

**RESEARCH**

# Agency Research Agenda 2020-2022



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RESEARCH

# Agency Research Agenda 2020-2022

## EXECUTIVE SUMMARY

The EASA Research Agenda edition 2020-2022 provides the updated list of research needs and requests identified by the Agency experts and external stakeholders in the fields of aviation safety, security, environmental protection and public health risks.

The Research Agenda complements the European Plan for Aviation Safety (EPAS)<sup>1</sup>, which includes the top-level priority research actions identified by the Agency.

The general objectives associated to the research requests presented in this document include to prepare the evolution of aviation standards, support the development of new safety and security management concepts/methods/tools, investigate safety and security threats as well health risks linked to air transport, support pro-active and reactive risk management in these domains, and obtain knowledge and data on novel products, technologies or new types of operation in order to prepare their service entry.

The Research Agenda is updated on an annual basis by the EASA Research Committee (ERC). The research requests from previous editions that have been removed or modified are presented in the annex to the document.

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<sup>1</sup> EPAS 2020-2024 Edition is available at : <https://www.easa.europa.eu/document-library/general-publications/european-plan-aviation-safety-2020-2024>

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# 1. Introduction

The document provides the updated list of research requests identified by the Agency experts and external stakeholders in the fields of aviation safety, security, environmental protection and public health risks.

The main objectives associated to the research requests presented in this document include to:

- Prepare the evolution of aviation standards
- Support the development of new safety and security management concepts/methods/tools
- Investigate safety and security threats, support reactive safety management
- Obtain knowledge and data on novel products, technologies or types of operation

The research topics presented in the document have been grouped using the different aviation standards being addressed:

- Airworthiness Standards
- Flight Standards
- ATM / Aerodrome Standards
- New Operations / Processes / Products incl. Drones
- Operational safety and human factor issues
- External hazards, weather hazards protection
- Aviation Security
- Environmental Protection Standards
- Public / Occupational Health issues

Annex A provides the list of research topics from previous editions of the EASA Research Agenda that have been removed or modified.

## 2. Research Topics Per Domain

### 2.1 Safety

#### 2.1.1 Airworthiness Standards

| Reference | Project title  | Project Short Description   |
|-----------|--|---|
| LOC-04    | Air Data Enhanced Fault Detection & Diagnosis  | Develop new fault detection & diagnosis (FDD) and fault tolerant control (FTC) methods of the following types: <ul style="list-style-type: none"> <li>• Model-based analytical redundancy (e.g. virtual sensors),</li> <li>• Data-based (i.e. model free-methods), or</li> <li>• a combination of both types</li> </ul>   |
| AW-02     | Flight Control Systems Verification  | Develop new methods for the verification of complex flight control systems and for real-time error detection (via independent monitoring).  |
| AW-01a    | Ageing Composites - Phase I  | Identify specific potential ageing composite aircraft structure issues (baseline structure (including bonded joints) and repairs) in existing (and developing) fleets.  |
| AW-01b    | Blunt impact on composite structures   | Proposed impact test projects are an evolution of existing ones involving significant EU partners and for supporting changes to standards for primary structure elements of large aircraft.   |
| AW-01c    | Sandwich structured composites   | This research project shall help to develop further insight and guidance for the consistent and standardised design and safe use of sandwich structures in aviation. The results of the research shall be used to further complement the Composite Materials Handbook-17 and to refine regulatory material for initial and continuous airworthiness. This project has a high priority from a safety and environmental perspective.  |
| AW-06     | Hybrid Structure Certification   | This projects aims to better understand and standardise approaches to certifying hybrid structure, i.e. made of different materials (e.g. metallic, non-metallic) and assembling techniques.  |
| IN-25     | Safety Implications Resulting from the Introduction of Additive Manufacturing (AM) into Aviation | To support the introduction of Additive Manufacturing applications for aircraft structures, the main objectives are: <ul style="list-style-type: none"> <li>- rapidly identifying the key methods likely to reach maturity in aviation applications, particularly those likely to be used in more critical applications.</li> <li>- identifying a common optimised strategy regarding the definition of involvement for each method in each of EASAs regulatory activities, e.g. the level of certification checklist necessary to ensure that safety is maintained, the extend of knowledge expected of EASA POA auditors etc</li> </ul> |
| IN-13     | COTS IP certification  | Development of certification guidance for the use of pre-designed blocks inside complex programmable devices (COTS IP)  |

| Reference | Project title  | Project Short Description   |
|-----------|--|---|
| AW-04     | Ageing Aircraft  | Development of maintenance schedules for old General Aviation aircraft (e.g. wood structures).  |
| IN-20     | Transmission reliability and safety standards  | Preparation of an integrated strategy for improving transmissions reliability and safety standards with advent of new technologies (e.g. new materials), looking at cert procedures, regulations, research, DOA, POA, 145.  |
| RC-06     | Ditching in water or a Survivable water impact (SWI) for Rotary wing aircrafts (Helicopter, Tilt Rotor, Compound Rotorcraft) | Sufficient real flotation time (2-3 Minutes) before any capsizing or side floating movement to provide opportunities for the occupants to escape a rotary wing aircraft, taking into consideration sea state 6 conditions (irregular waves), in case of ditching in water or in the event of a survivable water impact (SWI). |
| RC-02     | De-icing of smaller helicopters  | Study the implementation of a rotor de-icing system using innovative technological solutions for smaller helicopters.   |
| IN-15     | Toxicity of failing non-rechargeable lithium batteries   | Non-rechargeable lithium batteries are more and more present in the occupied compartment. TCH/applicants information on this aspect is very limited since basic knowledge is missing about the toxicity of burning “small” non-rechargeable lithium batteries.  |
| IN-17     | Virtual testing tools  | Independent assessment and trials of off the shelf analytical tools (virtual testing methods) used by DOAs in certification.  |
| IN-18     | Test and Analysis Pyramid Statistics   | Define small dataset strategy for structures airworthiness certification, establishing the linkage between statistically credible simple base pyramid coupon datasets and the higher pyramid more complex test items.   |

## 2.1.2 Flight Standards

| Reference | Project title  | Project Short Description  |
|-----------|--|--|
| OP-03     | Group Operations – assess regulatory obstacles and social implications at EU and international level | Operators perform the consolidation of their business at the level of multi-national airline groups. This is essential for their commercial viability on an international scale and fully liberalized market. However, most of the existing rules, including ICAO SARPs are State-centric. Fitting such business set-ups in the existing regulatory framework leads to inefficient redundancies and generates unnecessary complexity. A multi-domain study analyzing all regulatory barriers, as well the associated social implications, would be beneficial as a starting point to establish an adequate regulatory framework for multi-national group operations. |
| FS-04     | Compliance monitoring effectiveness  | Measure the performances of a compliant system in the context of FCL, MED, FSTD regulations, in terms of qualitative and quantitative methods/tools for use in continuous monitoring.  |



| Reference | Project title   | Project Short Description   |
|-----------|---|---|
| OP-05     | Passenger mass survey   | Air OPS rules, in the context of mass and balance calculations, prescribe the use of “standard passenger masses”, which were taken from previous JAA materials. A survey was conducted in 2008 showed that the standard masses need to be updated; however such an update was not included in the Air OPS regulatory package as the scope at that time was mainly geared towards transposing EU-OPS. A new, smaller survey was planned to start in 2018, to update the data collected in 2018. Since the associated rulemaking task was deprioritized, this survey should be re-planned for a later date (e.g. 2019-2020) |
| HF-07     | Assess the efficacy of pilot training as a safety barrier in the context of EFVS operations | Enhanced Flight Vision Systems (EFVS) may be operated without the prior approval of the competent authority; considering that the flight procedures, equipment and pilot barriers are sufficiently robust. Following a risk assessment conducted during the rulemaking preparation, this research should confirm a series of initial assumptions for EFVS operations. The scope of this research is to test the readiness level of pilots with no or little exposure to EFVS to use such equipment.   |
| TRN-02    | Competency Based Training and Assessment (CBTA)   | Within pilot training domain, prepare the move towards less prescriptive hour requirements and putting the focus on assessing pilot competence against a set of standard competencies based on observable behaviours.   |
| IN-27     | Definition of 'acceptable level of safety'  | New BR (Article 36,2a,d) sets an obligation to the MS to establish 'acceptable level of safety' to the ANSP and to oversight and enforce compliance to it. Study should identify the best practices and propose a methodology for supporting the MS when establishing the 'acceptable level of safety'  |

### 2.1.3 ATM / Aerodrome Standards

| Reference | Project title   | Project Short Description   |
|-----------|---|---|
| OP-04     | Implementation of the “triple one” concept at aerodromes (or one runway, one frequency, one language)     | <p>Using a single frequency for communication purposes with regard to runway operations improves the situational awareness of the actors active on the airport movement area. However, this presupposes the use of a common language so that the use of a common frequency makes sense.</p> <p>There are examples cases of aerodromes with heavy traffic where this recommended “triple one” concept has been implemented, while it seems that in a significant number of cases other ways of operations are being used.</p> <p>The study should:</p> <ul style="list-style-type: none"> <li>- look at the current situation in Europe with regard to this issue, identifying the various concepts currently in use;</li> <li>- substantiate the safety benefits of the implementation of the “triple one” concept and identify the prerequisites for its implementation;</li> <li>- identify the operational or other reasons for the non-implementation of the triple “one concept”;</li> <li>- identify other solutions and best practices that increase situational awareness and which are not based on the use of the “triple one” concept;</li> <li>- preliminarily assess the impacts that the introduction of the “triple one” or other concepts may have on the affected stakeholders.</li> </ul> |
| OP-09     | Practical use and validation of high resolution surface laser scanners for assessing runway micro texture | <p>Runway surface micro texture is essential for ensuring good wet runway braking friction performances. Poor runway micro texture has resulted in numerous landing overruns occurrences on wet surfaces. There are currently no acceptable methods for airports to accurately assess the micro texture characteristics. The proposed research assesses the practical use and validity of high resolution surface laser scanners to determine the runway micro texture characteristics. A better understanding of these characteristics can reduce the number of runway excursions.</p>   |
| OP-06     | Conversion of Visibility to Runway Visual Range for Approach Ban Purposes                                 | <p>The currently used conversion factors used to calculate ‘Converted Meteorological Visibility (CMV) from a ‘visibility’ have been challenged. The background is that the original conversion factors were based upon ‘Meteorological Optical Range’, and this is different to ‘Visibility for aeronautical purposes’, as has been specified since 2001 by ICAO. The assumptions and science behind Meteorological Optical Range are not the same as those behind ‘Visibility for aeronautical purposes’, and give overestimates of the Runway Visual Range if applied.</p>  |

## 2.1.4 New Operations / Products / Processes

| Reference | Project title   | Project Short Description   |
|-----------|---|---|
| IN-30     | Machine learning  | One branch of artificial intelligence is machine learning. In order to qualify machine learning techniques for safety-critical or sensitive applications (example the one involving decision making process) there is a need to get visibility on the neuronal network functioning. The study will explore the methods and tools that safety regulatory authorities should have to ensure the integrity of the certification / approval processes.  |
| IN-22     | New landing aid   | Standard for simple flight director/auto-landing for single engine airplanes and helicopters, adapted to the specific aircraft and enabling automatic choice of field to land based on GPS database adapted to identify possible emergency landing sites following engine failure.  |
| LOC-03    | Landing and take-off monitor                                      | Assess means to assist the flight crew in: <ul style="list-style-type: none"> <li>- preventing runway overrun and managing aircraft total energy</li> <li>- monitoring the actual acceleration of the aircraft during the take-off run to detect mismatch between V1 and the actual remaining runway distance.</li> </ul>   |
| IN-31     | GA collision risk - Interoperability of e-conspicuity systems     | Assess feasibility of achieving the full interoperability of different e-Conspicuity devices/systems in use (e.g. operated by aeroclubs) through ground network connectivity while respecting data privacy requirements.  |
| OP-08     | Study on RAMP methodology   | The research will advise EASA on opportunities to improve the current safety audit methodology used, with the aim to: <ul style="list-style-type: none"> <li>• Establish a more stable indicator</li> <li>• Analyse the data at a lower granularity</li> <li>• Establish a better process to determine the impact on safety of the various non-compliances (the finding category)</li> </ul>  |
| IN-28     | New technology training devices rules adaptation                  | The world of training devices is fast growing, with “out of the box “ thinking which do not relate to the classic regulatory framework , i.e. included in the Certification Specification (CS) for Flight Simulation Training Devices (FSTD) .There is therefore a need to innovate in the area of FSTD qualification aiming first on their added value, i.e. pedagogic added value. A Study aiming on making best use of those training devices in the framework of FCL and OPS regulations (e.g. mission training ) is therefore necessary.   |
| IN-29     | Risk modelling tools specifically designed for novel technologies | New technologies emerge at an accelerated pace, challenging the established conventions (e.g. new aircraft categories: multi-rotors, VTOLs, new propulsion: electrical and hybrid, new operating concepts: single pilot large jets, remotely piloted aircraft, new applications: urban mobility). Irrespective whether they fit in the existing regulatory framework (most have no established means of compliance) before those can be operated EASA will need to answer the question “is this safe ?”. A bespoke, risk modelling tool, that is not entirely technology specific should help EASA to answer such a question. The research project should focus on developing such a tool that is not dependent on high amounts of “in-service” data. |

| Reference | Project title                              | Project Short Description   |
|-----------|--|---|
| EQ-01     | Ram-Air-Parachutes as Emergency Parachutes | Explore the use of ram-air parachutes as emergency parachutes, reducing the opening time and increasing the maximum operating speed, while allowing a more controlled landing site selection. |

### 2.1.5 Operational Safety and Human Factor Issues

| Reference | Project title  | Project Short Description   |
|-----------|--|---|
| HF-08     | Human factors in maintenance documents (ICA)               | There is only limited knowledge, especially scientifically supported, about how to produce handbooks/instructions/procedures in a way that it suits the human nature of the mechanics performing it. There are several documents existing standardizing the layout and the content, but they are not based on the needs of the human mechanics. There are a lot of guidelines for good authoring practice for aviation documents (e.g. by FAA), but they are not based on any research into what is suiting best the needs of a human mechanic, they are basically generic good practices for any writing, and they are at a very high level (e.g. describe complicated systems by illustrations, not by text). There is a lot of research into ergonomics of the workspace, but very limited into the ergonomics of manuals/documents. This research should also take into account the current trend away from printed handbooks to electronic documents with much better possible layouts and arrangements (hyperlinks for cross references, videos, virtual reality). It is totally unclear whether all this new technology is really helping the human mechanic, or just produces overload and confusion. |
| HF-06     | Support aviation professionals for new products / concepts | Support aviation professionals in coping with new procedures and increasingly complex technologies (e.g. new training methods)  |

### 2.1.6 External and Weather Hazards

| Reference | Project title                 | Project Short Description   |
|-----------|-------------------------------|---|
| WE-02     | Atmospheric turbulence hazard | Characterisation of phenomena and analysis of impact/mitigation for safety. |

## 2.2 Security

| Reference | Project title  | Project Short Description  |
|-----------|--|--|
| SEC-05    | Cybersecurity: common aeronautical vulnerabilities database                                    | Develop a vulnerability database collecting, maintaining, and disseminating information about discovered vulnerabilities targeting major transport information systems.  |
| SEC-12    | Aviation Resilience to GNSS Jamming and Spoofing   | Assess the safety impact of GNSS jamming and spoofing events to aviation users, support the development of mitigations and specific training actions, identify and mitigate the vulnerabilities of aviation products and the required changes to aviation standards<br><br>Note: the project has been selected in 2019 by the European Parliament as part of the 'Pilot Project' scheme. |
| SEC-06    | Composition of secure systems  | Develop tools and methods for the assessment of the effects on security properties when adding or modifying a subcomponents in a complex architecture  |
| SEC-07    | Cybersecurity vulnerabilities and complex systems  | Investigate the relationships between the number of cyber security vulnerabilities of a system and its level of complexity, incl. the analysis of combined effects of several vulnerabilities.   |
| SEC-08    | Aviation Cybersecurity Grand Challenge   | Organise challenge for hacking / defending teams on flight systems   |
| SEC-09    | New organisational structures for aviation security  | Develop methods and tools to assess organisational structures for security risk management of critical transport infrastructures (e.g. airport), with focus on inter-organisation processes  |
| SEC-10    | New detection techniques for physical threats to aviation security (e.g. behavioural analysis) | Assess new threat detection techniques for critical transport infrastructures (e.g. airports), covering the identification of unusual movements of human or vehicles (incl. drones) combining visual and electronic signals  |

## 2.3 Environmental Protection Standards

| Reference | Project title   | Project Short Description  |
|-----------|---|--|
| ENV-10    | Sustainable Aviation Fuels (SAF) Monitoring System & SAF Facilitation Initiative and fuel icing | The SAF Monitoring System will establish a cost effective, robust data stream to monitor the use and supply of SAF, as well as the associated emissions reductions, at the European level. In addition to SAF monitoring, it will also encompass the monitoring of general aviation fuel specification of fuel provided/used in Europe. The EASA SAF Facilitation Initiative will incentivise the approval and use of SAF as 'drop-in' fuels that can be safely incorporated into existing airport fuelling systems. |

| Reference | Project title  | Project Short Description  |
|-----------|--|--|
| ENV-7     | Impact Assessment and Validation of Future Aviation Concepts | Develop innovative methodologies, scenarios, data streams and tools to quantify the life-cycle environmental impacts and costs of future concepts of aircraft/engine technology and design, aircraft operations, alternative fuels and market-based measures. Enable the Agency to fulfil its roles under ICAO CAEP, EAER and State Action Plans in a consistent and efficient manner, and to prepare to support the future Clean Sky programme. Anticipate and monitor progress towards international / EU environmental goals. |
| ENV-8     | Drone & eVTOL Noise Measurement                              | Conduct noise flight test measurement campaigns for a wide range of products using different technologies in order to develop and improve future noise certification requirements for drones and eVTOL, as well as set appropriate noise limits.   |
| ENV-9     | Drone & Air Taxi Noise Impact                                | Assess the potential noise impact and acceptance by the public of drone and air taxi operations in order to develop a robust technical understanding of these aircraft that supports future decisions on appropriate noise limits for product certification as well as operational procedures.   |

## 2.4 Public / Occupational Health Issues

| Reference | Project title   | Project Short Description   |
|-----------|---|---|
| HE-03     | Cabin Air Quality (fume events) - Comparative Epidemiology study                | Assess the needs, feasibility and resources required for the performance of a large comparative epidemiology study involving flight crews, with an intervention group and a defined medical protocol used for fume event reporting.<br><br><i>Note: the action is part of the 2<sup>nd</sup> project addressing Cabin Air Quality addressed by the Contribution Agreement (funding reserved, launch by Q3 2020)</i>   |
| HE-06     | Vector control for public health concern  | Currently the climate change allowed a shift in the presence of certain vector born disease which led to locally developed Malaria and yellow fever in certain areas in Europe (Italy, Netherlands). The objectives of the study would be to assess the possibilities of various vector control on the aerodromes as well as the possibility of preventing the import, via aviation, of insects and animals (vectors) from endemic areas into Europe and especially those areas where they could become acclimatised.   |
| HE-07     | Limitation of spread of airborne infectious disease in the aircraft environment | As we know and was again demonstrated with the SARS-CoV-2 outbreak, the aviation constitutes the fastest mean of transport for long distances, but in the same time the fastest mean of spreading the contagious diseases. In order to ensure that passengers are not adversely affected by the air travel the objective of this study would be to look at the possibilities to further reduce the spread of airborne infectious agents within the aircraft environment by improving the filtration systems, the recirculation systems and the cabin airflow including the individual air supply nozzles. |

| Reference | Project title  | Project Short Description  |
|-----------|--|--|
| HE-13     | Cabin Air Quality (fume events) - assessing potential health risks and mitigations   | <p>What are the health risks associated to fume events ? How effective are mitigation strategies such as air filtration and sensors to improve cabin air quality ?</p> <ul style="list-style-type: none"> <li>- Intervention (filters in passenger aircraft)</li> <li>- Inflight air quality characterisation (UFP, VOCs, CO ...)</li> <li>- Health follow-up (questionnaire)</li> <li>- Bleed air and ventilation simulation</li> <li>- In vitro toxicology</li> </ul> <p><i>Note: the action is part of the 2<sup>nd</sup> project addressing Cabin Air Quality addressed by the Contribution Agreement (funding reserved, launch by Q3 2020)</i></p>  |
| HE-04     | Cabin Air Quality (fume events) - toxicological analysis using in-vitro lung toxicity, neurotoxicity assessment and human exposure study | <p>Expand the toxicological analysis of cabin air contaminants originating from engine/APU oil leakage, using in-vitro lung toxicity, neurotoxicity assessment and human exposure study.</p> <p><i>Note: the action is part of the 2nd project addressing Cabin Air Quality addressed by the Contribution Agreement (funding reserved, launch by Q3 2020)</i></p>  |
| HE-05     | Monitoring pilot health during the active life and after retirement  | <p>The objective of an assessment of the pilots' health is to evaluate if the specific risk factors are properly mitigated and what pathologies should be more closely monitored in order to ensure flight safety as well as a safe career for the pilots. The objective of the monitoring the pilot health would be to evaluate the possibility of allowing pilots to be involved in CAT operations beyond their 65th birthday while maintaining at least the same level of safety.</p>   |
| HE-08     | Mental Health of Pilots and ATCOs  | <p>Already before the GermanWings accident it was understood that the human mind is the most difficult system to assess when looking at the essential needs for a pilot or an ATCO to discharge their tasks safely. Furthermore, performing mental health assessment may have more than one goal, some assessments are intended to evaluate the overall fitness to perform, others are intended to evaluate the synergy between the pilot/ATCO profiles and a specific type of operations, while other assessments are intended to identify certain sequelae after special circumstances (involvement in an accident/serious incident, loss of a family member, etc) which may affect their overall performance. Currently there are no specific validated mental health assessment methods for use in aviation, incorporating the operational needs and addressing the issues identified. Research is needed to further detail the specific needs and to develop and validate the proposed assessment methods or to assess the applicability of existing methods for the use in aviation.</p> |

| Reference | Project title                                    | Project Short Description  |
|-----------|--|--|
| HE-09     | Radiation Effects on crew members                | Throughout the aviation history there have been several studies regarding the cumulative effects of cosmic radiations on the aircraft crew members. Nevertheless, 20 years ago most of the commercial aircrafts were flying Flight Level (FL) 310 or 320 while currently certain airliners can cruise at FL 380. Furthermore, the level of cosmic radiations is dependent on the latitude and longitude as well as on the season. In the context of the changes of the cruise FLs and of the climate and ozone layer as well as the changes in the on board technology the levels of radiation and their cumulative effects are raising concerns amongst the community of crew members but also amongst the frequent travellers. The objective of this research activity is to assess the current levels of radiations to which the crew members are subject while flying and the relevance of the existing mitigating measures in the current context.  |
| HE-10     | Cardiology new treatment and diagnostic measures | New technologies have been released on the market providing improved curative or supportive treatments in terms of medication and supportive equipment (implantable or external) that highly improve the quality of life for the cardiac patients. Some types of equipment, although performing very well at ground level are potentially pressure dependent which may lead to in-flight malfunctions (being that a regular flight or in the case of a sudden decompression). The study of such types of equipment will have an impact on the crew members, particularly on their fitness to perform their duties, but also on the passengers having such devices even if flying only occasionally. In a similar way, new medication has been developed to alleviate certain pathological conditions, nevertheless for some of them the side effects may be further enhanced by the on-board environment to the level of making the incompatible with flying. In the case of the medication, the issue has a greater impact on the fitness of the crew members rather than on the occasional passengers. Nevertheless, in order to have scientific evidence to amend the medical requirements and include the new developments in the current safety regulatory framework, a research study aimed at the use of medical solutions in the aviation environment is needed. |
| HE-11     | Diabetes mellitus                                | New diagnostic measures are being developed that allow reliable continuous blood glucose level monitoring. Furthermore, the medical industry has developed automated insulin pumps that allow the equipment to monitor the glucose level and administer the insulin dose needed in an automated manner. Nevertheless, the sensors used by all these type of equipment may be affected by pressure changes and aircraft on-board environment. There are no research studies available currently to assess the possibility of their safe use in aviation environment and in order to alleviate the requirements imposed to pilots with such pathology.   |



| Reference | Project title   | Project Short Description  |
|-----------|---|--|
| HE-12     | Colour vision requirements in the new full glass cockpit environment and modern ATCO consoles | <p>The colour vision needs for pilots and ATCOs have been studied throughout the history of aviation, but with no development for the last 20 years. Recently, major progress in aircraft design as well as in the development of ATCO consoles, namely through the introduction of ‘full glass’ cockpit, LED displays and other solutions. As a result, in order to increase the situational awareness and decrease the reaction times, a lot of information provided to pilots and ATCOs is colour-coded. As no measurements of the actual needs in terms of colour vision to ensure that the information received is correctly perceived are available, the objective of project is to measure the colour characteristics of information presented on the ground and in flight, in different moments of the day with different intensity of ambient light for most common aircraft types and in a similar way for the ATC operational displays. Following the measurements, the visual performance needs should be defined and the existing diagnostic methods should be assessed in terms of the relevance of their results.</p> |

## Annex A Previous topics removed or modified

The table below provides the list of research topics from previous editions of the Agency' Research Agenda that haven been removed or modified.

| #                              | Title   | Short description   | Justification                  |
|--------------------------------|---|---|--------------------------------|
| <b>Airworthiness Standards</b> |   |   |                                |
| FIR-02*                        | Fire risks with large Personal Electronic Devices (PED) in checked luggage  | Characterise fire risk (propagation, detection, suppression) for large PED transported in aircraft cargo compartment (checked luggage).   | Project launched               |
| AW-05                          | Halon Replacement   | Investigate Halon replacement including aircraft system integration level feasibility for engine/nacelle/auxiliary power unit fire extinguishing system due to banning by regulation the installation of 'halon firex' system on aircraft   | Existing project(s) identified |
| <b>Rotorcraft</b>              |   |   |                                |
| IN-10                          | Rotorcraft Gearbox health monitoring - In-situ failure detection  | New technologies for in-situ detection of helicopter gearbox failures   | Existing project(s) identified |
| IN-20                          | Transmission reliability and safety standards   | Preparation of an integrated strategy for improving transmissions reliability and safety standards with advent of new technologies (e.g. new materials), looking at cert procedures, regulations, research, DOA, POA, 145.  | Project launched               |
| RC-01*                         | Power reserve for rotorcraft  | Demonstration of the technical feasibility of equipping a helicopter with a reserve of power to be utilized in case of an engine failure  | Existing project(s) identified |
| RC-04                          | Enhanced emergency floatation systems for helicopters   | Enhanced emergency floatation systems for helicopters to enable post capsized floating attitudes that provide for a portion of the passenger cabin to remain above water to enable occupants to breathe whilst making their escape.   | Project launched               |
| RC-05                          | Rotorcraft main gear box (MGB) design to guarantee integrity of critical parts and system architecture to prevent separation of the main rotor following any MGB failure. | Recent continued airworthiness events have shown that failure of Critical Parts of helicopter Rotor and Rotor Drive Systems represents a significant risk for helicopter airworthiness. Deeper investigation of the critical design parameters and characteristics of Critical Parts, the threats they face during their service life and the methods used to substantiate the integrity and flaw tolerance of these parts, is proposed in order to investigate opportunities to minimize the likelihood of failure. Additionally, Rotor and Rotor Drive System architecture concepts should be reviewed that could reduce exposure to catastrophic failure modes | Project launched               |
| RC-07                          | Underwater Evacuation from Helicopters  | A Review of Current Research Data and Possibilities for Enhancement.<br>An initial review of the currently available research data regarding underwater escape from helicopters is required. Further to this, an assessment is to be performed of the feasibility of performing further focussed research aimed at correcting any shortfalls that may be identified in this initial review, if justified on the basis of safety gains versus costs.   | Project launched               |

| <b>Flight Standards</b>                   |   |  |                                |
|---|---|--|--------------------------------|
| HF-01                                     | HF issues and Training methods for complex automation in cockpit  | Support aviation safety development in coping with new procedures and increasingly complex technologies - starting with flight path management   | Existing project(s) identified |
| FS-01*                                    | Effectiveness of FTL  | Continuous review of the effectiveness of the provisions concerning flight and duty time limitations and rest requirements (FTL), initially for commercial air transport (CAT) by scheduled and charter operators)   | Project launched               |
| IN-04                                     | Quick recovery of flight data recordings                          | Assess means to recover flight recorder data quickly after an accident for the purpose of faster corrective actions, their limitations as well as the related challenges for standardisation and deployment.   | Project launched               |
| <b>Weather Hazards</b>                    |   |  |                                |
| WE-01*                                    | Icing hazard  | Characterisation of phenomena and analysis of impact/mitigation for safety (ice crystal icing or super-cooled large droplet icing) in order to participate in the development of means of compliance with the new ice protection regulation  | Existing project(s) identified |
| IN-16                                     | Ice crystal detection   | Ice crystal icing phenomenon is still posing a severe threat to high altitude flying, in particular to new engine designs. Pilots have little or no means to detect and/or avoid it, especially at night. A research is proposed in order to better detect the presence of ice crystal icing and to develop an equipment suitable to detect such a phenomenon  | Existing project(s) identified |
| LOC-06                                    | Fuel icing  | The engine exposure to continuous fuel icing threat (saturated fuel + 200 ppm free water) can potentially affect the engine operation.<br>It is now known that the ice concentration (specified in the Accepted Means of Compliance) is not the only pertinent parameter (ice particle size and structure have an influence on engine system operation)<br>The proposed research aims to characterise and reproduce test conditions more representative of the fuel icing threat generated by the aircraft system at the inlet of the engine | Topic merged                   |
| <b>Drones</b>                             |   |  |                                |
| RP-03*                                    | Vulnerability of manned aircraft to drone strike                  | The Project assesses the collision threat posed by drones to manned aircraft and validates its results by means of a complete set of activities including modelling and impact tests   | Project launched               |
| <b>Security</b>                           |   |  |                                |
| SEC-01*                                   | Tamper-resistant Aircraft Localisation                            | Ensure a fail-safe localisation of an aircraft whatever the outcome of an abnormal situation and covering aircraft tracking, autonomous distress tracking and automatic deployable flight recorder   | Existing project(s) identified |
| <b>Environmental Protection Standards</b> |   |  |                                |
| ENV-02*                                   | Aviation Emissions Support  | Obtain high quality technical expert support on standardisation issues   | Project launched               |
| ENV-04                                    | Development of Particulate Matter (PM) regulations and guidelines | Acquire high quality PM data, analysis, modelling and expert support for regulatory action   | Project launched               |
| ENV-06                                    | Market-based Measures (ETS and CORSIA) – ecoImpact II             | Extend and update of existing capabilities for assessment of Market-based measures notably to cater for new traffic data and forecasts, handling of novel scenarios and measures, ensuring their fitness-for-purpose and   | Project launched               |

|                             |                                     |  |                  |
|-----------------------------|-------------------------------------|--|------------------|
|                             |                                     | credibility for supporting critical policy-making both at European (EC, Member States) and international (ICAO) level.   |                  |
| <b>Public Health Issues</b> |                                     |  |                  |
| HE-01*                      | Research study on cabin air quality | Investigation of the quality level of the air inside the cabin of large transport aeroplanes and its health implication. The work aims at demonstrating, on the basis of a sound scientific process, whether potential health implications may result from the quality of the air on board commercially operated large transport aeroplanes. | Project launched |



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