standard, but it is intended that the standard is referred to in the AMC to the updated CS-25 as a means of compliance.

4.1.5.4 Traffic Surveillance

The topic of traffic surveillance and collision avoidance systems is becoming more complex and needs to be kept interoperable while maintaining the independence as a last resort safety net. The surveillance function of the Airborne Collision Avoidance System (ACAS) is enhanced by ADS-B and Extended Hybrid Surveillance. It will be extended to UAS, hence distinct collision avoidance systems (Traffic Alert and Collision Avoidance System (TCAS) II, ACAS Xa/Xo, ACAS Xu: Collision Avoidance for UAS) have emerged and must be kept interoperable. A “MASPS for the Interoperability of Airborne Collision Avoidance Systems (CAS)” (ED-264) was published already in 2020. With ACAS X_R, a variant for rotorcraft is currently being developed. This activity has been coordinated by WG-75 including resources from WG-105 and WG-112.

Finally, collision avoidance resolution advisories are intended to be more widely coupled to Flight Guidance systems.

While ED-264 provides requirements for the Interoperability of Collision Avoidance System, a new document is needed to guide the process of validating CAS. Therefore WG-75/SC-147 were tasked to develop a "Guidance for the Validation of Collision Avoidance Systems" with a target date for publication of April 2027.

4.1.6 Aircraft systems management and cockpit controls

Interactivity based on large touch screen display, on small control devices and virtual keyboards are now considered as the cornerstones of a smooth, evolutive and SWaP efficient operation, in recent avionics solutions.

Crew interactions within the cockpit are evolving significantly, consistent with the technology capacities of recent evolutions. Vocal commands and crew monitoring systems are examples that are entering cockpits and may require standardisation activities, in the short or medium term, to ensure interoperability between systems while providing an acceptable level of performance and safety.

With the arrival of electronic procedure management in many cockpit solutions, the crew alerting system now relates alerts with abnormal or emergency procedures, paving the way for both alert and procedure prioritisation and correlation.

The next step may lead to adjusting dynamically the procedures by considering real time status of aircraft systems, based on “smart sensors” sensing aircraft systems. This would considerably reduce pilot workload, at least in some degraded situations, and may result in a simplification of the operation and associated training.

Thus, future crew alerting systems and increased coupling of aircraft systems with avionics may be key to simplify the operation, leading to new standardisation activities.

4.1.7 External Vision

Enhanced and Synthetic Vision Systems are technologies which are progressively being introduced on various types of civil aircraft (Business jets, helicopters, Air transport, …).

Except for Enhanced Flight Vision System (EFVS), there are no established standards for the approval of these types of systems which therefore justifies the current activities of the WG-79.

Since the release of ED-249 “MASPS for Aircraft State Awareness Synthetic Vision Systems” and ED-255 “MASP for a Combined Vision System for Helicopter Operations”, main trends affecting this topic are driven by the desire to obtain some operational credit at reaching minima reduction with SVS and/or EVS, with Head-Down or Head-up/Head-mounted displays. The quantification of these credits for EFVS is supported by ED-291, released in 2021, which provides a method via flight test to measure and quantify the visual advantage performance of an installed EFVS.

WG-79 now focus on implementation of such guidance for Innovative Aerial Services/Advanced Air Mobility (IAS/AAM) and helicopters operations in low visibility and night environment.

In this domain, new components and emerging technologies may pave the way for new concepts, enabling easier integration into these different categories of aircraft and thereby facilitating operations by obtaining operational credits.

4.1.8 Recording and Distress Tracking Systems

The European Commission has published mandatory actions in the domain of flight tracking to improve the accuracy of the available impact point and to ease recovery of recorded data. One means to achieve the objective could be the use of deployable flight data recorders which are accomplished by an Emergency Locator Transmitter (ELT). WG-118 has published ED-155A “MOPS for Lightweight Flight Recording Systems” to reflect deviations to ED-155 (published 2009) introduced through more recent ETSO/TSOs, additional recording capabilities, as well as alignment with ED-112B “MOPS for Crash Protected Airborne Recorder Systems”.

The emergence and increased availability of new avionics technologies are enabling innovative concepts such as Virtual Flight Recorders. These systems rely on the transmission of flight data from aircraft to secure, cloud-based environments, rather than traditional onboard recording devices.

This shift presents new opportunities for improving data accessibility and analysis, but also introduces challenges related to data integrity, cybersecurity, and continuity of service. As a result, the development of new standards is essential to ensure the safe, secure, and reliable implementation of such technologies across the aviation sector.

Other safety recommendations resulting from accident or incident investigation may trigger the development of future standards.

4.2 Air Traffic Management

This domain addresses various standardisation activities that concern Air Traffic Management (ATM) functions and components, which contribute to the safe and efficient movement of aircraft during all phases of operations and to global interoperability. It also covers ground systems providing CNS capability and specific topics related to specialised services (e.g. meteorological, aeronautical).

A significant driver for EUROCAE in this area will be the identification and development of standards that may be required to support the EASA regulatory material for ATM/ANS ground equipment, deriving from EU 2018/1139 (the Basic Regulation). In October 2023, EASA published the initial set of AMC, GM and DS to support the new framework (EU 2023/1768 and 2023/1769), with many references to EUROCAE standards. An ongoing review and update cycle of the AMC, GM and DS under RMT.0743 and RMT.0744 will likely trigger the need for new or updated EUROCAE standards for ATM systems. EUROCAE has already developed standards supporting the ground infrastructure, such as ED-261 (GEN-SUR SPR), ED-136/ED-137/ED-138 (Voice over IP), ED-240 (Remote Towers) and Technical Standards for the ADS-B Ground Surveillance System (ED-129) or the Multilateration System (ED-142). Building on these available standards and in coordination with EASA and industry, EUROCAE will initiate activities to provide the required standards supporting the certification of ATM/ANS Ground Equipment.

EASA is developing a new ATM/ANS framework, which will partly rely on existing standards where they exist, but there will be a need for new standards, too. WG-130 *ATM/ATS Supporting Standards* will develop a work programme for these new standards.

The ATM Master Plan 2025 provides the vision for ATM evolution in Europe for the next 2 decades. In 2026, it is expected that there will be a consensus built for selected deployment actions to form the basis of a Commission Implementing Regulation providing mandates for deployment. This is anticipated to be referenced as Common Project 2 (CP2) which will drive standardisation effort in specific areas.

4.2.1 ATM – Flight Data processing

WG-59 Flight Data Processing (FDP) Interoperability has been working on this topic for the recent years. Besides that, several validation exercises have been executed under the umbrella of the SESAR programme.

An update to the “Flight Object Interoperability” specifications (ED-133A) was published in July 2025. The IOP-topic is further analysed and prototypes within projects related to WA3.1 will help to find the solutions which covers best the requirements related to Interoperability and Coordination and Transfer. This will result in the need for further standardisation activities. WG-59 has concluded that it is worth waiting for the results of the ongoing activities and that therefore the development of ED-133B should be suspended for the moment. The group considers end of 2026/early 2027 as the right time to re-evaluate the situation.

4.2.2 ATM – Digital Voice communications

WG-67 *Voice over Internet Protocol (VoIP) for ATM* is active on this topic and started work on the revision of ED-136 and ED-138. Publication is expected middle of 2026.

ED-136A will address the introduction of a number of safety critical services and related environments for the application of VoIP for ATM such as remote Air Traffic Services Unit (ATSU) operations, contingency scenarios, flight-centric operations, RPAS voice services and will allocate safety and performance requirements for each of these services. To achieve this purpose, the document will be spilt in two Volumes: an OSED and an SPR Standard.

ED-138A will include the feedback received from current implementations on security and performance associated requirements. ANSPs are using this document as the specification of their Networks.

ICAO has referenced the relevant EUROCAE deliverables in Doc 9896 in support of worldwide implementation. It is expected that these references would be maintained. As a consequence, these activities are now supported by experts from outside Europe, namely the United States, Australia, Singapore and Brazil.

The whole VoIP standard suite may need to be restructured for ICAO use, including new findings from worldwide (and European) VoIP implementations. In addition, SESAR work into virtualisation of ATS Units may express some new requirements.

A future activity considered is related to the maintenance of the Technical Specification (TS) on Voice over IP Ground/Ground Communication (ICAO, SESAR). For this medium-term activity, interested parties include Industry, EUROCONTROL and ANSPs.

Research is ongoing in SESAR into the use of VoIP as a means of air-ground digital communication. Such developments will ultimately need to be standardised. Digital voice must be developed to work in a multilink environment, where different digital voice airborne users may be connected to the ground though different communication means. This concept supports the geographically independent controller-pilot communications, as described in the Airspace Architecture Study (AAS) study report, e.g. Annex D.4.7. It will increase air-ground connectivity and avoid traffic growth being blocked due to the lack of availability of VHF frequencies. The concept should also bring an increase of the level of security compared to current operations, e.g. by using technical means to identify where a transmission comes from for authentication purposes. Furthermore, a link to WG-126 *VCS – ATC Interoperability* will ensure the direct support of the ATC system with the availability of data taken directly from the Voice environment, e.g. by specifying the link to an Automatic Speech Recognition component.

4.2.3 Air-ground data communication

To advance Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) concepts and support data communication developments for the Next Generation Air Transportation System and the Single European Sky ATM Research initiatives, WG-78 jointly with RTCA SC-214 has developed guidance material to define the safety, performance and interoperability requirements for Air Traffic Services (ATS) supported by data communications.

WG-78 had published Revision B to the suite of ATS Data Link Standards to support implementation of Common Project 1 (CP1):

- ED-228B “Safety and Performance Requirements Standard for ATS Data Communication”
- ED-229B “Interoperability Requirements Standard for Baseline 2 ATS Data Communications”
- ED-230B “Interoperability Requirements Standard for Baseline 2 ATS Data Communications - FANS 1A Accommodation”
- ED-231B “Interoperability Requirements Standard for Baseline 2 ATS Data Communications – Baseline 1 Accommodation”

In addition, ED-110B Change 1 “Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1” was published.

The new ATM Master Plan 2025 [ref. SDO#5 – Transition to Trajectory Based Operation (TBO)] foresees the need to improve the air/ground trajectory synchronisation via lateral and vertical complex CPDLC (Controller Pilot Data Link Communication) clearances to support TBO.

Therefore, WG-78 will continue to maintain those standards to ensure that they answer to new requirements in this changing environment. To that effect, WG-78/SC-214 are working on an Internal Report to summarise proposals for the development of Revision C of the Data Link Standards.

Another important topic is to ensure that the requirements in the documents above are properly implemented and that final systems comply with them. This will be achieved by

the “ATS Data Communications Verification Test Standard” scheduled to be available in the first half of 2026.

WG-76 is working together with RTCA SC-206 on the specification of AIS/MET Datalink Services. By specifying services for the Downlink, Uplink and Crosslink of such data, the aircraft is established as a source for meteorological data to benefit ground services (such as weather prediction) but also allows a direct reception of data on-board improving safety (e.g. turbulence) and efficiency (e.g. by facilitating more economic routes) of flight.

This is supported by work of WG-76 in the area of “Aircraft based Observations”, for instance meteorological conditions.

In this context it should be mentioned that ADS-B Version 3 already is prepared for the broadcasting of such information and currently efforts are underway to prepare the ground infrastructure for the use and dissemination of this data.

In the latest update of the WG-76 ToR, the group was tasked to develop a “MOPS for Emergency Diversion Service EDS”. This service is designed to provide the Flight Crew with all necessary information in case an emergency situation requires a deviation of the flight.

A concern has been raised with regard to the high number of datalink standards that currently exist. EUROCAE is supporting activities to evaluate a possible consolidation of those standards.

4.2.4 Interoperability of ATM Validation Platforms

WG-81 *Interoperability of ATM Validation Platforms* is active on this topic. ED-147B and ED-148A have been developed with several technical improvements including a new chapter in ED-147B aiming at filling the gap between logical concepts and target technologies.

Several low-level technical solutions must be proposed to achieve a concrete interoperability of ATM validation platforms so that ED-147 and ED-148 do not remain at high-level interoperability concepts only. WG-81 is currently developing a supplement to ED-147B Ch1 for the application of High Level Architecture (HLA) IEEE 1516.

4.2.5 VDL Mode 2

WG-92 is currently working on ED-92D (target date Q3 2026) which is used as the baseline for the certification of avionics systems. It needs to be consistent with the European DLS-IR mandate.

WG-92 is also working on the “Signal-in Space MASPS for Advanced VHF Digital Data Communications” which is already available as RTCA document DO-224E. Target date for this deliverable is Q3 2026.

An update to ED-276 “Guidance on Air to Ground VDL Mode 2 Interoperability” is scheduled for publication at the start of 2027.

In order to reach this objective, WG-92 is working jointly with the AEEC Data Link (DLK) Systems Subcommittee and the RTCA SC-214 VDL Sub-Group. Each group is in charge of a set of VDL-related documents, which are interlinked but cover different aspects.

4.2.6 Independent Non-Cooperative Surveillance Systems

WG-103 *Independent Non-Cooperative Surveillance Systems (ICNS)* has developed a system agnostic Technical Specification for non-cooperative surveillance sensors – supplemented as necessary with technique (multi/bi-static or mono-static, passive and/or active) or frequency specific aspects (operating spectrum will influence the clutter and target modelling) that may necessitate annexes specific to different high-level sensor types.

ED-288 was published in June 2025.

SESAR has identified potential for video cameras to augment existing surveillance sensors and contribute to aircraft tracking. EUROCAE will coordinate further with relevant stakeholders to determine the standardisation needs that may be necessary to support this capability.

4.2.7 ATN/IPS

Based on the inputs from ICAO, and in coordination with the AEEC IPS and RTCA SC-223 activities, EUROCAE WG-108 will determine what exactly is needed to ensure the deployment of ATN/IPS. In particular, ICAO will standardise the needed features for ATN/IPS such as Security, Addressing, Mobility, etc. This will require providing guidance to ensure a consistent end-to-end deployment. The guidance document will ensure that the ATN/IPS deployment answers to the need in terms for safety, security and performance.

4.2.8 Virtual Centre

The European ATM Master Plan 2025 identifies two key Strategic Deployment Objectives (SDO #6 Virtualisation of Operations and SDO #8 Service-oriented delivery model (Data driven & Cloud based) with links to Virtual Centres. A number of SESAR R+D projects are addressing Virtual Centre topics. The need for standards to support virtual centre deployment, and service-oriented ATM architecture more broadly, is accelerating and will require significant commitment by EUROCAE and its members. See also Section 4.2.10 below.

WG-122 is tasked to agree and define operational and functional specifications to ensure effective and seamless data exchange and interoperability, and to develop standards and related deliverables to support the implementation of the virtual centre concept.

ER-026 “Virtual Centre - Strategy for Standardisation - Phase 1” was published in early 2022, and ER-029 “Taxonomy of Services for Virtual Centres” was published in early 2024. Currently the WG is working on “Guidelines for Implementation” as the Virtual Centre concepts continue their validation through the SESAR programme. In addition an “Interoperability Standard for ATM Data Services for Virtual Centres” is currently in work; this first edition will focus on 2 validated services, but is expected to expand in the future to address the full suite of ATM services.

4.2.9 VCS-ATS Systems Integration for ATM Information Exchange

ATC Systems and Voice Communication System (VCS) represent the base combination required for an effective and efficient control of the air traffic assigned to operators. Although these elements are intended to be working together, the one defining the three-dimensional position and identification of an aircraft in the airspace, the other allowing communication to pilots, there is today no standard integration between them.

Besides aircraft position, the ATC system collects a number of other information elements through the protocol between aircraft and ground radar station. If made available, such information could be useful for a better usage of the communication infrastructure, allowing rationalisation of radio stations and permitting a punctual selection of the right communication satellite link between ATC Controller (ATCO) and pilot. Vice versa, the indication/highlighting on the air situation display of the aircraft whose pilot is currently speaking would increase the ATCO situational awareness.

A standard in this area would therefore be very beneficial because it provides large benefits to ATCOs having greater situational awareness, reducing their workload and increasing the overall flight safety. Such a standard would therefore bridge the ATM and VCS worlds, by integrating and exchanging information that are today available to ATCOs, but on separate systems.

WG-126, formed in 2023, is tasked to develop an OSED and an INTEROP Standard in this area to be available early 2026.

The new ATM Master Plan update 2024 foresees the need to standardise the input from ASRU (Automatic Speech Recognition and Understanding) tool into ground systems, in order to be easily integrated in any ATM system [ref. SDO#4 – Increased automation support for controllers]. This is an activity covered by WG-126.

4.2.10 System Wide Information Management

Through the SESAR programme, Europe has made great progress on defining, developing and validating System Wide Information Management (SWIM).

A key document has been the SESAR SWIM Concept of Operations which includes the SWIM definition, SWIM principles, the rationale for change and the associated benefits. It also captures practical examples of SWIM pioneers (e.g. Network Manager B2B) that explain their gradual evolution towards SWIM. Some initial ideas on governance are described, covering the full lifecycle from participating in SWIM to providing or consuming services on SWIM. All this is documented with use-cases to better illustrate how SWIM works in practice.

Further the SESAR SWIM Concept of Operations has also become the main source for the ICAO Manual on System Wide Information Management (SWIM) Concept (Doc 10039).

Initial implementation of SWIM is required since 2016 as detailed in the Pilot Common Project (since updated by Common Project) 1 for:

- common infrastructure components,
- yellow profile technical infrastructure and specifications,
- aeronautical information exchange,
- meteorological information exchange,
- cooperative network information exchange, and
- flight information exchange (yellow profile).

WG-104 developed a report “SWIM Information Service Specification Template and Methodology (Technical Standard)” with the view to facilitate the development of services and advanced profiles (ED-294). The WG also created a concept how to standardise SWIM compliant services by using the extended horizon Arrival Manager (AMAN) service as a first implementation (ED-254). The concepts developed in ED-254 may be usable for other services in the future.

The experience gained with first implementations of ED-254 provided some observations which required an update of the Standard to ED-254A. The availability of the XML schemas are going to be improved by publishing them as Supplementary Material, something that could be considered as a way towards a “digital standard”.

Operational stakeholders will provide and consume SWIM services as defined by CP1 through the SWIM registry using the “Yellow Profile”.

Not all SWIM services require standardisation activities: EUROCAE activities regarding SWIM are most relevant for services that will be provided by more than one provider and where service provision is regulated.

SWIM services in need for standardisation will in the future be identified by the prospective SWIM Governance function, where a close coordination with EUROCAE is already foreseen.

The ATM Master Plan 2025 foresees also the implementation of a new core ATC service delivery model or operations in all phases of flight [ref. SDO#8 – Service-oriented delivery model (data driven and cloud based)], enabling:

- Open ATM integration patterns enabling participation of third-party system providers
- Decoupling of service and infrastructure layers through cloud computing (including flight data processing (FDP), human machine interface (HMI) and the relation between FDP and HMI)
- New service agreements governing the delivery of core services (common to all ANSPs in Europe) versus additional services (specific to one ANSP)
- Effective system, ATM/ANS services and configuration management.

Specific needs for relevant standards may arise for discussion at TAC level.

4.3 Airports

This domain addresses standardisation activities related to airport systems, interfaces to other domains and aerodrome equipment, supporting the safe and efficient operating of air traffic on the ground.

Standardisation activities include Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Airport Collaborative Decision Making (A-CDM) or System Wide Information Management (SWIM). It is anticipated that these ATM functionalities will bring benefits to airports and to the whole ATM network and therefore EUROCAE is actively supporting standardisation for those topics. Attention is also given to the Counter-UAS capacity, providing airports the ability to minimise the risk and effect of unauthorised operation of Unmanned Aircraft Systems.

Standardisation activities covering the sustainability are related to the European Green Deal and include for example electric power and hydrogen supply to airplanes.

With airports becoming more integrated into the ATC network and new technologies available to support improving airport processes, EUROCAE is expanding its activities in this domain. Given the operating ICAO SARPS, particularly through Annexes 6, 14 and 15, the regulatory developments in progress and technical limitations of the current methods, EUROCAE is tasked to develop standards to define the performance expected from airport systems and define the way of verification.

The ATM Master Plan 2025 foresees the need of standardisation of the usage of video cameras as surveillance sensors in the ATC context [ref. SDO#6 – Virtualisation of operations]. Such surveillance based on video tracking may support gap filling for surface movement displays and detection of airborne very small targets (such as micro and mini UAV). Activities regarding gap filler technologies and combined surveillance on airport surface could be envisaged.

The future integration of surface management data links will be coordinated with data link experts while further interoperability with other ATC domains such as A-CDM or SWIM is needed as well.

The Establishment of a European certification/declaration system for safety-related aerodrome equipment (ref. EASA NPA 2024-05) is going to impact the standardisation activities in this domain.

Areas of concern for the future are AI based optimisation of aerodrome processes, the optimal use of available data and the provision of services related to advanced air mobility, such as UAS, autonomously operating vehicles on the aerodrome surface or the provision of airport infrastructure for innovative flight handling.

4.3.1 Advanced Surface Movement Guidance and Control Systems

The ATM Master Plan 2025 foresees the need to review the following A-SMGCS services [ref. SDO#1 - Alerts for reduction of collision risks on taxiways and runways]:

- Airport Safety Support Service enhanced with the Extended CMAC and CATC functions
- Routing Service
- Guidance Service using airfield ground lighting infrastructure

The review of the above services shall require a revision of the ED-87E.

To answer to the requirements for the exchange of information in this context, WG-41 has established coordination with the ASTERIX Maintenance Group, to develop the required interface specifications in a joint effort.

The evolution in the field of surveillance technologies encompasses new Surface Movement Radars (SMR), independent non-cooperative surveillance, next generation ADS-B, Multilateration (MLAT) improvements and more. As a result, updates of the surveillance sensor standards and a collaboration with other EUROCAE working groups are underway.

EUROCONTROL is developing a functional specification for a Surface Movement Awareness System (SMAS); the concept for this system being a lower cost, reduced functionality surveillance and alerting system for use at small to medium sized airports

where the full functionality of an A-SMGCS is not required. A supporting EUROCAE MASPS, addressing the technical requirements for an SMAS will be developed during 2026.

EUROCAE Documents under development by WG-41 include:

- Interoperability Standard for Data Exchange for A-SMGCS
- Guidelines for the implementation and operation of A-SMGCS
- Update to ED-116 for Surface Movement Radars
- MASPS for Surface Movement Awareness System (SMAS)

The ATM Master Plan 2025 foresees the need for standardisation of Mini-MLAT performance (derivation of the Minimum Operational Performance Standard (MOPS) based on the MASPS for MRT-SUR) [ref. SDO#6 – Virtualisation of operations] Airport Equipment.

4.3.2 Remote and Virtual Tower

WG-100 Remote and Virtual Towers (RVT) is active on this topic.

ED-240 “MASPS for Remote Tower Optical Systems” has evolved through four publications to the current ED-240B; each update incorporating specifications for additional functionality. The current ED-240B incorporated specifications for non-optical sensors and recording/playback functionality and was published in July 2023.

The application of the RVT concept in an increasing number of sites, including multiple remote tower centres, will bring up additional standardisation needs in the future, for instance for new HMI input and presentation systems based on HUD or using Augmented Reality (AR) technology. Full integration of all ATC tools for safe and intuitive operation of RVT will require standardised planning assistance, adapted radio communication and a robust data fusion of visual and other sensors.

On the basis of proven cost-effective optical and radar target tracking technologies and remote provision of ATS to Multiple Aerodromes, WG-100 will update ED-240B to support the application of Artificial Intelligence, increased automation and high level of cyber security.

4.3.3 Airport Collaborative Decision Making

Airport Collaborative Decision Making (A-CDM) is a key enabler for airport and network optimisation, through the sharing of information across stakeholders, allowing the real time updating of operational information and milestones, improving gate and turnaround management, as well as improving aircraft operating efficiencies both on ground and airborne.

Functional evolution of A-CDM as well as requirements derived from the CP1 or other domains with close connection to A-CDM (such as A-SMGCS with regard to dynamic taxi times) also require to be reflected in updates on the MASPS and Guidance Documents for A-CDM.

WG-111 collaborates with EUROCONTROL, with the EUROCAE documents focussing on the technical specifications for A-CDM, while EUROCONTROL focusses on the functional requirements. ED-141A and ED-146A were published concurrently with the new EUROCONTROL Specification for Airport Collaborative Decision Making in February 2025.

WG-111 is continuing with work on the following two standards, with the target to publish in late 2026/early 2027;

- “Airport CDM Interface Specification” (ED-145A).
- “Airport CDM Data Model Specification” (New ED).

4.3.4 Total Airport Management

Total Airport Management (TAM) is concerned with taking a holistic view of airport operations, including the three key processes (aircraft, passengers, baggage) and more importantly, the interaction between them, as it is the degree of coordination between these different processes which constitutes a significant contributory factor to punctual and predictable operations and passenger satisfaction. To do so, airports will be setting up a so-called Ground Coordinator.

The SESAR programme is undertaking research that provides the essential building blocks for collaborative management of airport performance. These additional building blocks will be fully integrated with the Airport Operations Plan (AOP) which is designed to be a single, common and collaboratively agreed rolling plan that will form the single source of airport operations information to all airport stakeholders. The existing standards for A-CDM will serve as a technical starting point for Total Airport Management standardisation activities. WG-111 has identified the likely need for an AOP and TAM Data Model Specification, however work on this will follow on from the above tasking for the WG.

4.3.5 Counter UAS

WG-115 *Counter-UAS (C-UAS)*, working with RTCA SC-238 (temporarily paused), is active on this topic.

Sighting of drones in the vicinity of major airports has significantly impacted airport and flight operations. To prevent such disruptions, the airspace around an airport needs to be protected and unauthorised UAS activities need to be detected and reported, at the earliest possible stage, to Air Traffic Control and responsible authorities. Finally, and in accordance with national regulations, neutralisation or disruption of the UAS (either the Unmanned Vehicle, the Command & Control Datalink or the Remote Pilot) could be considered.

Regarding the capacity to defeat the UAS, it is essential that any countering measures (e.g. jamming, interception, destruction) do not impact current operations. As such interoperability must be achieved with existing and near-future communication, navigation and surveillance systems.

- WG-115 has developed ED-286 “OSED for Counter-UAS in controlled airspace” (published in Q1 2021) introducing the overall capability of a Counter UAS System, including the detection capabilities of unauthorised UAS in a protected area of influence around an airport and address the resulting hazard or threat, in a risk-based balanced manner. A review of ED-286 is taking into account the evolution of understanding of C-UAS operational requirements and emerging system capabilities.
- Then, building on the OSED update, Interoperability Requirements for Counter-UAS systems are going to be developed.

It should be noted that other SDOs are also active in C-UAS standardisation efforts, including ISO and military SDOs, and WG-115 maintains liaisons to minimise the possibility of duplication or overlap of effort and published standards.

4.3.6 Weather surveillance

New systems and data protocols for runway friction measurement and the corresponding data exchange has required the creation of several MASPS.

The ICAO Friction Task Force developed the “Global Reporting Format (GRF)” with new demands for Runway Condition Reporting. WG-109 *Runway Weather Information Services (RWIS)* was established to develop technical requirements for Runway Weather Information Systems and published ED-292 in December 2021; the GRF implementation slightly preceded this publication. WG-76 *AIS/MET Datalink Services* updated ED-89A to accommodate GRF requirements for extended length messages in Digital Automatic Terminal Information Service (D-ATIS); ED-89A Ch1 was published in July 2023. An updated version of D-ATIS requirements will also be part of the Datalink Services defined in ED-335 published by WG-76/SC-206 in March 2025.

WG-109 was re-convened in March 2024 to work on an update to ED-292, and additional guidance material on RWIS implementation for the industry.

In addition, WG-76 is working on the development of a Work Programme to standardise the provision of Aircraft-based Observations. It should also be mentioned that ADS-B Version 3 (ED-102B/DO-260C) already contains provisions for the broadcasting of weather reports.

4.4 Space and Space-based solutions

Aviation development is increasingly intertwined with space technology innovation therefore this domain includes all standardisation activities related to space-based solutions, either for providing CNS capability in all phases of operations, or for proposing ATM capacities. In addition, EUROCAE experience in space-based solutions and ATM may open the door to involvement in new activities such as Space Traffic Management (STM) in the future.

4.4.1 Global Navigation Satellite Systems

The use of satellite navigation services for aeronautical navigation has been growing steadily over the past three decades. Based on the use of the Global Position System (GPS) operated by the United States, the introduction of satellite navigation has enhanced safety by reducing CFIT, revolutionised the way to navigate by enabling flying more direct routes and by reducing fuel consumption and emissions, as well as the organisation of airspace. More recent Global Navigation Satellite System (GNSS) constellations include the EU developed Galileo, and Chinese developed Beidou.

To enhance GNSS positioning accuracy, Satellite Based Augmentation Systems (SBAS) have been developed, the first being the Wide Area Augmentation System (WAAS) developed by the US Department of Transport. Europe has developed its own SBAS, the European Geostationary Navigation Overlay Service (EGNOS), which has delivered a certified Safety-of-Life service since 2011. Current EGNOS services are provided on a single frequency and only augment GPS. The European Commission has launched an ambitious modernisation plan for EGNOS (EGNOS V3) to deliver dual-frequency multi-constellation services augmenting both Galileo and GPS. Other SBASs are either in service, or under development for other regions of the world.

In this context, the leading European actors in the field (EC DG DEFIS and DG MOVE, EASA, EUSPA and EUROCAE) are joining forces and aligning the schedule of their respective activities to prepare the operational introduction of new satellite navigation services for aviation in the shortest timeframe.

These developments in Europe fully embrace the new concept of multi-constellation services developed by ICAO and support the plans in Europe to transition to a full “Performance Based Navigation” in the 2030 timeframe and to rationalise conventional navigation aids still in operation (NDBs, VORs), thereby contributing to the reduction of aviation Route Charges, maximising safety, flight efficiency, and reducing the environmental impact, e.g., by reducing fuel consumption.

WG-28 *Ground Based Augmentation Systems (GBAS)* contributes to the development of the multi-constellation multi-frequency concepts using Galileo in the frame of ICAO NSP DFMC GBAS Working Group.

The group has elaborated an internal report on preliminary material for GBAS multi-constellation multi-frequency MOPS developments, which is intended to outline the scope of the changes needed in order to incorporate DFMC GBAS in an update to ED-114B. It identifies the sections needing to be changed, and list/identify material needing to be developed for the section to be updated. The output shall differentiate between the impact of SFDC (“GAST D based on GPS and Galileo signals”) and DFMC GBAS.

WG-62 *GNSS* works on the development of standards for the use of GALILEO and other GNSS systems in civil aviation applications. The group published ED-259A “Minimum Operational Performance Standard for Dual-Frequency Multi-Constellation Satellite-Based Augmentation System Airborne Equipment” in a joint configuration with RTCA SC-159 in 2023. This MOPS addresses the development of Galileo E1/E5a, GPS L1/L5, and multi-constellation multi-frequency SBAS airborne equipment. It also integrates DO-229F requirements for class Beta, Delta and Gamma receiver classes. It is intended to support validation of airborne requirements as well as the development of DFMC SBAS services. ED-259A provides robustness requirements against jamming and spoofing threats and associated test procedures including radio-frequency interference detection.

ED-259 Revision B development, commenced in late 2023, is intended to be suitable for ETSO/TSO production and certification. It will include H-ARAIM (Horizontal

Advanced Receiver Autonomous Integrity Monitoring), the management of institutional scenarios developed at the ICAO NSP. It will also provide additional capability to operate in degraded mode (i.e., single frequency L5 mode) and it will validate and consolidate the robustness to RFI requirements.

A WG-62 subgroup was launched in April 2022 to develop an Internal report on the Beidou system and BDSBAS as a pre-requisite to support the introduction of Beidou in the avionics standards for SBAS equipment which will be considered after the completion of the ED-259B version.

The number of reported transient GNSS losses due to radio-frequency interference (RFI) is increasing. The loss of GNSS signal can cause a downgrade of the aircraft position computation capabilities. However, modern Civil Air Transport aircraft are designed to maintain position computation capability without a GNSS signal by using Inertial System or ground Radio-Navigation aids data, which is not always the case for smaller aircraft. Robust systems and procedures are in place for aircraft and operations, and are regularly reviewed with the industry, to ensure continued safety and security despite Global Navigation Satellite System Radio Frequency Interference (GNSS RFI) threats like Jamming or Spoofing proliferation.

As such, GNSS shall be protected from harmful interference in accordance with ITU Radio Regulations. Yet, several GNSS in-service events related to RFI have been observed. Industry is actively working with airworthiness authorities (EASA, FAA), international organisations (ITU, ICAO, EUROCONTROL, IATA, IFALPA) and standardisation bodies (EUROCAE, RTCA) to address the threat evolution in relevant regulations and standards, and implement if deemed necessary additional measures and mitigations on-board aircraft to avoid outputting hazardous misleading information.

The new DFMC SBAS standard (ED-259A), developed by EUROCAE WG-62, released in October 2023 has brought additional robustness against RFI and add new features to detect and report RFI to aviation stakeholders. Since ICAO NSP has decided to standardise Galileo OS Navigation Message Authentication for aviation, it is expected to be standardised in the future revision of this MOPS.

Additionally, an ad-hoc GNSS spoofing working group has been launched in joint configuration with RTCA SC-159 WG-2 with the mission of proposing material (e.g., requirements on equipment performance under spoofing) to improve the content of ED-259A/DO-401 on GNSS spoofing.

WG-133 *GNSS Multi Elements Antenna* was set up in 2025 to develop standards supporting multi elements antenna technologies, initially focusing on Controlled Radiation Pattern Antenna (CRPA) technology. This new work will support increased GNSS resiliency when used in airborne operations while initially aiming to minimise/avoid changes to receiver specifications. Effort shall be made to develop requirements and procedures that will enable required levels on integrity and applicable levels of continuity and accuracy to be achieved as observed at the output of a GNSS airborne equipment. Once CRPA technology is addressed, if necessary, future capabilities entailing relevant changes to antenna and receiver specifications will be considered as a subsequent step.

4.4.2 New Air-Ground Data Link Technologies

WG-82 *New Air-Ground Data Link Technologies*, working with RTCA SC-233, works on the development of standards relative to new air-ground data link technologies including three components: airport surface, satellite, and en route/TMA L band systems. For the space domain, WG-82 is currently updating ED-243D MOPS for Avionics Supporting Next Generation Satellite Systems and ED-242D MASPS for AMS(R)S Data and Voice Communications Supporting RCP and RSP.

4.4.3 Space-based secure connectivity

A global air traffic surveillance system has been implemented by Aireon that uses a satellite-based, space-based Automatic Dependent Surveillance-Broadcast (ADS-B) network. In addition, SESAR activities are investigating the use of space-based VHF to provide direct-controller pilot communications (DCPC) for both voice and Controller–pilot data link communication (CPDLC) in oceanic and remote areas, initially by VHF voice and VDL2 CPDLC, and in the future, possibly via space-based LDACS.

In the wider space context, industry is looking for harmonisation and a predictable environment to develop, produce and operate solutions. Within the EU Space Programme, this aspect is addressed by the GOVSATCOM component which proposes a satellite communications service under civil and governmental control enabling the provision of satellite communications capacities and services to Union and Member State authorities managing security critical missions and infrastructures.

The progress on these activities is supported by WG-82.

The ongoing modernisation of air traffic management requires efficient air-ground datalink with sufficient resources to accommodate the air traffic growth while the capacity of current safety communication links is already reaching its limit.

Aircraft are increasingly equipped with commercial cabin connectivity systems, providing broadband communications access that support both passengers and aircraft operations.

HYCON (HYbrid COmmunication Networks) formerly known as Hyperconnected ATM is being defined with the objective to allow using commercial cabin connectivity in addition to safety protected spectrum links. Dedicated security, performance and reversion mechanisms would allow using commercial cabin connectivity systems to convey safety communications, with no impact and no new specific requirements on commercial connectivity systems in full compliance to Performance Based Communications and Surveillance requirements.

This topic is being investigated in ICAO relevant experts' groups. A new Working Group has been created at AEEC to define HYCON systems architecture, the detailed HYCON components specifications (for both airborne and ground parts), and the interoperability between air and ground components (air-ground protocol).

4.4.4 Space Traffic Management

Space Traffic Management (STM) is intended to develop a set of standards and rules to organise safe access to and operations in space, considering the proliferation of space vehicles, satellites, and space debris. EUROCAE currently has no WG developing related standards, but the topic is monitored closely. Coordination should be achieved between STM and ATM with a clear definition of a minimum interface for data exchanges.

Today, launches and recovery of rockets are done through the traditional airspace structure, fully segregated by closing airspace with substantial safety buffers, proper integration in the ATM, handed over to STM and re-entry into ATM to land at the spaceport or airport. The EU Space Programme considers the autonomy in launchers and STM a strategical objective and intends exploring new and competitive solutions for access to space and for STM.

Developments in STM will need to work closely with, and ensure integration with, Higher Airspace Operations, and this will require extensive standardisation activity.

4.4.5 Higher Airspace operations

Higher Airspace Operations (HAO) refer to operations that take place in airspace above where conventional IFR operations occur. Although the upper and lower vertical limits are not formally defined, this airspace is typically from above FL 660 up to space, or around 100 km. Although EUROCAE currently has no dedicated WG developing related standards, the topic is followed closely and provisions for High Altitude and Velocity message were already included in ED-102B/DO-260C, the MOPS for ADS-B Version 3. EUROCAE is a member of the advisory board of the SESAR 3 research project ECHO2 (European Concept for Higher Altitude Operations Phase 2 SESAR 3 Research). The SESAR project ECHO2 may liaise with WG-51 to enable efficient surveillance at higher altitudes, when necessary.

The variety of operations emerging for this airspace volume is such that some form of management will be needed, but it does not necessarily need to follow the model of ATM below it. Operators may be able to take more of a role in managing their fleets within new ICAO guidelines, making use of innovative services and technologies. It may be possible to adapt existing or emerging ATM concepts to support such operations, for example trajectory-based operations or advanced flexible use of airspace, or it may

need an entirely new model such as U-Space/UTM. This will need regional and global harmonisation since higher airspace operations will involve international and even inter-continental trajectories.

It is certain that all these emerging activities will, to varying degrees, have an impact on current aviation and on the air navigation system as a whole. Consequently, they must be integrated appropriately to encourage and enable innovative new businesses while maintaining the high levels of safety, regularity, efficiency, and security for all existing airspace users.

These considerations highlight several areas where EUROCAE currently has little standardisation activity. Enabling these operations will require the standardisation of new applications for existing technologies, as well as the introduction of new technologies that will need standardisation.

The European Commission (DG DEFIS) wants to strengthen Europe as global actor, with a tailored space strategy to foster innovation and entrepreneurship and to encourage applications as well as to reinforce autonomy and security. This includes supporting rocket launches from European sites in such a way that it can be managed safely and economically, in coordination with the ATM environment, as well as by creating a regulatory framework for orbital and sub-orbital activities that integrates with other users of the Higher Airspace.

All this is foreseen as performance-based regulation, supported by standards. Industry and operators are calling already today for more harmonisation and standardisation to develop quick and innovative operations in a predictable environment worldwide.

4.5 Innovative Aerial Services

In the Innovative Aerial Services (IAS[2]) domain EUROCAE develops standards to support the certification and safe integration of emerging concepts such as piloted, unmanned or uncrewed aircraft systems (e.g. UAS, into VTOL etc.) into the airspace alongside the current airspace users. New concepts for general aviation will also fall in this domain.

In addition to the certification and operation of aircraft this domain also covers related air traffic management topics, like UAS Traffic Management (UTM or U-space in Europe) and ground infrastructure, that are necessary for the deployment and scalability of IAS.

The work of EUROCAE on IAS is mapped to global (e.g. ICAO SARPS) and regional (e.g. European Commission, EASA) developments. For example, the European ATM Master Plan 2025, in the Strategic Deployment Objective (SDO) #10, provides for a few stepping stones in supporting the IAS integration into the European airspace by mentioning a few enablers of innovative air mobility (IAM) & drone operations.

EUROCAE has Working Groups dedicated specifically to this subject:

- WG-105 on Unmanned Aircraft Systems which is developing standards covering from technical design issues all the way to operational requirements of U-Space/UTM and the integration into the existing aviation ecosystem.
- WG-112 developing standards for VTOL systems in a holistic manner with the goal to safely certify and integrate eVTOL aircraft into the existing aviation ecosystem.

In addition to these specific WGs EUROCAE hosts several WGs with transversal influence which support areas of the IAS domain: WG-31 *Electromagnetic Hazards* WG-63 *Complex Aircraft Systems*, WG-79 *Enhanced Vision Systems/Synthetic Vision Systems*, WG- 111 *Airports Collaborative Decision Making*, WG-113 *Hybrid Electric Propulsion Systems*, WG-116 *High Voltage* etc.

In 2025, EUROCAE launched WG-132 *Automated Aircraft Inspection*, a new standardisation activity dedicated to a specific use case: aircraft inspection using small

[2] In addition to IAS, the EU has also introduced the term Innovative Air Mobility (IAM), whilst the ICAO, FAA and other international stakeholders globally use the term AAM. This domain is evolving fast and terminology will continue to change.

UAS. This activity intends to standardise aircraft certification and maintenance using this new technology.

Collaboration with other SDOs is crucial to ensure global standards and harmonised approaches worldwide. Indeed, the regulatory frameworks developed by Aviation authorities are relying on consensus standards as means of compliance to the regulations. EUROCAE maintains collaboration agreements with RTCA, SAE, ASTM to work jointly on developing standards to cover IAS domain.

4.6 Cabin

The Cabin domain intends to gather different aspect related to airspace users from air medical to other topics to be included at a later stage. These additional topics could address for examples: seats, cabin monuments, oxygen supply systems, interior lighting, cargo, evacuation systems and many more topics as per the needs of EUROCAE members.

Air Medical activities were developed in 2020/2021, addressing measures to support management of the COVID-19 situation of the time and possible future pandemics. Common guidance and guidelines were needed for the safe detection, handling, and transportation of infectious passengers, aircraft cleaning, disinfection, and similar topics.

In 2023, WG-123 published ED-317 “Guidance Document for Aeromedical Handling and Transport of Infectious Passengers”. EUROCAE will continue to monitor developments in this area, however there are no standardisation activities currently underway.

4.7 Environmental Sustainability

4.7.1 Introduction

This domain aims at providing support in building a more environmentally, socially and economically sustainable aviation sector. Standards related to technological and operational measures, such as new energy sources, improved airframes, optimised operations, and other relevant improvements that contribute to reducing the environmental impact of aviation are in the scope of this domain.
New activities are expected in this domain in the short-term, in particular related to Sustainable Aviation Fuels (SAF).

4.7.2 Context, status quo and future needs

ICAO estimates continued growth in air traffic and predicts that, in the absence of containment measures, the international aviation emissions (carbon dioxide (CO_2), Nitrogen Oxides (NOx), water vapour, soot particles) could triple by 2050 compared with 2015.

Consequently, in 2022, ICAO set a Long-Term Aspirational Goal (LTAG) that seeks reaching net zero carbon dioxide emissions in international aviation by 2050. Prior to this date, several high-level measures and initiatives have already been taken by the aviation sector to meet this target, such as:

- CORSIA, the Carbon Offsetting and Reduction Scheme for International Aviation, agreed by all ICAO members states in 2016, entering its first phase of implementation, focusing on monitoring, reporting, and verification of CO_2 emissions from international flights.
- The establishment by the European Union of a “Fit for 55” legislative package which aims at reaching the EU Green Deal objectives, by allowing to meet an intermediate target of at least 55% net reduction in CO_2 emissions by 2030.

Practically, different steps are envisaged by the aviation sector to meet the CO_2 emissions reduction objective.

- In short term, scaling up the production of alternative, low carbon and sustainable aviation fuels (SAF), and seeking ways to optimise flight and ground operations. In the interim, also utilising out-of-sector carbon reduction market-based measures, such as carbon offsets, to compensate the residual emissions.

EUROCAE has initiated discussions with EASA in the context of EC Pilot Project "European body for jet fuel standards and safety certification", to support the current fuel qualification process and specifications to accurately reflect the perspectives of EU stakeholders to complement existing standards from ASTM and UK DEF STAN.

- In mid to long term, innovating in technology and preparing improvements in infrastructure and operations. It is anticipated that the standards impacting the aircraft architectures, design and technologies will have to be ready by 2030, i.e. before the launch of major aircraft development programs.

EUROCAE's programme seeks to promote a reduced environmental impact of aviation, focusing its efforts on the standardisation needs generated in areas where R&D is advancing. Particularly, EUROCAE is supporting Clean Aviation Programme and other Horizon Europe frameworks, envisaging the development of industry standards in this domain.

Some areas which can bring important environmental benefits in aviation operations include new feedstocks and production pathways for SAF and hydrogen, as well as battery-electric aviation. In particular, three propulsion technologies with zero in-flight CO_2 potential include hydrogen combustion, hydrogen fuel cells, and battery-electric propulsion. Hybrid systems using SAF range extenders can greatly reduce emissions in short-haul flights, advancing carbon efficiency toward zero-carbon aviation.

EUROCAE has been actively contributing to the Alliance Zero Emission Aviation (AZEA) launched by DG DEFIS in 2023. The objective of the Alliance is to prepare the market for the entry into service of this zero-emission aircraft, by identifying and prioritising the challenges and recommendations. EUROCAE is committed to continue to support the work done in the Alliance in particular in the WG-4 *Regulation, Certification, Standards*.

On the operational side, innovations that may contribute to reducing the aviation CO_2 impact, the Strategic Research and Innovation Agenda (SRIA)[3] has highlighted new ways of flying, optimum green trajectories, Formation flight, advanced RNP green approaches or environmentally optimised climb and descent operations (OCO and ODO). Standards related to measuring non- CO_2 effects can also bring important value in addressing the aviation decarbonation challenge. Also, harmonisation of aircraft noise measurements and innovations around reducing noise as well as exploring the new opportunities arising from artificial intelligence, machine learning and Internet of Things.

Effectiveness of such standards will require a strong worldwide co-operation and joint activities with non-European Standardisation Organisations such as RTCA and SAE.

The following section provides a description of EUROCAE activities already running as well as an outlook of standardisation activities that could be launched in the future.

4.7.3 New technologies for propulsion of aircraft

Conventional jet fuel, used to power aircraft engines, when combusted, contributes to 2% of anthropogenic CO_2 emissions, and like other fossil-based products its reserves are limited and localised around the world.

Consequently, activities during the recent years have been mainly focused on more efficient engines, increased use of electric energy, hybrid propulsion or other alternative and sustainable sources of energy with a view to have standards and other means of compliance ready by 2030.

For the storage of electrical energy, several activities for standardisation are running at RTCA or SAE. This includes lithium battery requirements, development of specifications for electrical actuators (traditionally powered by hydraulic systems), electrical aircraft engines, and solar cells. The EUROCAE role in this sector depends on the willingness of European industry and EUROCAE stakeholders to engage.

[3] Strategic Research and Innovation Agenda (SRIA) | Circular Bio-based Europe Joint Undertaking (CBE JU) (europa.eu)

4.7.3.1 Hydrogen Fuel Cells

Since mid-2019, WG-80 *Hydrogen and Fuel Cell Systems* has been developing a MASPS for liquid hydrogen storage in aviation. The objective is to establish system performance requirements to ensure the safe development, testing, integration, validation, and certification of Liquid Hydrogen (LH2), including its storage and distribution. The document is expected to be published by the end of 2025. The use of Hydrogen systems in General Aviation is increasing as well; therefore in 2021 WG-80 added a second deliverable, a MASPS for Gaseous Hydrogen Storage for Small Aircraft, to their Work Programme. The standard deals with the specifics of gaseous hydrogen storage systems and aircraft's ecosystem.

With the initiatives for reduction of emissions in aviation, in the latest 3 years there was a major shift towards proposals of usage of hydrogen and fuel cells for main power generation and for the aircraft propulsion. The WG is working on a MASPS for Hydrogen fuel cells for propulsion jointly with SAE AE-7F committee.

Studies into the electrification of aircraft propulsion revealed the potential of reducing carbon footprint by 50% between 2005 and 2050 – supporting ACARE Flightpath 2050 goals. This step-change in technology/architecture will require new ways of collaborating among airframers, engine manufacturers and system suppliers – and addressing the regulatory framework and Means of Compliance for these new architectures.

Electric and hybrid-electric propulsion, as described in EASA Special Condition E-19, encompasses a wide range of technologies and architectures with various levels of novelty compared to traditional aircraft propulsion systems. The common feature in all of these solutions is the partial or complete reliance on electric power/energy to produce lift, thrust or power for flight.

WG-113 *Electric/Hybrid Propulsion Systems* is actively evaluating EASA's requirements, reviewing existing standards against SC E-19, and developing standards recognised as Acceptable Means of Compliance in response to EASA SC-EHPS. The Working Group is expected to publish guidance material on durability substantiation for Electric/Hybrid Propulsion Systems (EHPS) early 2026. The WG is also considering additional topics, such as fire protection.

4.7.3.2 Power distribution – High voltage

With the constant increase of electrical power demand in aircraft and introduction of electrical and hybrid products, there is an increasing tendency to use higher voltages compared to traditional aircraft systems. For electrical propulsion systems, voltages of up to 3000 V (or even higher) are envisaged.

WG-116 on High Voltage was launched by EUROCAE at the beginning of 2020 to address this issue.

Higher voltages are favoured in order to decrease the weight of the wiring and other electrical components. But usage of voltages above 540 VDC will introduce new considerations like ageing of electrical harnesses, protection of maintenance personnel, flight crew and passengers, and airframe insulation, that will impact the overall aircraft electrical systems design.

These considerations will lead to WG-116 developing interactions with:

- WG-14 to adapt Equipment Qualification Conditions prescribed in ED14/DO160,
- WG-31 for consideration of Electro-Magnetic Interference, and
- WG-63 providing guidance on new hazards to take into account when performing Aircraft Safety analyses.

WG-116 aims to certify new design for electrical and hybrid aircraft, where electrical voltages will be much higher than the current standards.

In February 2025, ED-321 "Guidance for Aircraft High Voltage Power Quality" was published. This document specifies the minimum performance requirements for propulsive High-Voltage DC (HVDC) electrical systems and provides design requirements and verification methods to ensure interoperability within the electrical power system, including compatibility between power sources and distribution.

Additionally, WG-116 in collaboration with SAE AE-11, is developing test guidelines for electrical insulation materials and components used in high-voltage systems, publication is expected by mid 2026.

4.7.4 Green Airport

4.7.4.1 Autonomous Taxi

A substantial opportunity towards emission reductions is to optimise aircraft operations on the aerodrome surface. The emissions of ground movements need to be cut as much as possible and therefore new concepts of CO_2 free taxi procedures are currently being developed. Possible ways to achieve the required goals include the reduction of energy and fuel consumption. That includes autonomous taxi scenarios using CO_2 free operating tugs, or CO_2 free taxiing aircraft. Investment in zero emission vehicles and ground support equipment with alternative drive systems and a switch to zero-carbon energy and fuel sources is possible, both requiring detailed technical specifications and interoperability standards.

Beyond the environmental impact resulting from the reduction of the use of aircraft engines and hence of fuel consumption during taxiing phases, such concepts are expected to favour:

- Cost savings for the airlines,
- Decrease of noise pollution for airports located in high-density population areas,
- Ultimately compliance to local or global regulations that will be progressively implemented to reduce emissions and noise pollution from aviation.

Apart from the reduction of emissions during taxi, all the turnaround processes need to be considered, especially provision of power and conditioned air to the aircraft and all vehicles, machines and infrastructure serving the ground handling of aircraft (vehicles including tugs, passenger buses, luggage tugs, etc.). The design of new energy efficient infrastructure and the retrofitting of existing infrastructure plays a key role in this respect as well as the supply of the entire airport infrastructure including terminal buildings and car parks with regenerative energy.

The SESAR initiative STX (Sustainable TaXiing), is aiming at devising Operational Concepts for operating safely various forms of Autonomous Taxiing systems building in the cooperation of the relevant European stakeholders (airlines, ground handling companies, airport operators, air navigation service providers, regulators, aircraft or aviation systems industry, the EU and its agencies, international organisations, etc.).

From 2026 and onwards, EUROCAE will build on the guidance material issued by the STX initiative to start harmonising and ultimately standardising (sustainable) ground operations and to achieve all the goals for sustainable airport operations effectively and in an efficient manner. The standards will allow an objective comparison and a quantitative measurement of performance goals on the one hand and interoperability of various technical solutions on the other hand.

EUROCAE already developed an OSED (ED-251) and a MASPS (ED-284) for the automatic taxi of RPAS which could serve as input for the possible standardisation activities regarding the environmentally friendly development of airports and airport operations:

- Interoperability standards for electrical infrastructure for aircraft, ground vehicles and power supply at airports,
- Performance requirements and technical guidelines for the measurement of economical friendliness,
- Standards, safety requirements and interoperability requirements for infrastructure and interfaces about the use of hydrogen on aerodromes,
- Guidelines and performance requirements for environmentally friendly targets and efficient ground operations,
- Requirements for the measurement of particles emitted by airport operations into the air.

4.7.4.2 Airport Energy Infrastructure

Regardless of whether the energy needed for aerodrome operation is provided through electric power, hydrogen, biofuel or other means, common charging/refuelling technology, infrastructure for energy distribution and storage, well defined interfaces (plugs, network interfaces etc.) and state-of-the art software and hardware to optimise the operations will be needed. In the future the airports will need to provide a sustainable energy supplying infrastructure for aircraft and zero emission vehicles of passengers and cargo handling companies as well as for other stakeholders. Furthermore, airports should create the preconditions to encourage passengers to use energy-efficient means of transport in combination with smart digital applications when travelling to the airport (mobility as a service).

The operation of electric, hybrid-electric and hydrogen aircraft will require airport adaptations driven by technical needs and new or updated certification requirements and regulations. Reliance on standards applicable to airport infrastructure and ground operations would provide harmonised means of compliance enabling a global transition in a safe and efficient manner. Within this context, ER/ AIR8466 – Hydrogen Fuelling Stations for Airports was launched jointly with SAE AE-5CH in 2023 to identify the needs and challenges specific to aircraft hydrogen refuelling in both liquid and gaseous phases.

Airports should support the efforts to improve the supply of aircraft with sustainable alternative fuels generated from renewable energy.

4.7.4.3 Quality of Air

Quality of air is another important pillar to achieve the aim of sustainable and responsible airport operations. Any ultrafine particles and other air pollutants emitted directly or indirectly though aircraft operation will need to be avoided. Methods of measurement and quantification need to be established.

4.7.5 Wake energy retrieval

The Wake Energy Retrieval (WER) function relies on the principle of an aeroplane harvesting a part of the energy from lift generated by the vortex of a leading aircraft.

The adoption of Wake Energy Retrieval operations could be envisaged from 2031-2032 over North Atlantic in a phased approach so that they can be first implemented, with a limited number of changes to ICAO provision.

The SESAR Gain Environmental Efficiency by Saving Energy (GEESE) is actively developing the operational concept of (WER) in collaboration with ANSPs, OEMs and ATM system providers. A standard and regulation impact analysis has been conducted in the frame of the SESAR GEESE project. ICAO is expected to be the main standard making organisation harmonising the operations globally via the work of the ANC panels. In addition EUROCAE and RTCA will be involved to address specific aircraft crosslink matters.

4.8 RF Spectrum

This domain encompasses various aspects linked to the use and management of the Radio Frequency Spectrum, and the interoperability issues between aviation systems or functions and their environment. There is an increased need to protect the spectrum allocated to aviation use. Certain aviation bands are being challenged by other spectrum users. Moreover, the aviation industry may not always use the spectrum in the most efficient way. For these reasons, spectrum is an area which will deserve much attention in the coming years.

EUROCAE has meanwhile signed a cooperation agreement with the European Conference of Postal and Telecommunication administrations (CEPT), emphasising the need for closer cooperation with the spectrum authorities and other spectrum users.

Radio Frequency Spectrum is a scarce resource that the aviation and telecommunications sectors are competing for. This has an important impact on

aviation's activities and results in the need to update, improve and develop new standards to ensure that the radio frequency (RF) characteristics of aeronautical CNS systems use the spectrum efficiently while respecting the necessary safety margins.

WG-96 *Wireless On-Board Avionics Network*, aiming at supporting ICAO SARPs for Wireless Avionics Intra-Communication (WAIC), released in July 2022 the ED-260A document, providing system requirements and rules to ensure coexistence between wireless avionics intra-communication systems and between WAIC and radio altimeters on board other aircraft. A "MOPS for Wireless Avionics Intra-Communication System" (ED-319) was published in July 2025.

Dedicated spectrum resources are traditionally allocated to aeronautical use at no cost to support safety. In a context of resource scarcity and high market value associated with spectrum exploitation by other users, the appropriate use of the spectrum by aeronautical service is under scrutiny. This situation resulted in the creation of the joint WG-124/SC-242 *Spectrum Compatibility*. The intention behind the development of this WG is to develop good practice and guidance on the use and management of spectrum. The resource is intended to support other WGs developing standards with spectrum aspects. More particularly, the objective is to ensure that the RF characteristics of aeronautical systems supporting safety and flight critical functions, such as CNS systems, are specified in a consistent and complete manner and are defined in such a way as to be consistent with existing regulatory requirements and guidance material. The guidance material, planned to be published in 2027, should also provide information to a broader audience including non-aeronautical sectors on the RF performance necessary to meet existing aviation performance standards (e.g. availability, reliability, continuity, latency etc) for safety-of-life functions.

The Guidance material will rely on the development of two EUROCAE Reports (ER), the first one being "Survey of Radio Frequency (RF) Performance of Standards for Aeronautical RF Systems". This ER is intended to be the reference for non-aerospace spectrum stakeholders, to support effective and successful discussions with the aerospace industry, and to inform Civil Aviation Authorities and ICAO while the second ER, Report for Aeronautical Radio Frequency Systems, their Regulatory Framework, and Operational Considerations, will be a reference for a broader audience including aviation systems developers, as well as for non-aerospace spectrum stakeholders. As such, it will support effective and successful discussions with the aerospace industry and regulators in future ITU Study Cycles.

The deliverables are envisaged to be referenced by EASA, other CAAs, ICAO, and national/international spectrum regulators, as appropriate, in guidance material for aviation systems.

It should also be noted that the current work in EUROCAE WGs keeps the impact on the RF spectrum in mind. WG-51 may serve as an example by developing a Technical Standard for a composite surveillance system combining the capabilities of a Multilateration system (passive determination of the aircrafts position) with the information gained by decoding the ADS-B messages received by such a system. This significantly reduces the need for interrogations thereby limiting the spectrum usage.

4.9 IT & Software

This domain covers initiatives to guarantee the safe design, development, and qualification of aviation software, both for on-board and in ground systems. It also covers the specific topic of artificial intelligence applied in aviation.

4.9.1 Interoperability of virtual avionic components

WG-97 *Interoperability of Virtual Avionics Components* is developing an update to ED-247A "Technical Standard for Virtual Interoperable Simulation for Tests of Aircraft Systems in Virtual or Hybrid Bench". The first release of the standard covered main avionics interfaces and was followed by a revision released in February 2020 to expand the scope of avionics interfaces and functionalities, while defining interoperability conditions and, as much as possible, ensuring backward compatibility.

4.9.2 Complex aircraft systems

WG-63 is active on this topic.

In 2025, two documents were released: an internal report providing an analysis of the main process novelties brought by ED-135, and a report providing guidance material on intrinsic hazard analysis (ER-037). In addition, two internal reports should be released by early 2026: one providing an analysis of the main changes between ED-79A and ED-79B, and one providing an analysis of the main differences between regulatory material AMC 25.1309 from EASA and the recently published AC 25.1309-1B from FAA.

Throughout 2026, joint development with SAE S-18 will continue on several standards: guidance material on use of Model Based Systems Engineering in the development process (resulting in EUROCAE report), guidance material on use of STPA (System-Theoretic Process Analysis) in the development and safety assessment processes (EUROCAE report), guidance material on addressing Common Mode Errors in critical systems (ER-030), a report providing a set of clarifications on some ED-79B topics (ER-035), and guidance material on the Development Assurance Reviews (resulting in EUROCAE report).

In 2025, WG-63 decided to join S-18 on the writing of a standard defining the interactions between the Safety and Security activities (EUROCAE report) and the activity will continue throughout the year 2026. This is done in coordination with WG-72.

Also in 2026, WG-63 SG-1 (UAS/VTOL) will continue joint development with SAE S-18 of a report providing applicability considerations of Development Assurance and Safety Assessment practices to new aviation transportation technologies (ER-038), and SG-2 (Human Factors) will continue joint development with SAE S-18 of guidance material on human factors considerations for Functional Hazard Assessment (EUROCAE report). ER-038 is done in coordination with WG-105 and WG-112.

4.9.3 Artificial Intelligence

Artificial Intelligence (AI) technologies combine the raw computing power of machines with the cognitive power to reason, learn and make decisions.

AI technologies are attempting to provide computers with the ability to:

- Recognise and understand inputs like handwritten inputs, natural language, audio, pictures, video and more,
- Interact / respond,
- Reason and make decisions.

AI technologies are developing quickly and appear to become more accessible for aviation, providing attractive future capabilities, thanks to the significant processing power increases in recent years, enabling machine learning and computing so that they can perform certain complex functions inferred from data not from authored requirements.

The objectives of WG-114 *Artificial Intelligence* (AI) are to establish industrial best practices for the development and the certification of AI embedded into aerial vehicle and ground equipment, providing standards for qualification of aeronautical systems embedding AI in Airborne (manned and unmanned) and Ground (ATM/CNS/U-Space/UTM).

The first task pursued by the group was to develop an internal report “Qualification Process of Aeronautical Systems Implementing Artificial Intelligence - Statement of Concerns” to establish a comprehensive statement of concerns versus the demonstration of conformity of AI-based products to the regulation requirements, and to clarify the future scope of the standard applicability. It was an opportunity to align the groups (EUROCAE WG-114 and SAE G-34) on a common understanding of the AI techniques and the concerns that the use of such techniques would cause with respect to the development of an aeronautic system, as well as to recommend a path forward and to form an efficient organisation to develop the future standard.

The report mainly focused on Machine Learning (ML) and performed a gap analysis on the main design assurance standards for airborne and ground systems to determine if they are sufficient when implementing ML, leading to the need to develop specific guidance and methods. ML development specifics were studied to identify areas of

concerns and led to a ML workflow within a system development workflow. The group also identified an approach for ML-based system certification/approval and detailed potential development assurance activities to be further studied within the joint WG in addition to use cases of interest such as aircraft systems and ATM/U-Space/UTM.

It is planned that a joint activity between SAE and EUROCAE committees will address the needs identified in the internal report. The direction taken by the documents under development is stemming from this initial report. The WG-114 successfully published the Statement of Concerns (ER-022) showing the alignments of the industry on the technical challenges when applying AI/ML into the existing framework. Also, the release of Taxonomy (ER-027) giving comprehensive understanding the various components and processes involved in AI/ML systems within the aviation context, supporting the effective implementation of the ED-324 guidelines.

The first official release of the ED-324 is focusing on the off board supervised Machine Learning technique. The WG-114 jointly with G-34 will work on next steps to introduce other AI techniques.

EASA has identified a need for standards to be updated or developed. Some of these areas include classification, safety, security, continuous risk assessment and organisational aspects.

4.9.4 Aviation Software Standards

With the aim to identify how ED-12 could apply to the small UAS community, a joint EUROCAE/RTCA working group has delivered a report. As a result, WG-117 has been established to identify development assurance methods appropriate to UAS low-risk applications, as well as system and safety conditions enabling the re-use of Commercial Off the Shelf (COTS) software for UAS solutions.

Regarding Software (SW) Assurance for Low-Risk Applications (WG-117 SG-1), decision was taken in 2022 to focus more specifically on alleviation objectives to match “LR2” (below level C objectives) for a first time, sufficient to comply with up to HAZ Failure conditions on UAS lower Risk operations.

On the conditions enabling the re-use of COTS/OSS SW into DAL C SW, a draft ED-337 is in the phase of comment resolution from OC and FRAC on both the EUROCAE and RTCA sides to proceed to a first release in Q2/2026.

Concerning ATM/ANS Ground equipment, WG-130 has been established to support the new EASA ATM/ANS Conformity Assessment Framework. The Working Group identified a need to revisit the existing software assurance standards: both ED-153 and ED-109A address software assurance considerations, resulting in a need for clarifying and separating assurance-related topics between the functional systems (e.g. definition of air navigation services, deployment/configuration/adaptation of ATM/ANS equipment etc.) and the design of ATM/ANS equipment, so that regulation may easily refer to adequate standardisation document, depending on the context.

4.9.5 Lower-risk Aviation Applications

The regulatory framework for UAS is being developed along a risk-based, operation-centric approach that considers certified, specific, and open categories. While the certified UAS category is aligned with the ED-12C/DO-178C document suite for development, the open category does not have a software development standard needed for use and deployment, and the specific category does not currently have a comprehensive compliant development standard identified to provide assurance as to the safe operations of the UAS.

The continued release of information on UAS development and UAS operations by EASA provides an opportunity for a new software development standard that will be tailored to lower-risk UAS applications, and the specific category defined by EASA. Moreover, certain lower-risk applications within the General Aviation (GA) community might also benefit from a simplified software development methodology.

WG-127 is tasked to define the Software Considerations in Low-Risk Applications Equipment Certifications and Approvals.

4.10 Aviation Security

EASA EPAS identifies as a strategic priority the management of information security risks impacting safety. EUROCAE has been involved in the field since the early 2000s with its Aeronautical Systems Security Working Group 72.

AISS shall be seen from an end-to-end perspective from information production, processing, management, communication to operational usage and maintenance. AISS therefore encompasses the aircraft, supporting ground infrastructure including communication, and the supply chain.

4.10.1 Aeronautical Systems Security

The approach to aeronautical system security of WG-72 is holistic, rather than based on specific technological solutions to ensure their stability over time. WG-72 addresses both airborne and ground systems, their end-to-end interdependence and particularities from operational and AISS standpoints.

WG-72 intends to develop and maintain acceptable processes and methods of compliance addressing information security issues in support of the development of the AMC/GM of the PART-IS in the frame of the Rule Making Task (RMT) 0720. WG-72 has been actively involved in supporting AMC/GM for the PART-IS delivered by the European Strategic Cooperation Platform (ESCP). As a result of this coordination, most of WG-72 standards are referenced in the GM.

WG-72 is currently structured around five sub-groups:

- WG-72 SG-3 is working on organisational aspects of information security. in revision ED-206A of the “Guidance on Information Security Event Management (ISEM)” and introduction of a vulnerability scoring system that takes into account the impact on safety and the exploitability of the vulnerability.
- WG-72 SG-4 is working on the adaptation of ISMS to aviation. A report (ER-040) was published in September 2025, which will be completed by a full standard currently under development. The document is intended to be used by organisations and authorities subject to the new EASA PART-IS in a standardised way to implement, maintain and improve an ISMS in the aviation framework and as a baseline for auditing by certified organisations.
- WG-72 SG-5 addresses end-to-end security for data. The recently published report (ER-039, June 2025) can be used as a tool for non-security expert WG to help having a common view between stakeholders of the protection of the data impacting aviation safety and the minimum countermeasure for each security attribute. This may include, airborne software, databases, production and maintenance data, and possibly data used in end-to-end digital communication. The SG is now working on a data security standard.
- WG-72 SG-6 is revisiting ED-203A: the “Airworthiness Security Methods and Considerations”, with ED-203A Change 1 and a FAQ Companion Report to ED-203A, to tackle several issues easing its application, and to clarify some open points like COTS management, SAL and CC equivalence.
- WG-72 SG-8 is working on revision ED-204B of Information Security Guidance for Continuing Airworthiness.

WG-72 activities are joint with SC-216 ensuring that the activities are harmonised globally. Moreover, the activities are closely coordinated with other SDOs and stakeholder organisations in the framework of the ECSCG and reflected in the ECSCG RDP in order to avoid duplication and address any gap identified.

WG-72 also serves as a resource and coordinator for Aeronautical and ATM information security-related matters with all EUROCAE Working Groups. For example, WG-72 has been coordinating with WG-112 on VTOL, WG-105 on UAS, and WG-96 on WAIC.

4.11 System Engineering

The scope of this domain is to accommodate activities on transverse topics that are clearly within the scope of EUROCAE, but do not solely fit within a single domain, such as Environmental Qualification, Aeronautical Database Management, System Wide Information Management, and Quality and Safety Design.

4.11.1 Environmental Qualification

WG-14 *Environmental Testing*, working with RTCA SC-135, and WG-31 *Electromagnetic Hazards*, working with SAE committees AE2 and AE4 are both active on this topic.

WG-14's primary focus is on the update of ED-14G/DO-160G "Environmental Conditions and Test Procedures for Airborne Equipment" to reflect advances in aircraft technologies and testing methodologies. ED-14G/DO-160G is widely referenced in regulatory material and by aircraft manufacturers, and is supported by the associated user guide ED-234/DO-357. ED-14H/DO-160H is planned for publication in 2026, with the updated user guide to follow.

Additionally, a WG-14 subgroup is developing an environmental qualification standard that will specify requirements and procedures for surface-based (not airborne) equipment in the UAS Detect and Avoid, the Command and Control Link, and Control Station Equipment. Liaison with WG-105 (UAS) is ongoing in this topic.

WG-31's scope includes the development of standards underpinning regulation and the certification of aircraft in relation to electromagnetic hazards such as lightning protection, electromagnetic compatibility (EMC), High Intensity Radiated Fields (HIRF) etc. WG-31 has a large programme of work updating the suite of standards in these areas, working cooperatively with SAE to deliver technically identical documents.

WG-31 is also liaising with WG-112 *VTOL* which is developing lightning protection standards for these new aircraft designs.

4.11.2 Aeronautical data management

WG-44 *Aeronautical Databases*, working with RTCA SC-217, is active on this topic.

The standards related to aeronautical databases aim at providing a framework to enable the development of aviation-specific applications using geographic and appropriate aeronautical information/data as it relates to terrain, obstacles, and aerodrome mapping.

Aeronautical Information Services (AIS) has been evolving from the paper product-centric service to the data-centric Aeronautical Information Management (AIM) with a different method of information provision and management.

This evolution is being referred to as the transition from AIS to AIM. The major changes in the transition to AIM will be the increased emphasis on information management requirements such as digital data exchange and distribution, which is expected to place the future AIM in a position to better serve airspace users and ATM.

EUROCAE activities need to be in line with and support this evolution.

In the medium term, WG-44 is drafting updates to the family of standards related to terrain, obstacle and aerodrome data supporting evolving user requirements and new envisaged applications; specifically ED-99D/DO-272D, ED-98C/DO-276C, and ED-119C/DO-291C.

WG-44 members also liaise with WG-105 *UAS* to develop new standards for aeronautical data required for UAS/drones/"new entrants", such as autonomous vehicles, vertical take-off and landing vehicles. Additionally, EASA RMT 722 may need to be monitored by WG-44 for any additional standardisation needs. RMT 0722 addresses the provision of the aeronautical data by the aerodrome operator taking into account not only the provisions of ICAO Annex 14, Volume I, but also some cases related to the provisions of ICAO Annex 15 and PANS-AIM.

The emphasis on digital data exchange and distribution will result in an increased capability to present data and information in graphical form.

CHAPTER 5
CONCLUSION

EUROCAE is constantly evaluating the potential for standardisation of emerging technologies in the field of aviation or affecting the operation of air traffic. All identified tangible activities of the stakeholders mentioned above are considered for possible future standardisation activities and expressed in this technical work programme.

5.1 Summary

Chapters 1 and 2 offered an introduction and developed on the context of the TWP.

Chapter 3 reviewed how stakeholders are shaping the environment of EUROCAE Technical activities. In this edition, special care has been taken to map the relationship with the regulatory framework, in particular following the implementation of the Common Project 1 (CP1) and the ATM Master Plan 2025.

Chapter 4 provided an overview of all the ongoing and foreseen activities across the 11 domains. It is important to note that some of these domains are likely to expand in the coming year(s). This is the case for activities related to Air Traffic Management where an important increase in activities related to ground certification (4.2) and service-oriented architecture is expected. New activities are also expected related to aerodromes and in the sustainability domain, or to address topics related to cabins.

For visualisation of the current activities in the domains by number of associated WGs and ongoing deliverables, see Figure 4.

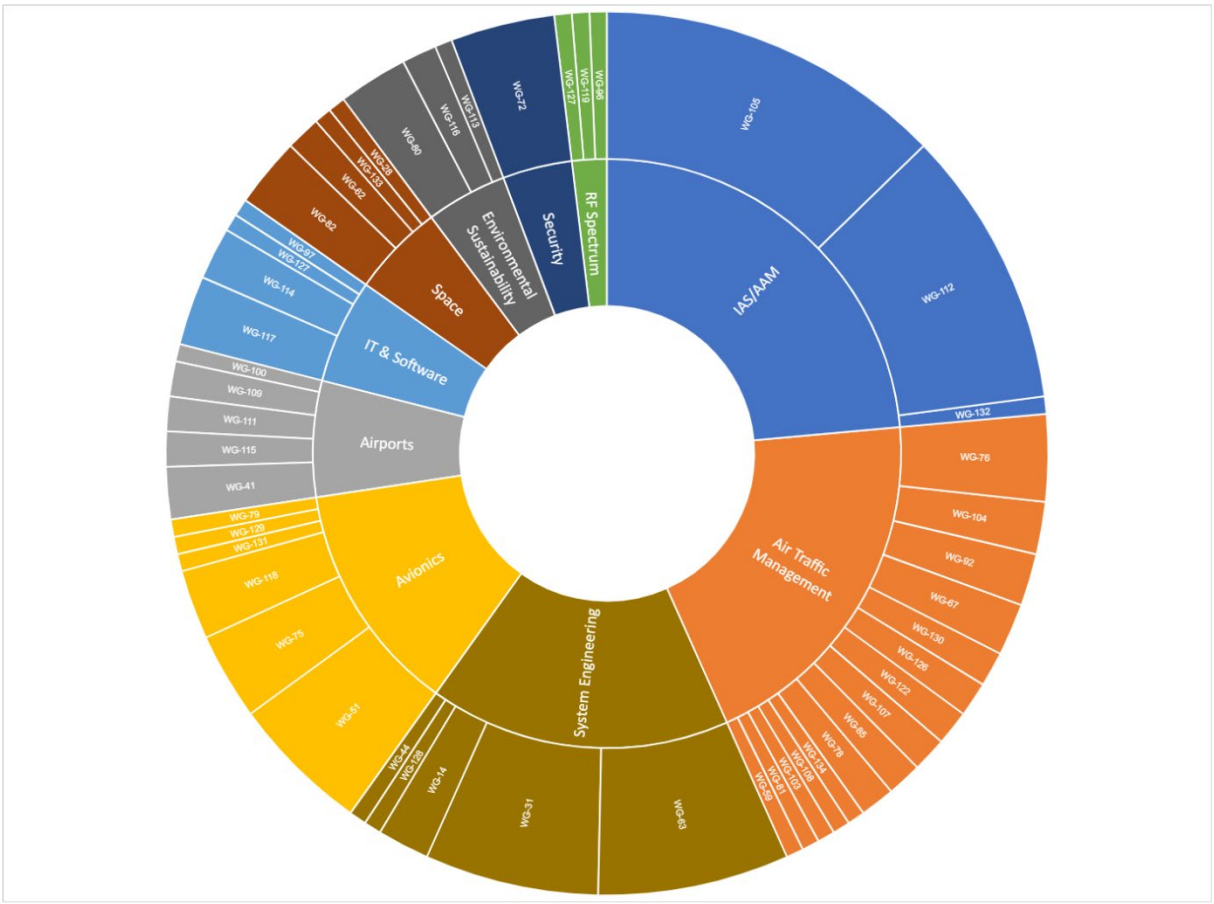

FIGURE 4:EUROCAE DOMAINS, BY WG AND NUMBER OF DELIVERABLES

Finaly section 5 concludes this document by a summary and some hints on what topics are expected to be further developed in the future.

5.2 Looking Into The Future

EUROCAE is constantly evaluating the potential for standardisation of emerging technologies in the field of aviation or affecting the operation of air traffic. All identified tangible activities of the stakeholders mentioned above are considered for possible future standardisation activities and expressed in this technical work programme.

The following fields of standardisation are derived from concepts of air transport currently at the edge of development or in very early stages of research:

- Aerodrome environment topics such as Advanced Ground Handling Services:
- Quantum computing:
- More automated Systems and Operations to support the crew in decision makings and reduce their workload.
- Air-to-air connectivity.
- Air-to-ground integration by system-to-system connectivity.
- Performance based approach to separation management.

These topics are monitored carefully through the EUROCAE Secretariat and the Technical Advisory Committee and some of these might be moved to Chapter 4 in the coming years.

APPENDIX A
CURRENT WORKING GROUPS

Reference	Title	Domain	Joint with
WG-14	Environmental Testing	System Engineering	RTCA SC-135
WG-28	Ground Based Augmentation Systems (GBAS)	Space	
WG-31	Electromagnetic hazards	System Engineering	SAE AE2, AE4
WG-41	A-SMGCS	Airports	
WG-44	Aeronautical Databases	System Engineering	RTCA SC-217
WG-51	Automatic Dependent Surveillance - Broadcast (ADS-B)	Avionics	RTCA SC-186
WG-59	Flight Data Processing (FDP) Interoperability	ATM	
WG-62	GNSS	Space	RTCA SC-159
WG-63	Complex Aircraft Systems	System Engineering	SAE S-18
WG-67	Voice on Internet Protocol (VoIP) for ATM	ATM	
WG-72	Aeronautical Systems Security	Security	RTCA SC-216
WG-75	Traffic Alert and Collision Avoidance Systems (TCAS)	Avionics	RTCA SC-147
WG-76	AIS/MET Datalink Services	ATM	RTCA SC-206
WG-78	Standards for Air Traffic Data Communications Services	ATM	RTCA SC-214
WG-79	Enhanced Vision Systems (EVS), Synthetic Vision System (SVS)	Avionics	RTCA SC-213
WG-80	Hydrogen and Fuel Cell Systems	Sustainability	SAE AE-7A
WG-81	Interoperability of ATM Validation Platforms	ATM	
WG-82	New Air-Ground Data Link Technologies	Space	RTCA SC-222
WG-85	4D Navigation	ATM	RTCA SC-227
WG-92	VDL Mode 2	ATM	RTCA SC-214
WG-96	Wireless On-Board Avionics Networks	RF Spectrum	RTCA SC-236
WG-97	Interoperability of virtual avionic components	IT & Software	
WG-100	Remote & Virtual Tower (RVT)	Airports	
WG-104	SWIM Services	ATM	
WG-105	Unmanned Aircraft Systems (UAS)	AAM	
WG-107	DME Infrastructure supporting PBN Positioning	ATM	
WG-108	ATN/IPS	ATM	RTCA SC-223
WG-109	Runway Weather Information Systems	Airports	
WG-111	Airport Collaborative Decision Making (A-CDM)	Airports	
WG-112	Vertical Take Off and Landing (VTOL)	AAM	SAE Seats
WG-113	Hybrid Electric Propulsion	Sustainability	SAE E-40

Reference	Title	Domain	Joint with
WG-114	Artificial Intelligence	IT & Software	SAE G-34
WG-115	Counter UAS (C-UAS)	Airports	RTCA SC-238 (currently dormant)
WG-116	High Voltage Systems and Components in Aviation	Sustainability	SAE AE-11
WG-117	Topics on Software Advancement	IT & Software	RTCA SC-240
WG-118	Crash-Protected and Lightweight Flight Recorders	Avionics	
WG-119	Radar Altimeters	RF Spectrum	RTCA SC-239
WG-122	Virtual Centre	ATM	
WG-124	Spectrum	RF Spectrum	RTCA SC-242
WG-125	Next Generation Aviation Professionals (NGAP)	Sustainability	
WG-126	VCS-ATC Systems Integration for ATM Information Exchange	ATM	
WG-127	Lower-risk Aviation Applications	IT & Software	
WG-128	Airborne Electronic Hardware Design Assurance	System Engineering	RTCA SC-243
WG-129	Take-off Performance Monitoring System	Avionics	RTCA SC-244
WG-130	ATM/ANS Supporting Standards	ATM	
WG-131	Terrain Awareness and Warning System	Avionics	RTCA tbc?
WG-132	Automated Aircraft Inspections	UAS	SAE G-38
WG-133	GNSS Multi Elements Antenna	Space	
WG-134	DME Interrogators	ATM	

Dormant Working Groups

Reference	Title	Domain	Joint with
WG-49	Mode S Transponders	Avionics	RTCA SC-209
WG-83	Airport Foreign Object Debris (FOD) Detection Systems	Airports	
WG-98	Aircraft Emergency Locator Transmitters	Avionics	RTCA SC-229
WG-103	Independent Non-Cooperative Surveillance System (ICNS)	ATM	
WG-110	Helicopter Terrain Awareness and Warning Systems (HTAWS)	Avionics	RTCA SC-237

APPENDIX B
ACRONYMS

A&ACAP	[NATO] Armament and Aerospace Capabilities
AAM	Advanced Air Mobility
AAS	Airspace Architecture Study
ACARE	Advisory Council for Aviation Research and innovation in Europe
ACAS	Airborne collision avoidance system
A-CDM	Airport Collaborative Decision Making
ACI	Airports Council International
ACRIS	Airport Community Recommended Information Services
ADS-B	Automatic Dependent Surveillance-Broadcast
ADSP	ATM Data Service Provider
AEEC	Airlines Electronic Engineering Committee
AI	Artificial Intelligence
AIDX	Aviation Information Data Exchange
AIM	Aeronautical Information Management
AIS	Aeronautical Information Services
AISS	Aeronautical Information Systems Security
AMAN	Arrival Manager
AMC	[EASA]: Acceptable Means of Compliance
AMS(R)S	Aeronautical Mobile-Satellite (R) Service
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
AOG	Aircraft On Ground
AOP	Airport Operations Plan
A-PNT	Alternative Positioning, Navigation, and Timing
APOC	Airport Operations Center
AR	Augmented Reality
ARAIM	Advanced Receiver. Autonomous Integrity Monitoring
ARC	Administrative Reforms Commission
ARINC	Aeronautical Radio Inc
ARP	[SAE] Aviation Recommended Practice
ASD	AeroSpace and Defence Industries Association of Europe
ASD-STAN	ASD-Standards
A-SMGCS	Advanced Surface Movement Guidance and Control System
ASRU	Automatic Speech Recognition and Understanding
ASTM	American Society for Testing and Materials
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFM	Air Traffic Flow Management
ATI	[UK] Aerospace Technology Institute
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Sir Traffic Services
ATSP	Air Traffic Services Providers
ATSU	Air Traffic Services Unit
AZEA	Alliance for Zero-Emission Aviation
CAA	Civil Aviation Authority
CAN	Controller Area Network
CAP	Civil Aviation Publication
CARATS	Collaborative Action for Renovation of Air Transport Systems
CCO	Continuous Climb Operation
CDO	Continuous Descent Operation
CEPT	Conférence Européenne des administrations des Postes et des Télécommunications
CDTI	[SP] Centre for Development of Industrial Technology
CFIT	Controlled Flight Into Terrain
CNS	Communications, Navigation & Surveillance
CONCERTO	Construction Of Novel CERTification methOds and means of compliance for disruptive technologies (Clean Aviation project)
COTS	Commercial off-the-shelf
CORAC	[FR] Conseil pour la recherche aéronautique civile
CP1	Common Project One

CPDLC	Controller–pilot data link communication
CS	[SES] Community Specifications
CS	[EASA] Certification Specifictions
CUAS	Counter UAS
CVS	Combined Vision System
D-ATIS	Digital Automatic Terminal Information Service
DCPC	Direct Controller Pilot Communications
DFMC	Dual-Frequency Multi-Constellation
DG	[EC] Directorate General
DG DEFIS	[EC] Directorate General Defence Industry and Space
DLK	Data Link
DME	Distance Measuring Equipment
DO	[RTCA] Document
DP	[SES] Deployment Programme
DS	[EASA] Detailed Specifications
EASA	European Union Aviation Safety Agency
EASCG	European ATM Standards Coordination Group
EC	European Commission
ECSCG	European Cyber security in aviation Standards Coordination Group
ED	EUROCAE Document
eDME	Enhanced DME
EFVS	Enhanced Flight Vision System
EGNOS	European Geostationary Navigation Overlay System
EGNSS	European Global Navigation Satellite System
EHPS	Electric / Hybrid Propulsion System
ELT	Emergency Locator Transmitters
EMC	Electromagnetic Compatibility
eMCO	extended Minimum Crew Operation
EN	European Norme
EPAS	European Plan for Aviation Safety
EPP	Extended Project Profile
ER	EUROCAE Report
ESA	European Space Agency
ESCP	European Strategic Cooperation Platform
ESO	European Standardisation Organisation
ETSO	[EASA] European Technical Standard Orders
EU	European Union
EUROCONTROL	the European Organisation for the Safety of Air Navigation
EUSCG	European UAV Standards Coordination Group
EVS	Enhanced Vision System
FDP	Flight Data Processing
FDR	Flight Data Recorder
FF-ICE	Flight and Flow Information for a Collaborative Environment
FOD	Foreign Object Damage
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GAST	GBAS Approach Service Type
GATMOC	Global ATM Operational Concept
Gb	Giga Bit
GEESE	Gain Environmental Efficiency by Saving Energy (SESAR project)
GM	Guidance Material
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GRF	Global Reporting Format
HAO	High Altitude Operations
HEMS	Helicopter Emergency Medical Services
HIRF	High Intensity Radiated Fields
HLA	High Level Architecture
HMD	Head Mounted Display
HMI	Human Machine Interface
HTAWS	Helicopter Terrain Awareness and Warning System
HUD	Head Up Display
IAM	Innovative Air Mobility
IAS	Innovative Aerial Services
ICNSS	Integrated CNS and Spectrum
IFR	Instrument flight rules
IMA	Integrated Modular Avionics
INCS	Independent Non-Cooperative Surveillance
INTEROP	Interoperability Requirements
IP	Internet Protocol
IPS	Internet Protocol Suite
IR	[EASA] Interoperability Regulation
ISEM	Information Security Event Management
ISMS	Information Security Management System

ISO	International Organization for Standardization
IT	Information Technology
ITM	Interference Threshold Mask
ITU	International Telecommunication Union
KPA	Key Performance Area
LDACS	L-band Digital Aeronautical Communication System
LH2	Liquid Hydrogen
LIDAR	Light Detection and Ranging
LTAG	Long Term Aspirational Goal
LuFo	[GE] Luftfahrt Forschungs Programm
MASPS	Minimum Aviation System Performance Standard
MBSA	Model Based System Assessment
MBSE	Model Based System Engineering
MET	Meteorological
ML	Machine Learning
MLAT	Multilateration
MLS	Microwave Landing System
MoC	Memorandum of Cooperation
MOPS	Minimum Operational Performance Standard
MoU	Memorandum of Understanding
NGAP	Next Generation Aviation Professional
NGSS	Next Generation Satellite Systems
NextGen	Next Generation Air Transportation System
NIS	Network Infrastructure and Security
NOP	Network Operations Plan
NSA	National Security Agency
NSP	Navigation Systems Panel
OCO	Optimized Climb Operation
ODO	Optimized Descent Operation
OS	Operating System
PANS	[ICAO] Procedures for Air Navigation Services
PBN	Performance Based Navigation
PCP	[SES] Pilot Common Project
PGW	Propylene Glycol Water Mixture
QMS	Quality Management System
R&D	Research and Development
RA	Radio Altimeter
RAIM	Receiver autonomous integrity monitoring
RDP	Rolling Development Plan
RF	Radio Frequency
RFI	Radio Frequency Interference
RMT	Rule Making Task (by EASA)
RNP	Required Navigation Performance
RPAS	Remotely Piloted Aircraft System
RTCA	Radio Technical Commission for Aeronautics
RVT	Remote Virtual Tower
RWIS	Runway Weather Information Services
SAE	Society of Automotive Engineers
SAF	Sustainable Aviation Fuel
SARPs	Standards and Recommended Practices
SATCOM	Satellite Communication
SBAS	Satellite-Based Augmentation System
SC	Special Conditions
SCG	Standards Coordination Group
SDM	SESAR Deployment Manager
SDO	Standard Developing Organisation
SDO	[SESAR] Strategic Deployment Objective
SES	Single European Sky
SESAR	Single European Sky ATM Research
SFDC	Single Frequency Dual Constellation
SJU	SESAR Joint Undertaking
SMAS	Surface Movement Awareness System
SMR	Surface Movement Radar
SOA	Service Oriented Architecture
SORA	Specific Operations Risk Assessment
SPO	Single Pilot Operation
SPR	Safety and Performance Requirements
SRIA	Strategic Research and Innovation Agenda
STM	Space Traffic Management
STX	[SESAR] Sustainable TaXiing
SUR	Surveillance
SVS	Synthetic Vision System
SW	Software
SWaP	Size, Weight and Power
SWIM	System Wide Information Management
TAC	[EUROCAE] Technical Advisory Committee

TAM	Total Airport Management
TBO	Trajectory Based Operations
TC	Technical Committee
TCA	[NATO] Technical cooperation Arrangement
TCAS	Traffic Alert and Collision Avoidance System
TMA	Terminal Manoeuvring Area
TOBT	Target Off Block Time
TRL	Technology Readiness Level
TS	Technical Specification
TSO	Technical Standard Order
TWP	Technical Work Programme
UAM	Urban Air Mobility
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
US	United States
USSP	U-space Service Provider
UTM	UAS Traffic Management
VCS	Voice Communication System
VDL	VHF Digital Link
VHF	Very High Frequency
VoIP	Voice over IP
VTOL	Vertical Take Off and Landing
WAAS	Wide Area Augmentation System
WAIC	Wireless Avionics Intra-Communications
WER	Wake Energy Retrieval
WG	Working Group
WIMAX	Worldwide Interoperability for Microwave Access