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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and repealing Regulation (EC) No 216/2008 of the European Parliament and of the Council

{COM(2015) 613 final}
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1 INTRODUCTION

1.1 Political context

This initiative is part of the 2015 European Commission's 'Aviation Package for improving the competitiveness of the EU aviation sector'. The objective of this review is to prepare the EU aviation safety framework for the challenges of the next 10-15 years and thus to continue to ensure safe, secure and environmentally friendly air transport for passengers. This initiative builds on over twelve years of experience in the implementation of Regulation (EC) No 216/2008[1] and its predecessor.[2]

The 2011 White Paper on transport[3] aims at Europe becoming the safest region for aviation. Air transport in the EU has at present an excellent safety record. With the average annual accident rate in commercial air transport in the last ten years standing at 1.8 per ten million flights, the EU is one of the safest regions in the world for air travellers.[4] However, with the aviation traffic in Europe predicted to reach 14.4 million flights in 2035 (50% more than in 2012),[5] we must make sure, by focusing on clearly identified risks, that the system continues to maintain the current low number of accidents. This means that the accident rate has to continue decreasing in proportion to traffic growth.

While aviation safety is an important objective of this initiative, it is not the only one. This proposal must also be seen in the context of the Europe 2020 Strategy[6], in particular regarding employment and innovation, and of the Commission priorities of fostering jobs and growth, developing the internal market and strengthening Europe's role as a global actor.[7] Aviation is one of the strategic EU industries with a positive growth projection for the next decades and generates numerous, highly skilled jobs. Including indirect and induced impacts, the air transport sector supports 5.5 million jobs and contributes nearly EUR 395 billion to GDP in the EU28.[8] This initiative thus also aims at contributing to a competitive European aviation industry based on a well-functioning internal market, which creates high value-jobs and drives technological innovation.

Safety is a pre-requisite for a competitive aviation sector. Staying competitive without making concession on safety however, requires the EU to become more efficient. While the present system has been so far effective in ensuring safety of air passengers, it is not the most efficient one, and creates unnecessary costs for Member States, industry and airspace users. There is a strong call from the industry and Member States for a more flexible system which would allow using the limited resources more efficiently, eliminate ineffective regulation, facilitate innovation and boost the competitiveness of the European industry. Especially the small and medium sized enterprises (SMEs) urge the EU to introduce a more proportionate

[1] Regulation (EU) No 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC, (OJ L 79, 19.3.2008).
[2] Regulation (EC) No 1592/2002 of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency', (OJ L 240, 7.9.2002).
[3] COM (2011) 144 final, p. 22.
[4] EASA, Annual Safety Review (2013), p. 15.
[5] EUROCONTROL, Challenges of Growth 2013, Task 4: European Air Traffic in 2035. This is the most likely out of four scenarios proposed by EUROCONTROL that range from 11.2 to 17.3 million flights (19–83% growth compared to 2013).
[6] COM (2010) 2020 final.
[7] Commission Work Programme 2015, COM (2014) 910 final, 16.12.2014.
[8] ATAG, Aviation benefits beyond borders (2014), p. 47.

regulatory framework and to eliminate regulation which stifles entrepreneurship and introduction of new technologies with too prescriptive requirements.

Finally the present unfavourable economic situation puts an increasing pressure on EU and Member States' budgets. Many National Aviation Authorities are finding it difficult to maintain, not to mention increase, their resources, while the demand from industry for technically challenging certification and oversight work does not diminish.

1.2 Legal context

The responsibilities for the implementation of the EU aviation safety system are shared between the national and EU levels. In addition, in the area of air traffic management, the EU still makes some use of the European Organisation for the Safety of Air Navigation (EUROCONTROL) which is a separate intergovernmental organisation. The International Civil Aviation Organisation (ICAO) influences the functioning of the EU system by setting minimum standards at the global level and overseeing their implementation by Member States and the European Aviation Safety Agency (EASA). Finally a number of specialised bodies, such as SESAR Joint Undertaking, Network Manager and Performance Review Body, contribute to the functioning of the EU aviation safety system.

The EU legal framework for civil aviation safety is primarily based on Regulation (EC) No 216/2008[9], which constitutes a recast of Regulation (EC) No 1592/2002.[10] This Regulation establishes the main functions of the system, such as rulemaking, certification and oversight, and creates EASA as a specialised EU aviation safety body. Originally the scope of the Regulation was limited to airworthiness and certification of environmental protection with respect to aeronautical products. This initial scope was subsequently extended to flight operations and aircrew (2008), and safety aspects of air traffic management, air navigation services and aerodromes (2009).[11] Whilst Regulation (EC) No 216/2008 defines the scope of the system and sets out the responsibilities for its implementation, the detailed obligations of the regulated entities, such as airlines or manufacturers, are laid down in Implementing Rules adopted by the European Commission on the basis of technical proposals of EASA.

In addition to Regulation (EC) No 216/2008 and its Implementing Rules, the legal framework of the EU civil aviation safety system is composed of a number of additional regulations, most notably on: accident investigation,[12] occurrence reporting and analysis,[13] and banning of unsafe operators.[14] Finally safety aspects of air traffic management and air navigation services are still to a certain extent regulated in parallel by Regulation (EC) No 216/2008 and the Single European Sky (SES) regulations. With respect to this last point, the European

[9] See note 1.
[10] See note 2.
[11] Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation services and repealing Directive 2006/23/EC, (OJ L 309, 24.11.2009)
[12] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC', (OJ L 295, 12.11.2010).
[13] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18).
[14] Regulation (EC) No 2111/2005 of the European Parliament and of the Council of 14 December 2005 on the establishment of a Community list of air carriers subject to an operating ban within the Community and on informing air transport passengers of the identity of the operating air carrier, and repealing Article 9 of Directive 2004/36/EC **(**OJ L 344, 27.12.2005, p. 15).

Commission has launched the SES II+ initiative which aims to remediate the overlap[15], and on which the present proposal builds.

Regulation (EC) No 1008/2008 on common rules for the operation of air services in the Union[16] also contains a number of safety related provisions (concerning leasing and Air Operators Certificates) which are impacted by the present initiative.

Finally, the governance, functioning and oversight framework for EU agencies has been subject to a comprehensive review in 2012, which resulted in a 'Common Approach on decentralised agencies' between the Commission, European Parliament and the Council, which needs to be taken into account by the present initiative.[17]

Annexes VI and VII contain additional information about the functioning of the EU aviation safety system and responsibilities of the different actors involved in its implementation. Annex XXIII contains a glossary of the main technical terms used in this report.

1.3 Evolution of aviation safety in the EU/EFTA[18] states in the last decade

When it comes to scheduled commercial air transport operations, the EU/EFTA enjoys today one of the best safety records in the world (Table 1), with the average fatal accident rate in the last ten years standing at 1.8 per ten million flights, which is significantly below the worldwide average (Figure 1).

Table 1: Scheduled Commercial Air Transport Fatal Accident Rate per 10 million flights, 2004-2013

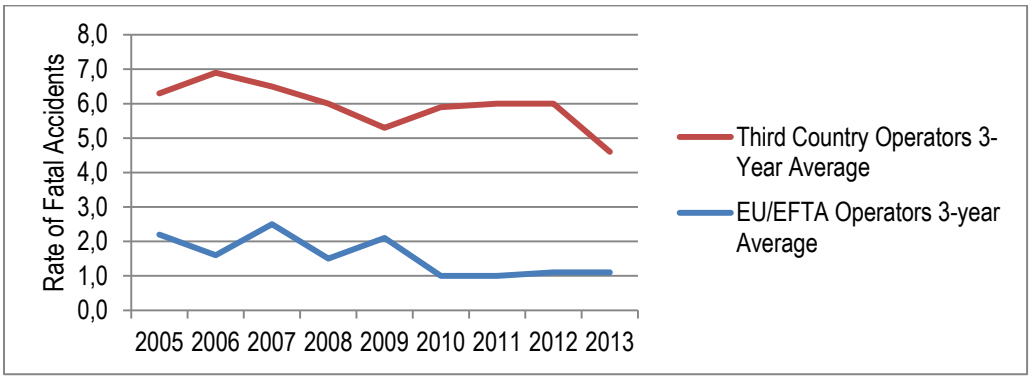
EU/EFTA	1,8
North America	1,9
Asia	6,3
Middle East	15,5
Africa	38,3

Source: EASA, Annual Safety Review (2013)

The available data also shows that the rate of fatal accidents for EU/EFTA Member State operated aeroplanes in scheduled passenger operations remains stable since 2010. Between 2005 and 2013 the number of flight movements under instrument flight rules in the EUROCONTROL area has increased by only 2.5% due to the economic downturn of 2008.[19]

[15] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Accelerating the implementation of the Single European Sky, (COM(2013) 408 final, 2013), p.9.
[16] OJ L 293, 31.10.2008, p. 3.
[17] http://europa.eu/agencies/documents/joint_statement_and_common_approach_2012_en.pdf
[18] The EFTA States (Switzerland, Norway, Iceland and Liechtenstein) have been associated with the EU aviation safety system and the work of EASA on the basis of international agreements.
[19] Source: EUROCONTROL.

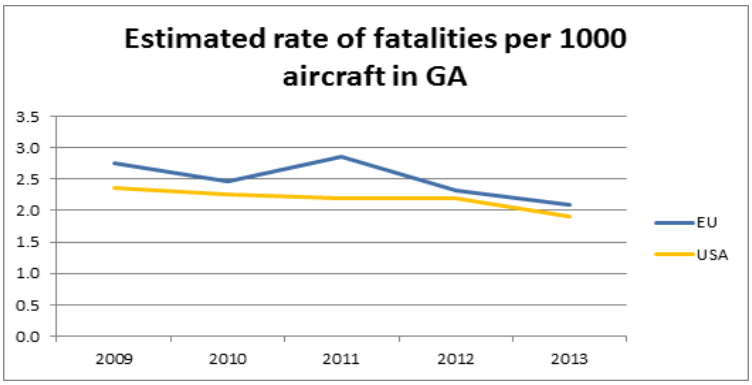
Figure 1: Rate of fatal accidents in EU/EFTA Member States and third country operated scheduled passenger operations, aeroplanes above 2250 kg MTOM, 2004-2013 per 10 million flights



Source: EASA, Annual Safety Review (2013)

When it comes to non-commercial aviation, or 'General Aviation', it is at present not possible to calculate accident rates in a similar fashion as for commercial air transport, due to unavailability of exposure data (number of flights or flight hours). Nevertheless, an approximate picture of General Aviation safety can be given using as exposure the size of the fleet. Using this method, we can assume that the rate of fatalities has been decreasing, but that the level of safety of General Aviation in the EU is slightly worse than in the US (Figure 2). Anecdotal evidence suggests that the reduction in the level of fatalities partly results from the reduction of General Aviation activity in the EU[20] - it is however not possible to verify such a proposition due to lack of exposure data.

Figure 2: Comparison of General Aviation safety in the EU and US



Source: EASA

2 PROBLEM DEFINITION

The problems selected for analysis have been chosen on the basis of the following primary sources:

(a) Results of the public consultation conducted by the services of the Commission (Annex II provides a summary);
(b) Opinion of the European Aviation Safety Agency;[21]

[20] For example in 2013 over 200 general aviation aircraft were destroyed and another 600 substantially damaged in Europe. At the same time, on average 170 general aviation aircraft are sold in Europe (Source: 2014 EASA Conference on General Aviation, Rome).
[21] EASA, Opinion 1/2015, European Commission policy initiative on aviation safety and a possible revision of Regulation (EC) No 216/2008.

(c) EASA Management Board Sub-Group Report on the Future of the European Aviation Regulatory System (Annex V provides a summary of recommendations);
(d) Report on the evaluation of the functioning of Regulation (EC) No 216/2008 conducted under Article 62 of that Regulation (Annex IV provides a summary of recommendations);
(e) Two support studies [*hyperlink to be added*] contracted by the Commission (Annex I provides further details);
(f) Own analysis by the services of the Commission.

The following sections of this Chapter will refer back to the above sources when substantiating the identification of a particular problem which has been selected for analysis in this impact assessment. The problems identified concern the technical framework for civil aviation safety. Where other technical domains of aviation regulation, such as aviation security, are taken into account, this is done to the extent that there are interdependencies between safety and these other technical domains. Environmental protection with respect to aeronautical products' certification is already within the scope of Regulation (EU) 216/2008, and is accordingly also within the scope of the present initiative.

Table IV at the end of this Chapter presents the relationship between the problems identified and their drivers. It also indicates the relative importance of the specific problem driver for each of the problems.

2.1 Description of the main problems

2.1.1 The present regulatory system may not be sufficiently able to identify and mitigate safety risks in the medium to long term

The European Aviation Safety Plan (EASp) identifies the main systemic, operational and emerging issues which present risk to safety of civil aviation in the Union (Annex XXI provides further details). However, the purpose of this initiative is not to deal with specific operational issues (such as loss of control in flight or runway excursions), as important as they may be.[22] Such operational issues are already within the scope of the Union competence and are being dealt with by EASA and the Member States' aviation authorities. The two exceptions in this respect, identified by the impact assessment and for which Union action is examined, are ground-handling and security aspects of aircraft and aviation systems' design. The relevance of these two issues for the maintenance of aviation safety are analysed under Section 2.2.3.

Other than that, this impact assessment looks at aviation safety from a systemic perspective. In this respect the Commission services have identified two main issues which require attention: shortages and inefficient use of resources by aviation authorities, as well as reactive nature of aviation safety regulation and oversight.

The above mentioned issues, and especially those related to the use of resources and safety management, are considered as system weaknesses which may make it more difficult to maintain the present safety record in conditions of expected traffic growth and increasing complexity of the aviation system. They also contribute to other problems as identified in this Chapter.

[22] The four main occurrence categories associated with fatal accidents of aeroplanes (2004-2013) are as follows: (1) Loss of control in flight; (2) Post impact fire; (3) System or component failure not related to engine/propeller; (4) Ramp or ground handling related accidents (Source: EASA, Annual Safety Review, 2013).

The evidence collected by the Commission supports the need for additional, proportionate efforts to maintain the current good safety record of the Union in conditions of traffic growth and other future developments. In particular, the safety performance study contracted by the Commission estimates that, to counterbalance the expected increase in traffic volume in Europe, the required risk reduction should amount to around 25% in the short term (10 years) and 60% in the long term (30 years).[23] These figures are in line with the assumptions for the SESAR project, which estimates the need for a 40% reduction in accident risk per flight hour in Step 1 of the project.[24]

The uncertainty about future safety performance of the system was also highlighted in the results of the Commission public consultation, where 77% of National Aviation Authorities and 75% of all organisations were of the opinion that the EU's ability to identify and mitigate risks has to be improved going forward.

Similarly, the Article 62 evaluation stated that the present 'largely positive picture of air safety in Europe cannot be taken for granted and both regulators and regulated must continue to maintain and even improve Europe's record on aviation safety.'[25] It also warned that 'any deviation from the highest standards of safety could have significant negative impact on Europe's air transport industry.'[26]

This analysis is in line with the approach of other leading civil aviation safety authorities in the world. In particular, the ICAO Resolution on the Global Aviation Safety Plan stresses that the 'expected increase in international civil aviation traffic will result in an increasing number of aircraft accidents unless the accident rate is reduced.'[27] Similarly, the US Federal Aviation Administration recognises the need to achieve the next level of safety by 2025 in a proactive manner, by augmenting the traditional methods of analysing the causes of accidents and incidents. [28]

2.1.2 The present regulatory system is not proportionate and creates excessive burdens especially for smaller operators

While the EU aviation safety system has been so far effective, it achieves good safety performance at a disproportionate cost. High costs are largely attributed to overregulation which affects especially SMEs and General Aviation. This view was strongly expressed in the Commission public consultation, where 77% of National Aviation Authorities and 82% of all respondent organisations stated that safety regulation is too detailed or difficult to comprehend; 88% of National Aviation Authorities and 83% of all respondent organisations stated that existing safety levels could be maintained with lower costs. The EASA Opinion concludes that the current regulatory system puts an excessive and unnecessary administrative and financial burden on the maintenance and operation of light aircraft.[29] The EASA agency points out in particular that the regulatory framework for light aircraft is not sufficiently differentiated from the regulatory framework for commercial air transport, while the risks

[23] ECORYS, Performance Scheme and Performance Based Approach in the context of aviation safety (Support study on performance), Final Report, (2015), p. 85.
[24] European ATM Master Plan, 2nd Edition (2012), p. 18.
[25] Article 62 evaluation, Final Report (2013), p.12.
[26] Idem.

[28] US Federal Aviation Administration, Destination 2025.
[29] EASA Opinion 1/2015, p.7.

involved are different, and that this results - to a certain extent - from the rigidity of the provisions in the Regulation (EU) 216/2008, notably as far as definitions are concerned.[30]

It is notable that nearly half of the respondents to Commission public consultation which expressed dissatisfaction with the current regulatory system are microenterprises employing less than 10 persons. More specifically, with respect to SMEs, the following issues have been identified in the Commission public consultations (see Annex II for further details):

⇒ The present system puts excessive requirements on SMEs compared to the achieved safety benefits. It is felt by many contributors that regulations are too complex and beyond the ability of many SMEs to comprehend and be abreast with the constant changes;

⇒ The ongoing improvements are focused on non-commercial aviation ('pure' general aviation), and not sufficient attention is being given to more proportionate regulation for commercial activities of SMEs;

⇒ Regulations are difficult to implement by companies where a single individual performs roles which in an airline or a big manufacturer are responsibility of multiple departments.

The results of the Commission public consultation and the support study on safety performance[31] point to the fact that disproportionate and overly complex regulation results not only in excessive cost to demonstrate compliance but also that resources of the operators and National Aviation Authorities are diverted from operational and oversight work as well as from innovation (activities important for safety and competitiveness of the EU aviation), towards administrative tasks.

Several attempts were made by the Commission to quantify the costs of overregulation more precisely. While no comprehensive picture could be obtained (manufacturers in particular indicated that companies do not routinely account certification costs separately from overall product development costs),[32] a number of cases of overregulation were identified and are presented as examples (Case I). Overall it seems that overregulation particularly affects businesses and operators involved in light and general aviation. This observation is also supported by the conclusions of the EASA Management Board sub-group report.[33]

Case I: Identified examples of quantified overregulation

- Overregulation leading to ***high maintenance costs for small aircraft and gliders***. A case study provided by Europe Air Sports and concerning one of the EFTA States shows that maintenance costs for small aircraft and gliders increased by 50% since 2003.[34] Figure 2 above demonstrates that General Aviation in the US has a better safety record than the EU, even though the requirements for this sector in the EU are more demanding;
- ***Disproportionate costs for advanced private pilot training.*** Instrument rating training costs are approximately twice as big in Europe as in the US[35]. These differences in training costs make an overseas training an attractive alternative for European private pilot licence holders who consider obtaining an instrument rating. Compared to the US, the share of private pilot licence holders with instrument rating is much lower in the EU than in the US (5.2% and 26.8%, respectively). These economic effects have also safety implications: the instrument rating qualification is an effective way of avoiding accidents in bad weather conditions. New instrument ratings that were recently introduced by the EU took into account the special needs of private pilot licence holders by making instrument rating training more accessible and less costly. Further efforts are however needed to increase the number of private pilot licence holders with

[30] Idem.
[31] Support study on performance, Final Report, p. 17.
[32] Source: Commission interviews with AeroSpace and Defence Industries Association of Europe (ASD).
[33] EASA Management Board sub-group, Final Report, p.8.
[34] Source: Europe Air Sports case study provided to the Commission.
[35] Sample study performed in an Impact Assessment performed by EASA for NPA 2011-16.

instrument ratings in the EU. This may include considering training outside approved training organisations.

- ***Regulatory burden is created by a lack of responsiveness of the current rulemaking system.*** When comparing the average duration of current technical rule development to the development of an industry standard a rough comparison indicates that it takes approximately 3 times longer to develop a rule compared to a standard, i.e. 3 years for a rule versus 1 year and 2 months for the industry standard.[36] Although referring to industry standards is not always an alternative to a traditional rulemaking process, this comparison points to potential time and cost savings which could be achieved by increasing reliance on industry standards.

2.1.3 The present regulatory system is not sufficiently responsive to market developments

Evidence shows that the regulatory system is not sufficiently adapted to market developments. This regards the ability of the system to: (i) quickly accommodate safety and efficiency enhancing technologies, and (ii) to respond to new operational practices of the industry.

(a) Aspects related to technologies:

The present system is largely based on prescriptive regulations which often describe, in a detailed manner, the required way of conduct or technical solutions to be used. Although this provides clear guidance to users and compliance with the rules is straightforward, this approach has also resulted in some parts of the aviation industry slowing down in adopting technological safety and efficiency improvements, as acceptance of new technologies and certification methods necessitates frequent changes in the requirements. In addition, it limits alternatives for achieving compliance and thus discourages innovation.

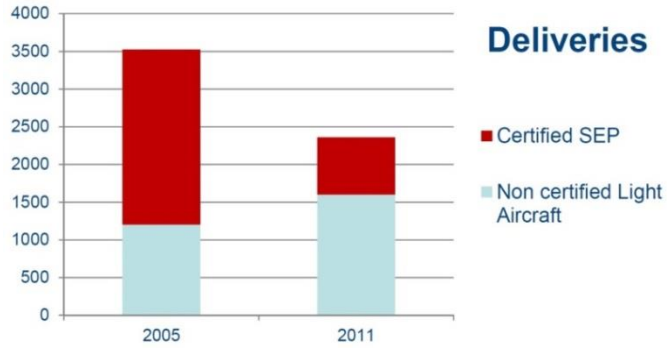
88% of the National Aviation Authorities and 72% of all organisations which contributed to the Commission public consultation stated that the system based on prescriptive rules hampers innovation. Similarly 77% of the National Aviation Authorities and 83% of all organisations stated that excessive reliance on prescriptive regulations puts the EU industry at a competitive disadvantage.

The safety performance study concluded that: 'the current prescriptive basis of regulation is seen as blocking or slowing down innovation by a continued focus on mandating specific methods and solutions rather than outcomes and not leaving much flexibility.'[37]

This problem can be very well illustrated with the example of General Aviation, where the increasing costs of operating certified aircraft and the slow level of incorporation of new technologies, which often represent safety improvements, has contributed to the shift of many pilots towards less regulated, ultralight and other Annex II aircraft[38], as Figure 3 illustrates and the EU General Aviation roadmap confirms.[39] It is notable that the average age of certified General Aviation aircraft is 40 years.[40] Similarly, for drones the existing rules do not reflect well the needs of this newly emerging technology.

[36] Source: EASA analysis prepared for the Commission.
[37] Support study on performance, Final Report, p. xvii.
[38] 'Annex II aircraft' refers to aircraft excluded from the scope of Regulation (EC) No 216/2008 as set out in Annex II to this Regulation.
[39] General Aviation Roadmap, http://easa.europa.eu/system/files/dfu/EASA%20MB%2004-2012%20WP09a%20GA-roadmap_mb.pdf, p.5.
[40] Source: General Aviation Manufacturers Association (GAMA).

Figure 3: European deliveries of Single Engine Piston (SEP) and non-certified light aircraft



Source: Daher-Socata (EASA General Aviation Conference, Rome 2014)

With respect to promotion of environmentally friendly technical solutions and technologies, the regulatory system based on Regulation (EC) No 216/2008 has not evolved since the adoption of the predecessor of this regulation in 2002, while the attention paid by the EU and citizens to 'greening' of air transport has significantly increased over the last twelve years. The scope of Regulation (EC) No 216/2008 is limited to environmental compatibility of aeronautical products only, and the automatic link with ICAO requirements[41] - which does not exist for safety rules - does not permit the EU to consider possible better alternatives to minimum international standards, and weakens the negotiating position of Member States and the EU in ICAO. The emergence of electric engines is also not reflected in Regulation (EC) No 216/2008, which defines 'complex aircraft' by referring to turbine powered engines only.

Finally, the manufacturing industry has voiced concern during EASA and Commission consultations that the present certification system, due to lengthy procedures and in particular limited availability of resources at EASA (see point 2.2.4), might not be able to respond to future industry demand for product certification in a timely manner, which could lead to financial penalties and more generally, to a competitive disadvantage for European industry. More specifically, it is estimated that a 6-month delay in delivery of an aircraft to an airline can lead to penalties to the manufacturer of up to 2% the price of each aircraft, or cancellation of orders to the benefit of competitors.[42] The development costs exceed 10 billion € for a new large aircraft. If a design issue is detected at a late stage of the certification process, the development costs can increase by 10%.[43]

(b) Aspects related to operational practices of the industry:

The creation of the single aviation market has lifted the limits imposed on the airline industry by Air Services Agreements, and airlines can now operate within the EU as if national borders did not exist. Similarly, the recognition of certificates enabled by EU legislation means that individuals can now claim recognition of their privileges anywhere in the EU.

The liberalisation has also resulted in emergence of new employment practices,[44] and business models. This includes multinational airline consortia, which hold multiple Air Operator Certificates (AOCs) in order to be able to satisfy ownership and control requirements of Air Services Agreements of individual Member States with third countries. However this necessity to hold separate AOCs from multiple Member States prevents such consortia from

[41] See Article 6 of Regulation (EC) No 216/2008.
[42] DG RTD InnovREFIT Task Force, Better regulations for R&I at EU level, Report, July 2015, p.87.
[43] Idem.
[44] Y. Jorens, D. Gillis, L. Valcke and J. De Coninck, 'Atypical forms of employment in the aviation sector', European Social Dialogue, European Commission, (2015).

operating as a single airline which would allow for interoperability of assets and associated safety benefits (see Case II). It has also become a common practice for airlines to use remote bases of operations which allows business development away from the principal place of business and outside the territory under the jurisdiction of the certifying authority.

Case II: One Air Operator Certificate (AOC) or four?

One of the EU tour operators holds four AOCs from separate Member States. The group would like to merge these certificates in order to eliminate inefficiencies caused by concurrent activities, achieve higher integration of fleet, and enhance safety by using only one process across the whole operation. At the same time the group does not want to jeopardise the traffic rights it enjoys from the Member States where its AOC holders are incorporated. While for the purpose of intra-EU operations one AOC and operating licence suffices, an airline must be licensed and certified by the designating Member State in order to exercise traffic rights outside the EU, if a third country did not accept an EU designation clause.

The current EU regulatory system does not explicitly envisage a 'joint AOC' issued by several states, although the concept of a joint air transport operating organisation is allowed by the Chicago Convention and has been effectively used by three EU/EFTA States based on an international agreement concluded in 1951. In 2014 at least three EU airline consortia expressed interest in merging their AOCs into a joint approval, while continuing to be able to exercise traffic rights to third countries from their Member States of establishment.

Evidence does not indicate that any of the new business models is 'unsafe',[45] although the oversight of multinational organisations and certificate holders moving between jurisdictions is more challenging and requires close collaboration between National Aviation Authorities. For example:

- The report issued by the Air Accident Investigation Unit of Ireland following the fatal accident of the Fairchild SA 227-BC Metro III EC-ITP which occurred on 10 February 2011 at the Cork airport, showed that inadequate oversight of a geographically remote operation by the State of the Operator can be a contributing factor to an accident;[46]
- At least three Member States reported to the Commission or EASA that they had encountered situations where licence holders claimed recognition of certificates which had been earlier revoked or suspended by the (another) issuing Member State (see Case III).
- Task Force on Measures Following the Accident of Germanwings Flight 9525 observed that the introduction of pan European medical certification has given pilots freedom to apply to any aero-medical examiner certificated by any EU/EFTA Member State. At the same time, the authorities and aero-medical examiners do not have easy access to information on whether a pilot has been denied a medical certificate in another State, nor the reason for eventual denial.[47]

[45] The 2015 study on atypical forms of employment in the aviation sector suggested that innovative employment schemes such as zero-hour contracts or 'pay-to-fly' employment schemes can raise safety concerns. While the services of the Commission noted the results of this study, they concluded that the evidence presented in the study is not sufficient to draw unequivocal conclusions as to the safety consequences of such market practices.
[46] Air Accident Investigation Unit Ireland, Formal accident report, Fairchild Aircraft Corporation SA 227-BC Metro III, EC-ITP Cork Airport, Ireland, 10 February 2011, at Conclusions.
[47] Task Force on Measures Following the Accident of Germanwings Flight 9525, Final Report (2015), p.14.

Case III: Challenges in cross-border enforcement (Irregularities in pilot licensing)

In 2014 two cases of irregularities with respect to the conduct of training courses and skill tests / proficiency checks were reported by two Member States. The investigation conducted jointly by the two Member States concerned necessitated review of documentation concerning hundreds of pilots, several training organisations and numerous instructors and examiners located in different countries. As a result of the investigation a number of pilot licences were suspended. The cross-border investigation made the case particularly complicated and the current regulatory framework proved to be of limited help. The authorities concerned and EASA also concluded that in absence of a central repository of pilot licences it would be difficult to detect if the individuals concerned did not apply for new licences in other Member States.

The Article 62 evaluation concluded that new business models are going to impact heavily on the work content of the EASA system.[48] These findings are also reflected in the Commission public consultation, where 88% of the National Aviation Authorities and 83% of all respondent organisations stated that the EU system lacks flexibility to accommodate new business models, while 77% of the National Aviation Authorities and 49% of all respondent organisations stated that there is a need to change the legislative framework to better accommodate multinational operations.

The 2013 EASA Annual Standardisation Report highlights transnational business models and operators having multiple principal places of business as new challenges which need to be addressed by the oversight authorities, and for which standardised implementation of regulations is not a sufficient solution on its own.[49]

The 2015 report of the EASA working group on safety implications of new business models concluded that regulators' own procedures and oversight methodologies are not adapted to the developments in business models and that there is insufficient guidance on cooperative oversight.[50]

2.1.4 There are differences in organisational capabilities between Member States

The availability of qualified personnel is an essential pre-requisite for effective oversight and certification by EASA and National Aviation Authorities. At the same time evidence shows that there are significant differences in organisational capabilities of Member States, which:

- Create potential safety risks, as some Member States are not sufficiently capable of ensuring effective oversight of EU legislation (see below);
- Contribute to mistrust between the Member States. The support study on resources reported for example that four out of sixteen National Aviation Authorities interviewed stated that they do not automatically accept certificates issued by some other authorities due to lack of trust in their compliance.[51] This is also one of the reasons why cooperative oversight is embraced with reluctance by Member States;
- Result in varying interpretations of requirements by Member States which negatively affects the level playing field on the market. Many of the organisations and National Aviation Authorities which contributed to the Commission's public consultation expressed concern over this issue;
- The support study on resources also concluded, based on 25 interviews, that 'both industry and the National Aviation Authorities must deal with an unequal playing field in the different Member States, which may potentially undermine the common market/system'. The study indicated that these differences stem from varying approaches of national

[48] Article 62 evaluation, Final Report (2013), p. 11.
[49] EASA, 'Annual Standardisation Report', (2013).
[50] EASA, Developing Business Models in Aviation: Report from the RAG Working Group (2015), p.4.
[51] ECORYS, Study on the resources deployed in the area of European aviation safety before and after the creation of EASA (Support study on resources), Final Report, (2015), p. 121.

authorities to oversight, availability of resources and qualification of staff, as well as differences in financing oversight (with some Member States recovering the costs through fees and some financed through Member State budgets);[52]

The identification of this problem is further supported by the following evidence:

- 66% of National Aviation Authorities and 68% of all organisations which contributed to the Commission public consultation were of the opinion that 'the capabilities of national authorities to perform oversight differ increasingly';
- The EASA standardisation programme shows that, at the end of 2014, ten (30%) of EU/EFTA Member States had open supplementary reports with non-resolved safety relevant findings, meaning that they did not adequately implement corrective action plans. Shortages of staff and its inadequate qualification were identified by EASA as two main reasons for inadequate oversight by National Aviation Authorities;
- The support study on resources concluded that, given the current working methods of authorities, the aviation safety resources in the EU are insufficient compared to workload, and that there are significant differences in supervisory approaches between the Member States;[53]
- The safety performance study concluded that approximately only 1/3 of National Aviation Authorities are 'sufficiently well-resourced and skilled to exercise appropriate oversight'[54]. While this does not mean that safety is in danger, it points to the fact that the levels of safety assurance vary across the EU;
- The Article 62 evaluation panel concluded that it is urgently needed to find a solution to the problem of weaknesses in safety oversight abilities of some Member States.[55]

At present, the EU already has a number of tools for addressing deficiencies identified in safety oversight capabilities of a Member State. These include infringement procedures to be launched by the Commission, the possibility to suspend recognition of certificates under Article 11 of Regulation (EC) No 216/2008, and imposing complete or partial operating restrictions on operators certified by an EU Member State using Regulation (EC) No 2111/2005[56]. However, these measures either take long to be implemented (which is the case for infringements), or simply stop the entire operation without resolving the underlying problems of deficient national oversight.

2.2 Underlying problem drivers

There is no one-to-one relationship between the problem drivers identified below and the problems set out in the preceding section. This means that one problem driver can feed into more than one problem. For example the problem drivers related to shortages and inefficient use of resources affect Problem No 1 related to the future performance of the EU aviation safety system, as well as Problem No 4 related to organisational capabilities of Member States. This is illustrated in Table 4.

[52] Support study on resources, Final Report, p. 103-105.
[53] Support study on resources, Final Report, p. 105, and p. 118.
[54] Support study on performance, Final Report, p.15.
[55] Article 62 evaluation, Final Report (2013), p.18.
[56] OJ L 344, 27.12.2005, p. 15.

2.2.1 Level and type of regulation does not sufficiently correspond to the risks associated with different aviation activities

According to the results of the public consultation, one of the primary reasons why the EU system creates excessive burdens for Member States and stakeholders is the fact that the level of regulation and the measures applied do not sufficiently differentiate between the risks involved in different types of activities. Although the preamble to Regulation (EC) No 216/2008 recognises that rules should take into account the risk associated with the different types of operations and complexity of aircraft, this principle is not very well reflected in the actual provisions of this regulation, which, for example, subjects all aircraft to a type certification procedure irrespective of the risk involved. The different classifications of operations provided in the regulation are also quite rigid and make reference to technical criteria (such as type of engines or maximum mass) which are better suited for lower level implementing measures.

The lack of sufficient differentiation between acceptable levels of risk has resulted, especially in the initial phases of developing the EU aviation safety regulations, in a 'one-size-fits-all' approach which is particularly disproportionate for smaller organisations. The EU General Aviation Roadmap concludes that 'much regulation has been blanket regulation, which aimed to cover all possible risks by saying something about everything, although the vast majority of fatalities are caused by a small set of recurring causes'.[57] In some cases (see Case IV) the 'one-size-fits-all' approach has affected the development of the single aviation market.

Case IV: Light Sport Aircraft: 'one size fits all' (or not) for product certification and production[58]

The light sport aircraft category covers a range of lightweight aircraft which represent an entry level for many private pilots. In the EU the light sport aircraft are subject to a type certification procedure by EASA and organisations which are involved in their design and manufacture must hold design and production organisations approvals, similar as manufacturers of large transport category planes.

In the US, the light sport aircraft can be designed in accordance with consensually developed industry standards, and put on the market based on the statement of conformity issued by the manufacturer. As a result, the design and production approval costs for light sport aircraft are on average 2.5 higher in the EU than in the US. Because of a more favourable regulatory environment overseas, more than 60% of EU produced light sport aircraft are sold in the US.

The second reason for excessive burdens, also highlighted in the results of the Commission and EASA public consultations, is the fact that the EU overly relies on legislative instruments as a means of addressing safety risks while not sufficiently exploring other tools providing more flexibility in addressing risks. Such alternative tools mentioned by the respondents include the use of industry standards, training and safety promotion.

2.2.2 System is reactive and predominantly based on prescriptive regulations and compliance checking

The EU aviation safety system is largely based on prescriptive rules, usually developed following lessons learned from accidents, which are controlled through periodic audit-type checks focusing on procedures and manuals.[59] This prescriptive and reactive approach, which has been an international standard so far, allowed the EU to achieve the present good safety

[57] General Aviation Roadmap, see note 42, p.2.
[58] Source: Light Aircraft Manufacturers Association EUROPE.
[59] Support study on performance, Final Report, pp. 9-10.

record.[60] The results of the Commission public consultation also show that prescriptive rules have many other advantages, such as legal certainty and straightforward compliance checking.

On the other hand the EASA Opinion indicates that 'compliance with detailed technical or prescriptive standards will in the future be less and less effective in ensuring a satisfactory level of safety in all cases'.[61] This is because the EU has reached a situation where accident causes have become operator unique. Controlling such unique threats through generic legislation is very difficult.[62]

To achieve further safety improvements, the EU has now mandated, in the Implementing Rules, a business-like approach to managing safety risks. This approach is based on the new Annex 19 to the Chicago Convention,[63] which contains safety management requirements for industry and States. Although progress has been made in implementing this new approach, the work is far from complete:

- Safety Management Systems are a recent requirement and not yet mature if we take the EU as a whole. At the State level, authorities are moving ahead with implementation of State Safety Programmes, but this remains voluntary as the adoption of Sates Safety Programmes is not yet mandated by EU law. Furthermore, evidence collected by EASA shows that there are still large differences between States, and that performance based elements (e.g. agreement on safety performance indicators for industry organisations) are posing greatest difficulties for Member States in the State Safety Programme implementation process;[64]
- The EU has not yet established a fully operational European Aviation Safety Plan, which would allow it to identify and address risks collectively as a region. This is partly due to the fact that Safety Management Systems and State Safety Programmes are not yet mature (see above), and partly due to the fragmentation of the safety management process at EU level, where safety information is scattered, in certain respects incomplete or of sub-standard quality.[65] There is also a lack of a process allowing the EU to identify risks in a systemic and evidence-based manner. The implementation of the European Aviation Safety Plan is voluntary and the effectiveness of the actions contained in the plan is not monitored, as highlighted by the EASA Opinion.[66]

2.2.3 Inconsistencies and gaps in the regulatory system

A number of gaps and inconsistencies have been identified in the present regulatory system. These result primarily from the high complexity of this system. A clear majority (73%) of all organisations, including National Aviation Authorities, which contributed to the Commission public consultation, believe that there are gaps, overlaps or contradictions between the different domains of EU aviation safety legislation. Many of the contributions point to the general problem of inconsistencies stemming from varying interpretations of EU requirements by Member States which has also been confirmed by the support study on resources.[67]

Many contributors to the Commission consultation highlighted inconsistencies between EU requirements for airborne and ground-based components of the air traffic management

[60] Idem.
[61] EASA Opinion 1/2015, p.4.
[62] SMICG, 'A systems Approach to Measuring Safety Performance: the regulator perspective', (2014), pp. 5-6.
[63] ICAO, Annex 19 'Safety Management', First Edition (2013).
[64] EASA, SSP Phase Implementation Survey Results, Annex C to EASp, 4th Edition, (2014).
[65] Support study on performance, Final Report, pp.18-19.
[66] EASA Opinion 1/2015, pp.5-6.
[67] Support study on resources, Final Report, p. 119.

system. With regard to the latter issue, the Commission understands that this refers to the problems with regard to deployment of data-link technologies, which are already being addressed.[68] The stakeholders and Member States also identified the lack of a common safety framework for drones as an issue for action at EU level. The Commission furthermore takes note of the concerns expressed by many stakeholders with regard to inconsistencies between occurrence reporting obligations in the Implementing Rules adopted under Regulation (EC) No 216/2008 and the new regulation on occurrence reporting[69]. The Commission believes that alignment of the reporting requirements[70] has ensured that the two systems are consistent and complementary and therefore that this issue is also already being addressed.

Another gap in the present EU regulatory system has been identified with respect to security aspects of aircraft and aviation systems' design, including cyber-security, where the EU currently lacks a clear mandate to act. Essential requirements to Regulation (EC) No 216/2008 do not explicitly address security of aircraft design. Essential requirements for airworthiness only provide that with respect to systems and equipment, design precautions must be taken to minimise the hazards to the aircraft and occupants also from reasonably probable external threats. EASA relies on this broad formulation to assess the resilience of aircraft design with respect to certain security threats, in particular related to cyber-security, but does not have a clear competence to propose relevant implementing measures or to mandate design changes addressing security threats for in-service aircraft. The EASA Opinion signals the need to address security aspects of aircraft airworthiness, where today the Agency has encountered a number of practical problems in addressing safety risks due to lack of a clear mandate to act.[71] Technical aspects of aircraft security related to the design of aircraft and aviation systems have been also identified by a number of contributions to Commission public consultation as requiring further EU action. At the same time however the stakeholders cautioned that cyber-security goes beyond technical aspects of aircraft and related systems and that aviation cyber-security measures should be consistent with the overall EU cyber-security policies. The Article 62 evaluation recognised that the security of communications between the ground and aircraft should be comprehensively addressed by the EU regulatory system, as it has clear safety implications. From a general policy perspective, the Commission proposal for a directive on network and information security (NIS directive) identifies the aviation sector as a critical infrastructure, vital to the EU economy and societal interests which needs appropriate protection against cyber threats.[72]

Furthermore, there are areas of aviation regulation where safety and security matters are so closely linked together that they should be considered jointly in order to avoid gaps or unintended consequences, and carefully balance any safety/security trade-offs that may have to be made when imposing new requirements on operators. Such close relationship between safety and security exists with respect to aircraft operations and in particular in-flight security measures, which at present are regulated in parallel by two separate legal instruments: Regulation (EC) No 216/2008 and Regulation (EC) No 300/2008. While the results of the public consultations do not point to the need for a complete integration of legal frameworks

[68] EASA, Technical issues in the implementation of Regulation (EC) No 29/200 9 (Data link), Report 1.1, (2014).
[69] See note 13.
[70] Commission Implementing Regulation (EU) No …/... of XXX laying down a list classifying occurrences in civil aviation to be mandatorily reported according to Regulation (EU) No 376/2014 of the European Parliament and of the Council
[71] EASA, Opinion 1/2015, p. 15.
[72] Proposal for a Directive of the European Parliament and of the Council concerning measures to ensure a high common level of network and information security across the Union, COM(2013)48 final. Further information on the NIS Directive is given in Annex XXII.

for safety and security, they did however bring to the attention of the Commission the need for better management of interdependencies between these two domains.

In addition, the EASA Opinion highlighted the need for an EU mechanism for conformity assessment of aviation security equipment, the absence of which is currently considered a stumbling block towards the creation of an EU market for manufacturers of airport screening and explosive detection equipment. With respect to this issue, a separate initiative is ongoing under coordination of DG HOME.[73]

Moreover, the EASA Opinion[74] and Article 62 evaluation[75] identified safety gaps with regard to ground handling. This is an area for which presently no safety provisions directly addressing the service providers exist at EU level, and which makes oversight and mandating corrective action by the competent authorities difficult.[76] All interested stakeholders, with the exception of airlines, point to the fact that regulatory action is necessary, in particular with respect to training of ground handling staff.[77] The airlines believe that they are sufficiently able to control the safety of ground handling through contractual arrangements with the providers and that the costs of regulating ground handling at EU level would outweigh the potential benefits.

The EASA Management Board sub-group also highlighted the issue of ground-handling as requiring analysis, but noted that further regulatory intervention should be based on a clear safety case.[78] In this respect, the safety data shows that since 2005, ground handling occurrences in the EU have constituted 6% of fatal accidents, 15% of non-fatal accidents and 2% of serious incidents. There are on average 3 500 risk-bearing ground handling occurrences reported annually, which is between 9%-11% of all risk-bearing occurrences reported.[79] Ground handling accidents constitute the fourth biggest accident category in the period of the last ten years after loss of control in flight, post impact fires, and system or components failures not related to the engine/propeller (See Annex XXI for information about other top categories of accidents in the EU).[80]

The main contributing factors to ground handling risk-bearing incidents are a lack of standardisation of ground handling procedures, not always sufficient training of staff, and deficiencies in safety management, including with respect to occurrence reporting. There is no evidence that Europe-wide voluntary safety initiatives have had a significant impact in improving ramp safety (see Annex XX for further information about ground handling market and safety of ground handling operations). With the expected growth in air traffic, the main European air hubs reaching full capacities, increasing pressure on aircraft turnaround times, and emergence of composite aircraft which are more prone to ground damage, the deficiencies in safety of ground handling operations become an issue that needs addressing. In

[73] Commission Roadmap for establishing an EU harmonised certification system for airport equipment, http://ec.europa.eu/smart-regulation/impact/planned_ia/docs/2014_entr_004_harmonized_certification_airport_screening_equipment_en.pdf.

[74] EASA, Opinion 1/2015, p. 12.

[75] Article 62 evaluation, Final report (2013), p. 16.

[76] Currently, there are no general safety objectives or specific requirements for ground handling operators in the EU aviation safety regulatory framework. Safety of ground-handling is addressed only indirectly through Implementing Rules related to flight operations and aerodromes.

[77] Conclusion reached on the basis of public consultations and discussions with stakeholders in advisory bodies established by the Commission.

[78] EASA Management Board sub-group, Final Report, p.6.

[79] EASA analysis based on data from the European Central Repository of information on aviation occurrences.

[80] EASA, Annual Safety Review (2013), p. 30. See Annex XXI for information about other top categories of accidents in the EU.

addition, the ground handling industry also highlighted the inefficiencies stemming from repetitive audits and inspections of the same service providers by multiple airlines and aviation authorities.

With regard to environmental protection, the current Regulation (EC) No 216/2008 makes Annex 16 to the Chicago Convention (as regards setting minimum standards for aircraft noise and engine emissions) directly applicable in EU law, while in the area of safety ICAO standards are met through the adoption of implementing rules. This difference in approach excludes the possibility for the EU to deviate from ICAO environmental standards for products and thus weakens its negotiation position at international level and prevents the EU from considering possible better alternatives to minimum international standards. For example, the fact that ICAO environmental standards for tilt-rotor aircraft are applicable only as of 2018, the current certification projects for such aircraft in the EU do not cover noise aspects. Another example is the ongoing discussions in ICAO on a new standard in respect of aircraft engine CO_2 emissions which have been significantly influenced by the US environmental protection agency announcement of an intention to develop a national CO_2 standard[81] – at present the EU cannot use a similar negotiating leverage. Stakeholders who contributed to the public consultation do not see a need for changing the scope of the current EU environmental action under Regulation (EC) No 216/2008, which is limited to environmental compatibility of products.[82] The contributions received point however to the need of better considering interdependencies between aviation safety and environmental legislation (in particular chemicals legislation under the REACH system).

The Commission has further identified inconsistencies in the EU legislation concerning leasing of third country registered aircraft - an issue which has been already identified in 2013 in the context of the EU internal aviation market 'fitness check'.[83] With regard to dry lease-in of foreign registered aircraft[84] the EU safety legislation allows, subject to a number of conditions, such arrangements, while the internal market legislation (Regulation (EC) No 1008/2008) is not clear whether they are allowed or not which leads to legal uncertainty. This inconsistency has been highlighted also by a number of Member States,[85] and an airline trade body which highlighted that 'registering and deregistering aircraft registered in a third country

[81] EPA, Proposed Finding That Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare and Advance Notice of Proposed Rulemaking, Federal Register / Vol. 80, No. 126, July 1, 2015.

[82] Other main EU legislation which aims at protecting environment from aviation impacts is: (1) Regulation (EU) No 598/2014 of the European Parliament and the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach (OJ L 173, 12.06.2014, p. 65); (2) Commission regulation (EU) No 691/2010 of 29 July 2010 lying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 lying down common requirements for the provision of air navigation services (OJ L 201, 3.08.2010, p.1); Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community (OJ L 8, 13.01.2009, p.3).

[83] European Commission, Fitness Check - Internal Aviation Market, Report on the suitability of economic regulation of the European air transport market and of selected ancillary services, SWD(2013) 208 final, pp. 53 and 66.

[84] Dry lease agreement means an agreement between undertakings pursuant to which the aircraft is operated under the air operator certificate (AOC) of the lessee or, in the case of commercial operations other than CAT, under the responsibility of the lessee. Wet lease agreement means an agreement, in the case of CAT operations, between air carriers pursuant to which the aircraft is operated under the AOC of the lessor; or in the case of commercial operations other than CAT, between operators pursuant to which the aircraft is operated under the responsibility of the lessor.

[85] Committee established by Article 65 (1) of Regulation (EC) No 216/2008, minutes of the meeting 2014/3, Brussels 8-9 July 2014.

for the typical duration of seasonal leases is complicated and costly'.[86] With regard to wet lease arrangements between EU operators, while Regulation (EC) No 1008/2008 requires a prior safety approval from the relevant authority,[87] the EU safety legislation does not impose on such arrangements any lease specific conditions in addition to the need of the lessor (AOC holder) to comply with usual EU requirements for flight operations and aircraft maintenance. The safety value of such prior approval is questionable, especially in view of the fact that airlines are now also obliged to monitor the safety of the services they contract from other providers. At the same time leasing is a crucial tool for airlines in maintaining operating flexibility – it is estimated that nearly 70% of aircraft in operation in the EU are leased aircraft.[88]

Finally, inconsistencies have been identified with respect to the way Member States notify to ICAO differences between international standards and recommended practices and EU requirements. The analysis of the content of the differences notified by 23 Member States (322 items) to ICAO through the EFOD[89] system revealed that EASA's recommendation concerning the type of a difference to be notified was followed in only 29.19% of cases (see Annex VIII for more detail). The cases when the recommendations were not followed include mostly no information provided, or outdated references to European rules (JARs or EU-OPS) or to national rules. This lack of uniformity undermines the consistency of the EU system vis-à-vis ICAO and third countries and stands in the way of achieving full coordination between ICAO and EU aviation safety audits of Member States, as envisaged under the EU-ICAO Memorandum of Cooperation on enhanced cooperation.[90]

2.2.4 Shortages of resources impacting safety oversight and certification

The support study on resources concluded that, taking into account the current working methods and the size of the EU industry, the aviation safety resources are insufficient.[91] While it is difficult to put a concrete figure on what would be the appropriate level of resources in Europe to continue ensuring a high level of aviation safety in the future, a number of observations can be made.

First of all, the growth in size of the industry has, over the last ten years, outpaced the increase in workforce and budget of aviation authorities, which at the same time have not yet significantly changed working methods. Table 2 illustrates that trend, based on key indicators calculated using samples of EU/EFTA Members States.

Table 2: Trends in evolution of resources and workload in EU/EFTA Member States since 2003

	2003	2008	2013	2003-2013
Resources				
OPS/AIR/FCL National Aviation Authority staff (MS=17)	1 574	1 727 (+10%)	1 659 (-4%)	+5%
National Aviation Authority budget (MS=16)	EUR 439 million	EUR 558 million (+27%)	EUR 530 million (-5%)	+21% / -3% if adjusted for inflation

[86] IACA, 'Dry lease-in of third country aircraft by Community operators for Commercial Air Transport'.
[87] Article 13(2), 'Leasing' provides that: (…) a wet lease agreement under which the Community air carrier is the lessee of the wet leased aircraft shall be subject to prior approval in accordance with applicable Community or national law on aviation safety.
[88] Fitness Check - Internal Aviation Market, see note 81, p. 53.
[89] ICAO Electronic Filing of Differences (EFOD) database.
[90] Memorandum of Cooperation between the European Union and the International Civil Aviation Organization providing a framework for enhanced cooperation, (OJ L 232, 09.09.2011, p. 2).
[91] Support study on resources, Final Report, p. 105.

Workload				
CAT fleet size (MS=22)	3 494	4 127 (+18%)	4 307 (+4%)	+23%
AOC holders (MS=31)	1,221	1,304 (+7%)	1,201 (-8%)	-2%
Pilots (MS= 23)	139 258	176 575 (+27%)	175 383 (-1%)	+26%
FTOs (MS=25)	1 544	2 010 (+30%)	2 047 (+2%)	+33%

Source: Support study on resources

In addition, the transition to the EU regulatory framework has created transition costs for the authorities, and in some cases increased workload due to the more demanding and complex regulatory framework (see Case VI as an example) and standardisation requirements.[92] Furthermore, budget constraints and divergences in the funding of authorities come into play, as demonstrated by the support study on resources.[93] Especially the small authorities funded through government contributions find it difficult to attract competent personnel from the market (see Case V).

Case V: Budget constraints (Source: support study on resources)

Among the primary problems cited by nearly all Competent Authorities is the imbalance created by an increase in workload alongside decreasing budgets in the aftermath of the 2008 economic crisis. There are considerable variations in the size of Competent Authorities' budgets, with larger Member States having relatively larger budgets than their smaller counterparts on account of the relative size of their respective workloads. In addition to this however a number of Competent Authorities recorded extremely low budgets which may be indicative of an even greater imbalance between Member States. For example, budgets in large Member States range from EUR 40 – 61 million, while in certain smaller Member States, budgets range from EUR 5 million to as low as EUR 1.1 million. While the latter group has a smaller workload than the former, the workload-budget disparity is considerably greater for small Competent Authorities.

The Article 62 evaluation concluded that in the current economic climate, there is a huge strain on the resources of Member States and EASA, and that it is incumbent on all partners in the system to strive for greater efficiency in the use of limited resources.[94] It concluded further that some of the National Aviation Authorities are finding it difficult to fulfil their statutory obligations related to safety oversight due to staffing/financial problems.[95]

Case VI: New regulatory requirements for ballooning

Before the establishment of the EU aviation legislation, some of the Member States were delegating oversight and certification in certain sectors of general aviation, for example ballooning, to user organisations, such as national aero-clubs. The EU legislation harmonised requirements for the production and maintenance of balloons as well as for their operations and pilots' competence. Member States which were not directly involved in that activity before now have to develop the necessary expertise and recruit additional personnel.

Also results of the EASA standardisation programme identified shortages in resources in respect of the size, scope and complexity of the regulated industry, as one of the two main contributors to inadequate oversight in some of the EU Member States in the fields of Air Operations, air traffic management/air navigation services and Aircrew.[96] Finally, 55% of National Aviation Authorities and 63% of all organisations which contributed to the Commission public consultation stated that 'some National Aviation Authorities do not have sufficient financial or human resources to carry out their oversight tasks'. At the same time, there was no clear position amongst the respondents, whether there are increased safety risks because oversight obligations are not always fully complied with.

[92] Idem, p. 100.
[93] Idem, p. 111.
[94] Article 62 evaluation, Final Report (2013), p. 10.
[95] Article 62 evaluation, Final Report (2013), p. 25.
[96] EASA Annual Standardisation Report (2013).

With respect to EASA, the total workload of the Agency with respect to product safety oversight workload has increased by 22% between 2011 and 2014, and is expected to further grow by 5% by 2016.[97] The Agency is going to deploy new performance based working methods but anticipates a steady increase in the initial certification and in continuing oversight activities due to the upturn of the aircraft fleets in operation and the increase in the number of type certificates issued.[98] This expectation is confirmed by a review of manufacturers' forecasts which predict the size of the EU fleet to nearly double by 2033.[99] The Article 62 evaluation predicts that in the next twenty years, Europe will need around 250 000 new engineers (25% of the global demand) to accommodate the increase in the size of the fleet, and new aircraft types.[100] Even though the EASA resources for certification are financed by the industry, they are prevented from being adapted to market demand, by an overall EU staffing cap, which may hinder the capability of the Agency to adequately respond to this anticipated growth. The cuts of the Agency's staff financed by fees and charges are applied irrespective of the industry demand for the certification and oversight services. Already today, EASA has to adjust efforts spent on continuing airworthiness to meet industry demands for initial certification as a consequence of the staff ceiling.[101]

The shortages of resources concern not only the availability of staff but also the level of qualifications which have been found sub-optimal in a number of Member States:

- The 2013 EASA standardisation report identified insufficient training and qualification of inspecting staff as one of the two main elements contributing to inadequate oversight in EU Member States in the field of Air Operations, Air Traffic Management/Air Navigation Services and Aircrew;
- Competence of personnel in the National Aviation Authorities has been also identified as one of the systemic issues to be addressed in the European Aviation Safety Plan 2014-2017.[102] The concerns about the level of training in some National Aviation Authorities have been also identified by the support study on resources.[103]

2.2.5 Inefficient use of resources stemming from fragmentation

The inefficiencies of the EU aviation system stem to a large extent from institutional fragmentation and a high number of actors involved. Already the 2007 report of the High Level Group for the Future European Aviation Regulatory Framework stated that 'fragmentation is a major bottleneck in improving the performance of the European aviation system'.[104] Similarly the Article 62 evaluation report stated that the architecture of the aviation safety system is not sustainable in the long term and that the current institutional set-up does not contribute to the maintenance of the high and uniform levels of safety.[105]

[97] Work Programmes of EASA for the years 2011-2015.
[98] EASA, Work Programme, (2015), p. 5.
[99] According to Airbus, the commercial passenger fleet with 100 seats or more in Europe is expected to grow by 82% by 2033 (Airbus, Global Market Forecast, 2014-2033, p. 111). Boeing's forecast, that includes also regional jets, projects a 77% growth in the size of European fleet during the 2013-2033 period (Boeing, Current Market Outlook, 2014-2033, p. 2). Embraer forecasts that the fleet of jets with 70–210 seats and turboprops with 70 or more seats is going to more than double in the 2013-2033 period (Embraer: Market Outlook 2014-2033, p.32).
[100] Article 62 evaluation, Final Report (2013), p. 11.
[101] EASA Annual Activity Report 2014, p. 51.
[102] EASA, European Aviation Safety Plan (2014-2017).
[103] Support study on resources, Final Report, p. 107.
[104] High Level Group for the Future European Aviation Regulatory Framework (2007), Final Report, p. 7.
[105] Article 62 evaluation, Final Report (2013), pp. 27-28.

The support study on resources concluded that the resources available in National Aviation Authorities and EASA do not operate as a single system and that there is lack of an effective framework for sharing of resources between National Aviation Authorities and between National Aviation Authorities and EASA.[106] The present system obliges National Aviation Authorities to be competent in each domain of aviation safety, even when the aviation activities in such a domain are limited.[107] This does not help specialisation of National Aviation Authorities and prevents achieving economies of scale.

At the same time, the evolution of the EU aviation market and the organisation of safety oversight result in an increasing need for authorities to cooperate with each other. Although a legal basis for cooperative oversight has been already introduced into the EU legislation, the support study on resources showed that sharing of resources is hampered by lack of common working procedures, limited transparency of information about certificates issued/revoked/suspended by Member States, differences in funding of authorities, lack of standardisation in training and qualification of staff, and absence of a common framework for delegation of responsibilities and tasks between authorities as well as practical issues related to recovery of costs, language barriers, and questions associated with liability of aviation authorities.[108] For example, the EASA pool of flight operations and airworthiness experts is hardly used due to the inability of the Member States to finance the use of experts from the pool.

A comparison between the EU and US aviation safety systems shows, despite some structural differences between the two systems, that the US manages an aviation market which is twice as big as in the EU with human resources which are only 29% bigger and a similar budget, as illustrated by Table 3.

Table 3: Comparison between Europe and USA on key indicators

Indicator	Europe (2013)	US (2012)
Budget	EUR 1.13 billion	EUR 1.0 billion
Total aviation safety staffing level (technical and support staff)	5 600	7 238
# AOC holders	1 201	2 686
# Aircraft on register	107 500	199 952
# Active pilots	255 204	496 053

Source: support study on resources[109]

Further inefficiencies result from the fact that Member States must run two or even three systems in parallel: (1) The EU system, which covers the majority of aviation activities in the EU; (2) A national system for Annex II aircraft which are excluded from the scope of Regulation (EC) No 216/2008; (3) A national system for State aircraft, such as police, or fire-fighting, which are also excluded from the scope of Regulation (EC) No 216/2008.

Case VII: Complex regulatory framework for aerial fire-fighting

Some EU Member States consider aerial-firefighting as a civil aviation activity. One of such Member States reported in an interview with the Commission that following the entry into force of the EU requirements for special operations, it will have to run in parallel two regulatory systems for aerial works. The national system will cover fire-fighting services which are excluded from Regulation (EC) No 216/2008. At the same time fire-fighting aircraft are also used in that Member State for agricultural

[106] Support study on resources, Final Report, p. 111.
[107] Support study on resources, Final Report, p. 109.
[108] Support study on resources, Final Report, pp. 104-124.
[109] Support study on resources, Final Report, p. 95.

operations which fall within EU special operations requirements. The Member State concerned would like to be able to opt-into the EU system for firefighting services to simplify the regulatory framework, and eliminate redundant paperwork resulting from the need to run two systems in parallel.

There are also overlaps in resources and cost between EUROCONTROL and EASA, an issue which has been highlighted by the EASA Management Board sub-group report,[110] and quantified by the support study on resources at around EUR 2 million per year.[111]

It may be that the system collectively disposes of enough resources, but that as a result of fragmentation there is a perceived shortage, which was pointed out by the support study on resources. This conclusion has also been suggested by the Article 62 evaluation panel[112] and EASA Management Board sub-group.[113] It is for this reason that this impact assessment puts a stronger emphasis on the need for increasing the efficiency in the utilisation of existing resources, rather than increasing the numbers of available staff, which in the current economic climate would be unrealistic to expect.

[110] EASA Management Board sub-group, Final Report, p.6.
[111] Support study on resources, Final Report, p. 46.
[112] Article 62 evaluation, Final Report (2013), p. 25.
[113] EASA Management Board sub-group, Final Report, p. 13.

Table 4: Problems (limitations of the regulatory system in meeting future challenges), problem drivers and objectives of the initiative

Problem drivers \ Problems	The present regulatory system may not be sufficiently able to identify and mitigate safety risks in the mid to long term	The present regulatory system is not proportionate and creates excessive burdens, especially for smaller operators	The present regulatory system is not sufficiently responsive to market developments	There are differences in organisational capabilities between Member States
Level and type of regulation does not sufficiently correspond to the risks associated with different aviation activities	☑	☑☑☑	☑☑	
System is reactive and predominantly based on prescriptive regulations and compliance checking	☑☑☑	☑☑	☑☑	
Inconsistencies and gaps in the regulatory system	☑		☑	
Shortages of resources impacting safety oversight and certification	☑		☑☑	☑
Inefficient use of resources stemming from fragmentation	☑☑		☑	☑☑☑

☑ - ☑☑☑ : Relative importance of a specific 'problem driver' for a given 'problem'

Specific Objectives (SO):	
1)	Eliminate unnecessary requirements and ensure that regulation is proportionate to the risks associated with different types of aviation activities
2)	Ensure that new technologies and market developments are efficiently integrated and effectively overseen
3)	Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation
4)	Close the gaps in the regulatory system and ensure its consistency
5)	Create an effectively working system of pooling and sharing of resources between the Member States and the Agency

2.3 Baseline scenario

2.3.1 Evolution of the problems

The structure of the baseline scenario mirrors the structure of the problem definition.

(a) The present regulatory system may not be sufficiently able to identify and mitigate safety risks in the medium to long term

The EU system will continue the transition to a risk and performance based environment. Safety management systems will continue to mature supported by further guidance, and will be used EU-wide across the industry. The European Aviation Safety Plan will remain a voluntary exercise however and it is likely that not all the Member States will be implementing the actions contained in the European Aviation Safety Plan and reporting back to EASA on its implementation. Safety information available at EU level will be gradually integrated by EASA into a single analysis process, although these efforts may be hampered by the reliability and completeness of this information.

Safety gaps will continue with respect to ground-handling, where experience showed that voluntary action is not sufficient. The risks stemming from cyber-security threats will also remain partly unaddressed, and are expected to intensify with the introduction of more data driven technologies and e-enabled aircraft. Weaknesses in oversight capabilities of some Member States are likely to persist due to continuing pressure on public administrations' budgets, as showed by the support study on resources. These weaknesses, combined with traffic growth,[114] will create additional risks for safety of the aviation system.

Modelling future performance of the EU aviation safety system is very difficult due to already low number of accidents and very low probabilities of system failures. For the purpose of this report, analysis has been performed based on past accident rates and future traffic projections for large aircraft operated in commercial air transport by EU/EFTA air operator certificate holders.

Based on the overall performance of the EU aviation safety system so far, it is reasonable to expect that the system is robust enough to at least maintain the current accident rate. This would however mean that the absolute number of fatal accidents and fatalities would increase by around 30% in the next ten years, due to the expected increase in traffic. The additional economic costs related to accidents under this scenario, taking into account the typical costs inherent in a fatal accident, are assessed to be around EUR 289 million by 2023 (see Table 5).

[114] Current economic trends point to significant growth in air traffic across Europe over the next two decades. Following an economic crisis in 2009 which saw a slow recovery from a significant decrease in air traffic across Europe, the 2008 peak in air traffic of 10.1 million flights is forecasted to be reached again by 2016 (this figure includes all instrument flight rules traffic of both EU/EFTA and foreign operators). This is expected to increase by 50% in the next 10 to 20 years, growing to 11 million flights in 2018 – a 16% increase over its 2011 flight total. Studies predict at the European level, traffic growth rates of 2.7% to 3.9% per year, on average over the next 10 to 20 years (Source: Support study on resources).

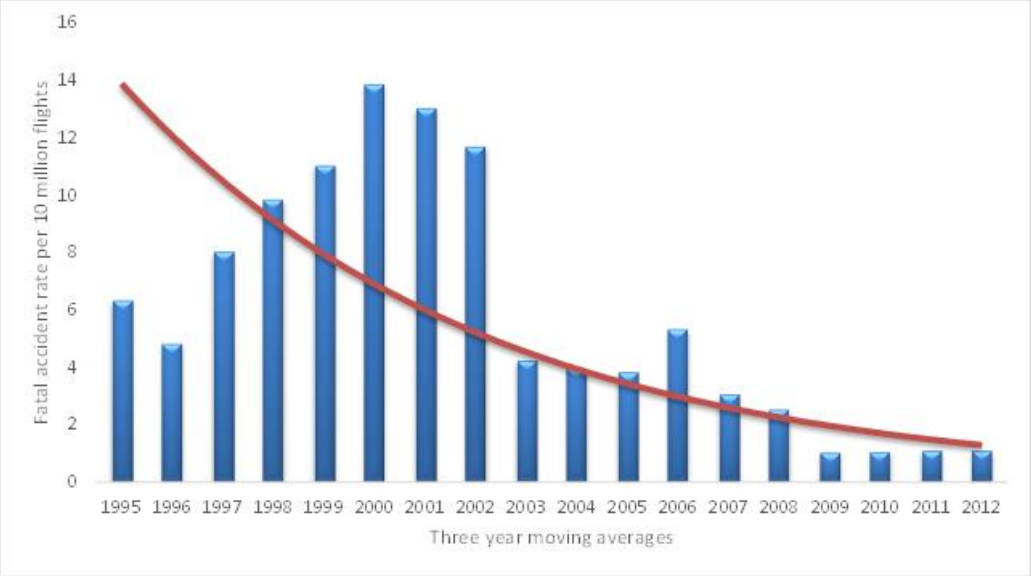
Table 5: Simulation of flight growth scenarios and associated accident costs

Items	Unit	Per accident	2004–2013 actual	2014-2023 with status quo accident rate	Change in accident cost 2004–2013 vs 2014–2023	2014-2023 with improved accident rate	Benefit of lower accident rate (2014–2023)
IFR Movements (000s)			78 000	107 396	29 396	107 396	
Number of Fatal Accidents			14	18	4	13	-5
Total fatalities			552	710	158	508	-202
Fatal accident per 10 million flights			1.8	1.8	1.8	1.2	-0.6
Typical costs of a fatal accident							
Search and rescue costs	(in million)	€ 0.6	€ 8.4	€ 10.8	€ 2.4	€ 7.7	-€ 3.1
Aircraft physical damage costs		€ 15.9	€ 222	€ 285	€ 63	€ 204	-€ 81
Site contamination and clearance costs		€ 1.5	€ 21	€ 27	€ 6	€ 19	-€ 8
Diversion, delays and cancellations costs		€ 1.8	€ 25	€ 32	€ 7	€ 23	-€ 9
Accident investigation costs		€ 10.0	€ 140	€ 180	€ 40	€ 129	-€ 51
Passenger liability (per fatality)		€ 1.1	€ 594	€ 763	€ 170	€ 546	-€ 217
Total costs of fatal accidents		**30.8**	**€ 1 010**	**€ 1 299**	**€ 289**	**€ 930**	**-€ 369**

Source: EASA[115]

The question therefore is under which conditions the accident rate could improve further in order to compensate for the expected traffic growth. Two aspects have to be considered in this respect. The first observation to be made is that while the system has been able to deliver increasing levels of safety, the rate of improvement has slowed down (Figure 4).

Figure 4: Three year moving average fatal accident rates and an exponential trend line



Source: EASA

The second observation is that past safety improvements did not happen on its own but were depending on the conscious efforts made by industry and the regulators. This observation is supported by the safety performance study, which links future reduction of accident rate with further improvement efforts and in particular successful implementation of safety

[115]Additional costs might be involved in an accident such as insurance costs and the impact on the value and reputation of the airline. However these are not easy to quantify. The costs included in the table are the most current on which reliable information is available. Number of flights includes only EU/EFTA Air Operator Certificate (AOC) holders. Sources: Ascend Fleets, IATA Safety Report 2014, Eurocontrol, National Luch- en Ruimtevaartlaboratorium (NLR): Aviation Safety Targets for Effective Regulation, Consolidated Final Report (2001)

management systems.[116] This impact assessment study is therefore based on the premise that further safety improvements will be conditional on addressing the weaknesses in the system identified in the problem definition section of the report.

As a first estimate on how large such an improvement could potentially be, the evolution of annual accident rates of EU/EFTA operators may be modelled using a function of exponential decay. This means extrapolating the trend line in Figure 4 into the future.

Based on this assumption, it is estimated that the accident rate may be further decreased from 1.8 to 1.2 fatal accidents per 10 million flights in the next decade (2014–2023), which would mean five fatal accidents and 202 fatalities prevented, as well as EUR 369 million saving in accident costs. This potential improvement would however require further improvement of the regulatory system and corresponding efforts in terms of safety promotion and oversight.

In the 2004–2013 decade there were also 17 non-fatal accidents for every fatal accident with an average €2.6 million aircraft physical damage costs, amounting to almost EUR 620 million. If the non-fatal accident rate would improve with the same rate as fatal accident rate, that would mean almost 85 non-fatal accidents with an estimated EUR 221 million aircraft damage prevented in the 2014–2023 decade.

(b) The present regulatory system is not proportionate and creates excessive burdens especially for smaller operators

Further efforts will be made to improve proportionality of the regulatory system and eliminate unnecessary regulation. In particular the General Aviation roadmap will continue to be implemented and EASA will gradually increase reliance on industry standards. A more rigorous impact assessment process is also being introduced by EASA to clearly link rulemaking tasks to safety risks and to consistently take into account non-rulemaking risk control measures, such as safety promotion actions, as possible alternatives.

The Regulation (EC) No 216/2008 will not allow however to introduce alternative to a type certification methods of assessing airworthiness of products, nor to grant more extensive competences to Qualified Entities to help Member States in the conduct of certification and oversight activities. Future Implementing Rules may be performance based if needed, but a number of prescriptive requirements in Regulation (EC) No 216/2008, such as detailed definitions or rigid conditions for granting exemptions, will hamper introduction of a truly proportionate regulatory regime, especially for lower risk operations such as light aircraft or drones.

(c) The present regulatory system is not sufficiently responsive to market developments

Intensification of innovative employment structures in the aviation industry and further development of the multinational organisation model can be expected. Cross-border movement of certification holders is also expected to be on the increase, as aviation personnel seeks employment opportunities within the internal market. The EU industry is also expected to continue seeking business opportunities overseas and developing new technologies such as drones, which may require additional regulatory oversight by EASA and National Aviation Authorities.

The above developments will increase the overall complexity of oversight required from the National Aviation Authorities and EASA. This, coupled with shortages of resources in some

[116] Support study on performance, Final Report, p. 84 and 88.

Member States and lack of an efficient framework for sharing resources may result in some organisations not being properly overseen. Fragmented oversight may slow down integration of multinational organisations and hamper interoperability of personnel and aircraft.

(d) There are differences in organisational capabilities between Member States

The differences in organisational capabilities of Member States are likely to persist. The economic forecasts for the EU indicate that the pressures on budgets of Member States will continue.[117] Lack of an effective framework for sharing resources will result in resources of National Aviation Authorities and EASA operating largely in isolation from each other.

Member States will also continue to be obliged to run three regulatory systems in parallel: (1) the EU system; (2) A national system for aircraft and aerodromes excluded from the scope of Regulation (EC) No 216/2008; (3) a national system for State aircraft, which are also excluded from the scope of Regulation (EC) No 216/2008.

Differences in organisational capabilities of Member States and variations in funding of oversight will also continue, affecting level playing field for the industry, and will increase possibilities for business to 'shop' for the most favourable regulatory environments. With respect to training, the EASA Virtual Training Academy will continue to be developed on a voluntary basis.

2.3.2 Expected future resource needs

The quantification of the baseline has been done in two main dimensions: (i) current resources and budgets for aviation safety at Member States and EASA levels; (ii) future needs for resources for aviation safety.

i. Current resources for aviation safety in the EU

The current resources for aviation safety in EU/EFTA Member States and in EASA, have been calculated with the help of the support study contracted by the Commission and are presented in Table 6 below. With respect to Member States, this calculation is broad and should only be used as an indication. The reason for that note of caution is that no precise data are available for all Member States. In particular no information is available from Member States splitting the resources into technical and support staff. Similarly the figures provided for the size of the budget of Member States is, to a certain extent, estimation based on extrapolation of available data.

Table 6: Staffing and budget on European level in 2013

	Staff	Budget
31 NAAs (EU/EFTA)	5 100	EUR 1 billion
EASA (technical staff only)+ NAAs	5 600	EUR 1.13 billion

Source: support study on resources

In order to provide a point of reference for both the resources available in the EU and the workload associated with these resources, a comparison with the US and FAA (aviation safety branch) has also been done, and which was presented in Table 3 above.

This comparison shows that the size of the budget for aviation safety in EU and US is similar. The US has +/- 29% more staff than the EU, but at the same time the volume of the aviation

[117] European Commission, Fiscal Sustainability Report (2012), p. 43.

activity under the responsibility of the FAA is roughly two times bigger than in the EU, which is also an indicator of the relative efficiency of the US system if compared with the EU.

ii. Costs of filling the future gap in authority resources:

The costs of future resource needs for aviation safety (until 2030) were calculated with the support of an external study.[118] The detailed calculations and assumptions for this analysis are contained in Annex XI. In summary, this 'resources gap' analysis indicated that:

- The need for additional staff to carry out the workload will increase by roughly 7.6 – 9.3% of the base figure of around 5 100 total National Aviation Authority staff in 2013 by the year 2020, amounting to between 5 487 to 5 572 total staff needed. By 2030, total staff needed is expected to increase by between 17.4-21.6% over the 2013 level, which represents between 5 987 to 6 200 individuals;
- The budget for National Aviation Authorities would need to be on a higher level compared to the current (2013) level of EUR 1 billion to accommodate for the additional staff. The annual increases have been estimated at EUR 21-26 million in 2020, and at EUR 49-61 million by 2030 to match the projected gap in resources in 2020 and 2030, respectively. The present value of the total increase amounts to EUR 290 – 360 million (2016-2030, 4% discount rate).

No information is available on the forecasted revenues of National Aviation Authorities.

Similarly, forecasted revenue of EASA is not available for the mid to long term. For 2016 the estimated revenue from fees and charges which are mainly related to certification activities, amounts to EUR 121.5 million. For the following years these estimates will largely depend on the evolution of the aviation market. Factors that will influence industry demand for certification vis-à-vis EASA include the number of new aircraft, the entry of new types of aircraft from Asian manufacturers on the market and the development of new technologies such as unmanned aircraft. However, since the EASA constituent act requires that fees and charges have to reflect the real costs of the related activities these revenues will not lead to a profit. Therefore they do not constitute revenue that would impact on the estimated future resource gap.

In order to verify the accuracy of these future predictions, a comparison has also been made by using as a benchmark the projection of future aviation safety resources needs in the US. The US FAA expects its staffing needs for aviation safety to increase by 12% by 2023 if compared to 2013.[119] This is a rate comparable to the one anticipated for the EU by 2020. Given that the EU and US have similar regulatory frameworks for aviation safety, are both in the course of transition to a safety management system environment and have comparable safety performance, it can be considered that the calculations used in this impact assessment for predicting future resources needs of the EU are in the right order of magnitude. The FAA aviation safety workforce trends are included in Annex XIV for comparison purposes.

[118] Support study on resources, Final Report, pp. 135-131.
[119] FAA, Aviation Safety FY2014 Workforce Plan, pp. 8-11.

2.4 Subsidiarity

2.4.1 Legal basis

According to Article 4(2)(g) of the Treaty on the Functioning of the European Union (TFEU), transport is a shared competence between the EU and its Member States. The right for the EU to act in the field of transport is set out in particular in Title VI of the TFEU which provides for the European Transport policy. Article 91(1)(c) gives the Union competence for laying down 'measures to improve transport safety' under the co-decision procedure. Article 100(2) gives the Union the possibility to lay down appropriate provisions for air transport.

2.4.2 Necessity and EU added value

Air transport is to a large extent of transnational character and therefore, by nature, calls for a regulatory approach at EU-level.

There is a general understanding of the Member States that common rules are necessary to reach a high level of safety. This was manifested already by the initial adoption of Regulation (EC) No 216/2008 and its predecessor Regulation (EC) No 1592/2002. The safety of the European aviation system depends inter alia on how well the elements of this system interlink. Any interface in this system constitutes a risk that requires coordination. Common legislation does away with the need to coordinate between Member States regulatory systems and as such contributes to an increase in safety. Promoting a common European safety system can most effectively be achieved only at EU level. Similarly, efficiency gains, in the order of up to 30% (based on comparison with the US), can be potentially achieved within the single European aviation safety system by countering costly fragmentation.

More specifically, as regards ground handling, this initiative has identified a safety gap due to a lack of safety requirements in the EU aviation safety regulatory framework. Analysis has also shown (see Annex XX) that voluntary initiatives have not as yet brought expected results. As ground handling is part of the overall aviation system and interlinks with other aviation domains, regulating it at EU level will assure regulatory consistency for ground handling safety throughout the internal market. The need for regulatory action in this regard is supported by all the groups of stakeholders save airlines, which do not believe that the benefits of an EU intervention would outweigh the costs. Member States see the need for addressing safety of ground-handling but caution about heavy regulation. The Commission believes that a properly designed regulatory framework building on existing industry standards would address these concerns while strengthening the oversight of ground handling.

Furthermore, while most actions addressing deficiencies in safety oversight would be implemented by the Member States on a voluntary basis and subject to a positive cost-benefit analysis, additional action at EU level seems necessary where the ability of a Member State to ensure effective oversight is seriously impaired. In this case Union action would be justified by the fact that failure to meet the safety requirements would negatively impact the whole of the internal market and that this serious safety risk could effectively be addressed by temporarily transferring oversight competences.

Finally, with respect to cyber-security and security aspects of aircraft and systems design it has to be pointed out that the EU is already involved in some of these issues, although not always with a clear legal basis, as was explained in Section 2.2.3. EU action to clarify the competence in this domain is justified by the fact that these matters are inseparably linked with the overall design aspects of aircraft and aviation systems, where the EU already has been given a competence to act under Regulation (EC) No 216/2008. The nature of cyber-security threats in particular is such that can affect systems spanning across multiple Member

States, or even the whole of the EU, and where therefore a coordinated action at Union level is required.

The other options examined in the impact assessment, including with regard to environmental certification of aeronautical products, do not entail an extension of existing EU competences.

3 OBJECTIVES

This policy initiative does not introduce specific EU level targets, expressed in numerical values. With respect to qualitative targets, this policy initiative reiterates the target which has already been expressed by the Commission in the 2011 White Paper on Transport, which is to become and maintain the position of the EU as the safest region in the world. Although the public consultation addressed the need for introducing specific safety targets, after consideration, this idea has been abandoned. Setting of minimum safety targets depends on reliable data and information. The EU is not yet technically ready in this regard, as showed by the safety performance study. In addition, review of relevant literature and expert sources points to the fact that setting of safety targets can result in unintended consequences, especially when such targets are defined in isolation from the operational environment.

This initiative is linked and fully consistent with the 2014-2019 strategic objectives of the European Commission with respect to the promotion of 'Jobs and Growth' and of a 'Deeper and Fairer Internal Market with a Strengthened Industrial Base'. This initiative is also an integral part of the Commission's 'Aviation Package for improving the competitiveness of the EU aviation sector'.

The specific objectives (SO) of this initiative are as follows:

1) Eliminate unnecessary requirements and ensure that regulation is proportionate to the risks associated with different types of aviation activities;
2) Ensure that new technologies and market developments are efficiently integrated and effectively overseen;
3) Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation;
4) Close the gaps in the regulatory system and ensure its consistency;
5) Create an effectively working system of pooling and sharing of resources between the Member States and the Agency;

In addition operational objectives are proposed for the preferred policy package in Chapter 6.

4 POLICY OPTIONS

4.1 General approach to policy options

This initiative addresses a broad range of issues. In order to cover all of them, five domains of policy options, which are independent of each other, have been developed. They address all problem drivers identified under Section 2 and contribute to the objectives set out under Section 3 (see Table 7 below).

Similar to the problem drivers and problems, there is no exclusive one-to-one relationship between a policy option and a problem driver. For example options in the domain of management and quality of resources address problem drivers related to shortages and inefficient use of resources and contribute to tackling Problem No 4 (Differences in organisational capabilities of Member States), but also Problem No 1 (Identification and mitigation of safety risks).

The policy options within the respective domains were developed taking into account the suggestions made in the two support studies, results of the public consultations, EASA Opinion, Article 62 evaluation, and the Report of the Management Board sub-group. In addition, a 'No EU action' option, the use of international standards and soft law measures have been considered, as explained in the following section dealing with pre-screening of options.

Table 7: Listing of Policy Options and their links with problem drivers and objectives

Domains of Policy Options	Policy Options	Problem drivers targeted	Objectives to be achieved
Management and quality of resources	PO 1.1: Baseline Scenario; PO 1.2: Enhanced cooperation within the current system; PO 1.3 (a): Joint oversight system with voluntary transfer of responsibilities; PO 1.3 (b): Emergency oversight support mechanism; PO 1.4: A single EU aviation safety authority;	Shortages of resources impacting safety oversight and certification; Inefficient use of resources stemming from fragmentation;	SO 2: Ensure that new technologies and market developments are efficiently integrated and effectively overseen SO 3: Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation SO 5: Create an effectively working system of pooling and sharing of resources between the Member States and the Agency
Proportionality and safety performance	PO 2.1: Baseline Scenario; PO 2.2: Enablers for a proportional and performance based safety system; PO 2.3: Two-layered regulatory system; PO 2.4: Transition to a full performance based regulatory system;	System predominantly based on prescriptive regulations and compliance checking Level and type of regulation does not sufficiently correspond to the risks associated with different aviation activities	SO 1: Eliminate unnecessary requirements and ensure that regulation is proportionate to the risks associated with different types of aviation activities SO 2: Ensure that new technologies and market developments are efficiently integrated and effectively overseen SO 3: Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation
Gaps and inconsistencies - *ground handling*	PO 3.1 (A): Ground-handling (Baseline Scenario); PO 3.1 (B): Ground-handling (Industry Standards/no certification); PO 3.1 (C): Ground-handling (Implementing Rules/certification);	Inconsistencies and gaps in the regulatory system	SO 3: Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation SO 4: Close the gaps in the regulatory system and ensure its consistency
Gaps and inconsistencies - *aviation security*	PO 3.2 (A): Aviation Security (Baseline Scenario); PO 3.2 (B): Legal framework for security aspects of design; PO 3.2 (C): Coordinated approach to safety and security related matters	Inconsistencies and gaps in the regulatory system	SO 2: Ensure that new technologies and market developments are efficiently integrated and effectively overseen SO 3: Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation

			SO 4: Close the gaps in the regulatory system and ensure its consistency
Gaps and inconsistencies - *environment*	PO 3.3 (A): Environment (Baseline Scenario);	Inconsistencies and gaps in the regulatory system	SO 2: Ensure that new technologies and market developments are efficiently integrated and effectively overseen SO 4: Close the gaps in the regulatory system and ensure its consistency
	PO 3.3 (B): EU essential requirements for environmental protection with respect to aeronautical products;		

4.2 Discarded Policy Options

4.2.1 'No EU action'

The 'No EU action' option was considered for each domain of policy options, meaning that the EU would stop regulating aviation safety matters entirely. This would mean returning to the voluntary system which existed under the Joint Aviation Authorities, with no regional EU enforcement mechanisms, different national requirements, and lack of automatic recognition of certificates. Aeronautical products would again be certified or validated by Members States individually instead of by EASA. Recognition agreements with US and other foreign partners would have to be revoked.

The above would result in a major disruption for the EU industry and could have negative impact on aviation safety and is therefore not a viable scenario. However, a 'No EU action' option is considered as potentially of added value if applied to some sectors of non-commercial aviation. The results of public consultations and support studies have shown that the EU regulatory intervention is too deep when it comes to General Aviation[120]. Accordingly Policy Options 1.3, 1.4, and 2.2 will consider measures which would reduce the authority involvement. This will include the possibility of transferring part of oversight from public authorities to competent user organisations, and greater reliance on industry standards in certification and oversight processes.

4.2.2 Using international standards only

In the field of aviation safety, ICAO adopts standards and recommended practices (SARPs) which are contained in Annexes to the Chicago Convention. Standards are binding for Member States, all of which are parties to the Chicago Convention. However, the SARPs are not directly applicable and require legal transposition into the national legal orders of the Member States. This is done through EU legislation where the competence has been delegated to the EU. Secondly the SARPs usually require adaptation to make them fully operational when being transposed into EU law. This requires a rulemaking process with the involvement of EASA and the European Commission, and sometimes also the European Parliament and the Council. Relying only on ICAO SARPs is therefore not sufficient and does not guarantee uniformity of action within the EU which is required for aviation safety. The proposed options have been designed in full consistency with the existing ICAO SARPs where they are applicable (e.g. ICAO Annex 19).

1.1.1. 'Soft law' measures

[120] General aviation means 'an aircraft operation other than a commercial air transport operation or an aerial work operation' (Source: ICAO Annex 6, Part II).

Soft law measures have also been considered in the development of the policy options. This analysis has shown that there is significant scope for greater reliance on recognised industry standards in regulating aviation safety in the EU. Accordingly, Options 2.1 to 2.4 and Option 3.1(B) consider reliance on industry standards. However industry standards are only a means of compliance with legally binding objectives which in any case always need to be defined at the EU level. In the context of the present initiative, these objectives are set in the so-called "essential requirements" for the different domains of aviation safety which are annexed to Regulation (EC) No 216/2008.

4.3 Description of Policy Options

4.3.1 Options with respect to the management and quality of resources

Adequately resourced aviation authorities, staffed with competent personnel is a pre-requisite for a well-functioning oversight system contributing to the maintenance of a high level of safety, level playing field for the industry and transition to risk based oversight and performance based regulation. The support study on resources[121], the EASA Opinion[122], the Article 62 evaluation[123] and the report of the EASA Management Board Sub-Group[124] all suggest various options with respect to more efficient management and quality of resources in National Aviation Authorities and EASA. These suggestions have been taken into account when developing the options listed below.

While there are shortages of resources in the present system, as was explained in Section 2.2.4, analysis conducted for the purpose of this impact assessment suggests that reorganisation of the way these resources are used, should allow for efficiencies to be gained. The support study on resources demonstrated, in case of centralisation of certification and oversight tasks at EU level, efficiencies in the order of 40%.[125] The comparison with the US in Section 2.2.5, also suggests that potentially the EU should be able to manage with the current resources a much bigger aviation market. The options proposed aim at making these efficiencies possible. It has to be underlined however, that the degree to which such efficiencies could be achieved would directly correlate with the degree of flexibility the regulatory authorities (EASA and national aviation authorities) have in re-allocating between themselves the certification and oversight work. For example, the staffing cap applicable to EASA means that, to be able to take on new tasks, more outsourcing would be necessary, which is not always possible (e.g. general shortages in supply of particular expertise at national authorities) or desirable (i.e. quality control and management functions should not be outsourced).

Option 1.1: Baseline Scenario

With the exception of amendments expected to be introduced through the SES II+ package[126], Regulation (EC) No 216/2008 is not revised, and the current distribution of responsibilities remains unchanged. Cooperation mechanisms between National Aviation Authorities and between National Aviation Authorities and EASA remain in their current form. EASA continues to develop the 'Virtual Academy' and additional guidance material. Minimum EU

[121] Support study on resources, Final Report, pp.125-147.
[122] EASA, Opinion 1/2015, pp. 20-21.
[123] Article 62 evaluation, Final Report (2013), pp.7-8.
[124] EASA Management Board sub-group, Final Report, pp.13-14.
[125] Support study on resources, Final Report, p. 188.
[126] COM(2013)409 and COM(2013)410.

standards (through Implementing Rules to Regulation (EC) No 216/2008) may be provided on qualification and training requirements for inspecting staff of National Aviation Authorities.

Option 1.2: Enhanced cooperation within the current system

This option consists of a number of non-legislative measures aiming at improving the implementation and enforcement of the existing regulatory framework. It focuses on creating closer relations among the authorities and on encouraging exchange of best practices through common forums under EASA auspices. The measures envisaged are as follows:

a) Promoting the use of risk and performance based oversight methods. This would be achieved by developing further guidance material by EASA. The Agency would also launch additional pilot projects together with the Member States. Exchange of best practices between the authorities would be also facilitated through dedicated workshops and training sessions organised by EASA;
b) Establishing central repositories of licences and approvals on a voluntary basis to facilitate cross border oversight. This measure would be implemented by the Agency through establishment of an IT database;
c) Further development and promotion of the EASA pool of experts (raising awareness of its existence and facilitating procedures for usage);
d) EASA to develop best practices and guidance material on cooperative oversight;
e) More detailed guidance material on training of staff of National Aviation Authorities to be developed by EASA;
f) Promoting exchange of best practice in the use of resources between Member States. This would be implemented through activities similar as under point (a);
g) Further development of the EASA virtual Training Academy (accreditation of training institutes in Member States on a voluntary basis).

This option is expected to have support of both Member States and of the aviation stakeholders.

The timeframe for implementation is expected to be one to two years. Risks related to implementation of this option are considered low.

Option 1.3 (a): Joint oversight system with voluntary transfer of responsibilities

The objective of this option is to join up the aviation safety resources available in the National Aviation Authorities and EASA through a system of 'pooling and sharing' and to focus them on the risks where the public expects greatest authority involvement. This option would consist of a number of measures, most of which would require an amendment of Regulation (EC) No 216/2008:

a) A pool of EU-accredited aviation safety inspectors with clearly defined privileges, common liability regime, and funded through fees. For this purpose the Agency would pre-define profiles on the basis of which Member States would designate candidates for participation in the pool. The rights and obligations of Member States providing and requesting the assistance from the EU inspectors would be defined in EU law (today in individual contracts signed by national authorities). A funding mechanism would be also established based on fees and charges (today charging is organised on a bilateral basis between the national authorities concerned). The pool of experts would be thus put on formal basis, as opposed to today's informal framework coordinated by EASA;
b) Increased possibilities for EU Member States to transfer regulatory responsibilities to other Member States or EASA on a voluntary basis (this measure would also require

amendment of Regulation (EC) No 1008/2008, if transfer of responsibilities for certification and oversight of air operators from Member States' aviation authorities to EASA were to be enabled. At present Regulation (EC) No 1008/2008 requires the same Member State to be responsible for the operating license and for the AOC). Such transfers are already possible today as far as production organisations and flight simulators are concerned. This measure would extend these possibilities to other domains of aviation;

c) Freeing up resources of National Aviation Authorities by enabling delegation of certain certification and oversight responsibilities to the General Aviation sector, while ensuring that conflicts of interest are properly managed. This measure would require amendment of the current requirements related to Qualified Entities. Member States would also be able to grant to qualified entities a privilege to issues certificates on their behalf;
d) Establishing a repository of aircraft, organisations and personnel registered and approved in EU Member States (mandatory), and possibly of other information relevant for cooperation between authorities in certification, oversight and enforcement. This measure would be implemented by establishing an IT database by EASA in cooperation with the national aviation authorities;
e) Establishing an accreditation scheme for aviation training institutes building on the current EASA 'Virtual Academy' process. This means that the legal basis for the accreditation process would be established in EU legislation. The accreditation criteria would be also made public by EASA to ensure transparency. Member States would not be obliged to participate in the accreditation scheme;
f) Introducing a more flexible framework for funding EASA activities (en-route charges to cover the costs of air traffic management related responsibilities; human resources financed by fees and charges are allowed to fluctuate in line with the market demand for certification services[127]). Implementation of these measures would require an amendment of the founding act of EASA. A corresponding reduction of the EUROCONTROL budget would have to be also achieved as explained in Annex X;
g) Voluntary 'opt-in' for State aircraft and Annex II aircraft for Member States and aircraft manufacturers. Regarding state aircraft, Member States would be able to extend the scope of the basic safety regulation to all or certain state aircraft under their regulatory responsibility. Regarding Annex II aircraft, a possibility would be given to manufacturers of aircraft which are produced in series and which could benefit from circulation within the internal market to opt-into EU requirements;

In addition this Option entails measure (a) under Option 1.2 (promotion of risk and performance oversight methods).

This option is expected to have support of both Member States and aviation stakeholders. The timeframe for implementation is expected to be two to three years. Risks related to implementation are also considered low to moderate in view of the voluntary nature of most of the measures.

Option 1.3 (b): Emergency oversight support mechanism

This option encompasses all the measures envisaged under Option 1.3(a). In addition, where objective evidence shows that the ability of a Member State to ensure effective oversight of

[127] An inter-institutional working group on partially self-financed agencies is examining the cap on staff financed from fees and charges.

activities under its responsibility is seriously degraded and there are no prospects for rapid resolution of the problem, the Commission, following opinion of EASA, could decide that the oversight of a particular organisation or group of organisations is temporarily transferred from the Member State concerned to the EU level (EASA), pending satisfactory resolution of the underlying oversight issues. This option would envisage that a Member State is first invited to make use of the possibilities to temporarily transfer the responsibility to another authority, pending the resolution of the underlying difficulties. The implementation of this option would require an amendment of Regulation (EC) No 216/2008. The procedures and conditions for activating and deactivating the emergency mechanism would be established in EU law. Implementation of this option would require development by EASA of means and capabilities for AOC oversight.

This option is expected to draw some opposition from the Member States but should be supported by the aviation industry. The timeframe for implementation is expected to be two to three years. Risks related to implementation are considered moderate in view of the mandatory nature of the emergency mechanism.

Option 1.4: A single aviation safety authority

Under this option EASA becomes the competent safety authority for all aviation activities in the EU. It allocates tasks to the National Aviation Authorities, which act as local offices of EASA, based on the actual demand in the system. Under this option EASA fully oversees the work of National Aviation Authorities where they act within the scope of the EU system. Standardisation mechanisms are replaced by internal quality mechanism of EASA which covers also the National Aviation Authorities.

This option would be based on an EU-wide accreditation mechanism, and require amendment to Regulation (EC) No 216/2008. National inspectors would continue to be employed at the national level, but perform the certification and oversight work 'on behalf of EASA'. The single aviation authority would also operate a training academy for its staff and those of the local offices - National Aviation Authorities. Under this option there is only one safety programme for the whole of the EU instead of 28 national programmes. Similar to Option 1.3 (a), Member States may decide to opt into the EU system as far as state aircraft are concerned. However, Annex II aircraft and all aerodromes are included from the outset into the scope of EU aviation safety legislation.

The financing of the single authority would come from a fees and charges scheme. Concerning the timeframe for implementation, a transition period would have to be established in the Union legal act establishing the authority. At the time when EASA was originally established, a transition period of three and half years was provided for to allow the Agency to assume its aircraft certification and other responsibilities. The establishment of the single authority would most likely take longer and in any case be a gradual process. A detailed implementation plan would need to be developed in close cooperation with the Member States. The risks involved in the implementation of this option are considered high, due to a significant change of the legal and institutional set-up of aviation safety oversight in the EU.

This option is expected to draw some opposition from Member States and possibly smaller aviation operators, but is expected to be supported by the large aviation industry. The EASA Management Board Sub-group report did not support the proposal for 'convergence of the

various existing actors towards a single entity, one integrated Agency, within the EU institutional architecture'.[128]

4.3.2 Options with respect to proportionality and safety performance

The options considered under this section aim at better identifying and mitigating safety risks, at supporting the development of more proportionate regulations, and at using resources more efficiently by targeting them according to risk priorities.

Safety management systems, safety performance schemes and performance based rules are different approaches used in managing and regulating aviation safety. A brief explanation as to how they are used in the context of this impact assessment has been added as Annex XVII. There is wide consensus in the aviation community that implementation of these concepts is the way forward to attain further safety improvements beyond current safety levels. ICAO reflects this common understanding in its safety management manual.[129] The benefits of these regulatory approaches were also confirmed by the support study on resources, which was peer-reviewed (see Annex XVIII). Consequently, this impact assessment does not put into question the merits of a performance based system, but rather focuses on the modalities for its effective implementation.

The EASA Opinion recommends that 'existing prescriptive rules should be progressively reviewed to assess whether they are efficient, should remain, or could be either complemented or replaced by performance based rules.'[130] The EASA Management Board sub-group has also recommended a gradual approach by 'promoting performance and risk-based regulations where appropriate.'[131] The support study on performance recommended that performance based rules are introduced over time in accordance with a transition plan, for organisations with sufficiently mature Safety Management Systems.[132]

Furthermore, an option on establishing a safety performance scheme[133] at EU level has been considered, but eventually disregarded. This is justified by the fact that the EU today is technically not yet ready for such a step, primarily due to a lack of reliable data and information.[134] In addition, from a safety management point of view, much better effects are achieved when safety improvement targets and indicators are defined close to the operational environment, as the support study on performance concluded.[135] Experience with the EU performance scheme in the air traffic management sector also shows that a performance scheme at EU level requires an elaborate administrative machinery,[136]and that the scheme has not yet succeeded in defining meaningful safety performance targets.

There is nevertheless a need for strengthening cooperation between EU and Member States in identifying and mitigating risks of EU-wide concern. The views of the stakeholders and Member States from the public consultation indicate that while there is little support for

[128] EASA Management Board sub-group, Final Report, p.20.

[129] ICAO, Safety Management Manual, Third edition 2013, ICAO Doc 9859, AN 474.
[130] EASA, Opinion 1/2015, p. 5.
[131] EASA Management Board sub-group, Final Report, p.8.
[132] Support study on performance, Final Report, p.117.
[133] A safety performance scheme allows for measuring safety levels and identifying risks by using indicators and setting safety improvement targets.
[134] SMICG, 'A systems Approach to Measuring Safety Performance: the regulator perspective', (2014), pp. 5-6.
[135] Support study on performance, Final Report, pp.53-55.
[136] The Commission outsources the implementation of the ATM performance scheme to EUROCONTROL which acts as a Performance Review Body under Commission Regulation (EC) No 691/2010of 29 July 2010 laying down a performance scheme for air navigation services and network functions (OJ L 201, 3.8.2010, p.1).

establishing an EU safety performance scheme, there is support for formalisation of the existing voluntary processes around the European Aviation Safety Plan. The EASA Opinion[137] and the Article 62 evaluation[138] similarly suggest giving to the European Aviation Safety Plan a formal legal basis.

Option 2.1: Baseline Scenario

The EU system continues to incorporate elements of risk based oversight and performance based regulation. Further efforts are made to complete the safety management systems requirements in all aviation domains and to ensure uniform implementation of these requirements by authorities and industry, which are subject to the EASA standardisation programme. Guidance material is developed and exchange of best practices on evaluating the implementation of safety management systems takes place. Member States continue to adopt and implement State Safety Programmes on a non-mandatory basis only. At EU level the European Aviation Safety Programme is regularly updated by the Commission. The European Aviation Safety Plan process continues to be developed on a voluntary basis. EASA continues to develop safety analysis capabilities.

Future Implementing Rules could be drafted in a more performance and risk based manner if needed. There are some provisions in Regulation (EC) No 216/2008 which can be considered as overly prescriptive (i.e. definitions, product certification), and which may hamper, but do not fully prevent the introduction of performance based rules.

Option 2.2: Enablers for a proportional and performance based safety system

This option establishes a number of enablers which will facilitate the introduction of a more proportionate and performance based regulatory environment. It in particular brings closer together the safety management processes at EU and Member State levels, though falling short of mandating EU safety targets.

Under this option, a more proportional and performance based approach is achieved through:

a) Reviewing definitions and classifications of aircraft and operations in Regulation (EC) No 216/2008 to make sure that they are in line with risk hierarchy principles (Annex XVI). In particular the definitions of 'commercial operation' and 'complex motor-powered aircraft would be reviewed';
b) Introducing in Regulation (EC) No 216/2008 a broader range of possibilities for demonstrating compliance with essential requirements, in particular for product certification, based on risk assessment. These should include mechanisms of accreditation and declarations of compliance, particularly for light aircraft and drone operations;
c) Introducing the principles of a risk hierarchy to the mechanism of exemptions and derogations under Regulation (EC) No 216/2008. For low risk activities Member States would be given more flexibility to decide on exemptions and derogations;
d) Simplifying the regulatory framework for wet leasing of aircraft between EU operators in Regulation (EC) No 1008/2008, and corresponding Implementing Rules to Regulation (EC) No 216/2008 (removing the requirement of prior approval).
e) Greater reliance on recognised industry standards when developing Implementing Rules, Acceptable Means of Compliance, Guidance Material or Certification Specifications.

[137] EASA, Opinion 1/2015, pp. 5-7.
[138] Article 62 evaluation, Final Report (2013), p. 8.

In addition, a collaborative safety management process is created, requiring each Member State to establish a State Safety Programme (in line with ICAO Annex 19). The adoption and update of the European Aviation Safety Plan and the European Aviation Safety Programme are formalised in Regulation (EC) No 216/2008. A process is agreed with the Member States to identify risks of EU concern and to develop mitigating actions needed to address these risks.

Regarding performance based rules this option is based on the premise that a decision on the type of rule to be introduced is best taken on a case by case basis, each time a new Implementing Rule under Regulation (EC) No 216/2008 or a significant amendment thereto, is being developed. For each rule which has been converted into a performance-based, organisations have a choice to either remain under a 'traditional approach' or to opt for a performance based rule. This option also envisages reviewing essential requirements in Annexes to Regulation (EC) No 216/2008 for all the domains of aviation safety with a view to eliminating overly prescriptive language or rules which could be an obstacle to a more systematic introduction of performance based rules or which are better suited for Implementing Rules.

The implementation of this option would require amending Regulation (EC) No 216/2008 and, as regards leasing, Regulation (EC) No 1008/2008.

Explanation of the process to be followed for developing performance based rules is set out in Annex XVII.

This Option is expected to have support from both the Member States and the aviation sector.

Option 2.3: Two-layered regulatory system

This option builds on Option 2.2, but with regard to performance based rules creates a two-layered approach for the entire safety regulatory system. All Implementing Rules to Regulation (EC) No 216/2008 are drafted both in a prescriptive and in a performance based manner, where relevant.

Under this Option, Implementing Rules which have been adopted so far are systematically reviewed to bring them in line with the two-layered principle. Organisations can then apply for performance based rules if their safety management systems are sufficiently mature. EASA verifies the ability of Member States to authorise organisations under their regulatory responsibility to switch to a performance based approach as well as Member States' ability to perform oversight on performance based rules.

To illustrate how this Option would work in practice a parallel with the present requirements for pilot training can be made, where in addition to a standard set of requirements, operators can also apply to its aviation authority for an authorisation of an alternative, performance based training qualification programme.

This Option is expected to be supported by the aviation sector but to draw some opposition from the Member States due to additional administrative burden imposed on the authorities.

Option 2.4: Transition to a full performance based regulatory system

This option builds on Option 2.2, but as regards performance based rules a transition plan towards performance based rules for the entire safety regulatory system is developed at EU level, taking into account the specificities of different aviation domains. This transition plan

would be developed by EASA with the assistance of existing rulemaking advisory groups. Performance based rules are then introduced in the Implementing Rules to Regulation (EC) No 216/2008 in accordance to this plan, and prescriptive rules eliminated completely where feasible, not providing organisations with a choice as under Options 2.2 and 2.3. This option implies mandatory changes for organisations, and a top-down approach with a predetermined timetable: organisations are more and more required to collect evidence to show that they operate above a certain safety level, and this leads to a change in the way they operate. EASA controls the ability of Member States to perform oversight on performance based rules.

This Option is expected to draw some opposition from the Member States and from the smaller aviation organisations. The bigger aviation industry is expected to be supportive of this option.

4.3.3 Options with respect to the safety gaps and inconsistencies

4.3.3.1 Options with respect to safety aspects of ground handling

Today ground-handling safety is regulated by the EU only indirectly, through requirements imposed on air operators and aerodrome operators. The options proposed would change that by allowing the EU to impose safety requirements directly on providers of ground-handling services. The EASA Opinion recommends addressing ground-handling safety through the use of industry standards.[139] The EASA Management Board sub-group also cautioned against imposing requirements going beyond the recognised industry standards.[140] Ground handling service providers, airports and ground handling staff favour an EU action on ground handling safety, while airlines advised against that believing that they are sufficiently able to control the quality of services through their contractual relations with ground handlers.

Option 3.1(A): Baseline Scenario

Safety of ground handling operations is handled in an indirect manner through air operations and aerodrome rules adopted under Regulation (EC) No 216/2008. There is however no legal basis in Regulation (EC) No 216/2008 for addressing specific safety requirements directly to ground-handling operators.

Option 3.1(B): Addressing safety of ground handling through industry standards

This option would extend the EU competence and establish a set of high level essential requirements in Regulation (EC) No 216/2008 regarding safety of ground handling, on the basis of which EASA could issue Acceptable Means of Compliance/Guidance Material based on existing industry standards for ground operations (such as materials from the International Air Transport Association (IATA) or the Airports Council International (ACI)). No certification requirements are envisaged under this option. However service providers would be required to declare their compliance with the essential requirements, and Member States would be responsible for ensuring safety oversight. If needed, implementing rules could be adopted as well to supplement the essential requirements.

This option is expected to be supported by the ground handling service providers and aerodrome operators. The airline industry is expected to be opposed to this option. Most Member States are expected to be supportive.

[139] EASA, Opinion 1/2015, p. 12.
[140] EASA Management Board sub-group, Final Report, p. 6-7.

Option 3.1(C): Certification of ground handling service providers

This option, in addition to establishing essential requirements for the safety of ground-handling operations would create, also in Regulation (EC) No 216/2008, a legal basis for the development of related Implementing Rules, including a certification system and related oversight obligations for National Aviation Authorities. Ground-handling would be therefore regulated in a similar fashion to other certified aviation activities.

This option is expected to draw some opposition from Member States and the airline sector. The ground handling service providers and aerodrome operators are expected to be supportive or neutral.

4.3.3.2 Options with respect to aviation security

The proposed options aim, as a minimum, at addressing the most pressing problems related to identified safety gaps (security matters related to the design of aircraft and aviation systems, including cyber-security), and better coordination of interfaces between safety and security measures.

The Commission has also considered an option whereby the implementation of the current EU competence related to aviation security would be transferred to the European Aviation Safety Agency. This option has been however abandoned due to expected lack of support for this option from Member States and stakeholders. In addition the problems identified with respect to the interfaces between safety and security matters can be addressed without the need to change the existing institutional set-up and division of competences.

Option 3.2(A): Baseline Scenario

Security aspects of aircraft design continue to be addressed by EASA on an ad-hoc basis through special conditions. EASA has no clear competence to issue security sensitive airworthiness directives and cannot develop design requirements for other aviation systems in order to protect them from cyber-security threats. The ongoing discussions on the Commission proposal for a Network Information Safety Directive[141] could provide a framework for reporting cyber incidents affecting aviation safety, but the final outcome of the legislative process concerning this Directive is at this point uncertain. Safety and security measures related to flight operations continue to be addressed separately under Regulation (EC) No 216/2008 and Regulation (EC) No 300/2008.

Option 3.2(B): Legal framework for security aspects of design

A legal basis (i.e. essential requirements) is introduced in Regulation (EC) No 216/2008 to address security aspects of aircraft and aviation systems design, including with respect to protection against cyber-security threats. EASA is also given the competence to issue security sensitive airworthiness directives.

This option is expected to be supported by Member States and the aviation stakeholders.

Option 3.2(C): Coordinated approach to safety and security related matters

In addition to Option 3.2(B), this option proposes a change in the way existing EU competences are exercised. The objective of this option is to ensure that, where relevant, safety and security aspects are considered together and that interdependencies between these two areas are better taken into account. It does not imply any extension of existing EU

[141] COM(2013)48 final.

competence beyond what is proposed under Option 3.2(B), but only reorganising within the EU the way this competence is exercised.

Under this option, interdependencies between Regulation (EC) 216/2008 and Regulation (EC) 300/2008 are better taken account by establishing closer cooperation between EASA and Commission on aviation security matters. Under this option, EASA could assist the Commission in developing proposals for aviation security legislation which has impacts on aviation safety, or where trade-offs have to be made between safety and security. To this end EASA could issue technical opinions and provide advice, as is at present the case for aviation safety. This role of EASA would not cover measures which require a security threat and risk assessments, which would remain under responsibility of the Member States and the Commission. The Commission could also, on a case by case basis, call upon EASA's support in performing security inspections of Member States. This is a model currently used with respect to security inspections in the maritime sector, where EMSA provides technical assistance to the Commission in the performance of security inspection tasks. The overall functioning of the aviation security committee (AVSEC) and its advisory bodies would not be affected by this option and would remain under the responsibility of the Commission.

This option would require amendment of Regulation (EC) No 216/2008.

This option is expected to be supported by Member States and the aviation stakeholders.

4.3.3.3 Options with respect to environmental protection

Option 3.3(A): Baseline Scenario

The current system of automatic transposition of minimum ICAO requirements (Annex 16 to the Chicago Convention) with respect to environmental protection of aeronautical products (noise and emissions) is maintained.

Option 3.3(B): EU essential requirements for environmental protection with respect to aeronautical products

Under this option the EU adopts its own essential requirements for environmental protection for aeronautical products, parts and appliances, which is the present scope of the EU competence. This would require amending Regulation (EC) No 216/2008. As it is done in the field of safety, these essential requirements would then be implemented by means of Implementing Rules and EASA certification specifications, hereby affording the necessary flexibility to provide for the best level of environmental protection.

To allow Member States to fulfil their ICAO obligations and to avoid penalising the European industry, the essential requirements and their implementation measures would need, in principle, to be fully consistent with the ICAO framework. However, the EU would also have the possibility – which does not exist today – to depart from minimum ICAO requirements if this is justified by the need for more or less stringent measures. In that case all Member States would be obliged to file, in a uniform manner, a difference under Article 38 of the Chicago Convention.

This option also includes, through an amendment to Regulation (EC) No 216/2008 the introduction of a European Environmental Report for Aviation to increase transparency of the environmental protection measures taken at European level with respect to civil aviation. Such report already exists for aviation safety.

5 ANALYSIS OF IMPACTS

This section details the impact assessment for all the policy options. The impacts of the options have been assessed as a net change compared to the baseline described in Section 2.3.

Given that each domain of policy options addresses distinct issues, the impact assessment is done for each domain separately. The impacts are quantified wherever possible, but it has to be noted that a number of policy options concern aspects such as administrative or governance efficiency, where all elements of changes cannot be quantified.

In addition some of the options (e.g. related to environment or ground handling) aim at establishing a general framework for regulating a particular activity, where the specific impacts can only be quantified once the competence is actually exercised, for example though adoption or amendment of an implementing rule.

Finally a number of options do not aim at creating legal obligations but rather at opening new opportunities for cooperation, especially between Member States, and in such cases the magnitude of impacts will depend on whether these new opportunities will be taken up by the Member States or not, which is a further limitation to quantifying impacts.

Next to monetary quantification (where possible), the impacts are rated as negative (-), positive (+) or neutral (0) impacts. Further explanation of the methodologies used can be found below in the part of the text dealing with each policy domain, and in the Annexes IX to XIII.

The impact assessment is based on:

- Results of the two support studies;
- EASA expert advice;
- Results of public consultations, and relevant documentation review;
- In house Commission expertise and expert judgement.

5.1 Quality and management of resources

	Option 1.2: Enhanced Cooperation within the current system	Option 1.3(a): Joint oversight system with voluntary transfer of responsibilities	Option 1.3(b): Emergency oversight support mechanism	Option 1.4: A single aviation safety authority
ECONOMIC IMPACTS				
Functioning of the internal market	Positive impacts are expected on the level playing field in the internal market through more uniform oversight provided by the national authorities. This is expected primarily thanks to more standardised training offered by the EASA virtual academy, and additional guidance material offered by EASA and exchange of best practices between national authorities. Overall impact positive: (+).	Positive impacts are expected on the level playing field in the internal market through more uniform oversight. These impacts are expected to be stronger than under Option 1.2, thanks to a more robust pool of European inspectors, and enhanced possibilities for Member States to delegate and pool responsibilities for certification and oversight. Voluntary opt-in for State aircraft, and Annex II aircraft should have a positive impact on the small aircraft manufacturers and free movement of services and personnel within the internal market. It is estimated that over 1 000 state aircraft could potentially benefit from the opt-in.[142] The number of Annex II aircraft is estimated to be at least 18 000,[143] however the opt-in could apply only to those aircraft which are in serial production. Positive impacts are expected on manufacturers by allowing the EASA staff involved in certification to fluctuate in accordance with market demand, and thus shorten time to market for new products. Overall impact positive: (++).	Same impacts are expected as under Option 1.3(a). In addition, the emergency oversight support mechanism allows the market operators to continue to do business where they are compliant with EU aviation safety requirements, but where serious deficiencies have been identified in the safety oversight capabilities of the national aviation authority responsible for oversight, and where these deficiencies are not being resolved by the Member State concerned. Overall impact positive: (++/+++).	Significant positive impacts are expected on the level playing field and uniformity of oversight. Interfaces for the industry are also reduced, while proximity of service is ensured through local offices. A single authority is expected to create more standardised approach for industry and reduce uncertainties regarding interpretation and application of rules by different authorities. Overall a very positive impact: (+++).
Operating and compliance costs for businesses	Positive impacts are expected for best performing organisations through reduction of costs of compliance audits (risk based oversight methods allow greater reliance on internal compliance assurance of operators). EU law already allows scheduling audits in (up to) 48 months intervals instead of annually for best performing organisations. These costs cannot be calculated upfront as they depend on the scope and depth of the audits and their frequency, which in turn are determined by risk profiles of the operators. EUR 10 000 accreditation fee for an	Additional costs are expected for the industry in those Member States which make use of the pool of experts or delegate responsibilities to EASA. Simulation of the magnitude of costs for initial AOC issuance and its continuous oversight for a mid-sized airline, based on a fee schedule currently applied by one of the Member States: - initial AOC issuance: EUR 90 000; - annual fee: EUR 464 000;[145] Another example is the EASA fee for approval of a repair station (in case a Member State delegates to EASA approval of its repair stations): - initial approval of repair station[146]: EUR 32 080 + fee for technical ratings (range from EUR 580 to 12 780/rating); - annual fee: EUR 32 080 + fee for technical ratings (range from EUR 580 to 12 780 /rating); Hourly fees would need to be established for the use of European aviation safety inspectors. Examples of hourly fees applied today by selected aviation	Same impacts are expected as under Option 1.3(a), meaning additional costs for industry. Similar as under Option 1.3(a) most of these costs (use of EU aviation safety inspectors, delegation of certification responsibilities to EASA, seeking accreditation for an aviation training institute) would apply only in those cases where an organisation or a Member State responsible for oversight of the organisation, expresses an interest in using these new possibilities. However, in exceptional cases where the emergency oversight support	Significant additional costs are expected for industry by transferring the costs which are currently covered by Member States' budgets into a 'fees and charges' based financing. At present around 40% of NAAs budgets are covered by state budget – this amounts to +/- EUR 400 million annually, which under this option would have to be converted into activity based fees and charges.[153] In the 2016-2030 timeframe the net present value (NPV) of these costs are being estimated at over EUR 4 billion.[154] Overall, a very negative impact on industry in terms of additional costs: (- - -)

[142] Source: Ascend
[143] Support study on resources, Final Report, p. 65.

	aviation training institute participating in the 'virtual academy'.[144] These costs are however incurred only by organisations willing to seek EASA accreditation. Overall impact positive (+).	authorities are as follows: - UK CAA: EUR 236;[147] EASA: EUR 233;[148] IE: EUR 205;[149] The possibility for delegating certification and oversight responsibility from Member States to competent users' organisations (i.e. a national aeroclub) is expected to reduce the compliance costs for non-commercial aviation by ensuring proximity of the authority and simplification of oversight. It is also assumed that should this not be the case, the organisation will not take up these new opportunities, which are on a voluntary basis. Removing the staffing cap on EASA resources financed from fees and charges is not in itself expected to create additional costs for manufacturing industry, as the certification work is in anyway subject to fees and charges. In the domain of product certification, based on current growth in the fleet size and plans of aircraft manufacturers it can be estimated that in the mid to long term the number of EASA staff is expected to increase by around 12%, compared to the current Multiannual Staff Policy Plan, which is around 30 posts (EUR 2.8 m).[150] This would be reduced in case of downturn in demand for certification resources.[151] Otherwise same impacts as for Option 1.2. Overall impact in terms of additional costs negative: (-)	mechanism would be used, mandatory costs would be imposed on market operators to recover the costs of certification and oversight tasks exercised by EASA. This would most likely apply to AOC issuance and oversight, where the costs can be simulated in a similar manner as for voluntary transfers: - initial AOC issuance: EUR 90 000 (if applicable in a given case); - annual fee: EUR 464 000;[152] Overall impacts are expected to be negative, in terms of additional cost, for operators affected by an emergency oversight support mechanism. However it has to be pointed out that the mechanism would apply only in cases where otherwise the operation would have to be stopped entirely and thus the market operator put out of business. Overall impact in terms of additional costs negative: (-)	

[145] Simulation based on an actual air operator with five aircraft types and 36 aircraft in the fleet, including one type with maximum mass over 100 tonnes. An ETOPS authorisation for one of the aircraft types was included in the simulation of costs.
[146] Simulation based on a repair station employing between 100 and 499 staff. See Annex to Commission Regulation (EU) No 319/2014 of 27 March 2014 on the fees and charges levied by the European Aviation Safety Agency, and repealing Regulation (EC) No 593/2007 (OJ L 93, 28.3.2014).
[153] Support study on resources, Final Report, pp. 200-201.
[154] Support study on resources, Final Report, p. 201.
[144] Source: EASA
[147] UK CAA, Scheme of Charges, Official Record Series 5, 2015.
[148] See note 144.
[149] Irish Aviation Authority (fees) (No. 2) Order, S.I. No. 805 (2007).
[150] Source: EASA internal resources plan for product certification. In addition EASA estimates that improved working methods and more reliance on bilateral partners through BASA agreements should allow to gain further efficiency gains.
[151] In case of downturn of demand for certification resources EASA would reduce, as a short term measure, outsourcing to Member States, and then reduce internal staff by not replacing leaving staff and not extending time limited contracts.
[152] Simulation based on an actual air operator with five aircraft types and 36 aircraft in the fleet, including one type with maximum mass over 100 tonnes. An ETOPS authorisation for one of the aircraft types was included in the simulation of costs.

Administrative burden for businesses	No new mandatory reporting obligations identified. Overall impact neutral: (0)	No new mandatory reporting obligations identified. When multiple approvals are combined at the EU level as a result of delegation of responsibilities by Member States to EASA, the reporting obligations for businesses will be simplified. Overall impact neutral or slightly positive: (0/+)	Same impacts expected as under Option 1.3(a). Overall impact neutral or slightly positive: (0/+)	Significant simplification of reporting obligations is expected for industry, which will have to interact with just one aviation authority, and where proximity would be maintained through NAAs acting as local offices. Overall impact positive: (+)
Innovation	No significant impacts identified. Overall impact neutral: (0)	New technologies might be more rapidly introduced thanks to more efficient use of resources in Member States and EASA. Adding en-route charges as source of income for EASA is expected to ensure the necessary resources for support to the deployment of new SESAR technologies. Removing the staffing cap on EASA resources financed from fees and charges is expected to have positive impacts on innovation by making sure that new technologies can be certified according to market demand. Overall impact positive: (+)	Same impacts expected as under Option 1.3(a). Overall impact positive: (+)	New technologies might be more rapidly introduced thanks to more efficient use of authority resources and existence of a single system. These impacts are expected to be more significant than under Option 1.3(a), due to even more efficient use and higher specialisation of resources. Overall impact positive: (++)
SMEs	No significant impacts identified. Overall impact neutral: (0)	Positive impacts expected on SMEs, by enabling delegation of certification and oversight to competent users' organisations in the GA sector (many of which are SMEs). Overall impact positive (+)	Same impacts expected as under Option 1.3(a). Overall impact positive (+)	Same impacts expected as under Option 1.3(a). Overall impact positive (+)
International relations	Some positive impacts on the promotion of EU aviation safety requirements are expected by opening cooperation between the virtual training academy and third countries. Overall impact positive: (+)	Positive impacts on the promotion of EU aviation safety requirements by opening cooperation between virtual training academy and third countries. Positive impacts are also expected on implementation by EU MS of ICAO requirements, thanks to a common system of filing of differences, which should also contribute to better alignment between ICAO USOAP programme and EU system of standardisation inspections and continuous monitoring activities. Overall impact positive (+/++)	Same impacts expected as under Option 1.3(a). Overall impact positive (+/++)	Same impacts expected as under Option 1.3(a). In addition positive impacts are expected through better coordination of EU positions at the international level, more optimal use of resources for technical work at ICAO and other international fora. Overall impact positive (++)
Competitiveness	At least neutral, possibly positive, as competitiveness of the EU airline industry partly relies on its safety record. Overall impact neutral to slightly positive: (0/+)	Positive impact, as competitiveness of the EU airline industry partly relies on its safety record. However, these impacts will depend on the ability of the EU and Member States to adequately manage the interfaces involved in the horizontal and vertical transfers of responsibilities for safety oversight – the possibility which is envisaged under this option. Should these interfaces not be adequately managed the safety impacts could be negative, having a knock-on effect on the competitiveness of the EU industry. The risks of successful implementation have to be therefore taken into account. Positive impacts are also expected on companies with multiple approvals in different Member States, which will be able to combine approvals at EU	Positive, as competitiveness of the EU airline industry partly relies on its safety record. The positive impacts are expected to be stronger than under Option 1.3(a), due to the fact that the emergency oversight support mechanism could be used as a means of last resort in exceptional cases of safety oversight deficiencies in a Member State.	Overall impacts on competitiveness are expected to be negative. This is because although some positive impacts are expected from safety improvements, (as competitiveness of the EU airline industry partly relies on its safety record), and the fact that EU industry would be represented by a single authority, the positive impacts would be outweighed by additional costs which the EU industry would have to incur as a result of the change in charging

		level, thus simplifying oversight and reducing administrative overheads. This should also facilitate the consolidation of the EU airline industry.[155] Based on past experiences, it can be assumed that the possibility to combine approvals at EU level is also expected to bring benefits for multinational companies, based on the fact that they would be represented by a single, internationally recognised authority (EASA).[156] Overall impact positive: (+)	Overall impact positive: (+/++)	regimes (see compliance costs for businesses). The airlines are expected to transfer these additional costs on to the passengers, which could deteriorate the competitive position of EU industry vis-a-vis other regions where the costs of oversight are covered by public budgets (e.g. US). Overall impact negative (-)
Implementation costs for public authorities	Central repository of certificates: EU level: EUR 1.2 m (one-off costs) + EUR 0.5 m (annual maintenance);[157] MS level: - EUR 0.1 m (annual savings);[158] Pool of experts: EU level: EUR 0.4 m (one-off upgrade costs) + EUR 0.1 m (annual costs);[159] Further development of virtual training academy: EU level: EUR 0.1 m (one-off costs);[160] MS level: EUR 0.3 m (annual additional training costs);[161] Additional training guidance material: EU level: EUR 0.2 m (one-off costs);[162] Promotion of risk and performance based oversight methods: EU level: EUR 0.2 m (annual costs), MS level: EUR 0.4 m (annual costs);[163] Accreditation audits for training	Same impacts as under Option 1.2. In addition: Mid to long term positive effects on reduction of future resources needs of Member States are expected, the NPV of which is estimated during the 2016-2030 time frame at EUR 13-25 million.[165] Expanded possibilities for delegation of certification and oversight responsibilities to EASA, would result in the following impacts: - EASA would need to build capabilities to act as a competent authority primarily in air operations. For other domains EASA already has the capability as a result of competence for approval of third country organisations, but it would need to be expanded based on interest of Member States to delegate the responsibility. The new capability in air operations would be built on a combination of internal EASA resources, and resources available in the Member States and qualified entities (through an accreditation programme). The costs would be financed by fees and charges (see example of a simulation under 'compliance costs for businesses'). The one off costs of setting up of administrative and contractual framework for effectuating the delegations to EASA is	Same impacts as under Option 1.3(a) Overall the long term impacts for the Member States and the EU are expected to be positive: (+)	The total NPV of transitioning to the single authority is estimated (for the period 2016-2030) at: - EU: EUR 7.4 m[168] - MS: EUR - 4.3 billion to - 4.4 billion; The savings for the Member States include: - reduction of employment at National Aviation Authority level by 64 FTEs due to work rationalisation. The total NPV of this rationalisation for 2016-2030 is estimated at EUR 117 m. [169] - reduction of future resources needs of Member States, NPV of which is estimated, for the period 2016-2030, at EUR 209-246 m, and which corresponds to 368-433 FTEs.[170] - 4,1 billion EUR savings for the public budgets, by switching completely to an industry funded authority (see operating and

[155] Attempt was made to quantify these benefits based on the current example of the Airbus Single Production Organisation approval, but this analysis, including contacts with Airbus, allowed to assess the impacts only qualitatively. Another example of such a combined approval is the Scandinavian Airline System, which holds a joint AOC from Sweden, Denmark and Norway. The SAS structure creates significant benefits for the operator, at the same time requires however additional administrative arrangements between authorities to coordinate the oversight.
[156] This assumption is based on an interview with the Airbus consortium, which highlighted that one of the main benefits of a single EU approval and establishment of EASA was the fact that Airbus was put under responsibility of an aviation authority which is recognised worldwide, and with competence commensurate with the significance of the EU aviation Industry, and at par with the FAA.
[157] Support study on resources, Final Report, pp.168-171.
[158] Support study on resources, Final Report, p. 170.
[159] Support study on resources, Final Report, p.169.
[160] Support study on resources, Final Report, p. 169.

[162] Resources support study, Final Report, p. 169.
[163] Resources support study, Final Report, p. 170.

	institutes: EU level: 1 FTE(EUR 95 000) (magnitude of EU-wide costs depending on demand for accreditation);[164] Additional savings expected for the Member States from the use of the pool of experts. However based on experience so far it is clear that MS that have already very limited resources, find it also difficult the financing of the use of central pool of experts. The resources support study was not able to assess up front the impact of the pool of resources, as a self-standing measure, on the reduction of future resources needs. The measures under this option are largely voluntary, and therefore the majority of the costs will be incurred only by the Member States which take advantage of the opportunities offered. **Total EU level**: EUR 1.9 m (one-off costs); EUR 0.895 m (annual costs); Overall NPV 2016-2030: EUR 12,7 m.; **Total Member States:** EUR 0.6 m (annual costs); Overall NPV 2016-2030: EUR 8.6 m. Additional savings not possible to quantify. Overall impacts are expected to be negative in terms of additional costs for both Member States and EU: (-)	estimated at: EUR 0.7 m for EU budget.[166] Impacts of financing EASA ATM/ANS tasks from en-route charges are set out in Annex X. The formalisation of the common repository of differences between EU and ICAO requirements is not expected to create additional costs, as the processes are already established and functioning as part of the baseline scenario. At the same time it is expected to reduce the costs of demonstrating compliance with ICAO requirements for the Member States. Additional one-off costs are expected for Member States which take up the opportunity to delegate responsibilities to users' organisations. An administrative and surveillance framework has to be established in such case. In case all Member States take up such opportunity, the EU wide costs are estimated at: EUR 1.8 m.[167] **Total EU level (including option 1.2):** EUR 2.6 m (one-off costs); EUR 0.8 m (annual costs); Overall NPV 2016-2030: EUR 11.5 m; **Total Member States (including option 1.2):** EUR 1.8 m (one off costs); EUR 0.6 m (annual costs); Overall NPV 2016-2030 as the net total of NPV of reduction of resource needs of EUR 13-25 million and NPV of total costs of EUR 8.6: EUR - 4.4 m to – 16.4 m Additional savings not possible to quantify Overall the long term impacts for the Member States and the EU are expected to be positive: (+)		compliance costs for businesses); **Total EU:** Overall NPV 2016-2030: EUR 7.4 m **Total Member States:** Overall NPV 2016-2030: EUR -4.1 to -4.2 billion Overall impact very positive (+++)
SOCIAL IMPACTS				

[165] See Annex XII for detailed calculations and methodology.
[168] Resources support study, Final Report, p.198.
[169] Resources support study, Final Report, p.203.
[170] See Annex XII for detailed calculations and methodology.
[164] Source: EASA.
[166] Resources support study, Final Report, p. 182
[167] Support study on resources, Final Report, p.170.

Number and quality of jobs	There is a marginal impact from the safety benefits of these options, as the aviation industry's market share and therefore the aviation related employment in the internal market are impacted by the number of accidents. Overall impact neutral: (0)			
Aviation safety	Positive impacts expected through improved training and qualification of staff and more uniform oversight. Critical Element No 4 (training) and Critical Element No 7 (surveillance of state safety oversight system) have 'strong' and 'very strong' correlation with accident rates, according to ICAO statistical model (see Annex XIII). Overall impact positive: (+)	Same impacts as under Option 1.2. In addition, the possibility for delegating certification and oversight responsibility from Member States to competent users' organisations (i.e. a national aeroclub) is expected to free up resources in NAAs, which can be then shifted to oversight of higher risk activities, bringing safety benefits. Overall impact positive (+/++)	More positive impact than under Option 1.3(a) by providing a mechanism for dealing with safety oversight deficiencies at Member State level. See correlation between critical elements of safety oversight system and accident rates in Annex XIII. Overall impact positive: (++)	Significant positive impacts are expected by reducing the number of interfaces between authorities, ensuring uniformity of oversight, common training and qualifications of inspecting staff and minimising conflicts of interest. There are however significant implementation risks involved during the transition to the single authority. Overall impact positive: (+++)
ENVIRONMENTAL IMPACTS	This option involves very limited environmental impacts which could be linked to the prevention of environmental damage caused by aircraft accidents. Overall impact neutral (0)			

1.2. Proportionality and safety performance

	Option 2.2: Enablers for a proportional and performance based safety system	Option 2.3: Two-layered regulatory system	Option 2.4: Transition to a full performance based regulatory system
ECONOMIC IMPACTS			
Functioning of the internal market	Eliminating overly prescriptive rules and introducing a broader range of possibilities to demonstrate compliance with essential requirements stimulates economic activity and allows for a wider range of technical solutions and thus choices on the market. Changes to Reg. 216/2008 will allow new methods for product certification, quality assurance from manufactures and an increased use of industry standards according to the risk involved. This will reduce the complexity and length of administrative procedures. (See example of certification specifications CS-23 in Annex XV). Simplification of leasing approvals will also have positive impacts on the airline industry by increasing operational flexibility. Positive impacts are expected for new technologies such as drones. Overall impact positive: (+)	Same impacts as under Option 2.2. With regard to PBR, two sets of rules apply in parallel within the internal market. The choice of the set of rules is left to industry and the only limiting and non-discriminatory criteria enabling this choice is the maturity of the safety management system of the operator. Hence no additional impact on the internal market as compared to Option 2.2. Overall impact positive: (+)	Same impacts as under Option 2.2. Overall impact positive: (+)

Operational and compliance costs for businesses	With regard to safety management, operators are already mandated to monitor the safety of their operations on an ongoing basis as part of their management systems which is an existing EU requirement. In addition it is expected that a simplification of certification procedures, increased reliance on industry standards, simplification of leasing approvals and more extensive use of Qualified Entities in the certification and oversight processes will reduce compliance costs for businesses. For example in the light sport aircraft category, a comparison with the US system shows that this approach could reduce the certification costs by over 50% while maintaining an acceptable level of safety.[171] Positive impacts are also expected by giving industry the possibility of PBR on a case by case basis. Overall impact positive: (+)	Same positive impacts are expected as under Option 2.2, with regard to simplification and proportionality related measures. Additional positive impacts are expected by maintaining the prescriptive rules in parallel to new PBR across the whole spectrum of aviation regulations, which will allow companies to choose the preferred method of compliance. The organisations opting for PBR may need to develop additional skills and possibly adapt their Safety Management Systems to the specificities of the rules[172] (e.g. develop additional safety indicators, identify relevant sources of information) to demonstrate compliance with the objective of the performance based rule. It is assumed that the operator will opt for PBR based on a cost-benefit analysis where the additional costs of adapting the system will be outweighed by other benefits (e.g. safety benefits). Overall impact positive: (++)	Same positive impacts are expected as under Option 2.2, with regard to simplification and proportionality related measures. Additional compliance costs are expected compared to the baseline, as PBR is imposed on all organisations in a top-down manner according to a predetermined schedule and not based on individual and operators specific cost-benefit analyses. Overall impact neutral to positive: (0/+)
Administrative burdens for businesses	The requirement for the industry to provide information will increase in those Member States which have not yet implemented a State Safety Programme (15 Member States[173]). In such situation the relevant industry will have to provide to their State information on their safety performance. This additional burden is however limited compared to the baseline scenario, as the assessment of the safety performance of an organisation is already required by EU law in the context of safety management system requirements. Overall impact negative: (-)	Same impacts as under Option 2.2. Additional reporting requirements for those businesses having opted for performance based rules to demonstrate having reached acceptable performance levels established by these rules will exceed those of Option 2.2 as the entire safety regulatory system is concerned. Overall impact negative: (- -)	Same impacts as under Option 2.2. In addition, there will be additional reporting requirements for all businesses to demonstrate having reached acceptable performance levels established by performance based rules. Overall impact negative: (- -)
Innovation	Eliminating overly prescriptive rules, reducing costs of compliance and introducing a broader range of possibilities to demonstrate compliance with essential requirements is expected to stimulate innovation. In particular greater reliance on industry standards is expected to reduce the time to market for new technologies (e.g. electric engines or drones). Furthermore, increased use of PBR that define a desired outcome without prescribing the method of how to achieve it, will give to industry more flexibility in developing new technologies. Thus there is a positive impact compared to baseline for all three options. Overall impact positive: (+)		
SMEs	No measures under Option 2.2 and Option 2.3 specifically target SMEs, but SMEs in particular could benefit from simplified and less costly procedures, which so far have kept them out of business in certain areas. In addition, these options are favourable to SMEs, among which capabilities to accommodate PBR differ significantly, as it could provide them with a choice of applying prescriptive or performance based rules on a case by case basis. The voluntary nature of the measures related to PBR is to the advantage of SMEs, some of which may prefer to use prescriptive rules which clearly describe what exactly is required from the operator.		Negative impacts are expected on SMEs that would prefer prescriptive rules but which will be obliged, regardless of their preference, to apply PBR rules which require more sophisticated management systems and data collection and analysis capabilities.

[171] See Case IV in Section 2.2.
[172] Safety Performance Study, Final Report, p. 107.
[173] Source: EASA

	Overall impact positive: (+)		Overall impact negative: (-)
International relations	Harmonisation of rules at international level may become more difficult if foreign partners do not follow an equivalent approach to regulation. The example of CS-23 certification code which is revised jointly with the FAA shows that it is possible to develop performance based rules across national borders. With regard to safety management this option will positively impact the compliance of the European Union Member States with international ICAO standards as the requirement for States to adopt and implement a State Safety Programme already exists at international level (ICAO Annex 19) and will be transposed into EU legislation under this option. Overall impact neutral: (0)		
Competitiveness	Competitiveness of European industry is influenced by the safety record of air carriers and the ability of industry to innovate. Accidents reduce public confidence in the safety of the transport system and this is particularly true for aviation where accidents usually involve a high number of fatalities. Accidents have an impact on the market value of the organisation concerned and on the demand for tickets offered by the airline which has had an accident. Compared to the baseline scenario which involves an increased fatal accidents number, the expected aviation safety benefit from an improved collaborative safety management process will contribute, as a minimum, to the EU industry remaining as competitive as it is in the current situation, if not more competitive. The quantitative dimension of this impact is however difficult to assess, mainly due to lack of a reliable methodology to assess the number of accident which could be avoided thanks to the implementation of this option. Eliminating overly prescriptive rules and introducing a risk-based approach and performance elements to regulation will render compliance less costly, stimulate innovation and thus positively impact competitiveness. However, impacts related to a more proportional, risk and performance based regulatory system are difficult to quantify due to lack of a methodology to assess the number of accidents avoided and monetary benefits from innovation. Overall impact positive: (+)		
Implementation costs for public authorities	In this option, all EU Member States are required to set up and implement a State Safety Programme and to report on the European Aviation Safety Plan implementation. Currently, on the basis of available information, 13 Member States have started to implement a State Safety Programme[174]. In this respect this option will mainly impact 15 Member States. The effort required per Member State is estimated at an average need of 2 senior person-years and 3 junior person-years[175]. However, in the current economic context, it is expected that most these resources will be redeployed internally, notably benefiting from the potential savings of performing a more focused and risk-based oversight. The effort compared to the baseline scenario is estimated around 2 FTE for each of the 15 Member State in which a State Safety Programme is not yet implemented. This means 30 FTEs EU wide at a total cost of: EUR 1.7 million annually.	With regard to implementation of State Safety Programmes, European Aviation Safety Plan, and simplification of certification and approvals procedures the costs/benefits for Member States and EASA will be the same as under Option 2.2. As regards PBR, although these significantly reduce the need for regular updates and modifications as explained under Option 2.2, the two-layered system of rules envisaged under this option will require additional rulemaking, training and standardisation efforts, which can be estimated as follows: - At EU (EASA) level the two-layered system will have to be set up and compliance checking of Member States to be integrated in the standardisation programme. It is estimated that 3 FTE at EUR 285 000 per year are needed;[177] - At the Member States level, the adaptation and training costs are estimated at EUR 3.5 million one-off training costs and EUR 17.7 million recurrent costs;[178]	With regard to implementation of State Safety Programmes, European Aviation Safety Plan, and simplification of certification and approvals procedures the costs/benefits for Member States and EASA will be the same as under Option 2.2. As regards PBR, although these significantly reduce the need for regular updates and modifications as explained under Option 2.2, the need for completely reforming the regulatory system as envisaged under this option will require additional rulemaking, training and standardisation efforts, the costs of which can be estimated as follows: - At EU (EASA) level the introduction of PBR has to be set up and checking compliance of Member States to be integrated in the standardisation programme. It is estimated that 3 FTE at EUR 285 000 per year are needed.[179] - At the Member States level, the adaptation and training costs are estimated at EUR 3.5 million one-off training costs and EUR 16.1

[174] Source: EASA
[175] Support study on performance, Final Report, pp. 97-98.
[177] Support study on performance, Final Report, p. 108.
[178] Support study on performance, Final Report, p. 107.
[179] Support study on performance, Final Report, p. 109.

	This option is not expected to require additional resources from EASA, as it only formalises the current process with respect to the European Aviation Safety Plan. The analysis of the information coming from Member States on implementation of European Aviation Safety Plan is expected to be absorbed by EASA with the currently available resources. As regards PBR, these significantly reduce the need for regular updates and modifications. The standard EASA rulemaking process is also on average three times longer if compared to the development of specifications by industry by the most efficient standard setting bodies.[176] On the other hand, staff at Member States will need additional training and oversight has to be adapted. Increasing reliance on accreditation mechanisms and declarations of compliance for product certification should also reduce the costs of EASA in product certification and oversight in the general aviation sector. Finally, simplifying the approvals for leasing should also reduce the administrative costs for Member States. The quantitative impact for the public authorities is expected as follows: **Total EU level:** Reduction in rulemaking and certification costs **Total Member States:** Overall NPV 2016-2030: EUR 24.5 m Additional costs for training of staff and adaptation of oversight to PBR Reduced effort for participation in rulemaking Reduced costs of leasing approvals Reduced costs for production oversight of light aircraft Overall impact positive: (+)	**Total EU level (in addition to Option 2.2):** Overall NPV 2016-2030: EUR 4.3 m **Total Member States (in addition to Option 2.2):** Overall NPV 2016-2030: EUR 255 m Overall impact negative: (- -)	million recurrent costs;[180] **Total EU level (in addition to Option 2.2):** Overall NPV 2016-2030: EUR 4.3 m **Total Member States (in addition to Option 2.2):** Overall NPV 2016-2030: EUR 232 m Overall impact negative: (- -)
SOCIAL IMPACTS			

[176] Source: EASA.
[180] Support study on performance, Final Report, p. 109.

Number and quality of jobs	It is expected that employment is impacted positively by more proportionate rules and favourable conditions for innovation. The introduction of PBR in certain areas will require training of job holders which positively affects the quality of jobs. The simplification of certification procedures should have in particular positive impacts on decreasing costs in the general aviation sector, which could translate into new jobs in the sector. While it is difficult to quantify these benefits, a comparison with the US shows that the costs of certification and production oversight for the simplest aircraft are probably over 2 times higher in the EU than in the US.[181] The aviation industry's market share and therefore the aviation related employment in the internal market are impacted by the number of accidents. The safety benefit from this option will, as a minimum, contribute to an equivalent level of employment in the aviation industry compared to the current situation and an improved one compared to the baseline scenario. Overall impact positive: (+)
Aviation safety	By improving the ability to identify and mitigate safety risks through a collaborative safety management process, the overall safety performance of the EU aviation safety sector should improve. The adoption of a State Safety Programme by each Member State (whereas only 13 Member States have started to implement a State Safety Programme in the current situation) will improve the ability of each Member State to agree with their organisations on the safety performance of their Safety Management Systems. It will also support States in performing risk-based oversight. Furthermore, the monitoring of the implementation of European Aviation Safety Plan actions will ensure a better effectiveness of the European risk identification and mitigation processes. This option is expected to deliver an overall safety level improvement of 19% on the short term (10 years) and 44% on the long term (30 years).[182] Compared to the baseline scenario in which the number of accidents is expected to increase, this option should therefore bring safety benefits by reducing the probability of accidents and related fatalities. Determining quantitative impacts in terms of decrease in number of fatal accidents is not possible due to lack of a reliable calculation method. As regards performance based rules, the safety impacts depend on the specific rules that will be converted from prescriptive to performance based requiring a case by case assessment and can therefore not be quantified. Overall, a performance based approach to the regulation of aviation safety lends itself well to setting safety performance targets that are progressively more ambitious. Being data-driven, a performance based approach allows operators to better adapt to different conditions in order to meet safety targets (Fatigue risk management is an example.) Indirectly, PBR could stimulate swifter introduction of innovations that improve safety (CS-23 is an example - see Annex XV). On the other hand, the proof and verification of whether safety levels have been attained becomes more complex for organisations and authorities under PBR than under prescriptive rules which bears a risk if not mitigated by suitable processes and qualified staff. Overall impact positive: (+)
ENVIRONMENTAL IMPACTS	This option involves limited environmental impacts. Indirect positive impacts could stem from swifter innovation including also more environmentally friendly technologies and practices. In addition, the prevention of environmental damage caused by aircraft accidents entails positive environmental impacts and therefore the baseline scenario would be impacted positively in proportion to the safety improvement. Overall impact neutral to positive: (0/+)

5.2 Gaps and inconsistencies - safety aspects of ground handling

	Option 3.1 (B): Ground handling (industry standards, no certification)	Option 3.1 (C): Ground handling (implementing rules, certification)
ECONOMIC IMPACTS		
Functioning of the internal market	This option is expected to have a positive impact on the functioning of the internal market by introducing common safety standards for ground handling services across the EU. This should contribute to a level playing field for the operators. The recognition of standards would also be enabled	The functioning of the internal market would be ensured to the same or even slightly greater extent as under Option 3.1(B), given the fact that certification requirements would improve the enforcement of common standards.

[181] See Case IV in Section 2.2
[182] Support study on performance, Final Report, pp. 88-91.

	thus making market access for operators easier across the EU. Overall impact positive: (+)	Overall impact positive: (+/++)
Operating and compliance costs for businesses	Limited compliance costs are expected under this option, due to absence of new certification requirements and reliance on existing industry standards which are followed by the majority of the market operators. Positive impacts are expected for ground handling operators from harmonised EU standards which could lead to airlines not imposing their own standards when auditing ground handling providers. Positive impacts are expected for airlines by reducing the costs of ground handling related damage. Airlines estimate the worldwide cost of ground handling incidents to be in the region of EUR 9 billion damages and delay (no EU specific information on these costs is however available).[183] Overall impact neutral: (0)	The impacts are expected to be more negative than under Option 3.1(B) because the new certification process would imply higher cost for industry to demonstrate compliance with the common EU requirements. It is not certain whether the certification requirement would be able to replace / significantly reduce audits of ground handling companies by airlines, which are obliged to ensure oversight of contracted services under EU rules for flight operations. Overall impact negative: (-)
Administrative burdens for businesses	Due to absence of a certification scheme, there would be no new reporting obligations for ground-handling companies. Occurrence reporting obligations are already imposed on the ground handling operators through separate EU legislation. Overall impact negative: (-)	The new certification process would result in reporting and auditing requirements creating administrative burden for ground handling businesses. Overall impact negative: (- -)
Innovation	No significant impacts identified Overall impact neutral: (0)	
SMEs	Only a low/medium number of ground handling companies are expected to be SMEs.[184] The implementation of industry standards is not expected to have negative impacts for the SMEs. Overall impact neutral: (0)	Only a low/medium number of ground handling companies are expected to be SMEs.[185] However, the increase in administrative costs would have a more significant impact on SMEs than on larger companies who operate in the ground handling market. For example, if a certification process for ground-handlers is introduced at a European level, an SME in one country would incur costs similar to a large ground handling company, operating in a large number of EU Member States. The cost, as a proportion of turnover would be higher in the SME than in the larger company. Overall impact negative: (-)
International relations	No significant impacts identified. Overall impact neutral: (0)	

[183] Steer Davies Gleave, Possible revision of Directive 96/67/EC on access to the ground-handling market at Community airports, Final Report, 16 June 2010, p. 22.
[184] EC, Impact Assessment accompanying the proposal for a Regulation of the European Parliament and of the Council on ground-handling services at Union airports and repealing Council Directive 96/67/EC, COM(2011) 824 final, p. 40.
[185] EC, Impact Assessment accompanying the proposal for a Regulation of the European Parliament and of the Council on ground-handling services at Union airports and repealing Council Directive 96/67/EC, COM(2011) 824 final, p. 40.

Competitiveness	Positive impacts are expected for airlines by reducing the costs of ground handling related damage and associated delays. Airlines estimate the worldwide cost of ground handling incidents to be in the region of EUR 9 billion damages and delay.[186] On the other hand there are additional costs expected for ground handling service providers to ensure compliance with the new essential requirements. Overall impact neutral: (0)	Positive impacts are expected for airlines by reducing the costs of ground handling related damage and associated delays. Airlines estimate the worldwide cost of ground handling incidents to be in the region of EUR.9 billion damages and delay. On the other hand there are additional costs expected for ground handling service providers to ensure compliance with the new essential requirements. These additional costs are higher than under Option 3.1 (B) due to certification requirements. Overall impact negative: (-)
Implementation costs for public authorities	Low cost impact on national aviation authorities to set up or adjust the existing oversight system. With respect to EASA, 1.5 FTE (EUR 142 500) is expected to set up and maintain the system of common requirements including initial rulemaking and maintenance of rules, standardisation and implementation support.[187] **Total EU level:** Overall NPV 2016-2030: EUR 2.05 m **Total Member States:** marginal Overall impact negative: (-)	Medium to high cost impact on national aviation authorities in terms of implementation costs, as a certification process needs to be set up in the competent aviation authorities. With respect to EASA, 1.5 FTE (EUR 142 500) is expected to set up and maintain the system of common requirements including initial rulemaking and maintenance of rules, standardisation and implementation support.[188] **Total EU level:** Overall NPV 2016-2030: EUR 2.05 m **Total Member States:** Costs of setting up a certification system. Depends on the size of the ground-handling industry under responsibility. Overall impact negative: (- -)
SOCIAL IMPACTS		
Number and quality of jobs	The introduction of minimum training, as well as the introduction of minimum quality requirement in terms of safety of operations, should contribute to an improvement of working conditions and reduction of injuries under both policy options. Overall impact positive: (+)	
Aviation safety	The safety issues identified in Section 2.2.3 of this impact assessment report are expected to be further mitigated as essential requirement would allow for a direct oversight of the ground handling activities.[189] Overall impact positive: (+)	There is no indication that in this particular case the certification solution can provide a significantly higher level of safety as compared to using industry standards.[190] The safety impacts are therefore expected to be comparable to those under Option 3.1(B). Overall impact positive: (+)
ENVIRONMENTAL IMPACTS	No significant impacts identified.	No significant impacts identified.

[186] Steer Davies Gleave, Possible revision of Directive 96/67/EC on access to the ground-handling market at Community airports, Final Report, 16 June 2010, p. 22.
[187] Expert judgement by EASA.
[188] Expert judgement by EASA.
[189] Expert judgment by EASA.
[190] Expert judgement by EASA.

	Overall impact neutral: (0)	Overall impact neutral: (0)

5.3 Gaps and inconsistencies - aviation security

	Option 3.2 (B): Legal framework for security aspects of design	Option 3.2 (C): Coordinated approach to safety and security related matters
ECONOMIC IMPACTS		
Functioning of the internal market	With respect to the security aspects of aircraft airworthiness this option will have neutral impacts compared to the baseline. This is because EASA in practice already addresses security of aircraft design but the legal basis for that is not clear. With respect to the security of the ATM systems, this option is expected to have a positive effect on the functioning of the internal market by reducing the probability of disruption in the provision of air traffic services. Overall impact positive: (+)	Impacts expected as under Option 3.2(B) or slightly more positive thanks to better assessment of safety and security trade-offs and interdependencies in cost-benefit analysis leading to more optimal solutions being chosen. Overall impact positive: (+/++)
Operating and compliance costs for businesses	With respect to the security aspects of aircraft airworthiness this option will have neutral impacts compared to the baseline. This is because EASA in practice already addresses security of aircraft design but the legal basis for that is not clear. With respect to the security of ATM system, this option, by imposing new requirements, is expected to have additional costs for the air traffic service providers. Overall impact negative: (-)	Overall impacts are expected to be more positive than under Option 3.2(B), thanks to better assessment of safety and security trade-offs and interdependencies in cost-benefit analysis leading to more optimal solutions being chosen. Overall impact neutral to positive: (0/+)
Administrative burdens for businesses	With respect to the security aspects of aircraft airworthiness this option will have neutral impacts compared to the baseline. This is because EASA in practice already addresses security of aircraft design but the legal basis for that is not clear. With regard to ATM, no additional reporting obligations are envisaged in case the NIS Directive imposes adequate obligations concerning reporting of cyber-security related incidents on providers of critical ATM infrastructure. Should that not be the case, aviation specific reporting obligations would be introduced with the resulting increased administrative burden. Overall impact neutral to negative: (0/-)	Impacts expected as under Option 3.2(B) Overall impact neutral to negative (0/-)
Innovation	Essential requirements for cyber-protection and resilience of critical ATM infrastructure and systems are expected to stimulate development of innovative technical solutions to meet these requirements Overall impact positive: (+)	Positive impacts are expected but slightly stronger than under Option 3.2(B), thanks to better assessment of safety and security trade-offs and interdependencies in cost-benefit analysis leading to more optimal solutions being chosen. Overall impact positive: (++)
SMEs	With respect to the security aspects of aircraft airworthiness this option will have neutral impacts compared to the baseline. This is because EASA in practice already addresses security of aircraft design but the legal basis for that is not clear. With regard to ATM, the SMEs are not expected to be affected as they are not involved in the provision of air traffic services. Overall impact neutral: (0)	Impacts expected as under Option 3.2(B) Overall impact neutral: (0)

International relations	This option would have a positive effect on the compliance of EU Member States with the ICAO Annex 17 recommendations concerning measures related to cyber-threats (Recommendations 4.9.1 and 4.9.2.) Overall impact positive: (+)	Impacts expected as under Option 3.2(B) Overall impact positive: (+)
Competitiveness	With respect to the security aspects of aircraft airworthiness this option will have neutral impacts compared to the baseline. This is because EASA in practice already addresses security of aircraft design but the legal basis for that is not clear. With respect to ATM, innovative solutions developed by the EU industry to meet the safety objectives defined by the new essential requirements could have positive impacts on the competitiveness of the EU industry. On the other hand the additional costs for ANSPs of implementing the new requirements are expected to be reflected in the air navigation charges. Overall impact neutral: (0)	Impacts expected as under Option 3.2(B) Overall impact neutral (0)
Implementation costs for public authorities	Additional costs are expected for the national aviation authorities, of acquiring the expertise necessary for assessing the compliance of ANSPs with the new essential requirements. No additional costs are expected for EASA as in practice it already addresses security of aircraft design and has the relevant expertise in house. **Total EU level:** 0 **Total Member States:** The cost of developing cyber-security expertise. Overall impact negative: (-)	Some additional costs for both Member States and EASA. Compared to Option 3.2(B), EASA will gradually need to further develop its security expertise (estimated at 3 FTEs for the EU budget at a cost of EUR 285 000 / year). **Total EU level (in addition to Option 3.2(B)):** Overall NPV 2016-2030: EUR 4.3 m **Total Member States (in addition to Option 3.2(B):** 0 Overall impact negative: (- -)
SOCIAL IMPACTS		
Number and quality of jobs	There are no impacts identified Overall impact neutral: (0)	There are no impacts identified Overall impact neutral: (0)
Aviation safety	This option would have a positive impact on aviation safety by allowing the EU to better safeguard aviation against security related risks, including in particular cyber-security threats. Overall impact positive: (+)	Positive impacts are expected to a greater degree than under Option 3.2(B), thanks to better assessment of safety and security trade-offs and interdependencies in cost-benefit analysis leading to more optimal solutions being chosen. Overall impact positive: (++)
ENVIRONMENTAL	There are no impacts identified	There are no impacts identified

IMPACTS	Overall impact neutral: (0)	Overall impact neutral: (0)

5.4 Gaps and inconsistencies - environmental protection

	Option 3.3 (B): EU essential requirements for environmental protection with respect to aeronautical products
ECONOMIC IMPACTS	
Functioning of the internal market	Having the possibility to deviate from the minimum ICAO standards (Annex 16 to the Chicago Convention), based on EU-specific impact assessment process, would allow the EU to adopt aviation environmental protection requirements for "products" (aircraft, engines and propellers) which are better adapted to the interests of European citizens and EU industry. The European Aviation Environmental Report would provide objective, accurate information on the environmental performance of the air transport sector, as well as feedback on the effectiveness of existing policies in place and future environmental challenges that lie ahead. The positive impacts on the environmental protection are also expected to contribute to the growth of the EU aviation market, given the fact that environmental limitations are expected to be a significant constraint to development of air transport in the EU. Overall impact positive: (+)
Operating and compliance costs for businesses	The cost-benefit analysis of deviating from minimum ICAO requirements would be done on a case by case basis, when the new flexibility envisaged under this option would be actually used. It is thus not possible to estimate such impacts upfront. It has to be pointed out however that the cost-effectiveness analysis that is done in ICAO may not be the same as for the EU.[191] The EU Aviation Environmental Report will not have any costs for the businesses. Overall impact in terms of costs is not possible to be estimated upfront, and is therefore considered as neutral (0)
Administrative burdens for businesses	There are no new reporting obligations for businesses envisaged under this Option. Overall impact neutral: (0)
Innovation	The change would allow adapting EU rules more easily, thus allowing a more rapid response to benefits from innovation. In case EU would opt for higher stringency than the minimum ICAO requirements this would create a market incentive that would stimulate innovation and potentially give EU industry an advantage over other parts of the world, allowing it to export its knowledge. Overall impact positive: (+)
SMEs	Overall, the impact for SMEs would likely be neutral, but would again need to be analysed on a case by case basis. There may be cases where a lower stringency of standards would allow taking into account particular interests of SMEs, as in ICAO it is not always easy to get changes agreed that would only benefit a small part of the industry. For instance, it was not possible to lift the ICAO requirement for determining the smoke number for the very small jet engines that power self-launching gliders as there was no global interest to support this work. Overall impact neutral: (0)
International relations	This option is expected to improve the negotiation position of the EU in the ICAO Committee on Aviation Environmental Protection (CAEP). Other CAEP participants have a system in which ICAO SARPs have to be transposed into national legislation, making it relatively easy for them to deviate where they see fit. Consequently, the current EU legal framework does not help to make a credible reservation against a

[191] As an example, a higher stringency may not impact the EU fleet as much as the global fleet, as on average the EU fleet is more modern. Also the benefits of a higher stringency may be higher in a densely populated EU, compared to other regions of the world where there is more room to build new airports further away from densely populated areas. There may also be cases where the EU would prefer to be less stringent - for instance noise standards for helicopters mainly used for sea operations could be less stringent when such helicopters would have significant operational advantages in such an operating environment, while few people would be affected by the higher noise. Applying a higher stringency for just the EU may less affect the asset value of the current fleet as when there would be a global stringency increase, because the aircraft would still have value in other parts of the world. In other cases it may be deemed beneficial to be less stringent than ICAO if there is a particular problem for some European products.

	CAEP decision. As explained above, the effects of deviating from ICAO would have to be carefully assessed before deciding. If there is no such benefit, ICAO SARPs would be followed as today. The benefit would be to have an option to deviate available to the EU in principle, like other parts of the world have, rather than being automatically bound to the ICAO outcome. Where a possibility of deviation from ICAO SARPs would be used, all Member States would have to notify a common difference under Article 38 of the Chicago Convention. Overall impact positive: (+)
Competitiveness	The impact (positive or negative) would only materialise if it was decided to make use of the increased flexibility that this Option provides. For further assessment see ' *Compliance costs for businesses*'. Overall impact in terms of costs is not possible to be estimated upfront, and is therefore considered as Neutral (0).
Implementation costs for public authorities	There would be increased implementation costs of drafting the EU rules, while previously a simple update of the references to ICAO Annex 16 are all that has been needed. However, the need to spend resources in the ICAO process could potentially be decreased, as the risk of having an outcome that would affect the EU negatively can be mitigated by deviating from ICAO requirements. It is expected that the overall effort of keeping the environmental rules up-to-date would be of the same order of magnitude as the "baseline", or would be approximately 2 FTE higher, divided equally over EU (EUR 95 000) and Member States (EUR 55 000). This would primarily depend on the extent to which the increased flexibility would be used and could be judged against the expected benefits at such a moment. The implementation costs of the European Aviation Environmental Report, as well as the maintenance of data streams and modelling capabilities is estimated for EU at 1 FTEs (EUR 95 000) and EUR 300 000 / year for IT equipment. **Total EU level:** Overall NPV 2016-2030: EUR 7 m **Total Member States:** Overall NPV 2016-2030: EUR 0.8 m Overall impact negative: (-)
SOCIAL IMPACTS	
Number and quality of jobs	The impact (positive or negative) would only materialise if it was decided to make use of the increased flexibility that this Option provides. In general this Option should support the sustainable development of aviation which will likely benefit the number and quality of jobs. Overall impact in terms of costs is not possible to be estimated upfront, and is therefore considered as neutral: (0)
Aviation safety	Environmental protection requirements shall not have a negative safety impact. However, the increased flexibility could potentially allow alternative means to achieve the environmental objective while having safety benefits. European Aviation Environmental Report will not have an impact on aviation safety. Overall impact neutral to positive: (0/+)
ENVIRONMENTAL IMPACTS	The proposed change would allow easier fine-tuning of the aviation environmental requirements for aeronautical products to the environmental interests of European citizens and industry. It would allow a separate cost-effectiveness assessment from a European perspective only, and should lead to a more optimised mix of mitigation measures than the global measures that are agreed in ICAO. Another significant benefit would be that the EU could react more quickly to new developments, as the current system de facto has to wait for the relatively slow ICAO process to be completed. Innovation would be a key element of that, as well as being one of the main factors allowing the sustainable development of aviation. The European Aviation Environmental Report is also expected to have positive environmental impact. Overall impact positive: (+)

Table 8: The result of the assessment of impacts per domain of policy options

	Management and quality of resources				Proportionality and safety performance		
	PO 1.2	PO 1.3(a)	PO 1.3(b)	PO 1.4	PO 2.2	PO 2.3	PO 2.4
ECONOMIC IMPACTS							
Functioning of the internal market	+	++	++/+++	+++	+	+	+
Operating and compliance costs for businesses	+	-	-	- - -	+	++	0/+
Administrative burden for businesses	0	0/+	0/+	+	-	--	--
Innovation	0	+	+	++	+	+	+
SMEs	0	+	+	+	+	+	-
International relations	+	+/++	+/++	++	0	0	0
Competitiveness	0/+	+	+/++	-	+	+	+
Implementation costs for public authorities	-	+	+	+++	+	- -	- -
SOCIAL IMPACTS							
Number and quality of jobs	0	0	0	0	+	+	+
Aviation safety	+	+/++	++	+++	+	+	+
ENVIRONMENTAL IMPACTS	0	0	0	0	0/+	0/+	0/+

	Ground-handling		Aviation Security		Environment
	PO 3.1(B)	PO 3.1(C)	PO 3.2(B)	PO 3.2(C)	PO 3.3(B)
ECONOMIC IMPACTS					
Functioning of the internal market	+	+/++	+	+/++	+
Operating and compliance costs for businesses	0	-	-	0/+	0
Administrative burden for businesses	-	- -	0/-	0/-	0
Innovation	0	0	+	++	+
SMEs	0	-	0	0	0
International relations	0	0	+	+	+
Competitiveness	0	-	0	0	0
Implementation costs for public authorities	-	- -	-	- -	-
SOCIAL IMPACTS					
Number and quality of jobs	+	+	0	0	0
Aviation safety	+	+	+	++	0/+
ENVIRONMENTAL IMPACTS	0	0	0	0	+

6 COMPARING THE POLICY OPTIONS

Within each policy domain, the policy options (PO) are compared to the baseline in terms of effectiveness, efficiency and coherence.

1.1. *Quality and management of resources*

Effectiveness: PO 1.3(b) is considered as the most effective in achieving SO 5, SO 2 and SO 3, even though PO 1.4 better contributes to the reduction of the future resources needs for aviation safety in the EU and scores higher on safety benefits. PO 1.4 is however not expected to be supported by Member States, and has high risks during the transition period towards a single aviation authority, which reduces the overall probability of successful implementation of this policy option, and thus means a lower overall effectiveness. PO 1.3(b) has a higher effectiveness in achieving the SO 3 than PO 1.3(a) by including the emergency mechanism for dealing with oversight problems in Member States. Other than that, both PO 1.3(a) and 1.3(b) leave the same large scope for voluntary action at the Member State level. PO 1.2 has a lower effectiveness in achieving SO 5, SO 2 and SO 3, as it does not have a strong contribution to the reduction of future resources needs and has only a marginal positive impact on safety compared to the baseline.

Efficiency: PO 1.2 and PO 1.3(b) score best in a cost-efficiency analysis. While PO 1.4 is more effective in achieving SO 5, and SO 3, as stated above, the savings that it would allow for Member States' budgets are imposed as costs on the single market (NPV of over EUR 4 billion for 2016-2030). Given that the EU has already a high level of safety the improvement that could be achieved in this respect by implementing PO 1.4 would be marginal compared to the costs incurred by the market operators. At the same time PO 1.3(b) would allow to deal with the most serious safety oversight deficiencies in a targeted and proportional manner. PO 1.3(a) is also cost-efficient when it comes to making more efficient use of resources, but does not provide the additional safety benefit of PO 1.3(b). Although these safety benefits will result in additional costs for the operators, these costs are more than outweighed by the fact that under PO 1.3(b) a safe operator from a Member State with safety deficiencies will be able to continue doing business, while under PO 1.3(a) it would have to stop the operations.

Coherence: All policy options are coherent with the overarching EU objectives of a safe and well-functioning internal market for aviation, although they contribute to different degrees to these objectives. PO 1.3(b) provides for a framework enabling a safe, future growth of the aviation industry while at the same time allowing for the simplification of the legal framework and keeping decision making at the national level, unless public safety is at risk and Member States do not take sufficient action to address this risk. PO 1.4 could be considered as disproportionate due to the high cost imposed on the industry and strong encroachment on existing Member State competences, and thus not coherent with the priorities of the Commission in promoting the development of the internal market. PO 1.2 is coherent with the overall EU objectives, but its coherence with the objective of the promotion of the single market is weaker than that of PO 1.3(a) and PO 1.3(b).

6.2 Proportionality and safety performance

Effectiveness: All three options effectively contribute to reaching SO 3. By making State Safety Programmes and the European Aviation Safety Plan mandatory and by ensuring consistency between safety planning at EU and Member State levels, safety management will be enhanced and better synergies created across the EU compared to the baseline. PO 2.2 is also effective in reaching SO 1 and SO 2, as it provides a systematic approach for the introduction of more proportional rules. The main limitation of PO 2.2 is the fact that under

this option performance based rules are only introduced on a case by case basis. In this respect PO 2.3 is more effective, as under this option performance based rules are introduced into all existing safety legislation. PO 2.2 and 2.3 both provide a choice between prescriptive and performance based rules which is a solution best tailored to the capabilities of organisations. While also covering all legislation, PO 2.4 is less effective than PO 2.3, as it requires all organisations to apply performance based rules irrespective of the maturity of their safety management systems.

Efficiency: PO 2.2, though limited in scope, is the most efficient option in terms of implementation as it only requires a revision of Regulation (EC) No 216/2008 and otherwise can be integrated in the regular legislative process without much additional cost. PO 2.3 and PO 2.4 have high implementation costs because all existing safety legislation has to be revised. In addition, implementation costs under PO 2.3 are even higher as two types of rules have to be maintained. PO 2.3 on the other hand has the highest potential for cost savings in the long run for businesses. Overall though, costs are expected to outweigh the additional benefits of more performance based legislation, rendering PO 2.3 and PO 2.4 less efficient.

Coherence: All options are coherent with the overarching objectives of EU policy, in particular with regard to better regulation and fostering innovation thus contributing to growth and jobs, and support EU-wide compliance with ICAO recommendations. They all contribute to reaching the objectives without significant negative impacts. PO 2.2 and PO 2.3 are most coherent with the principle of proportionality though as they provides a choice to the organisation as to which regulatory system (performance or prescriptive) to use.

1.2. Gaps and inconsistencies - ground-handling

Effectiveness: Both PO 3.1(B) and PO 3.1(C) are considered equally effective in meeting SO 3, which is the primary objective linked to the policy option in this policy domain. The EASA analysis concluded that safety impacts of risk bearing ground-handling related accidents can be adequately addressed by both policy options under consideration. It could be however assumed that PO 3.1 (C) would have additional positive effects on enforcement and implementation due to the certification requirements, which do not exist under PO 3.1(B).

Efficiency: PO 3.1(B) is considered more cost-efficient, as it allows SO 1 with smaller compliance and implementation costs for the operators and authorities than in case of PO 3.1(C). In addition, the fact that PO 3.1(B) is coherent with the existing market practices should help improving compliance rates if this policy option is chosen.

Coherence: Both PO 3.1(B) and PO 3.1(C) score similarly with respect to the coherence with the overarching EU objectives. They both contribute to the safety of the aviation sector and to a well-functioning internal market. By raising the quality of jobs in the ground-handling sector through more standardised training, they also contribute to the social agenda of the EU. PO 3.1(B) could be considered however as better respecting the principles of proportionality and better regulation, and is therefore given a better final score.

1.3. Gaps and inconsistencies - aviation security

Effectiveness: PO 3.2 (C) is expected to be more effective than PO 3.2(B) in achieving SO 4, SO 3, and SO 2 by not only establishing a clear legal basis for the EU to deal with cyber-security protection of civil aviation and security aspects of aircraft and ATM systems, but by also ensuring a better assessment of safety and security trade-offs and interdependencies in cost-benefit analysis leading to more optimal solutions being chosen. This should reduce the risk of gaps or unintended consequences and better take into account operational aspects in design of security measures.

Efficiency: The scope of PO 3.2(B) and of PO 3.2(C) is different and therefore the cost-efficiency analysis is not directly comparable. However, these differences in scope are also reflected in cost of implementation. In case of PO 3.2(B) costs are expected for the Member States and industry, but not the EU, where EASA in practice already acts but without a clear legal basis. With respect to protection of ATM systems and infrastructure, the cost efficiency can be ensured by setting essential requirements while leaving up to the operators the choice of the methods and means of meeting these requirements. The situation is different with respect to PO 3.2(C), where additional costs are also expected at the EU level, but where on the other hand overall compliance costs for businesses are expected to be lower compared to the baseline.

Coherence: PO 3.2(B) is coherent with the EU cyber security strategy which aims at strengthening the security and resilience of vital information and communication technology infrastructures. It also contributes to the deployment of the SESAR technologies and thus achievement of the Single European Sky objectives by defining essential requirements for protection and resilience of critical ATM infrastructure and systems. PO 3.2 (C) is coherent with the overall objective of promoting safe and efficient air transport market and with existing aviation security policy.

1.4. Gaps and inconsistencies – environmental protection

Effectiveness: PO 3.3(B) is effective in contributing to SO 2 and SO 4. It favours the development of new environmental technologies and their market uptake. By aligning the legislative approach in the area of environmental protection to that of safety regulatory consistency is enhanced.

Efficiency: PO 3.3(B) involves higher implementation costs as it requires the adoption of essential requirements and implementing rules. As these costs can partly be offset by cost savings stemming from flexibility gains the option is expected to be only slightly more costly than the baseline. Taking into account the positive effect this option has in reaching SO 2 and SO 4, PO 3.3(B) can nevertheless be considered efficient.

Coherence: PO 3.3(B) is coherent with the overarching objectives of EU policy. It strengthens the position of EU Member States in ICAO on environmental issues and thus of the EU as a global actor and is expected to foster innovation through new environmental technologies.

The summary table 9 below gives an overview on the comparison of options to their respective baselines:

Table 9: Comparison of options with respect to the baseline scenario

Quality and management of resources:

	PO 1.2	PO 1.3(a)	PO 1.3(b)	PO 1.4
Effectiveness	+	++	+++	++
Efficiency	+++	++	+++	++
Coherence	++	++	++	+

Proportionality and safety performance:

	PO 2.2	PO 2.3	PO 2.4
Effectiveness	+	++	+
Efficiency	++	0	0
Coherence	+	+	+

Gaps and inconsistencies (ground-handling):

	PO 3.1(B)	PO 3.1(C)
Effectiveness	+	++
Efficiency	++	+
Coherence	++	+

Gaps and inconsistencies (aviation security):

	PO 3.2(B)	PO 3.2(C)
Effectiveness	+	++
Efficiency	+	+
Coherence	+	+

Gaps and inconsistencies (environmental protection – aeronautical products):

	PO 3.3(B)
Effectiveness	+
Efficiency	+
Coherence	+

1.5. Preferred policy package

In view of the above the following policy package could be created based on a combination of the preferred option from each of the five policy domains. The options comprising the preferred policy package address the problem drivers from different policy angles that are complementary. Thus, the options are coherent with one another and could be implemented simultaneously.

Table 10: Final package of policy options

	Policy Option
Quality and management of resources	1.3(b) Emergency Oversight support mechanism
Proportionality and safety performance	2.2 Enablers for a proportional and performance based safety system
Gaps and inconsistencies - ground-handling	3.1(B) Ground handling (industry standards/no certification)
Gaps and inconsistencies - aviation security	3.2(C) Coordinated approach to safety and security related matters
Gaps and inconsistencies - environmental protection	3.3(B) EU essential requirements for environmental protection with respect to aeronautical products

In the final policy package the preferred options for all policy domains are based to a large extent on the principle of voluntary cooperation. Regulatory measures pursue above all the aim of furthering collaboration within the European aviation safety system with regard to

efficient use of resources and safety improvements. A regulatory system is created that allows for the development of aviation safety by providing a framework without imposing solutions. With the exception of ground handling, emergency oversight mechanism, and to a certain extent security of design, the measures proposed do not extend the scope of EU competence.[192]

Under the final policy package, the regulatory system is made more proportional by introducing the principle of a risk hierarchy and introducing performance based rules. Increased use of performance based regulation and industry standards leaves more room to technological developments on the market. Safety gains will be achieved through a collaborative safety management process linking organisations, Member States and EU level. Oversight is also expected to be improved by creating a framework for sharing and pooling of resources. The latter makes it possible to delegate responsibilities and to share resources according to the needs identified by the Member States and EASA based on a case by case cost-benefit analysis.

The summary of impacts with respect to the options constituting the final policy package is as follows:

With respect to the **internal market** there will be positive impacts on a level playing field through more uniform oversight by the National Aviation Authorities and promoting EU-wide training standards. A broader range of possibilities to demonstrate compliance including an increased reliance on industry standards will further stimulate market activity and choices on the market. Voluntary opt-in for state aircraft and Annex II aircraft is expected to have similar effects. Common rules for ground handling based on industry standards will ease market access and enhance safety with minimum necessary compliance costs. The emergency oversight support mechanism will allow compliant operators to continue to do business where a National Aviation Authority fails to address serious deficiencies in its oversight capabilities. Airlines will have more flexibility in leasing aircraft. It is not expected that implementation of the preferred policy package would result in additional costs for the consumers. As the measures proposed aim at increased efficiency, they are expected to contribute to reduced costs for consumers in the longer term perspective.

Compliance costs and other operational costs for businesses will overall be positively impacted. Positive impacts stem from a more proportional and performance based regulatory system, more flexibility in the means to meet requirements, an increased reliance on industry standards. In particular risk-based oversight will lead to savings for well-performing organisations. Simplified certification procedures for light aircraft are further examples where cost savings would be achieved while maintaining an acceptable level of safety. Airlines will be positively impacted by simplification of leasing approvals and possible consolidation of certificates held by the same company in multiple Member States. Financing of measures related to pooling or sharing of resources and the emergency oversight support mechanism will be borne by the industry based on the 'user pays principle', which may impact businesses in those Member States where oversight is currently financed from general tax revenue, but these measures would be applied by Member States largely on a voluntary basis.

As regards **SMEs and light aviation**, a number of measures would reduce the administrative burden for these sectors and make the regulation more favourable for small entrepreneurs. As

[192] It has to be noted that with regard to ground-handling and cyber security, the majority of the stakeholders support action at EU level (with the exception of airlines that do not support action with respect to ground-handling).

regards aircraft certification, an alternative procedure to a type certification is proposed for light aircraft used in low risk operations. Manufacturers of Annex II aircraft would be also allowed to have their products regulated under common rules and thus benefit from free circulation within the internal market if they wish so. Competent users organisations (such as national aeroclubs or light aviation associations) would be allowed to act - within established conditions - as qualified entities on behalf of the national aviation authorities, thus ensuring proximity of the oversight to the regulated entities. A modular approach to certification of aviation activities and removal of overly prescriptive definitions from the framework safety regulation will allow to better adapt requirements to the risks involved in light aviation and activities of small organisations. SMEs will be able to benefit from risk-based oversight, which removes unnecessary controls, but may not benefit from performance based regulation to the same extent as larger businesses which have more means to collect and analyse the necessary safety information.

Under the preferred policy package **innovation** will be impacted positively mainly by the measures with regard to proportionality and performance. These will free resources and allow new technologies to be introduced more easily thanks to eliminating overly prescriptive rules, reducing compliance costs and introducing a range of possibilities to demonstrate compliance. New technologies, such as electric engines or drones, would be reflected in the updated regulatory framework. The combined assessment of safety and security issues at regulatory level will lead to improved solutions and ensure that interdependencies and trade-offs between safety and security are better managed. Increased flexibility in setting environmental standards for aeronautical products could further stimulate innovation, and allow the EU to adopt solutions which are better suited to the EU context than a generic solution developed at ICAO level.

Under the preferred policy package **aviation safety** is expected to improve. Safety gains will be achieved through a collaborative safety management process linking organisation, Member States and EU level, and improved oversight thanks to easier sharing and pooling of resources. Closing safety gaps for ground handling and security aspects of design will have additional positive impacts. The emergency support oversight mechanism will be a new tool of last resort to help maintain a high safety standard throughout the EU.

Competitiveness of the European aviation sector will benefit from safety improvements and favourable conditions for innovation, which were described above.

With regard to **creating new jobs,** the final policy package should contribute to the EU aviation sector to continue being able to safely grow in the future, stimulating innovation and new technologies, and cutting costs which are not justified from a safety perspective, in particular in the general aviation and SME sector. This should translate into additional jobs on the market.

With respect to **implementation costs**, Member States that have not yet introduced State Safety Programmes will be required to do so. Further costs arise from the need for additional training. Certain Member States will have to develop expertise in cyber security and ground handling. Nevertheless, the majority of the measures proposed and which affect the resources of Member States will be applied on a voluntary basis, and be activated by a Member State on the basis of a positive cost-benefit analysis. After some initial set-up and training costs, positive impacts on the resources of national aviation administrations are expected in the mid and long run, by achieving efficiency gains through the pooling and sharing of resources and the move to more targeted, risk-based oversight. The pooling and sharing of resources will be financed by fees and charges based on the 'user pays principle'. The preferred ground-

handling and security options do not involve new certification requirements and as a result oversight costs for Member States are not expected to be significant.

In terms of **resource needs for EASA** the preferred policy option would comprise to the following:

Table 11: Resources needs of EASA under preferred policy package
(1 FTE = EUR 95 000, not including overheads; based on support study on resources)

Policy option	Resources in FTE	One-off costs in EUR (non-staff costs)	Annual costs in EUR (incl. staff costs)	NPV 2016 – 2030 in EUR[193]
PO 1.3(b) Emergency Oversight support mechanism	1 FTE (repository of certificates) 1 FTE (pool of experts) 1 FTE (accreditation scheme for training institutes and monitoring)	Central repository of certificates: 1.2 m Pool of experts: 0.4 m development of virtual training academy: 0.1 m Additional training guidance material: 0.2 m setting up of administrative and contractual framework for delegations: 0.7 m	Central repository of certificates annual maintenance: 0.5 m Pool of experts: 0.1 m Promotion of risk and performance based oversight methods: 0.2 m Accreditation scheme: 0.095 m	12.7 m (annual costs) + 2.6 m (one-off costs)
PO 2.2 Enablers for a proportional and performance based safety system	Tasks are expected to be absorbed by present staff	No additional costs for EASA. Possibility for cost reduction due to increasing reliance on accreditation mechanisms and declarations of compliance for product certification should also reduce the costs of EASA in product certification etc.		
PO 3.1(B) ground handling (industry standards/no certification)	1.5 FTE	n/a	set up and maintain the system of common requirements incl. initial rulemaking standardisation and implementation support: 0.142 m.	2.05 m
PO 3.2(C) Coord. approach to safety and security related matters	3 FTE [194]	n/a	Support to rulemaking and inspections: 0.295 m	4.3 m
PO 3.3(B) EU essential requirements for environmental protection wrt aeronautical products	2 FTE	n/a	Update of environmental rules: 0.095 m IT equipment EUR 0.3 m European environmental report: 0.095 m	7 m
Total:	**9.5 FTE**	**2.6 m**	**1.822 m**	**28.65 m**

Possible financing of these resource needs is set out in Annex X 'The use of en-route charges to finance EASA activities in the field of ATM/ANS'.

[193] This NPV includes also the costs of FTE listed in the table.
[194] Depending on evolution of EASA role in inspections the number of FTE may increase to 7.

2. MONITORING AND EVALUATION

This section presents the monitoring and evaluation arrangement for the final policy scenario as described in the preceding section and with respect to the policy objectives of this initiative. Ample mechanisms for monitoring and evaluation already exist and can be used, due to the fact that in the field of aviation safety the monitoring of performance is an integral element of the regulatory framework.

The proposed monitoring and evaluation system would therefore largely rely on data and information sources and feedback processes already in place, or created through the implementation of the policy options envisaged under the present initiative. This should reduce additional administrative burden for Member States and industry to the minimum.

Table 12: Indicators for monitoring and evaluation of the final policy package

- **(SO 1) Eliminate unnecessary requirements and ensure that regulation is proportionate to the risks associated with different types of aviation activities:**

Main indicators	Source of information	Entity responsible for monitoring
1. Positive feedback from stakeholders and aviation authorities; 2. Reducing number of questions of interpretation concerning the revised rules; 3. Number of operators using performance based rules for demonstrating compliance with essential requirements; 4. Number of General Aviation Private Pilot Licences 5. Reduced costs for operators	- Regulatory committee under successor of Regulation (EC) No 216/2008 (regular basis) - Citizens and businesses (regular basis) - EASA standardisation and consultative bodies (regular basis); - Article 62 evaluation (every five years);	European Commission EASA EASA Management Board

- **(SO 2) Ensure that new technologies and market developments are efficiently integrated and effectively overseen:**

Main indicators	Source of information	Entity responsible for monitoring
1. Number of new rules which make reference to recognised industry standards; 2. Reduced age of the general aviation fleet in EU; 3. Reduced costs of aircraft certification and production; 4. Number of new certifications	- Rulemaking programme (annual basis) - Aircraft manufacturers (ad hoc)	EASA European Commission

- **(SO 3) Establish a cooperative safety management process between Union and its Member States to jointly identify and mitigate risks to civil aviation:**

Main indicators	Source of information	Entity responsible for monitoring
1. Accident rate in relation to traffic growth 2. Improving results of EASA standardisation and continuous monitoring activities 3. State Safety Programmes implementation level in Member States 4. Risk bearing occurrences involving ground-handling;	- EASA Safety Report (annual) - European Aviation Safety Plan (annual) - Central Repository of Information on occurrences in civil aviation (continuous) - Safety recommendations information system (continuous)	European Commission EASA

❖ **(SO 4) Close the gaps in the regulatory system and ensure its consistency:**

Main indicators	Source of information	Entity responsible for monitoring
1. Positive feedback from stakeholders and aviation authorities 2. Reducing number of questions of interpretation concerning the revised rules	- Regulatory committee under successor of Regulation (EC) No 216/2008 (regular basis) - Citizens and businesses (regular basis) - EASA standardisation and consultative bodies (regular basis); - Article 62 evaluation (every five years);	European Commission EASA

❖ **(SO 5) Create an effectively working system of pooling and sharing of resources between the Member States and the Agency:**

Main indicators	Source of information	Entity responsible for monitoring
1. Improving results of the EASA standardisation inspections and continuous monitoring with respect to resources and its competence in Member States 2. Positive feedback from Member States on workload impact of EU rules 3. Number of Member States making use of EU aviation safety inspectors, and new instruments for pooling and sharing of resources (delegation of responsibilities, opt-in for state and Annex II aircraft) 4. Evolution of resources in national aviation authorities of Member States measured in terms of FTEs and budget	- EASA standardisation report (annual basis) - 'Article 62 evaluation' (every five years) - Regulatory committee under successor of Regulation (EC) No 216/2008 (continuous basis) - EASA standardisation and consultative bodies (continuous basis); - Member States authorities (continuous basis) - EASA standardisation information system - SIS (continuous basis)	European Commission EASA EASA Management Board

8 IMPLEMENTATION OF THE PREFERRED POLICY PACKAGE

This chapter deals with aspects relates to the implementation of the preferred policy package. Issues taken into account in this respect include: operational objectives; timeframe for implementation; implementation risks; and interdependencies between different policy domains.

8.1 Operational objectives

The operational objectives are related to the specific measures to be implemented under the policy options comprising the final policy package (Table 13):

Table 13: Operational objectives with respect to the final policy package

Policy Option	Main operational objectives
1.3(b) Emergency Oversight support mechanism	- Establish a pool of EU-accredited aviation safety inspectors with clearly defined privileges, common liability regime, and funded through fees. - Establish an emergency oversight support mechanism to deal with weaknesses in safety oversight capabilities of Member States; - Create a legal basis for Member States to transfer responsibilities to each other Member States or EASA on a voluntary basis; - Enable allocation of certification and oversight tasks competent users organisation in the general aviation sector; - Establish a repository of information relevant for cooperation between authorities in certification, oversight and enforcement. - Establish an accreditation scheme for aviation training institutes

	- Introduce a more flexible framework for funding EASA activities; - Create a possibility of opt-in for state aircraft and Annex II aircraft produced in series;
2.2 Enablers for a proportional and performance based safety system	- Ensure all Member States implement State Safety Programmes; - Establish a formal process for the development and implementation of the European Aviation Safety Plan; - Review definitions and classifications of aircraft and operations in Regulation (EC) No 216/2008 to align them with risk hierarchy principles; - Introduce a broader range of possibilities for demonstrating compliance with essential requirements, in particular for product certification, based on risk assessment; - Introduce principles of risk hierarchy and risk assessment to the mechanism of exemptions and derogations under Regulation (EC) No 216/2008.; - Simplify the regulatory framework for wet leasing of aircraft between EU operators; - Ensure greater reliance on recognised industry standards when developing. - Develop policy on performance based regulations;
3.1(B) Ground handling (industry standards/no certification)	- Establish essential requirements and a legal basis for oversight of ground handling service providers in the EU;
3.2(C) Coordinated approach to safety and security related matters	- Establish EU essential requirements for cyber-security; - Establish a process for involvement of EASA in the work on aviation security where the Agency has relevant expertise; - Clarify the competence of EASA to issue security directives;
3.3(B) EU essential requirements for environmental protection with respect to aeronautical products	- Establish EU essential requirements for environmental protection of aeronautical products; - Establish a legal basis for aviation environmental protection report;

8.2 Timeframe for implementation

The timeframe for implementation depends on each particular measure. Some measures are a 'low-hanging fruit', where the very change of EU law would already provide benefits. Other measures would require preparatory work to be done which could last between one to three years. Table 14 presents an overview of the implementation timeframe for the policy options comprising the final policy package where measures require preparatory work.

Table 14: Timeframe for implementation of the preferred policy package

Policy Option	Timeframe for implementation
PO 1.3 (B)	Up to three years. Need for EASA to prepare for accepting transfers of responsibilities from Member States and to exercise oversight under the emergency oversight mechanism. Similar timeframe would be needed for establishment of repository of information on personnel, organisations and aircraft.
PO 2.2 +	Implementation of performance based regulations takes place on a case by case basis and the timeframe depends on the length of a rulemaking process involved. Implementation of national and EU safety programmes is an ongoing process. Implementation of a state safety programme requires up to five years according to ICAO.
PO 3.1 (B)	Up to two years needed for development of the necessary regulatory material by EASA.
PO 3.2 (C)	Up to two years needed for development of the necessary regulatory material by EASA for security of aviation systems (primarily for ATM).

8.3 Implementation risks

The main implementation risks are linked to the measures concerning the transfer of responsibilities for the implementation of EU aviation safety legislation. This applies to the

horizontal transfers (between Member States), vertical transfers (between Member States and EASA), and the emergency oversight mechanism. There are two types of issues to be considered here. Firstly, such transfers should only take place if the transferred responsibilities can be exercised efficiently and in full compliance with the applicable safety legislation. Secondly, there should be no ambiguity about which authority is responsible for which organisation/activity.

When it comes to the emergency oversight mechanism, its effectiveness will depend on the ability of EASA to develop the means and capabilities to act as a competent authority for AOC oversight, which would be a new competence for EASA.

In order to mitigate the above risks, conditions under which the transfers can take place (or should not be taking place) must be established in the EU legislation. Transparency should be also ensured by establishing a register of such arrangements, and which should include information about the scope of the transfers effectuated. Last but not least, adequate financing of the regulatory responsibilities subject to transfer must be provided for. In case of transfers between Member States, such financing should be agreed between the Member States concerned. In case of the transfers to EASA, including under the emergency oversight mechanism, the financing mechanisms should be created by EU law (i.e. extending the current fees and charges scheme to issuance and oversight of certificates issued by EASA under the transfer arrangements).

8.4 Interdependencies between measures in different policy domains

The Options comprising the final policy package address problem drivers from different angles and are mostly self-standing. Some interdependencies do however exist between PO 2.2 (Proportionality and safety performance) and PO 1.3(b) Emergency oversight mechanism.

In particular the implementation of a risk and performance based approach to safety regulation and oversight will require the authority inspectors and specialists to acquire additional competences such as the ability to assess safety management systems. Moreover, as oversight will be mainly based on performance, the ability to measure safety performance should also become part of the inspectors' knowledge base. The need to perform oversight of ground-handling will also require some additional resources from Member States, although this should not be overly demanding due to the fact that a certification process is not proposed.

It is however expected based on the impact assessments that the benefits of the measures under PO 1.3(b), including in particular the arrangements for pooling and sharing resources, will more than outweigh the demands put on authority resources under other policy options. In particular, as demonstrated in Chapter 5, under PO 1.3(b) mid to long term positive effects on reduction of future resources needs of Member States are expected, the NPV of which is estimated during the 2016-2030 time frame at EUR 13-25 million.

ANNEX I

Procedural information concerning the process to prepare the impact assessment report and the related initiative

LIST OF ABBREVIATIONS

A-NPA	Advanced Notice of Proposed Amendment
ANS	Air Navigation Services
AOC	Air Operator Certificate
ATM	Air Traffic Management
CAT	Commercial Air Transport
EASA	European Aviation Safety Agency
EASP	European Aviation Safety Programme
EASp	European Aviation Safety Plan
EFTA	European Free Trade Association
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAA	Federal Aviation Administration of the United States of America
FTE	Full Time Equivalent
GDP	Gross Domestic Product
IA	Impact Assessment
IAB	Impact Assessment Board
ISG	Inter-service Steering Group
ICAO	International Civil Aviation Organization
MTOM	Maximum Take Off Mass
NAA	National Aviation Authority of an EU/EFTA Member State
PBR	Performance Based Regulation
SES	Single European Sky
SESAR	Single European Sky ATM Research
SME	Small and Medium Sized Enterprises
SMS	Safety Management System
SPS	Safety Performance Scheme

1. Lead DG: DG MOVE

2. Agenda planning reference: 2015/MOVE/001

This impact assessment is prepared by DG MOVE to support a legislative proposal regarding a revision of Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/20012 and Directive 2004/36/EC (Agenda Planning Reference No 2015/MOVE/001). The original roadmap was published in April 2014, and an updated version was published in May2015.[195]

3. Organisation and timing:

An Inter-service Steering Group (ISG) was created in January 2014 following an invitation sent by DG MOVE to DGs and services concerned including the SG, DG SJ, DG BUDG, DG CLIMA, DG EMPL, DG GROW, DG ENV, DG NEAR, DG HR, DG RTD, EEAS as well as EASA (Ares(2014)9349). The SG, DG SJ, DG BUDG, DG EMPL, DG GROW, DG NEAR, DG HR, DG RTD, DG CLIMA and EASA actually participated and contributed actively. DG HOME was also consulted for the parts of the impact assessment which concern aviation security aspects. The ISG met 3 times. The first ISG meeting took place on 31 January 2014, the second meeting on 26 March 2015, and the third meeting on 7 May 2015. In addition, the ISG was consulted on the questionnaire that DG MOVE used for the stakeholder consultation and on the interim and final reports of the two support studies contracted by DG MOVE.

4. Consultation of the Impact Assessment Board:

This impact assessment report was reviewed by the Commission Impact Assessment Board (IAB) on 17 June 2015. The IAB has issued a positive opinion on 19 June 2015. Based on the IAB recommendations, the IA report has been revised as follows:

(a) Comparison of the accident rate in Europe and in other regions has been added in Chapter 1;

(b) Additional information was provided in Chapter 2 on how the problems have been identified;

(c) The problem tree has been reviewed and its presentation changed to clearly indicate the relationship between the problems and problem drivers and to indicate the relative importance of each problem driver;

(d) The main categories of air accidents in the EU have been added in Chapter 2, as well as indication of the main risks affecting the EU aviation safety system (based on European Aviation Safety Plan);

(e) Problem definition chapter has been reviewed and additional evidence provided where possible;

(f) The baseline scenario has been revised, including the calculation of possible evolution of accident rates based on latest data and technical analysis done by EASA;

(g) The formulation of the objectives have been revised;

[195] http://ec.europa.eu/smart-regulation/impact/planned_ia/roadmaps_2014_en.htm#MOVE

(h) The description of the options has been expanded to better explain how the different options would be implemented;

(i) A description of the impacts of the final policy package on SMEs and light aviation has been added in Chapter 7;

(j) A new Chapter 8 has been added and which addresses implementation aspects related to the final policy package (operational objectives, risks, interdependencies and timing);

(k) Glossary of technical terms and a bibliography have been added as Annexes XXIII and XXIV.

5. External expertise:

DG MOVE contracted two studies to support the impact assessment process:

- The first study analysed the availability, efficiency of utilisation and evolution of human resources and financing of the European aviation safety system (support study on resources).[196] This study concluded that the resource to workload balance has deteriorated over the last 10 years. The mismatch between resources and workload is intensified, according to the study, by a sub-optimal allocation of resources and qualification level of staff across the system. The study concludes that, combined, these aspects prevent aviation authorities from performing up to expectations. Additionally, the insufficient harmonisation of working approaches between National Aviation Authorities and the differences in charging schemes contribute to creating an uneven playing field that undermines the common aviation market in Europe.
- The second study, on performance schemes and performance based approach, explored possibilities of introducing performance elements in the management of aviation safety (support study on performance).[197] This study concluded that introducing a safety performance scheme is feasible, but cautions against its rapid introduction for a number of technical reasons. With respect to performance based approach to the regulation of aviation safety, the study concluded that this should have a positive impact on aviation safety and innovation, but the impact can only be described qualitatively and is very much depending on the specific rules that will be converted from prescriptive to performance based, which makes it impossible to quantify upfront the benefits of such approach. A meeting was held with safety performance experts of Member States and industry to peer review the results of the study on 10 February 2015, a summary of which has been included in Annex XVIII.

This Impact Assessment takes into account the relevant ICAO documentation, including the Global Aviation Safety Plan, which sets out a continuous improvement strategy for States to implement over the next 15 years, when the global aviation traffic is expected to double, including the achievement of predictive risk management capabilities by 2027.[198]

The Commission also took into account the EU General Aviation Strategy and Roadmap, which concluded that General Aviation is regulated in a disproportionate and bureaucratic

[196] ECORYS, Study on the resources deployed in the area of European aviation safety before and after the creation of EASA (Support study on resources), Final Report, (2015).
[197] ECORYS, Performance Scheme and Performance Based Approach in the context of aviation safety (Support study on performance), Final Report, (2015).
[198] ICAO, Global Aviation Safety Plan, Doc. 10004.

manner and sets out recommendations for a more proportionate regulatory system for light aviation and SMEs. [199]

This Impact Assessment also draws on the discussions and recommendations of the sub-group on the future EU aviation regulatory system of the EASA Management Board, which was made up of the Directors-General of Civil Aviation of 14 EU/EFTA countries, as well as of representatives from EASA and DG MOVE.[200] Finally the results of the independent external evaluation conducted in accordance with Article 62 of Regulation (EC) No 216/2008 on the implementation of this regulation were taken into account (Article 62 evaluation).[201] Both of these groups recommended, amongst other, a number of amendments to Regulation (EC) No 216/2008. The summaries of recommendations of both these groups are attached as Annexes IV and V.

[199] EU General Aviation Strategy and Roadmap, http://easa.europa.eu/easa-and-you/aviation-domain/general-aviation/general-aviation-road-map.
[200] EASA Management Board sub-group, 'Final Report' (2015), http://easa.europa.eu/the-agency/governance/management-board/meetings/mb-032014.
[201] Article 62 evaluation, Final Report (2013), http://easa.europa.eu/system/files/dfu/Article%2062%20Report.pdf.

ANNEX II

Summary of Commission Public Consultations

This section presents a brief summary of the results of the public consultation. A more detailed overview is set out below:

- There is a strong agreement that the EU has achieved a very high level of safety. Over 90% of contributors agreed or strongly agreed with a statement that it is, at present, safe to travel by plane in the EU;
- At the same time it was recognised that, when it comes to safety, there is no place for complacency. Over 70% of Member States and industry organisations which contributed to the Commission's on-line survey believe that the ability to identify and mitigate safety risks has to be improved;
- Beyond maintaining the current safety performance, the main concern of Member States and stakeholders is the efficiency and proportionality of the present system. The vast majority of the organisations which contributed to the Commission's on-line survey (82%), and in particular the SMEs, argue that existing regulation is too detailed and prescriptive, and that the current safety levels could be maintained with lower compliance cost (83%). This view is largely shared by Member States;
- There is a concern amongst Member States and industry that the current way the technical resources are being used by the aviation authorities is inefficient, and that some National Aviation Authorities experience shortages of resources. The majority (63%) of Member States and of the organisations which submitted replies to Commission's on-line survey believe that some of the National Aviation Authorities do not have sufficient financial or human resources to carry out their oversight tasks;
- The aircraft manufacturing industry has strongly advocated a more active role of the EU in promoting European safety standards internationally, including in ICAO, and expressed concern about long-term availability of resources at EASA for product certification;
- Many of the organisations which contributed to the Commission's on-line survey pointed towards inconsistencies in application of law stemming from its varying interpretations by Member States.

DG MOVE and EASA collaborated closely on the stakeholder consultation. While DG MOVE prepared a questionnaire published on *'Your Voice in Europe'*, EASA published an 'Advance Notice of Proposed Amendment' (A-NPA). The two consultations were complementary, with the Commission consultation being more high level and the EASA A-NPA going into more detail on specific issues. Both consultations were launched on 15 May 2014 and ran until 15 September 2014. In addition, both DG MOVE and EASA conducted a number of meetings with Member States and aviation stakeholders to supplement the public consultations with additional information.

Supplementary feedback on the problem definition and possible policy options was collected during dedicated events: on 10 February 2015 a meeting was held with safety performance experts of Member States and industry; on 23 February 2015 a meeting was held with Member State and industry representatives covering all aspects of the initiative. Conclusions of both meetings are attached as Annex XVIII and XIX respectively.

The Commission has sought an Opinion from EASA, which was delivered on 16 March 2015.[202] The Opinion is based on over 6 000 comments submitted by Member States and stakeholders, and suggests a variety of changes to the different areas of technical regulation of aviation including safety, security, research and environmental protection. The Opinion also makes suggestions on how the resources of EASA and National Aviation Authorities could be used more efficiently. The individual replies to EASA consultations were also available to the Commission and used for the purpose of the impact assessment.

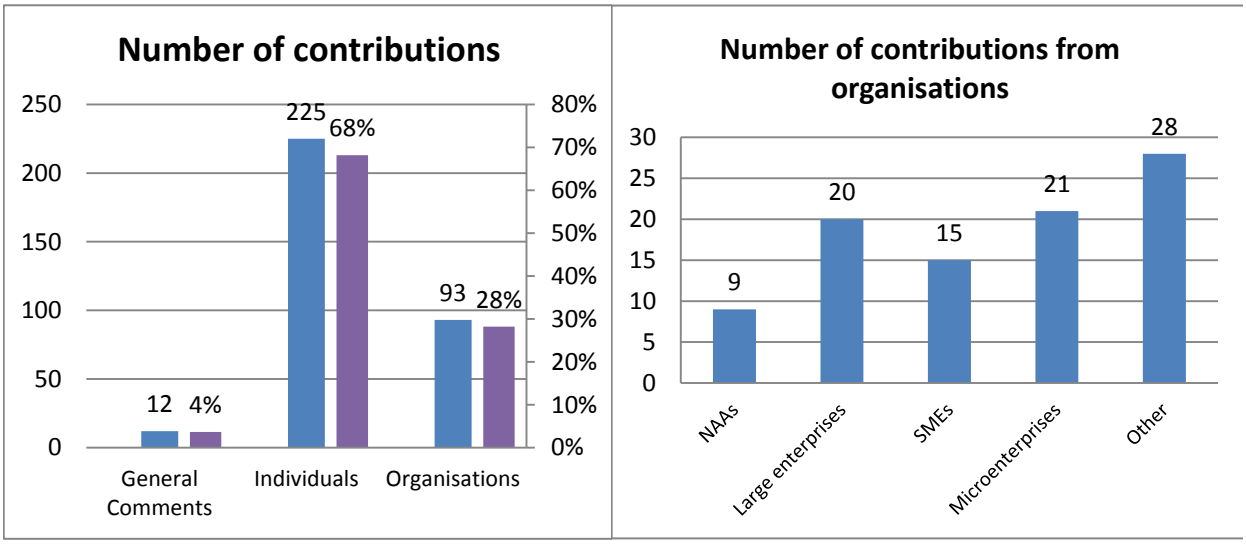
The Commission's minimum standards regarding public consultations have been met.[203]

A. GENERAL OVERVIEW OF CONTRIBUTION SOURCES

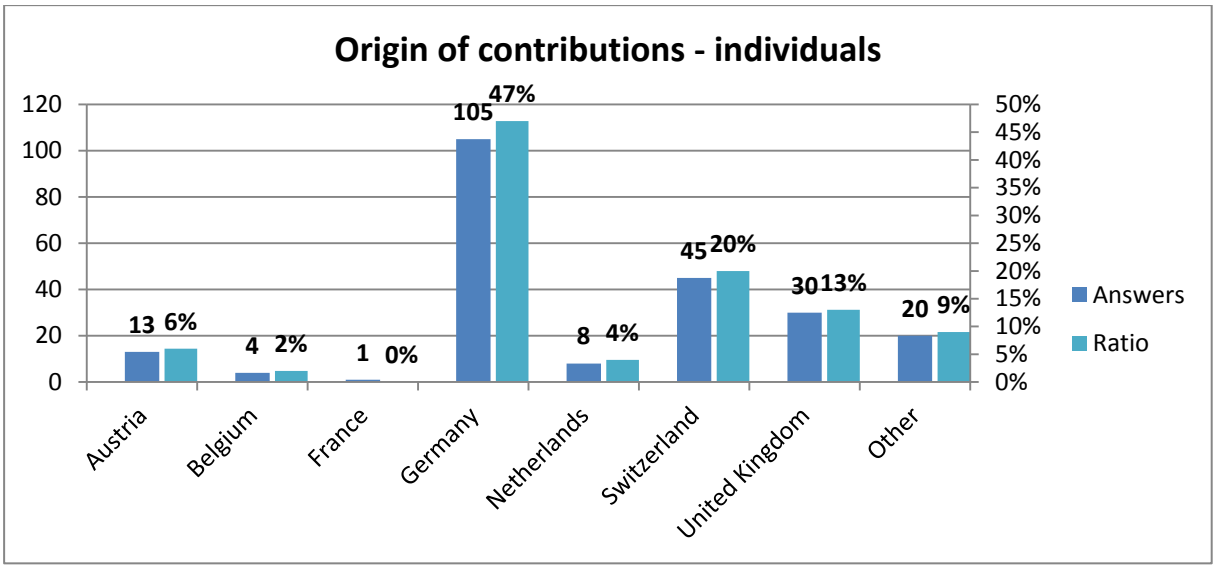
The public consultation has been opened on 23 May and closed on 15 September 2014.

In total 330 valid contributions were submitted, including 12 general comments (4%[204]), 225 contributions from individuals (68%) and 93 contributions from organisations (28%). Amongst the contributions from organisations, 9 were coming from National Aviation Authorities. In addition to National Aviation Authorities, a contribution was also submitted by EUROCONTROL.

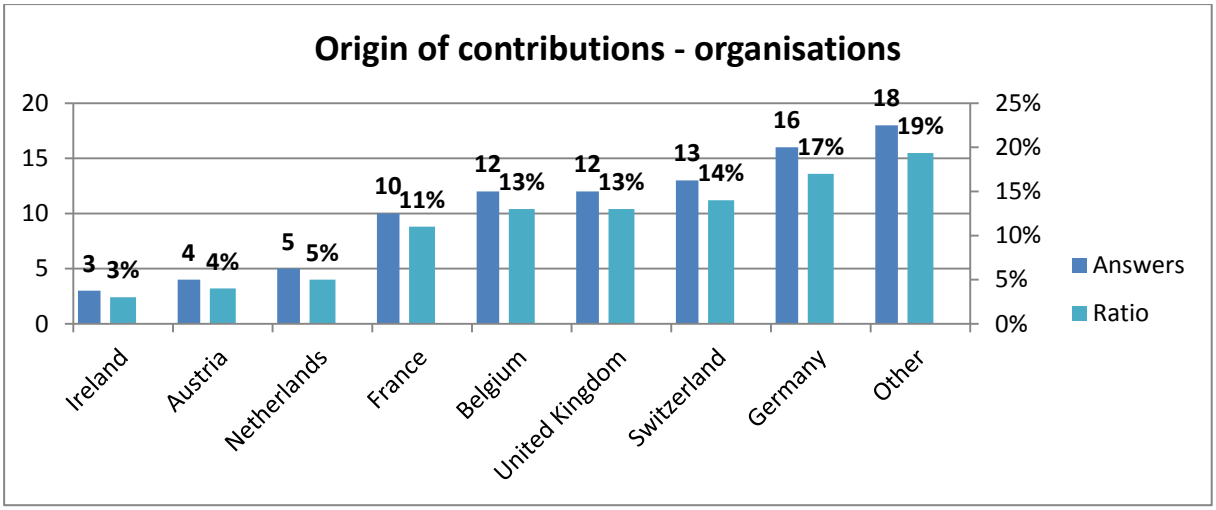
Contributions from organisations included 20 from large enterprises, 15 from SMEs and 21 from microenterprises. Overall contributions from enterprises constituted 60% of all submissions from organisations.



[202] EASA, Opinion 1/2015, http://easa.europa.eu/document-library/opinions/opinion-012015
[203] COM(2002)704.
[204] Note: Some of the percentages may not add up to 100% due to rounding of figures.



In terms of geographical distribution of contributors, the vast majority of submissions from individuals came from Germany (47%), followed by Switzerland (20%) and UK (13%).



When it comes to geographical distribution of submissions from organisations, nearly 70% of all contributions came from five States: Germany (17%), Switzerland (14%), United Kingdom (13%), Belgium (13%) and France (11%).

B. ISSUES TO BE ADRESSED

The subsequent part of this summary document contains an overview of the responses to the questions included in the survey. This overview consists of the statistical presentation of the replies to the multiple choice questions, as well as a summary of the main responses submitted by respondents as 'free text'. The replies to the multiple choice questions have been split into National Aviation Authorities, all organisations (which includes also National Aviation Authorities), and individuals.

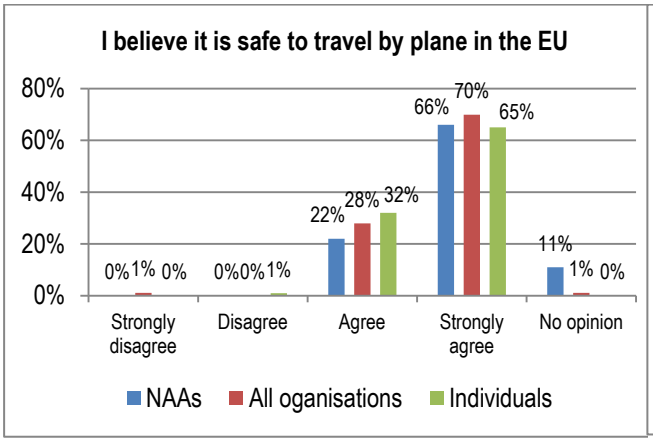
Due to the overly represented population of individual submissions from German private pilots, for some of the questions the results have been also compared with the population of individual responses which did not contain submissions from Germany.

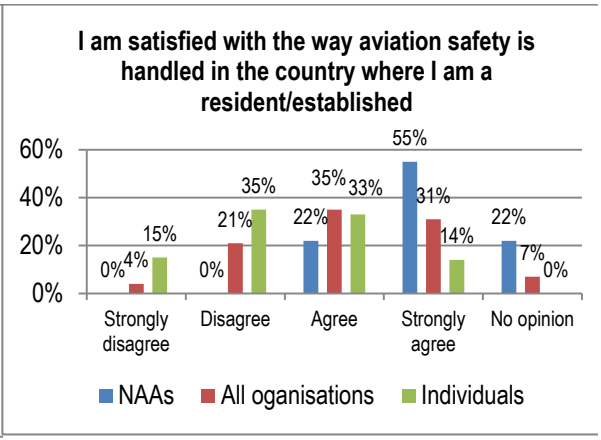
a. Overall satisfaction

Overall there is a strong agreement amongst all the categories of respondents (organisations: 98%; National Aviation Authorities: 88%; individuals: 97%) that aviation safety in the EU stands at present at a very high level.

Overall, the majority (66%) of the organisations which responded to the questionnaire are satisfied with the way aviation safety is managed in the country where they are established. A deeper analysis of the 25% of the organisations which responded that they are not satisfied revealed that nearly half of them (42%) are microenterprises employing less than 10 persons.

The satisfaction with the way aviation safety is managed is visibly lower amongst the individuals, where 50% of respondents responded that they are not satisfied with the current state of affairs. This relatively high level of unsatisfied individual respondents is maintained also when the contributions from private pilots from Germany are excluded from the analysis (52% satisfied; 46% not satisfied).



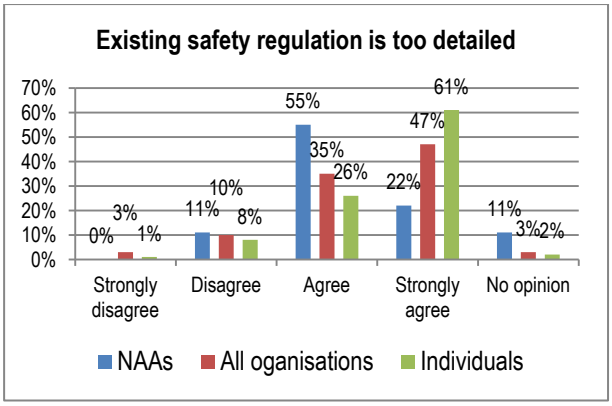


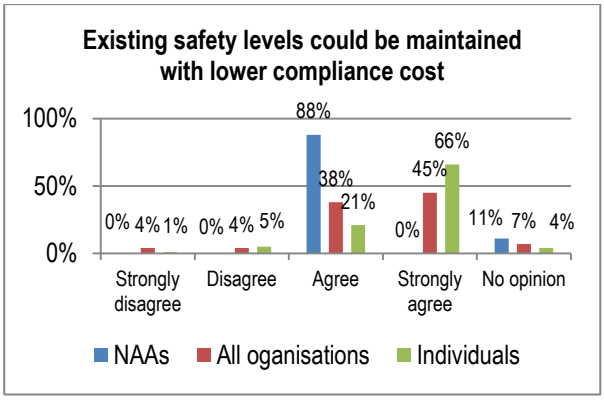
Some National Aviation Authorities pointed out that while the present safety levels are satisfactory, this should not distract the regulators from focusing on maintaining this good safety record in the future.

b. Specific Problem Areas

i. Level of regulation

Both the majority of the respondent organisations (82%) and the majority of the individuals (87%) stated that the existing safety regulation is too detailed, and that the existing safety levels could be probably maintained with lower compliance costs (83% of the organisations; 87% of the individuals). The respondent National Aviation Authorities largely share these views.





Many of the contributing organisations were of the opinion that the current complexity of the regulations is beyond the capability of the operators to understand and manage effectively, and that this in itself may present a risk, as organisations tend to overly focus on demonstrating compliance with the requirements instead of managing safety.

The contributors from the General Aviation community especially were of the opinion that impact assessments are not thorough enough and the effect of regulations on aviation safety is not being sufficiently evaluated, and that this results in requirements which are disproportionate to the risk or

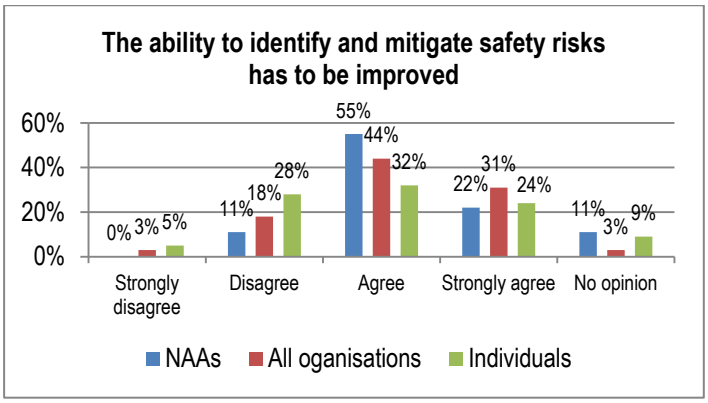
even not addressing the right risks. More generally the present requirements for non-commercial flying are considered as too onerous and costly compared to the achieved safety benefit. Many contributors suggested that the present definition of commercial operation should be reviewed.

It was pointed out by some of the contributors that North America achieves a similar safety level to EU, but with a much lower regulatory and financial burden upon its industry.

It was also pointed out by many of the organisations that aviation authorities (both at EU and NAA level) have inconsistent interpretations of the requirements. It was felt by contributors that some of the interpretations are more restrictive than the original intention of the rule.

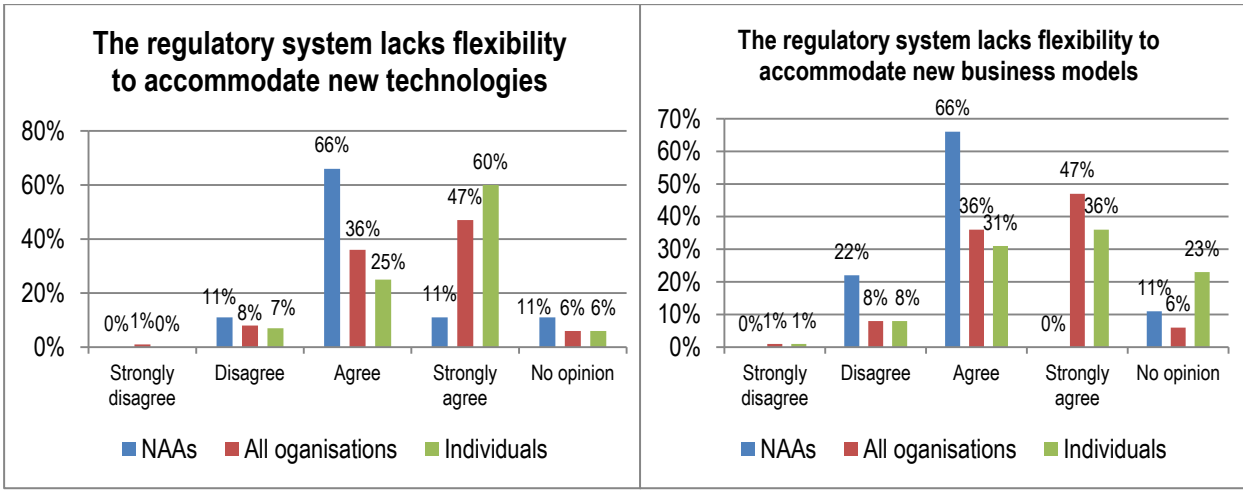
ii. Ability to identify risks and to accommodate new technologies and business models

While a clear majority of National Aviation Authorities (77%) and of the respondent organisations in general (75%) agree that the ability of the EU to identify and mitigate safety risk must be improved, there is also a group of organisations (21%), which disagree. An analysis of the latter group did not reveal any particular pattern in its composition. 56% of individual respondents believe that the ability of the EU to identify and mitigate safety risk must be improved, while 34% of the individuals disagree.



The large majority of all categories of respondents agree that the current system lack the ability to accommodate new technologies and new business models. As far as technologies are concerned, RPAS has been mentioned as an example by many of the organisations and National Aviation Authorities.

At the same time, the representatives of the aviation employees expressed their concerns about the possible negative impact of new business models on aviation safety and working conditions.

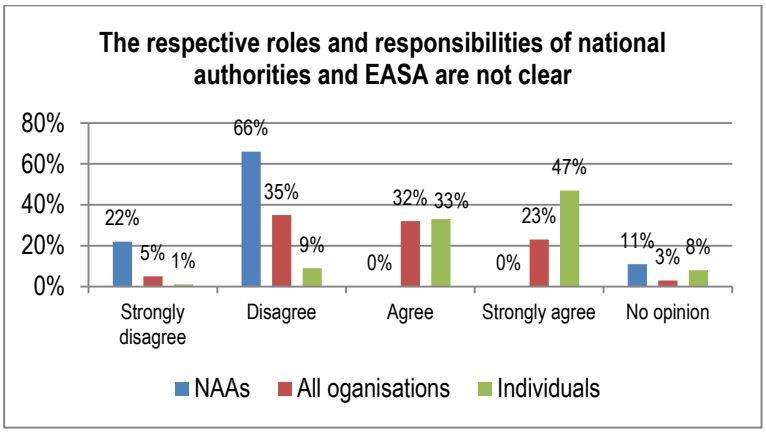


With respect to the new business models, some National Aviation Authorities and industry organisations suggested that rather than trying to restrict them, the rules should be broad enough to

safely accommodate them. It was also felt by some National Aviation Authorities that the new business models may put additional strain on oversight resources of competent authorities.

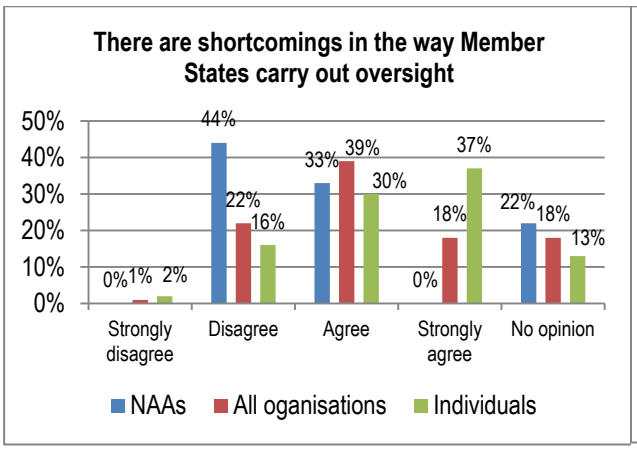
iii. Clarity of roles and responsibilities

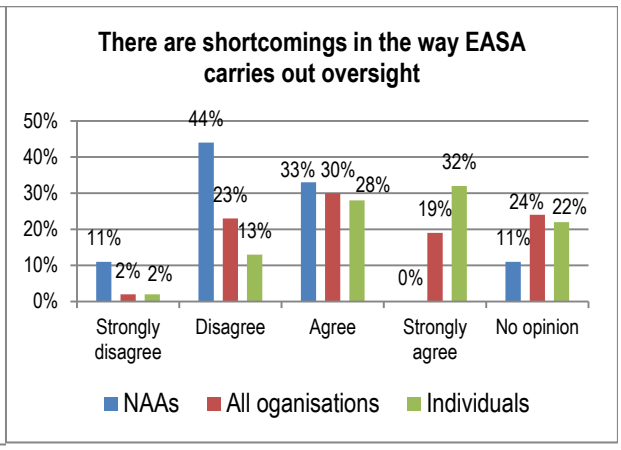
The division of responsibilities between National Aviation Authorities and EASA are clear for the Member States. On the other hand for 56% of the respondent organisations, the division of the respective roles and responsibilities of National Aviation Authorities and EASA are not clear. When it comes to individuals, 81% of them responded that the roles and responsibilities of National Aviation Authorities and EASA are not clear.



iv. Ability to carry out oversight by National Aviation Authorities and EASA

57% of organisations responded that there are shortcomings in the way Member States carry out oversight. 49% of the respondent organisations are also of the view that there are shortcomings in the way EASA carriers out oversight. When it comes to individuals, 67% of the respondents identified shortcomings in the national authority oversight, and 60% in EASA oversight. Most of the National Aviation Authorities which responded do not see shortcomings in national and EASA oversight.





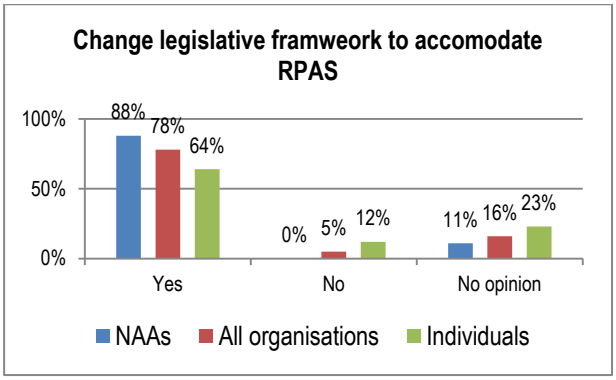
v. International leadership

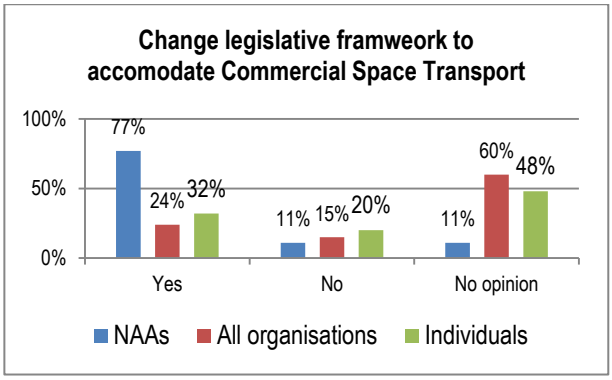
There are split views amongst respondents as to the EU international leadership on aviation safety. While 41% of organisations believe that EU lacks international leadership, 37% disagree with such a statement, and 21% have no opinion at all. The opinions of the National Aviation Authorities are split half-half.

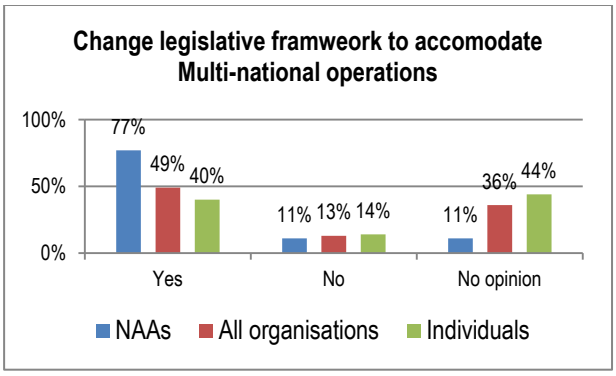
vi. Scope of the present rules

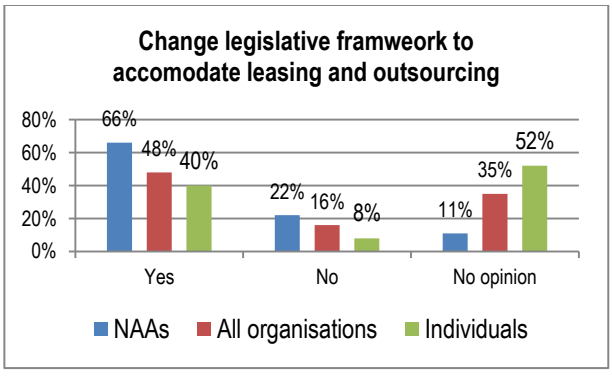
There is a very clear agreement amongst all the categories of respondents that the current legislative framework needs to be adjusted / extended to accommodate RPAS. When it comes to Commercial Space Transport, the majority of the organisations (60%) were not able to express an opinion, while 77% of respondent National Aviation Authorities see a need for a regulatory action in this respect (either at EU or ICAO level).

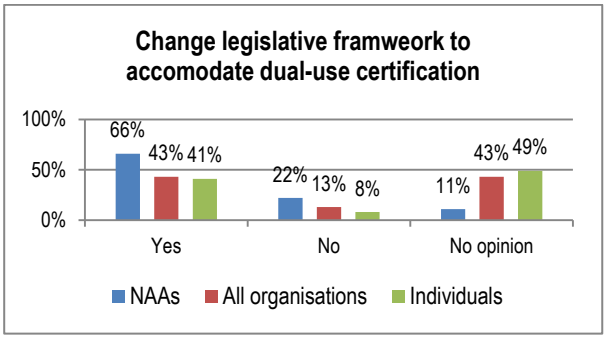
When it comes to multinational operations, outsourcing/leasing, and dual-use certification, the respondent organisations in general and National Aviation Authorities in particular tend to lean towards a need for a regulatory action. There is a large percentage of individuals which do not have an opinion on these rather specialised issues.











As regards other aspects related to potential changes in the scope of the EU rules, following main trends can be observed in the contributions received from organisations and National Aviation Authorities:

- Airports and transport workers suggest the inclusion of the ground-handling services into the scope of EU regulation. The air operators which submitted contributions and their representatives were also in favour of addressing ground-handling by the present initiative. The views amongst authorities on this issue were divided;

- Many of the organisations suggested that it should be possible for National Aviation Authorities and EASA to certify state aviation activities and aircraft (such as used by police or firefighters), according to civil rules;

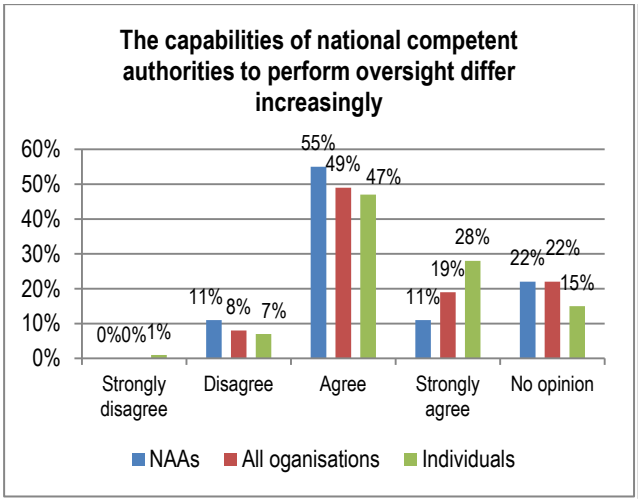
- Some of the organisations, especially from the General Aviation sector, suggested that the scope of Annex II to Regulation 216/2008 should be extended, and that leisure and sport aviation would be better regulated at the national level;

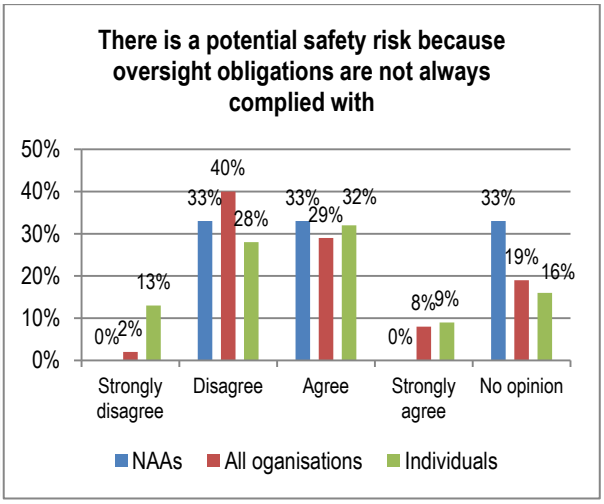
Concerning security issues, the views between organisations were rather split, with some of the contributors advocating a more integrated approach, with safety and security regulated together, while other contributors advised caution arguing that the current arrangements for security are appropriate and that any changes could have negative consequences. Those stakeholders which were in favour of including security aspects within the scope of Regulation (EU) 216/2008, would like them to be limited to technical issues such as cyber-security or aircraft design.

vii. Capabilities and resources of national authorities and EASA

There is a large agreement between all groups of respondents that the capabilities of national aviation authorities to perform oversight differ increasingly. At the same time there is no clear position amongst respondents whether there are potential safety risks because oversight obligations are not always complied with.

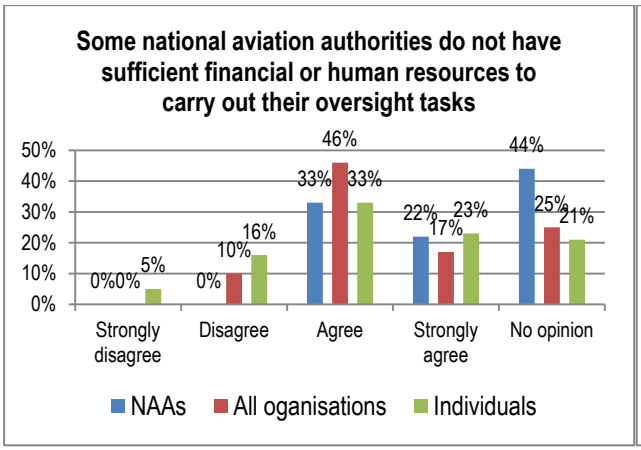
There is quite a clear majority amongst the respondents that some national aviation authorities do not have sufficient human or financial resources to carry out their safety oversight tasks. Over half of the respondent National Aviation Authorities share this view (55%). On the other hand nearly the majority of the respondent organisations (46%) in general, and most of the respondent National Aviation Authorities (77%) believe that EASA has sufficient financial and human resources.

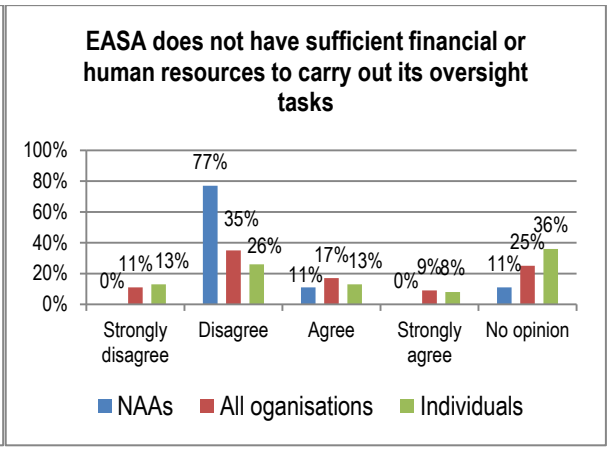




A point made by a number of organisations with regard to differing capacities of the authorities was that this difference largely stems from the fact that authorities do have differing volumes of aviation activity under their responsibility, and that it would be unrealistic to expect all the authorities to be at the same level. At the same time one of the main concerns of the industry is that the differing capabilities of the national authorities can result in a lack of playing field on the market.

Many contributions underlined the need for authorities to have first-hand experience and expertise deriving directly from the industry in order to be in touch with the realities of the market, understand changes in operational practices and be up to date with the latest technologies. The General Aviation community in particular believes that EASA lacks understanding of their sector.

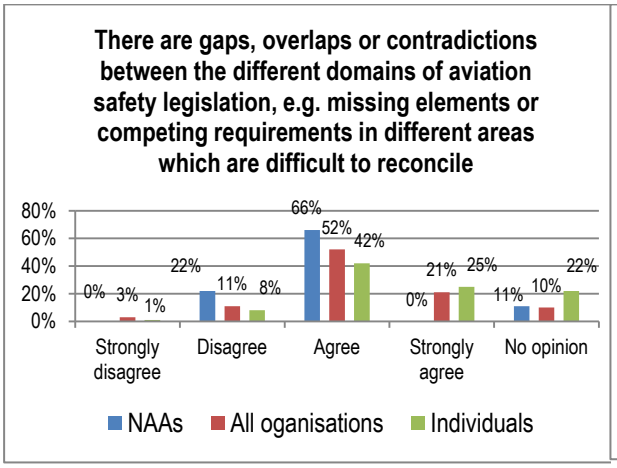


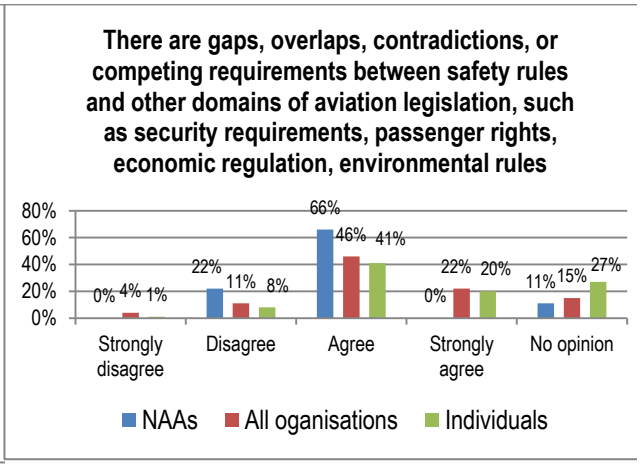


The aeronautical manufacturing industry has stressed the need for EASA to have adequate resources to ensure efficient certification of the new aeronautical products that are expected to be developed in the coming years.

viii. Consistency of the present regulatory framework

A clear majority of the respondent organisations (73%) pointed out that there are gaps, overlaps or contradictions between the different domains of aviation safety legislation. Similarly there was a clear majority of respondent organisations (68%) which believe that there are gaps, overlaps, contradictions, or competing requirements between safety rules and other domains of aviation legislation. These views were shared by the respondent National Aviation Authorities and individual respondents.





Some of the most common examples of inconsistencies and gaps pointed out by the respondents include:

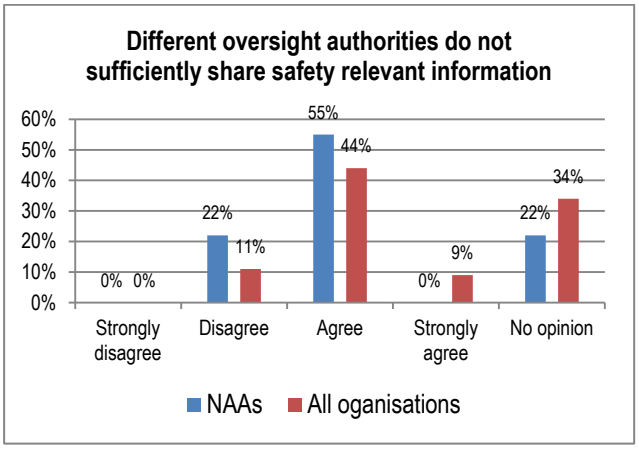
- Inconsistencies between requirements for airborne and ground-based components of the air traffic management system. Especially many air navigation service providers believe that the risk of such inconsistencies is big for the SESAR deployment phase.
- The inconsistencies between the occurrence reporting obligations in the present EASA implementing rules and the new EU regulation on occurrence reporting;
- Absence of a common framework for RPAS, and lack of coordinated response to emerging cyber-security threats;
- Inconsistencies between safety requirements and the EU chemicals regulation (REACH);

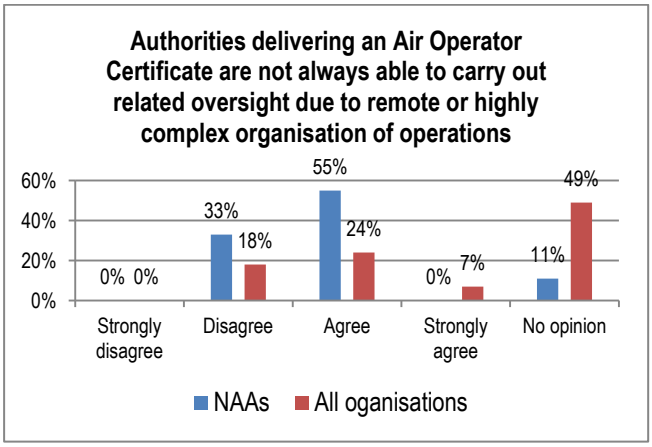
- Inconsistencies stemming from varying interpretations of EU requirements by different EU Member States;

ix. Exchange of information and oversight of complex Air Operator Certificate arrangements

While the majority of the respondent organisations (53%) believe that the oversight authorities do not sufficiently share safety relevant information, they were not able to give a clear opinion whether the complexity or geographical remoteness of the operation hampers the ability of oversight of air operator certificates by national authorities.

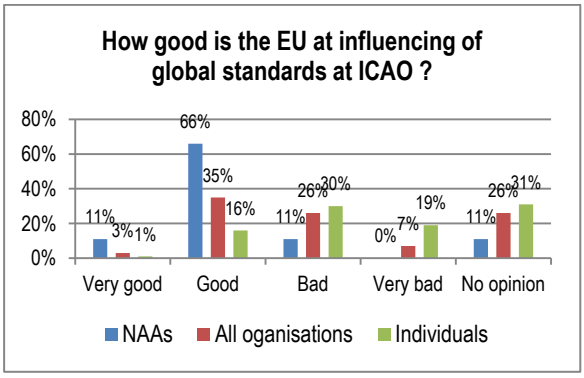
The majority of the respondent National Aviation Authorities (55%) believe that not only safety information is not sufficiently shared between the authorities but also that the authorities may not always be able to exercise oversight of air operator certificates due to remote or complex characteristics of the operation.

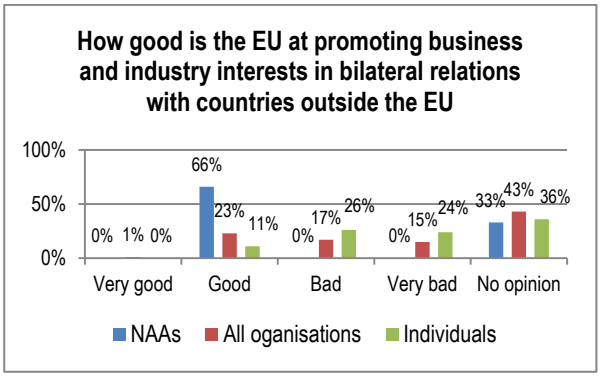


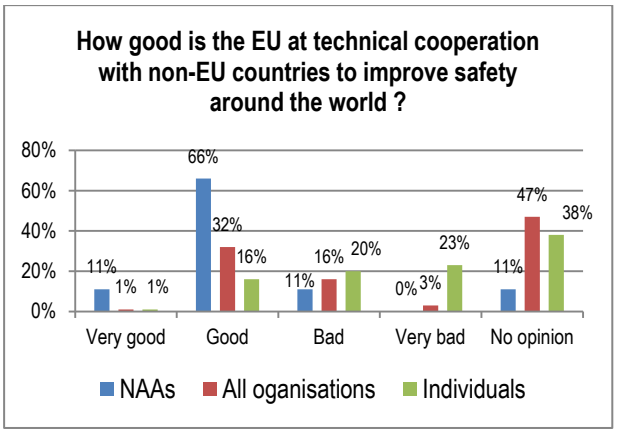


x. EU interests at international level

Views were almost equally split on whether the EU is successful in influencing international standards at ICAO level, with 38% of responding organisations agreeing that Europe is successful in this respect, 33% that not successful and 26% not having opinion at all. When it comes to the evaluation of EU's success in promoting the business interests overseas, and in supporting foreign countries in raising their safety levels, nearly half of the respondent organisations were not able to give an opinion. Respondent National Aviation Authorities were largely satisfied with the level of influence the EU has at the international level.







More specifically the following main trends can be observed in the contributions submitted:

- The manufacturing industry stresses the need for more reliance on Bilateral Aviation Safety Agreements to reduce redundant certifications and oversight. The manufacturing industry would also like to see EASA more present in the key markets and in ICAO, in order to promote the EU way of thinking on aviation safety and facilitate the export of aeronautical products;
- Many industry contributors see a need for close cooperation with the US, which at the same time is seen as a competitor;
- While the airline representatives underline the need for as close alignment with ICAO Standards And Recommended Practices as possible, the air navigation service providers caution about blindly following the ICAO Annexes which may be sometimes outdated or not adapted for the EU operational environment;
- While the need for coordination in representing EU interests abroad is widely recognised, many contributors believe that this should not be interpreted as speaking with 'single voice', and that 'multiple voices signing from the same hymn-sheet' would be more effective;

c. Subsidiarity of EU action

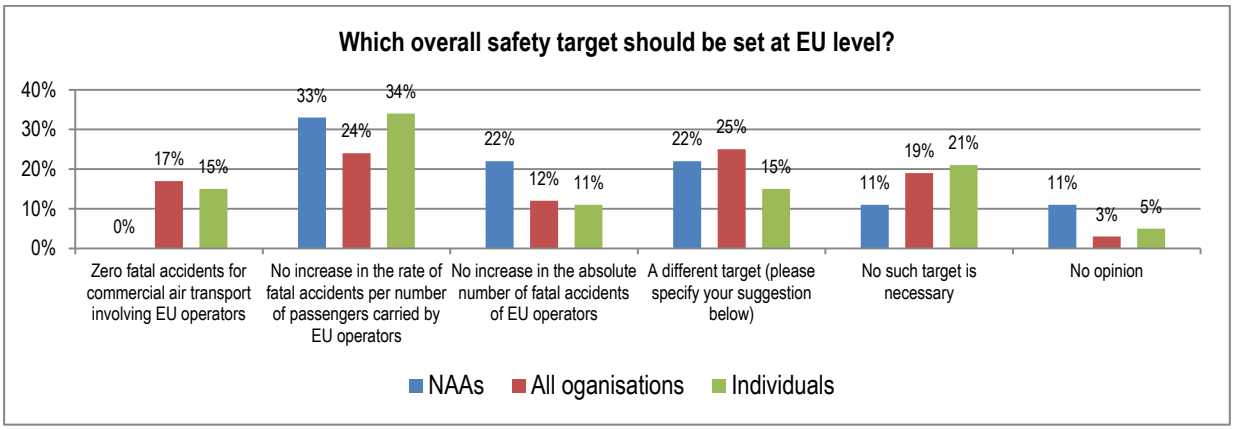
In the context of aviation safety regulation, the following main trends emerge from the contributions as regards subsidiarity of EU action:

- As a matter of principle, EU regulation is justified where it is necessary to ensure a level playing field on the internal market, or where the risks to be addressed concern more than one Member State;
- Operation in special local environments, such as mountainous regions, should be allowed on the basis of national rules or exemptions from common EU standards;
- A number of organisations suggested that sport and recreational aviation, especially with balloons and gliders, could be better regulated at the national than EU level. There were however submissions, suggesting that instead of reverting back to national approaches, the EU regulatory system for light aviation should be improved, and/or a choice given to the operators / manufacturers whether they would like to be under the EU or national system;
- Many helicopter operators suggested that commercial operations with helicopters should be regulated at national level.
- Many of the General Aviation organisations were of the opinion that more responsibility should be devolved from the authorities to competent users' organisations and individuals;

d. Policy objectives

i. The need for an EU target on aviation safety

Views were split with respect to the need to have an EU target for aviation safety. The largest proportion of the respondents was of the view that as a minimum the EU should be able to freeze the current rate of fatal accidents.



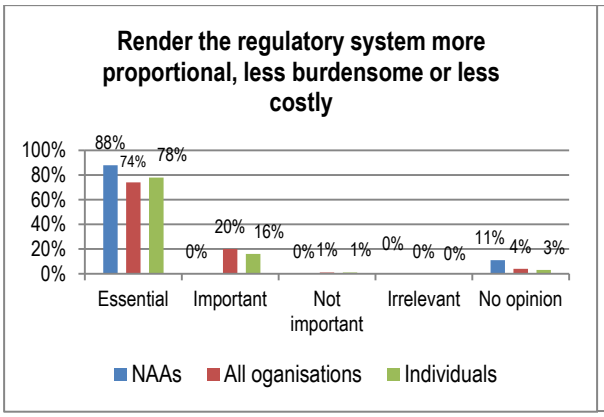
Main arguments in favour and against target setting were as follows:

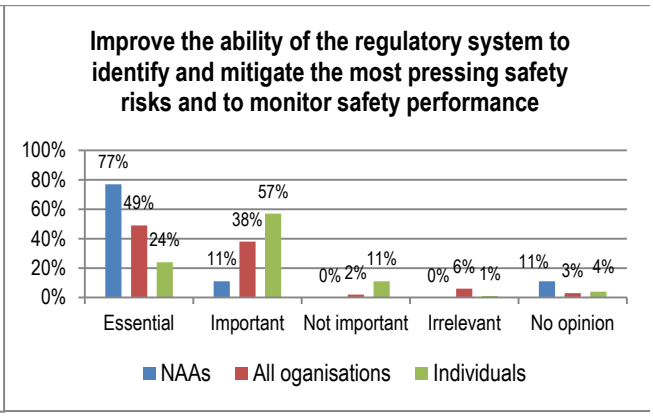
- Setting an overall safety target is too vague and could be at best considered as an aspirational objective. Targets should be set individually at the level of the organisation which has the most practical overview of the situation;
- While setting targets could be acceptable for Commercial Air Transport, General Aviation should not be subject to target setting;
- Safety targets should be set with respect to each domain of aviation and based on different acceptable levels of safety performance;
- Target setting can result in unintended safety consequences;
- 'Absolute' safety targets are unrealistic. Continuous improvement is a much better indicator of progress made;

ii. Key policy objectives, as perceived by stakeholders

Overall the respondents have agreed with the main objectives as suggested by the Commission. In particular there was almost a unanimous agreement between all the categories of respondents that the present regulatory system should be made more proportional and less costly.

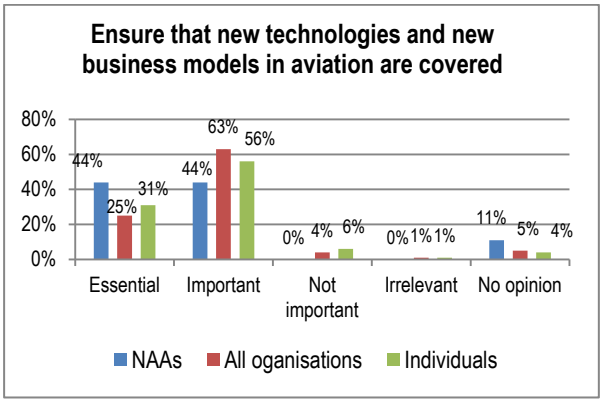
The improvement of the ability of the system to identify and mitigate safety risks has been also rated as a particularly important objective, especially by the respondent organisations and National Aviation Authorities more specifically.

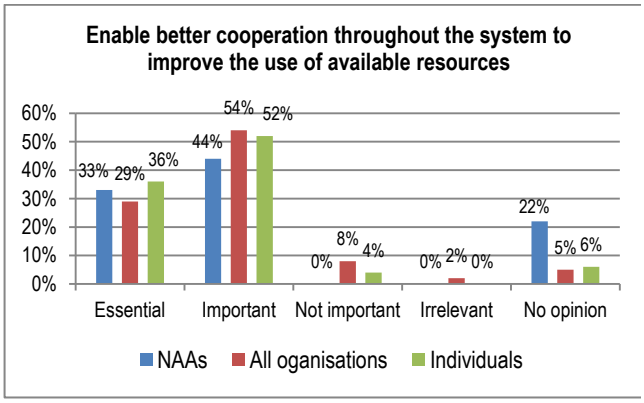


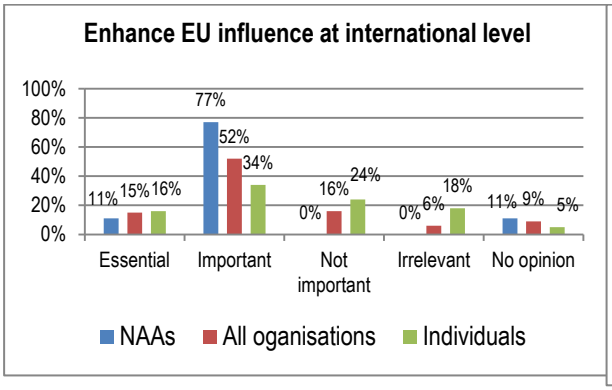


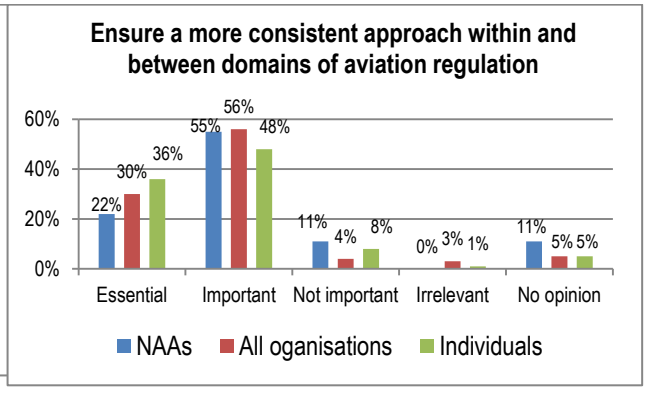
With respect to the future shape of the regulatory system, a large number of industry and National Aviation Authorities contributions suggested that rules should focus more on the safety objectives rather than prescribing in detailed the method of compliance, which should be up to the operators to choose.

Air navigation service providers and other stakeholders from the air traffic management sector advocated that EASA should be the only body in the EU responsible for setting safety requirements.









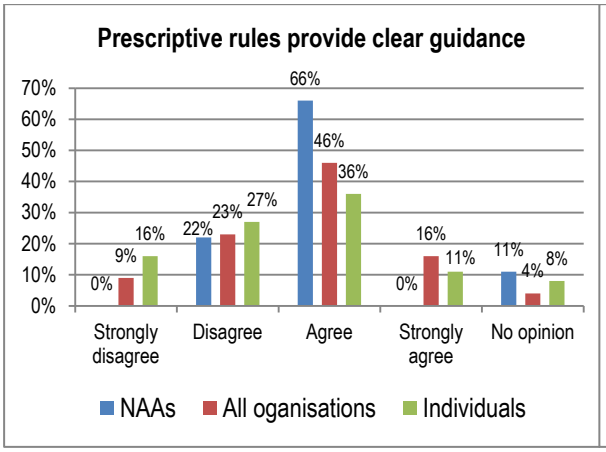
e. Policy measures

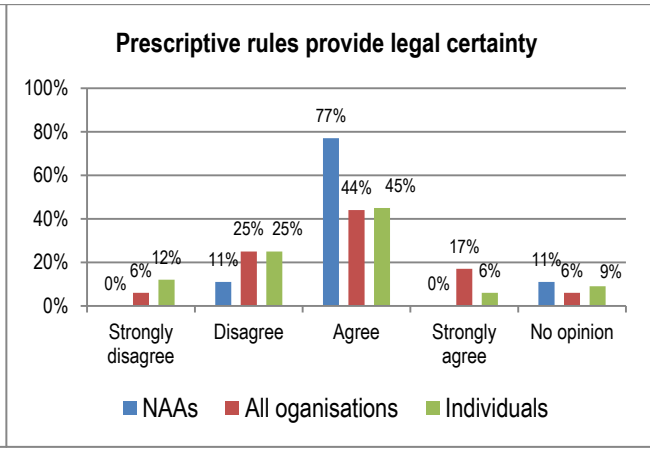
i. Regulatory system

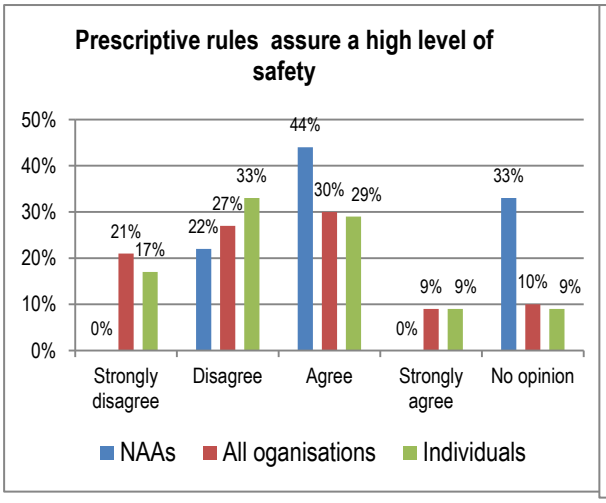
⇒ *Benefits of prescriptive regulations*

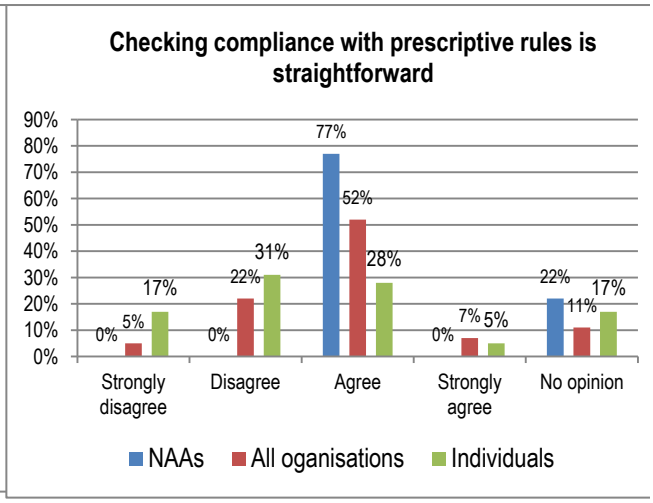
The respondents have largely agreed with the Commission as to the benefits provided by the prescriptive regulations (clear guidance, legal certainty and straightforward compliance checking).

However, views were split on whether the prescriptive regulations actually ensure a high level of safety, with 48% of all organisations and 50% of individuals disagreeing with such a statement.







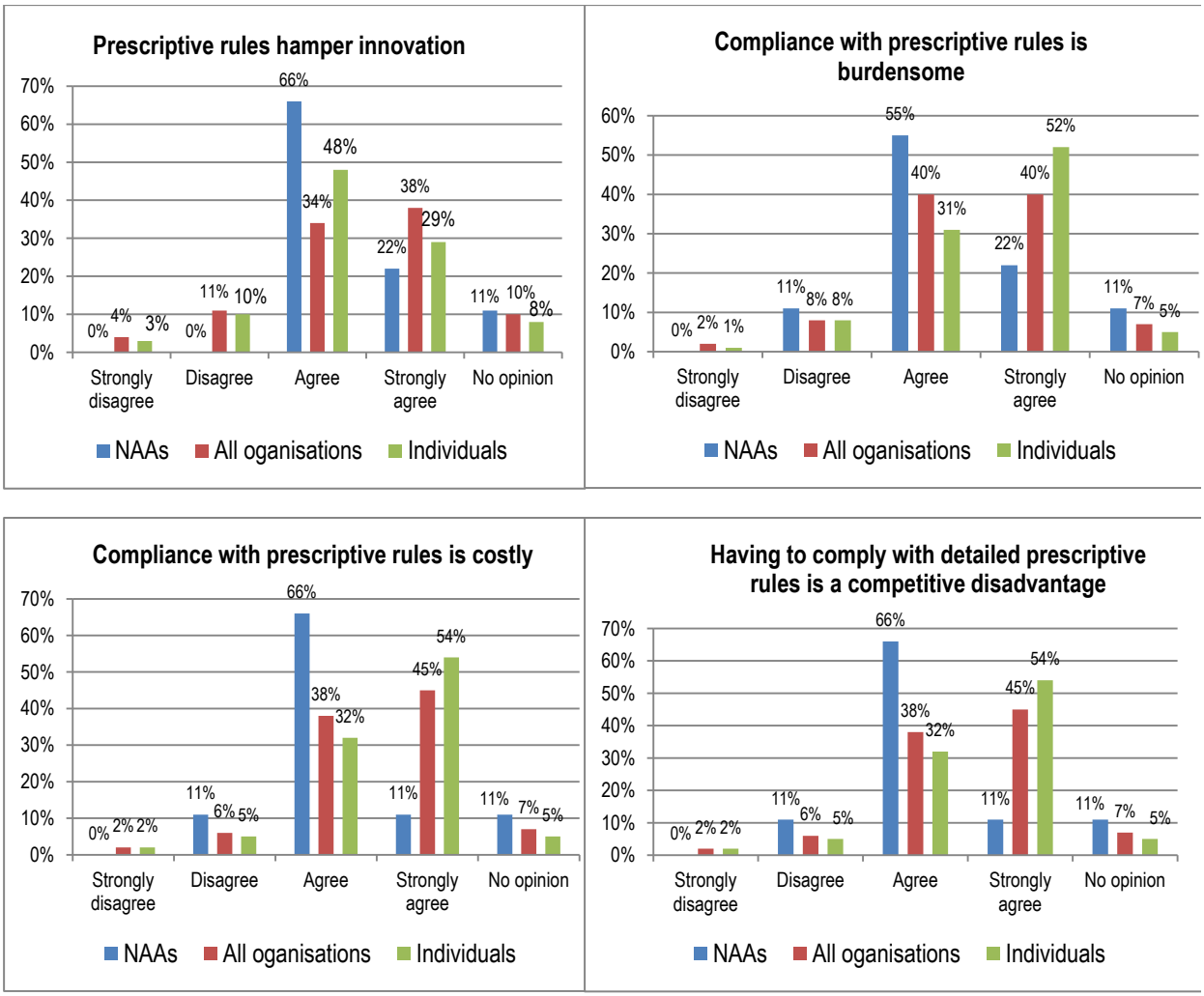


A thread that was present in many of the contributions is that while the prescriptive safety rules have helped to achieve the present high level of safety in Europe, the most important factors are commitment and professionalism of people and organisations, and that following the rule alone does not guarantee safety.

It was also highlighted in many of the contributions that EU is overly relying on regulation and that other means should be added to the EU's safety management 'tool-box' including safety promotion and support for training and implementation.

⇒ *Shortcomings of prescriptive regulations*

All the categories of respondents have similarly agreed with the statements made by the Commission with respect to the shortcomings of prescriptive regulations, which are perceived as hampering innovation, costly and burdensome.

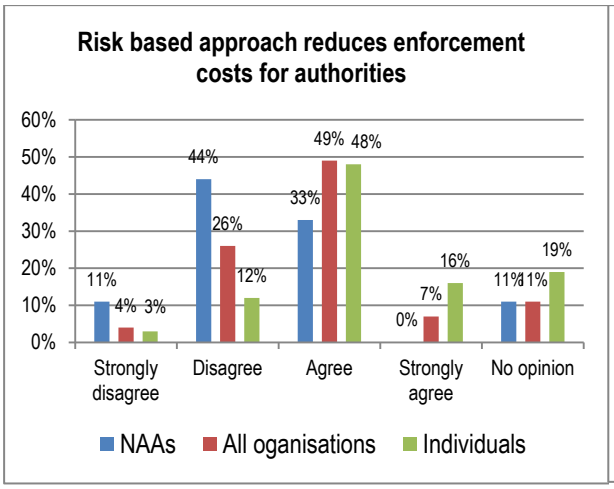


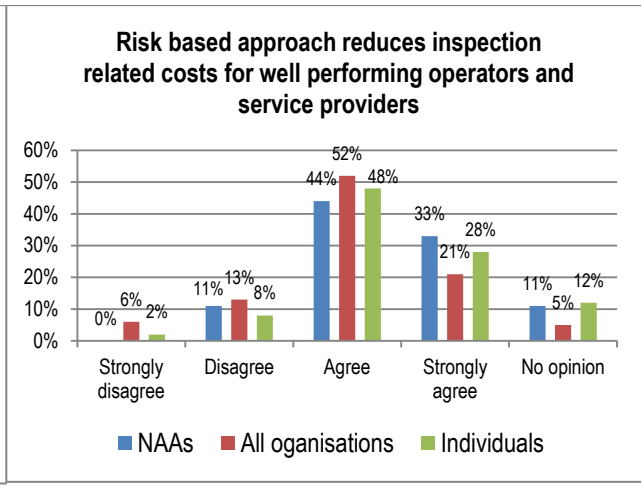
While the respondents identified a number of shortcomings of prescriptive regulations, many of them felt that there is a place for both prescriptive and performance based regulations. For many of the respondents the added value of prescriptive rules is the knowledge about safety risks - often stemming from accidents - which prescriptive rules contain. Prescriptive rules are also felt more appropriate for organisations which have not reached maturity which allows them to manage safety through own risks assessments.

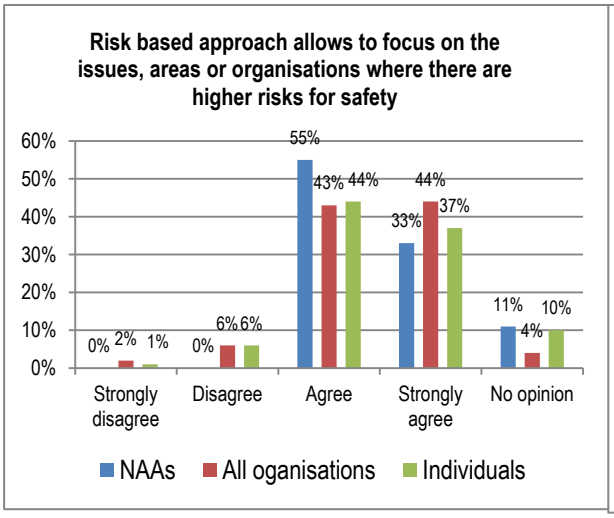
A number of respondents from the General Aviation community, while supporting a transition to more proportionate, performance and risk based regulatory framework, argued that in the first place there is a need to reassess whether in some domains there is a need for regulation at all.

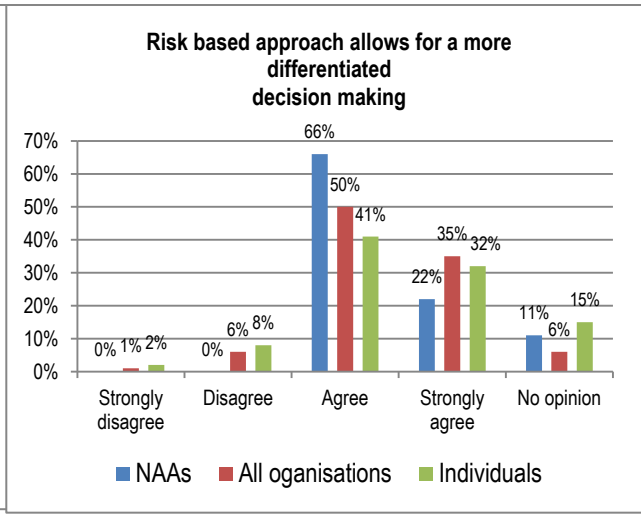
⇒ *Benefits of a risk based approach*

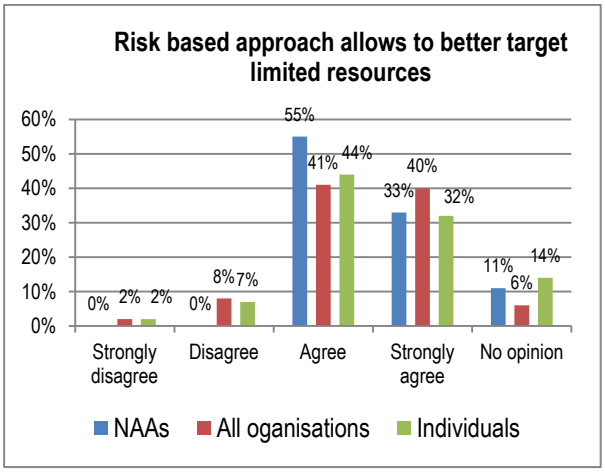
When it comes to identifying befits of a risk based approach, there has been a large degree of agreement amongst all the categories of respondents with the statements made by the Commission. However the majority of the respondent National Aviation Authorities (55%) and nearly a third of all respondent organisations (30%) do not agree that a risk based approach allows reducing enforcement costs for authorities.

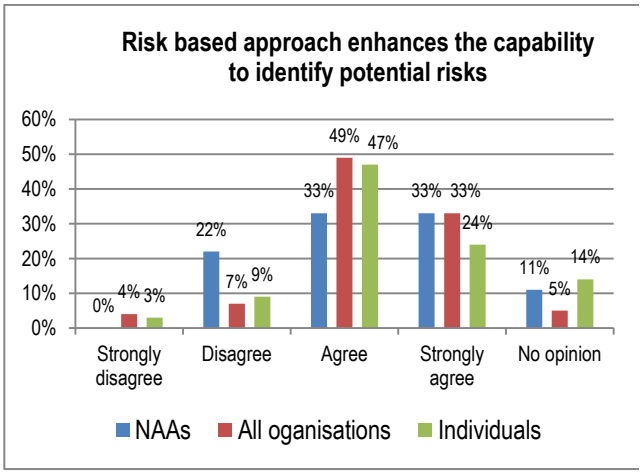










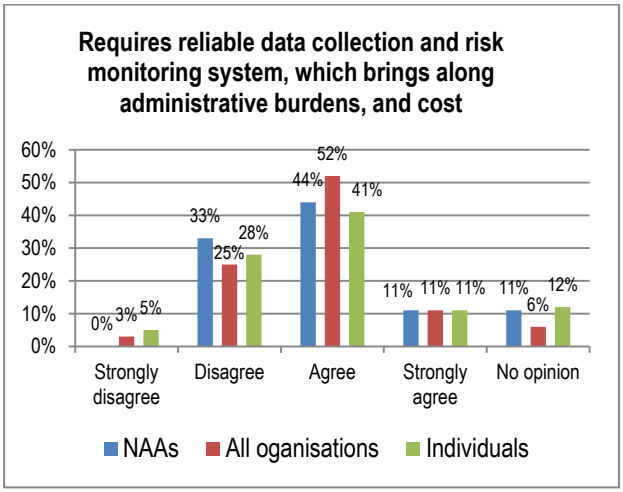


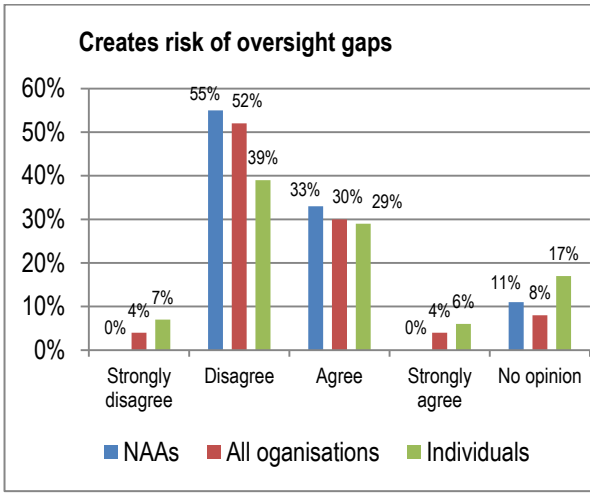
⇒ *Shortcomings of a risk based approach*

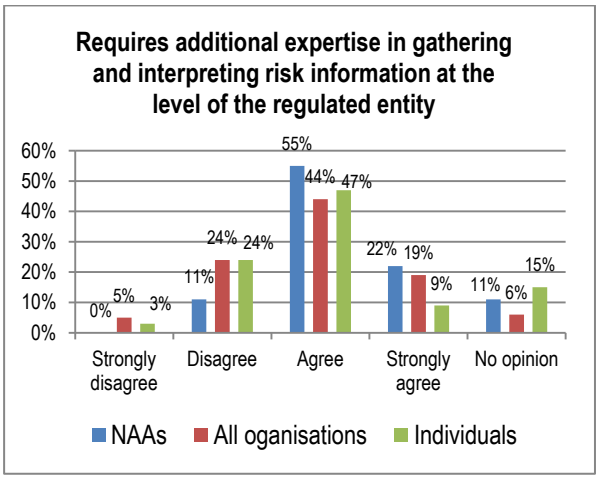
The majority of respondents in all categories agree that implementation of a risk based approach requires additional expertise in gathering and interpreting risk information, at the level of both the regulated entity and of the regulator. The majority of the respondent National Aviation Authorities (55%) and of the organisations in general (56%) believe that this new method can be implemented without risks of oversight gaps. However one-third of the respondents in each of the categories believe that such risks of oversight gaps do exist.

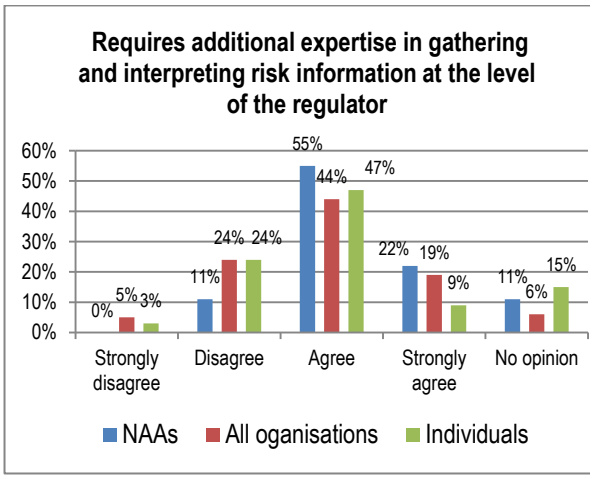
The majority of the respondents in each of the categories (55% National Aviation Authorities; 63% all organisations, 52% individuals) believe that implementation of a risk based approach creates additional costs and administrative burdens stemming from the need to put in place reliable data collection and risk monitoring systems. There is however also roughly a one-third of respondents in each of the categories, which believe that this not the case.

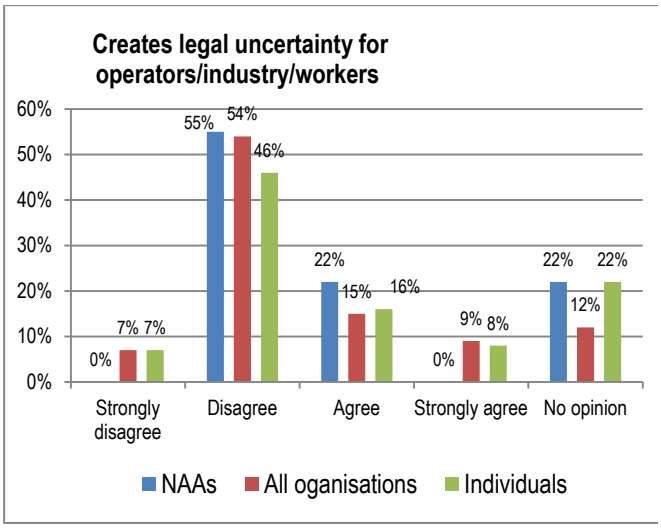
Finally, the majority of the respondents in each of the categories disagree with a statement that implementation of a risk based approach could create uncertainty for operators and employees, provided that such a new approach is well implemented.











⇒ *Benefits of SMS*

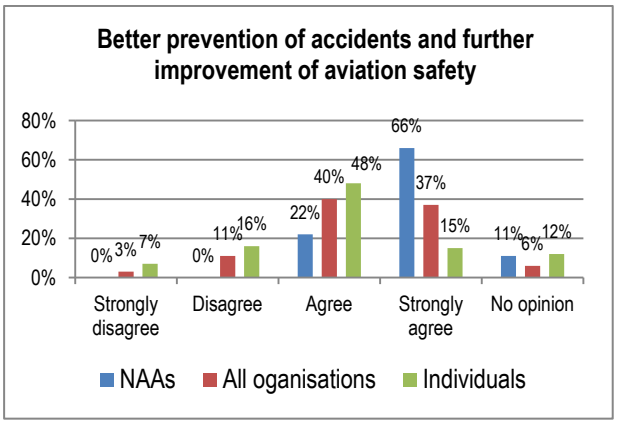
There is a strong agreement between all categories of respondents that SMS allows better prevention of accidents and further improvement of aviation safety. Respondents are also very much in agreement with the statement that SMS should allow the industry to increasingly manage its own safety.

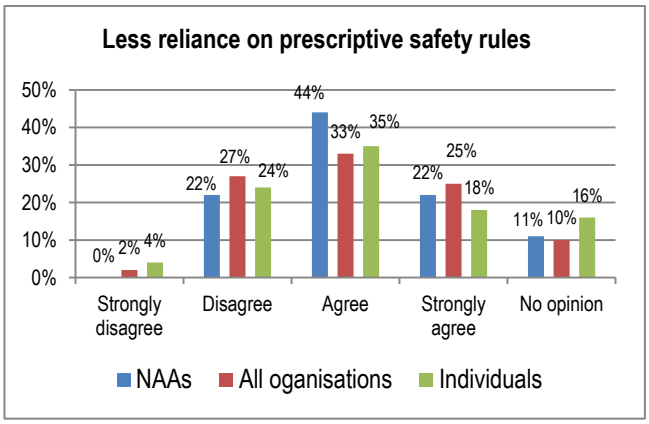
Views were however more split on the resource savings offered by SMS and on the possibility to rely less on prescriptive safety rules as a result of SMS implementation.

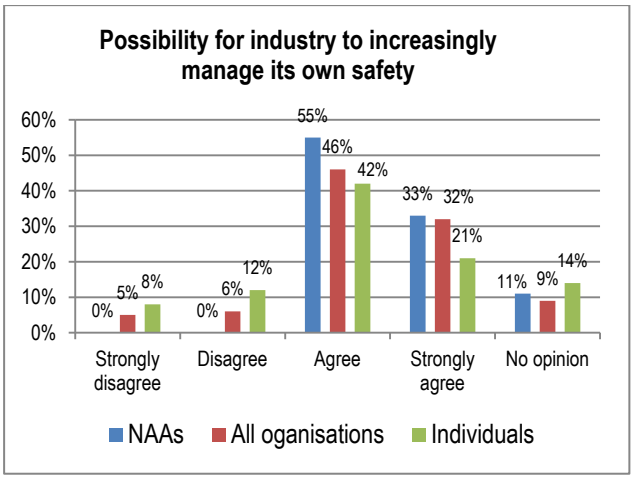
There were also two themes clearly present in the replies of respondents with respect to the SMS implementation:

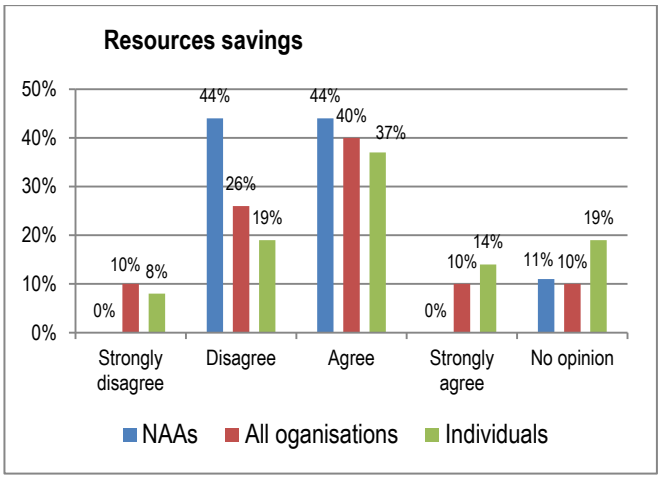
1. Genuine implementation of SMS takes time, and requires a cultural change within the organisation;

2. Smaller organisations and General Aviation community in particular expressed strong concerns about the added value of the SMS, compared to the costs required for implementation;





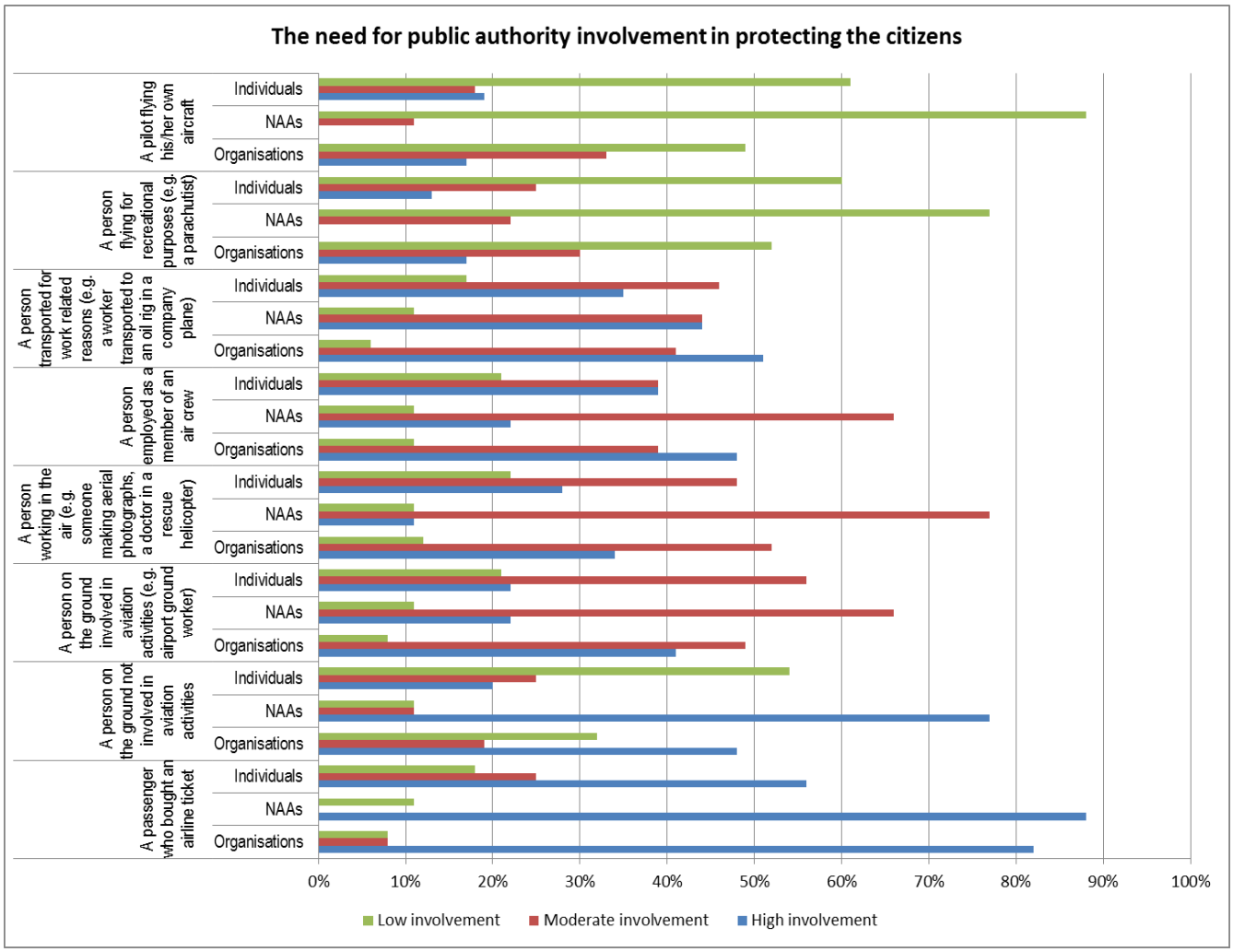




ii. The need for public authority involvement in protecting the citizens

The results of the responses to question related to the need for public authority involvement in protecting the citizens can be summarised as follows:

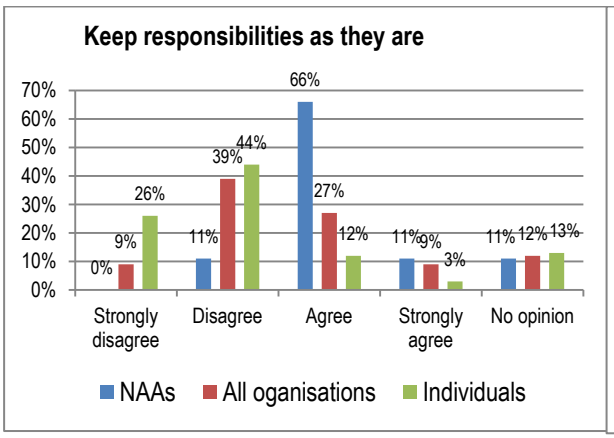
- There is an agreement between all the categories of respondents that the highest level of public authority involvement is necessary in case of airline passengers;
- The respondent organisations in general and National Aviation Authorities in particular also agree that a high level of protection (through authority involvement) should be given to persons on the ground not involved in aviation activities. This view is however not shared by the responded individuals.
- According to the respondents, a high to moderate level of protection (through authority involvement), should be afforded to persons transported by air for work related reasons, and employed as members of air crew.
- A moderate level of protection (through authority involvement), should be afforded, according to respondents, to persons on the ground involved in aviation activities (such as airport workers), and persons working in the air (such as aerial photography).
- Finally there is a large degree of consensus that the lowest need for public authority involvement is justified in case of persons flying for recreational purposes such as parachutists, and private pilots;

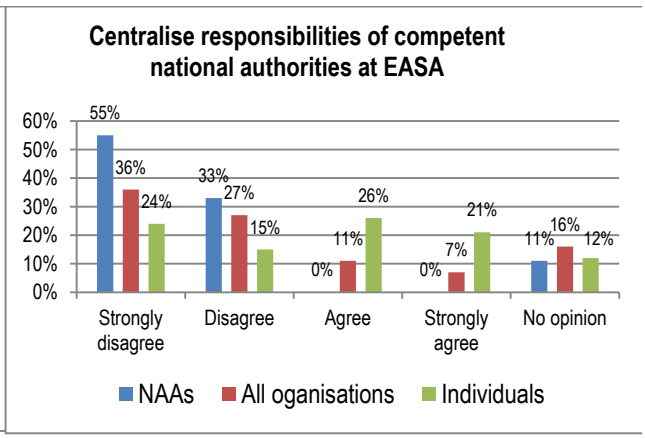


iii. Governance

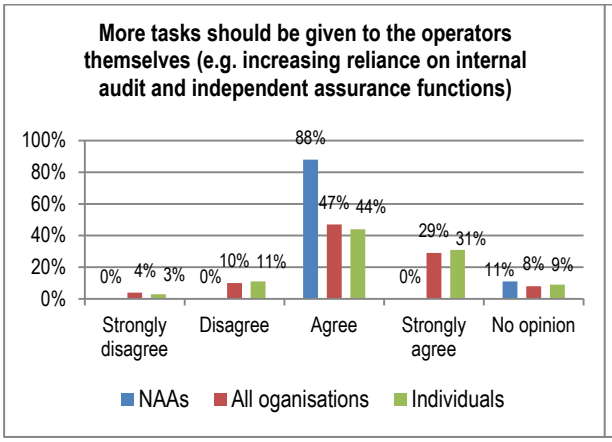
With respect to the governance, the majority of the respondent National Aviation Authorities (77%) would like to keep the current division of responsibilities between the EU and national level. On the other hand 48% of all the respondent organisations and 70% of individual respondents would like the allocation of responsibilities to be revisited.

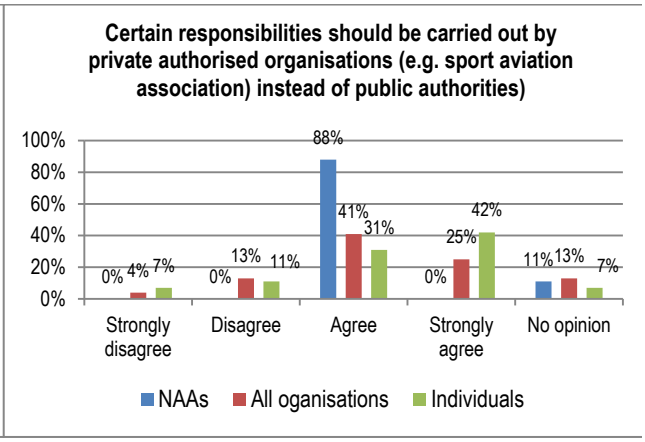
There is a strong disagreement amongst respondent organisations (63%) and National Aviation Authorities in particular (88%) with the proposition to centralise the responsibilities of national authorities at EASA.





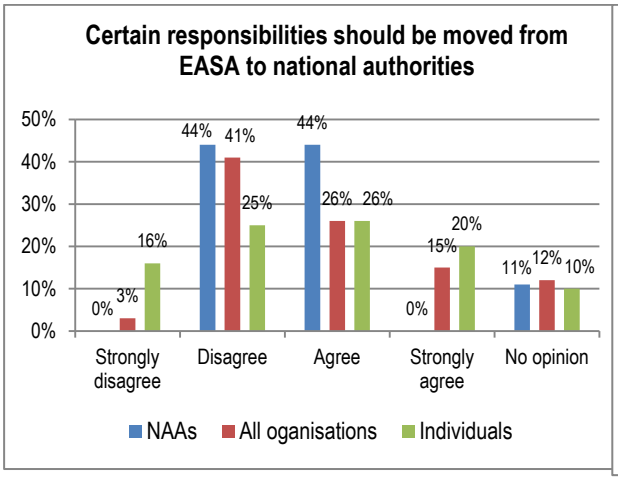
There is a very strong agreement between also the categories of respondents that more responsibility for safety should be given to the operators themselves, and that in the case of general aviation, certain regulatory tasks could be entrusted to specialised authorised private organisations, such as sport aviation associations.

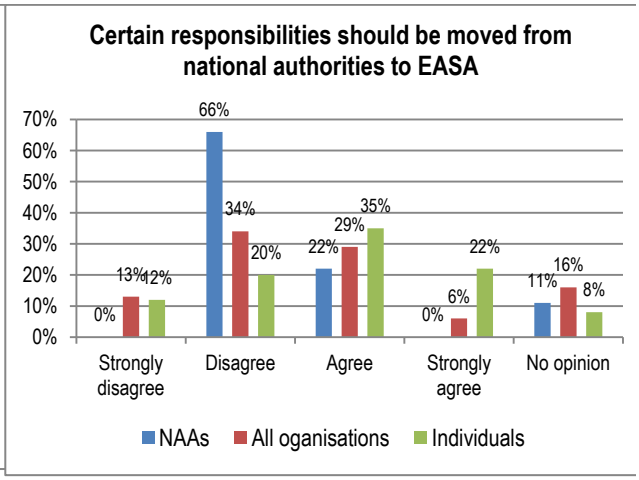




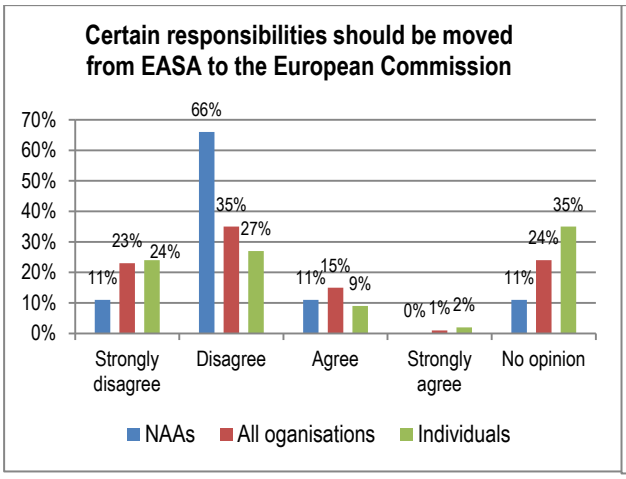
Views are almost equally split on whether certain responsibilities should be moved from EASA back to the national authorities. Similarly there are split views whether certain responsibilities should be moved from national authorities to EASA, but with the majority of the respondent National Aviation Authorities clearly against such a proposition.

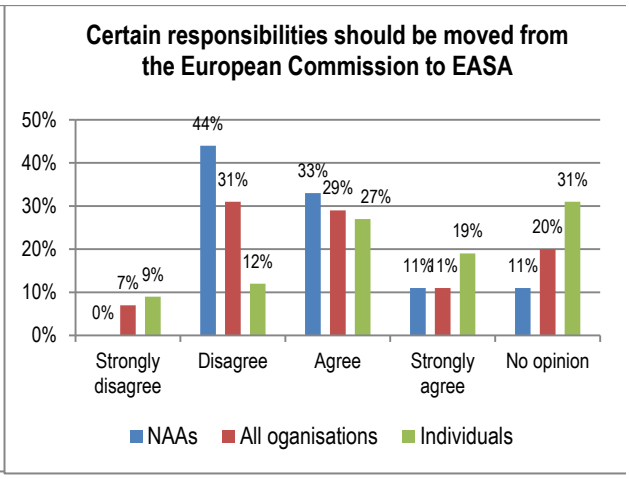
Where proposals were made by the respondents that certain activities be regulated at the national level instead of EU level, that primarily concerned light and recreational aviation. The large manufacturing industry on the other hand would like to see the EASA regulatory remit extended. In those cases were respondents agreed that certain tasks should be moved from national authorities to EASA this was justified by reasons of harmonisation and standardisation. At the same time the industry recognised in their submissions the value of local proximity that the presence of national authorities gives.





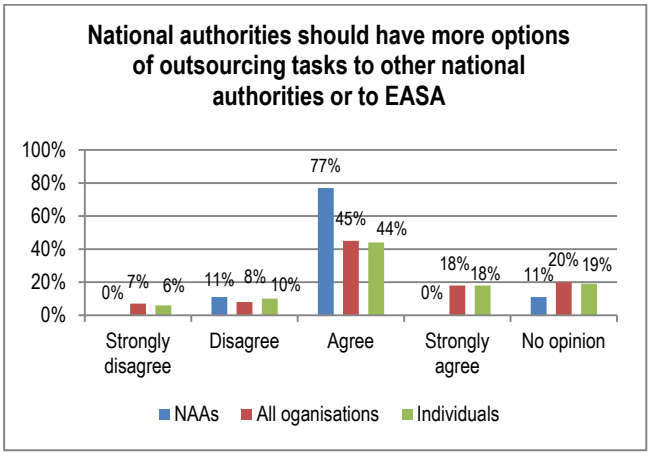
Views are split on whether some of the responsibilities should be moved from the European Commission to EASA. On the other hand respondents are clearly against moving responsibilities from EASA back to the European Commission.

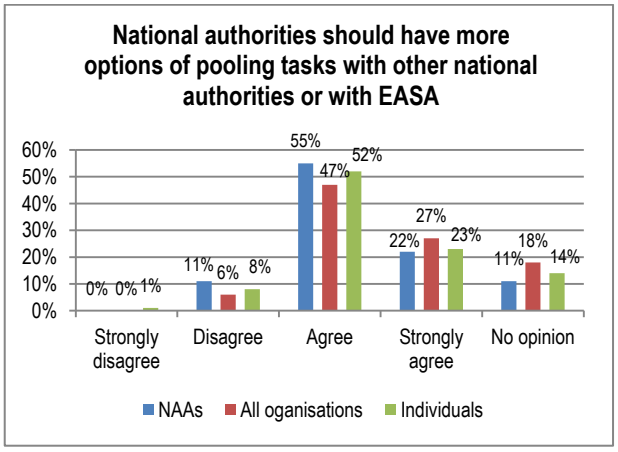


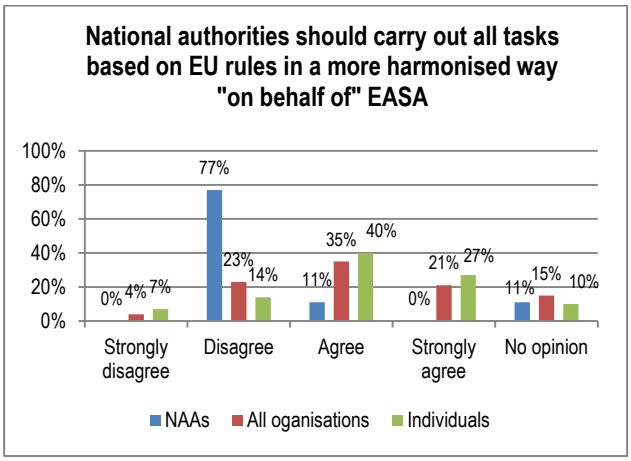


There is a clear agreement between all the categories of respondents that national authorities should have more options of outsourcing and pooling tasks amongst each other and with EASA.

The majority of the organisations (58%) would like to see the safety oversight and certification tasks executed by national authorities on behalf of EASA in a more harmonised manner. The majority of the respondent National Aviation Authorities oppose to such a proposition.







f. Small and Medium Sized Enterprises (SMEs)

The on-line survey contained a section dedicated to SMEs, and a number of contributors commented on this issue. The organisations which explicitly commented on the impact of the present regulatory system on SMEs highlighted the following:

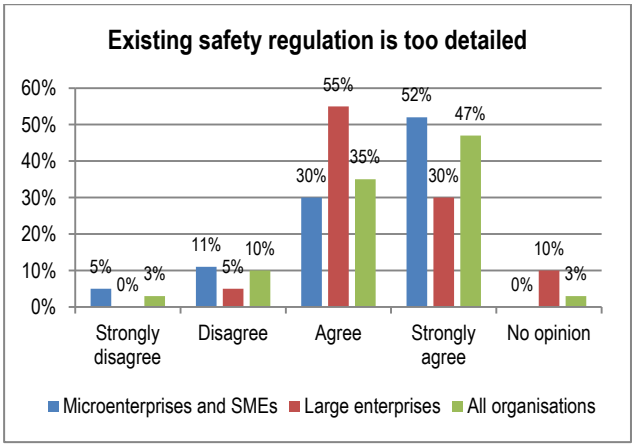
⇒ The present regulatory system puts excessive requirements on SMEs compared to achieved safety benefits. In particular it is felt by many contributors that regulations are too complex and beyond the ability of many SMEs to comprehend and be abreast with the constant changes;

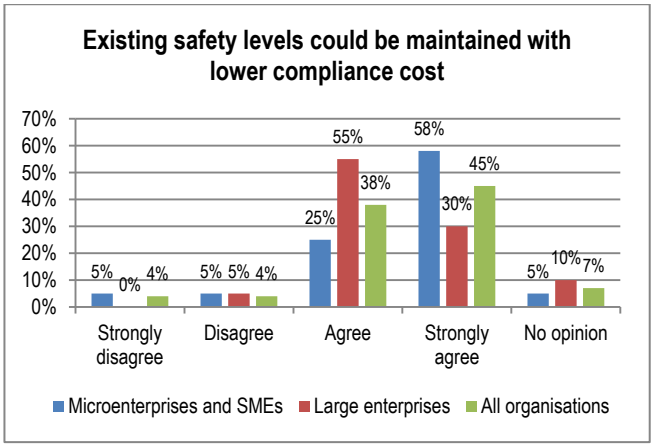
⇒ The regulations do not sufficiently differentiate between commercial air transportation provided on the mass scale by airlines and commercial air transportation provided by SMEs;

⇒ The present improvements are focused on non-commercial aviation (i.e. general aviation), and not sufficient attention is being given to more proportionate regulation for commercial activities of SMEs;

⇒ Regulations are very difficult to implement by companies where a single individual performs roles which in an airline or a big manufacturer are responsibility of multiple departments;

Overall, there is almost unanimity amongst the micro and SME enterprises which responded to the questionnaire, that the existing safety regulation is too detailed and that the existing safety levels could be maintained with lower compliance cost.





g. Other issues

Amongst some other issues brought by the respondents to the attention of the Commission were:

⇒ Suggestion to create a Light Sport Aircraft category, similar to the US one;

⇒ Need for translation of 'soft law' material into national languages;

⇒ Greater reliance on standards developed by the industry through recognised standardisation bodies;

⇒ Need for development of manuals which regroup all the regulatory material for a particular domain (i.e. general aviation) in a single user-friendly document;

⇒ Need for development of EU standards and authorisation procedures for aviation bio-fuels;

⇒ Review of EU requirements concerning wet-leasing to make them more operational.

ANNEX III

Who is affected by the initiative and how?

The stakeholders affected by the problems and their drivers outlined in Section 2 of the impact assessment are persons and organisations involved in the civil aviation safety system at national and/or EU level.

National Aviation Authorities and their staff, which are primarily responsible for the implementation of the EU aviation safety legislation, including initial approval and continuing oversight of persons, organisations and services subject to the provisions of Regulation (EC) No 216/2008 and its Implementing Rules, are affected by changes to the current legislation such as risk and performance based elements or cooperative oversight. The EU is concerned in its role as safety regulator and EASA in particular in its rule making and standardisation tasks. Both EU and Member States are responsible for ensuring a high and uniform level of safety and thus addressing safety risks.

Industry players (such as manufacturers, airlines, maintenance and training organisations including their staff) as well as private airspace users are affected as addressees of aviation safety legislation who have to handle its complexity, have to compete on a global market and are hindered in developing or using new technologies.

Employees in the aviation sector are also affected by changes to the current legislation such as risk and performance based elements or cooperative oversight, which require additional training to develop the necessary competences. Aircrew is particularly concerned by certain airline employment practices and other innovative business models.

The travelling public as potential victim of aviation accidents and incidents is affected by the ability of the regulatory system to identify and mitigate safety risks. Indirectly, their choices as consumers are influenced by the competitiveness of the European aviation sector.

ANNEX IV

Article 62 evaluation (2013)

Summary of recommendations

While the Panel has for the Management Board's convenience listed below its main recommendations, the Panel cannot emphasize too strongly the need for the Board to consider the totality of this report as the source of its advice to the Management Board. To concentrate only on these main recommendations would, in the Panel's view, not do justice to its work, nor would it enable the Management Board to derive full value from the Article 62 evaluation exercise.

1) The work of establishing a risk-based EU Safety Management System should be prioritised and completed urgently. It should extend to all areas in the Agency's remit and be mandatory involving changes to the Basic Regulation. Data collection and exchange should be accorded priority and action to implement a just culture regime across the EU System should be stepped up. Tools for the analysis of data and shared information should be enhanced as a matter of urgency.
2) The Agency should be mandated for the safety aspects of EU security measures as well as the safety aspects of ground handling, commercial space transport and remotely piloted aircraft.
3) Should Member States have insufficient resources to perform their oversight activities the Panel recommends a System-wide solution, which may be voluntary in nature but may in some cases need to be mandatory. For the voluntary solution the Agency should, by amending the Basic Regulation, be authorised to execute the national oversight duties for those Member States that wish to transfer their duties to the Agency. Where the voluntary solution is not appropriate or practical for whatever reason but the oversight responsibilities are not being or cannot be performed, a mandatory solution, requiring amendment of the Basic Regulation is recommended. The Agency should be mandated to identify and report to the Commission those States/National Aviation Authorities failing in their oversight obligations and if a method to resolve the problem (whether voluntary or mandatory) is not availed of by those States, consideration should be given to employing whatever measures are available to the Commission/Agency to resolve the issue.
4) The Management Board should initiate a study designed to clarify institutional roles and responsibilities of the actors involved in the EASA System. The outcome of the study should lead to a common understanding – pending any regulatory changes that may be required – amongst the EASA System actors on their institutional boundaries, responsibilities and roles. This understanding would be expressed in an agreed document.
5) A method should be found of tapping into and using the pool of expertise available in the European manufacturing industry. In addition, consideration should be given to delegating self-oversight arrangements to the industry on the basis of clear legal conditions.
6) A small Executive Board should be created and responsibility delegated to it by the Management Board, empowered to enable it to do this. Amendment of the Basic Regulation would be required.

7) The European Aviation Safety Plan should be embedded in the Basic Regulation (legally binding the Agency and Member States) and, as a rule, Agency proposals should emanate from this Plan.

8) To assist in securing stable and predictable funding of the Agency, new sources of funding should be explored with a stronger emphasis on the application of the user pays approach. One source that should be explored is the possibility of drawing on air navigation en route charges.

9) The Management Board should recognise and accept that the current EASA System is not sustainable in the medium to long term.

10) The Management Board should acknowledge the need for early planning to develop the present System into a genuine European Aviation Safety System through the convergence of the various existing system actors towards a single entity, one integrated Agency, within the EU institutional architecture.

ANNEX V

EASA Management Board Sub-Group on the Future of the European Aviation Regulatory System

Summary of recommendations

(a) Enable sharing of resources within the EASA system for specific tasks, through contractual and voluntary mechanisms;
(b) Extension of the remit to safety aspects in the field of ground handling, security (for oversight activities), environment (for product-related aspects), and RPAS;
(c) Avoid potential overregulation and promote performance and risk-based regulations where appropriate. The principles of proportionality and subsidiarity need to be respected;
(d) Risk-based oversight (RBO) - More effective, well planned use of oversight resources based on detected risks;
(e) Performance based oversight (PBO) concentrating on the required outcome or performance in relation with the agreed safety objectives;
(f) Facilitate the implementation of SMS at Europe/State/Authority and organisation level, in a consistent manner, as an enabler for a risk/performance-based environment;
(g) Have due regard to the competitiveness of the European industry, and avoid putting undue regulatory burden on it, as well as reviewing its role in the rulemaking process;
(h) The Agency shall enhance its presence at international level;
(i) Ensure the necessary resources are available, especially for certification and oversight purposes;
(j) Identify areas where resources could be released without compromising performance;
(k) Ensure continued availability of resources matching the evolving needs e.g. in safety analysis and PBO;
(l) New funding mechanisms based on the user-pays principle should be explored/made available, especially when the conditions change (e.g. remit expansion), but without generating new costs for the airlines.
(m) The continuous efficiency in the use of financial resources should be ensured and prioritised.

ANNEX VI

DIVISION OF RESPONSIBILITIES IN THE EU AVIATION SAFETY SYSTEM

(1) EU MEMBER STATES

Under the EU institutional system, and in particular Article 5 of the Treaty on the European Union (TEU) which sets out the principle of subsidiarity, the implementation of EU law is primarily the responsibility of the EU Member States. This is the case also for aviation safety where, unless it has been decided by the EU legislator that a certain function can be better performed - by reason of the scale or effects of the proposed action - at the EU level, EU Member States are, *per default*, responsible for the initial certification and continuing oversight of airlines, pilot schools and other types of organisations and personnel performing aviation activities. EU Member States are also primarily responsible for enforcing EU aviation safety legislation, in particular by revoking, suspending or limiting certificates, as well as laying down administrative penalties for breaches of EU aviation safety legislation.

(2) EUROPEAN COMMISSION

The European Commission has five main functions in the implementation of the EU aviation safety system. The first function is to present proposals for aviation safety regulations, which are developed, depending on whether the legal basis of the envisaged rule stems from Regulation (EC) No 216/2008 or not, either on the basis of a technical Opinion from EASA or on the Commission's own initiative. The second function is to monitor the correct implementation of the EU aviation safety *acquis*, and where the European Commission relies on EASA standardisation inspections and other monitoring activities. Thirdly, the European Commission has an enforcement role, which can take a form of an infringement action against an EU Member State or a financial penalty payment against a holder of a certificate issued by EASA. The fourth function is to negotiate, with technical assistance of EASA, Bilateral Aviation Safety Agreements with non-EU countries. Finally the European Commission has an overall responsibility for the implementation of the EU regulation establishing a list of air carriers subject to an operating ban or restriction.

(3) EUROPEAN AVIATION SAFETY AGENCY (EASA)

EASA is a body of the EU with legal personality which was originally established in 2002 on the basis of a regulation of the European Parliament and the Council. Its mandate was initially limited to airworthiness and environmental certification of aeronautical products, parts and appliances, but was subsequently extended to other domains of the aviation safety chain (in 2008 Air Operations and Aircrew; in 2009 to air traffic management/air navigation services and aerodromes). EASA is one of the few EU agencies which have not only advisory and monitoring role, but which have been doted also with executive competences. In particular EASA has been empowered by its Basic Regulation to conduct certification tasks in the area of aircraft design approval, certification of organisations located in the territories of non-EU countries and approval of organisations which provide pan-European Air Traffic Management services. In addition to its certification competences, EASA assists the European Commission in the development the EU

aviation safety *acquis* and the monitoring of its correct implementation. It has also the competence to adopt soft law measures, that is: Guidance Material, Certification Specifications and Acceptable Means of Compliance. EASA supports the European Commission and EU Member States in international cooperation with non-EU countries and ICAO, and has the competence to conclude technical working arrangements with foreign aviation authorities.

(4) EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL)

EUROCONTROL is an intergovernmental organisation which was originally established in 1960 with the intention of being a provider of air traffic management/air navigation services in the entire upper airspace of its six initial Member States. However, the majority of the European States were not prepared to give up as much sovereignty over their own airspace as EUROCONTROL would have needed to perform these functions and thus its focus shifted from integration to cooperation. Currently EUROCONTROL is active in areas such as SESAR related R&D, support to States in implementation of the Single European Sky (SES) initiative, support to the EU in rule drafting and oversight, and most visibly it has been nominated to host both the EU Performance Review Body and the Network Manager, where it provides vital EU functions. It is widely acknowledged that the current 1997 revised EUROCONTROL Convention - which is not in force - is outdated and needs modernisation in line with the organisation's current and future roles in support of the SES initiative and increasingly focusing on operational tasks through the Network Manager, support to SESAR deployment and the performance scheme. However this modernisation is difficult to achieve due to the intergovernmental status of EUROCONTROL and the fact that its membership goes beyond the EU borders.

(5) INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)

Although part of a separate UN system, ICAO influences the implementation of the EU aviation safety system in a number of ways. First of all by defining minimum requirements, which are set out in the 19 technical Annexes (majority of them dealing with aviation safety) to the 1944 Convention on International Civil Aviation (Chicago Convention). Whilst all the EU Member States are parties to the Chicago Convention and are thus responsible under international law for its implementation, the EU cannot be a party to it, and can influence the rulemaking ICAO machinery only indirectly. This reliance on ICAO is especially visible in the area of environmental protection where the ICAO requirements apply in the EU by reference. ICAO also monitors compliance of EU Member States with minimum requirements of the Chicago Convention. Where the EU Member States have delegated executive tasks to EASA, the Agency is also subject to monitoring by ICAO. Until 2014 ICAO has performed two audits of EASA. Finally ICAO is responsible for the global planning of aviation safety improvements and coordinated world-wide deployment of new technologies, in particular in the air traffic management domain.

ANNEX VII

The main functions of the EU aviation safety system

(1) THE CURRENT SCOPE OF THE EU AVIATION SAFETY SYSTEM

At present aviation safety is largely regulated at the EU level. The EU Member States continue to regulate only in areas which have been traditionally excluded from the EU competence, such as state aviation (military, police etc.), or where in view of the subsidiarity principle the legislator has decided that the EU regulatory involvement would not bring much added value (e.g. small general aviation aerodromes, amateur-built or historic aircraft).

The second feature of the current EU regulatory system is that not all the safety related rules are developed and maintained following the same process. In this respect three main pillars can be distinguished:

- **Pillar I**: Currently the majority of the aviation safety rules are developed, adopted and maintained in the framework of Regulation (EC) No 216/2008, which, following its initial adoption in 2002,[205] has been subsequently extended twice to cover all the principal domains of the aviation safety chain.[206] The essential requirements which are set out in the Annexes to Regulation (EC) No 216/2008 are supplemented with detailed Implementing Regulations, which in turn are accompanied by Certification Specifications, Acceptable Means of Compliance and Guidance Material developed by EASA. It is a general policy of the EU to regulate aviation safety under Pillar I. In this respect a number of safety rules which were originally developed before the adoption of Regulation (EC) No 216/2008, such as the former SAFA Directive[207] or the EU-OPS Regulation,[208] have been subsequently transformed into Implementing Rules to Regulation (EC) No 216/2008.[209]

- **Pillar II:** In 2009, Regulation (EC) No 1108/2009 extended the competences of EASA to safety aspects of air traffic management/air navigation services. Whilst this resulted in the incorporation of various related technical elements into Regulation (EC) No 216/2008, the

[205] Regulation (EC) No 1592/2002 of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency', (OJ L 240, 7.9.2002).
[206] Regulation (EU) No 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC, (OJ L 79, 19.3.2008); Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation services and repealing Directive 2006/23/EC, (OJ L 309, 24.11.2009).
[207] Directive 2004/36/CE of the European Parliament and of the Council of 21 April 2004 on the safety of third-country aircraft using Community airports, (OJ L 143, 30.4.2004, p. 76).
[208] Council Regulation (EEC) No 3922/91 of 16 December 1991 on the harmonization of technical requirements and administrative procedures in the field of civil aviation (OJ L 373, 31.12.1991, p. 4)
[209] Both the former SAFA Directive and the EU-OPS Regulation have been replaced, subject to transitional periods, by Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, (OJ L 296, 25.10.2012, p. 1)

corresponding changes to the SES founding regulations[210] were not completed simultaneously. The reason for this approach was that the legislator wanted to avoid a risk of regulatory gaps during the transition from the SES to the EASA framework. However this also caused an overlap between the SES founding regulations and Regulation (EC) No 216/2008, and more generally a mismatch between the approach used for all other sectors of aviation (airworthiness, crew licensing, air operations etc.) in the EASA framework and air traffic management/air navigation services. The 2012 SES II+ initiative launched by the European Commission has as its objective to "eradicate the overlap between SES and EASA regulations",[211] and work is ongoing on bringing all the safety relevant legislation related to air traffic management/ air navigation services under Pillar I.[212] It is therefore ultimately envisaged that Pillars I and II will be merged, following the adoption of the relevant provisions of the SES II+ package.

- **Pillar III:** This pillar contains aviation safety rules which are developed neither under the SES framework regulations, nor under Regulation (EC) No 216/2008. Three main areas can be distinguished in this respect: Air Accident investigations;[213] the reporting analysis and follow-up of occurrences;[214] and finally the EU list of airlines subject to an operating ban or restriction.[215]

[210] Regulation (EC) No 549/2004 of 10 March 2004 laying down the framework for the creation of the single European sky (OJ L 96, 31.3.2004, p. 1.); Regulation (EC) No 550/2004 of 10 March 2004 on the provision of air navigation services in the single European sky (OJ L 96, 31.3.2004, p. 10); Regulation (EC) No 551/2004 of 10 March 2004 on the organisation and use of the airspace in the Single European Sky (OJ L 96, 31.3.2004, p. 20); Regulation (EC) No 552/2004 of 10 March 2004 on the interoperability of the European air traffic management network (OJ L 96, 31.3.2004, p. 26).

[211] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Accelerating the implementation of the Single European Sky, (COM(2013) 408 final, 2013), p.9

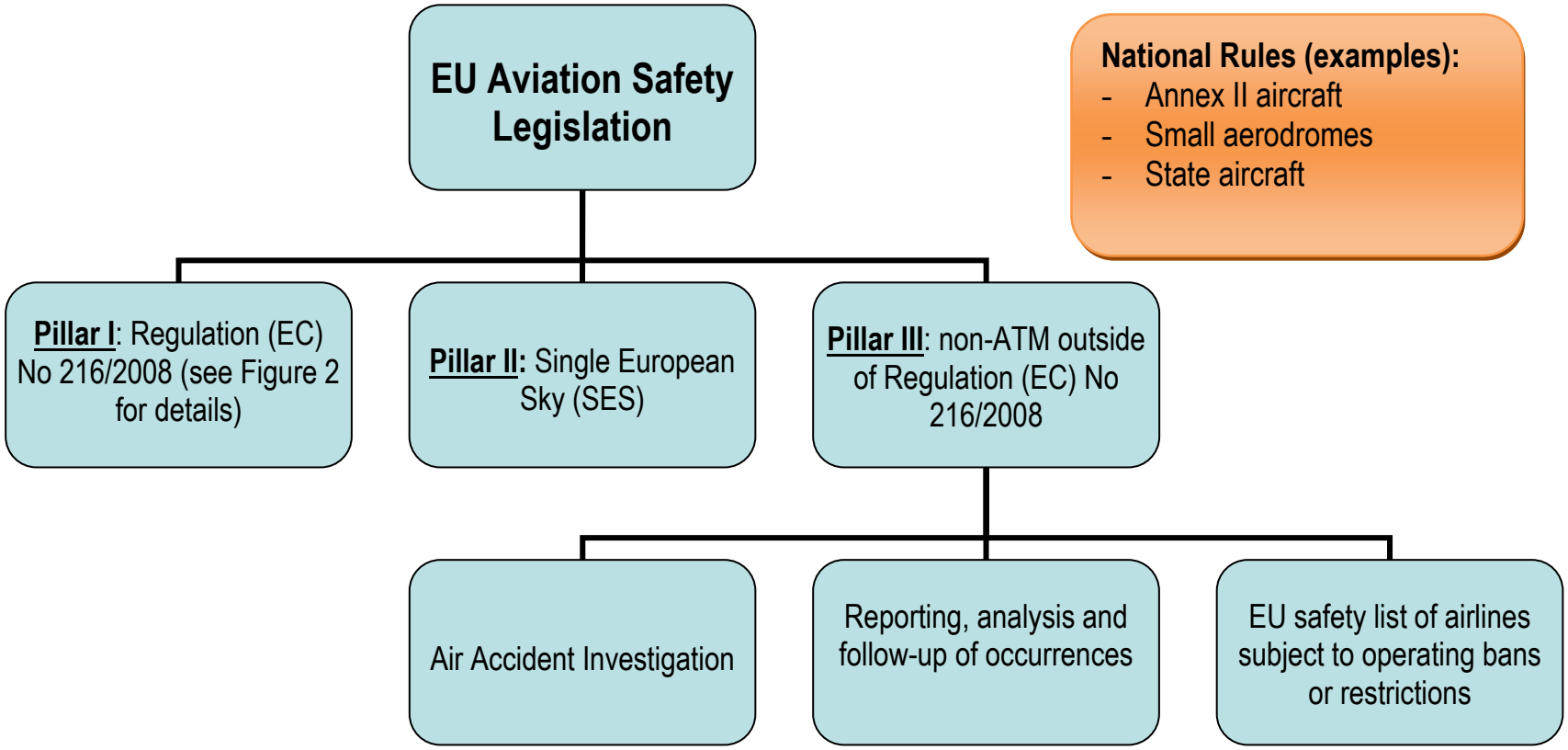
[212] This has been the case for example with the former Directive on ATCO licensing (Directive 2006/23/EC of the European Parliament and of the Council of 5 April 2006 on a Community air traffic controller licence (OJ L 114, 27.4.2006, p. 22)), which has been transformed into Commission Regulation (EU) No 805/2011 of 10 August 2011 laying down detailed rules for air traffic controllers' licences and certain certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 206, 11.8.2011, p. 21).

[213] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC', (OJ L 295, 12.11.2010)

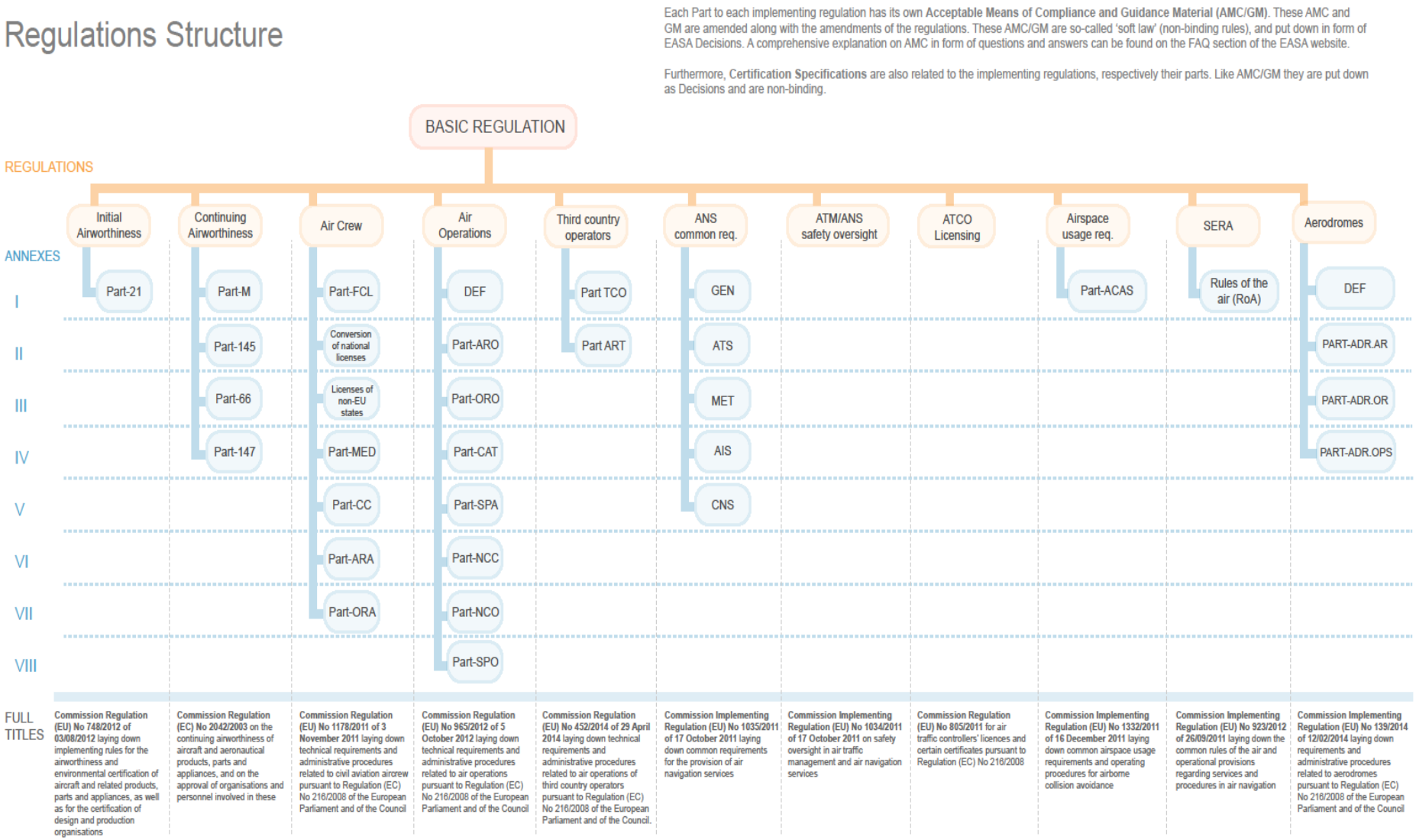
[214] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18).

[215] Regulation (EC) No 2111/2005 of the European Parliament and of the Council of 14 December 2005 on the establishment of a Community list of air carriers subject to an operating ban within the Community and on informing air transport passengers of the identity of the operating air carrier, and repealing Article 9 of Directive 2004/36/EC **(**OJ L 344, 27.12.2005, p. 15).

Architecture of the aviation safety regulatory framework in 2014



Structure of EU aviation safety regulations (Regulation (EC) No 216/2008 framework)



Source: European Aviation Safety Agency

(2) RULEMAKING

The principal objective of the Regulation (EC) No 216/2008 is to "establish and maintain a high uniform level civil aviation safety in Europe."[216] One of the means to ensure this objective is "the preparation, adoption and uniform application of all necessary acts."[217] Harmonised and adequate rules are not only one of the safety barriers, but in the case of the EU with respect to the creation of an internal market are also essential for a level playing field for the industry, facilitating free movement of goods, persons and services, and promoting cost-efficiency in the regulatory and certification processes.

Safety rules are currently developed primarily under Pillar I above, following a rulemaking process which is defined in Regulation (EC) No 216/2008.[218] In this respect, the responsibilities are shared between the European Commission and EASA depending on the type of the regulatory material being developed:

- Proposals for binding measures of general applicability, i.e. amendments to Regulation (EC) No 216/2008 and proposals for Implementing Rules thereto are made by the European Commission on the basis of EASA technical Opinions. Regulations of the European Parliament and the Council are adopted in accordance with the ordinary legislative procedure. Implementing Rules, which are Commission Regulations, are adopted by the College.

- The non-binding regulatory material, i.e. Certification Specifications, Acceptable Means of Compliance and Guidance Material, are developed and adopted by EASA;

The above hierarchy of regulatory material was introduced to enable technical standards and best practices to be adapted quickly in view of operational experience and rapid scientific progress which characterises the aviation sector. A major benefit that the EU system has brought about when compared with the former Joint Aviation Authorities is that currently the safety requirements are legally binding and directly applicable in all EU Member States, while under the Joint Aviation Authorities rules needed transposition into the national legal orders of the Member States, and national variants were possible, which made acceptance of certificates more complex.

(3) CERTIFICATION

Another major benefit of the EU regulatory system is the principle of automatic certificate acceptance which is established by Article 11 of Regulation (EC) No 216/2008, and which requires the EU Member States to recognise "without further technical requirements or evaluation" certificates which were issued in accordance with this Regulation. This is a significant difference compared with the former Joint Aviation Authorities system which could only issue *recommendations* for certificate acceptance which in practice led to a patchwork of recognition arrangements between the Member States. The precondition for this automatic recognition of certificates is the existence of the common regulatory framework as presented under point (2).

[216] Article 2(1) of Regulation (EC) No 216/2008
[217] Article 2.3(a) of Regulation (EC) No 216/2008
[218] Articles 18-19 and 52 of Regulation (EC) No 216/2008

The second characteristic feature of the EU civil aviation system is centralisation of certification tasks, where it has been found by the EU legislator that such centralisation would bring additional efficiency effects compared to national based certification, or if it is justified by need for uniformity of action *vis-a-vis* third countries. In such cases it is EASA, and not the National Aviation Authorities, which is a competent authority for the initial approval and continuing oversight of an organisation, device or an aeronautical product. By the end of 2014 the centralisation of certification tasks will have been used in the areas of: approval of design of aeronautical products, parts and appliances,[219] third country organisations and operators,[220] and organisations providing pan-European air navigation services.[221] Regulation (EC) No 216/2008 also allows EU Member States to delegate to EASA certain certification tasks on a voluntary basis. Such voluntary delegations are currently possible in the domain of production[222] and approval of Flight Simulation Training Devices.[223] The most notable practical example of the use of such voluntary delegations is the Airbus consortium which holds a single production organisation approval from EASA and which covers the facilities of Airbus both in the EU and abroad (e.g. the A320 Final Assembly Line in Tianjin, China).

The EASA certification process represents a 'one-stop-shop' for the aeronautical industry: only one technical investigation is conducted and one certificate issued at the end of this process which is automatically valid in all EU Member States and other countries which have been associated with the EU aviation safety system on the basis of international agreements. This is a difference with the previous Joint Aviation Authorities system, where each authority had to still issue a separate certificate on the basis of the technical investigation / recommendation, and where the recommended certification basis could still be modified at the national level.

(4) OVERSIGHT & ENFORCEMENT

The EU aviation safety system has own oversight mechanisms which complement those available in EU Member States. The primary objective of the EU level oversight mechanisms is to ensure a uniform level of implementation of the common safety requirements and facilitate the sharing of best practices between the EU Member States.

The primary oversight mechanism that the EU uses to monitor the implementation of aviation safety legislation is the system of standardisation inspections and other monitoring activities which are performed by EASA on a mandatory and continuous basis, and through which the Agency assists the European Commission, using a risk based methodology, in controlling the application and uniform implementation by competent authorities of the EU Member States of Regulation (EC) No 216/2008 and its implementing rules.[224] The system of EASA standardisation inspections and other monitoring activities, together with the common

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[219] Article 20 of Regulation (EC) No 216/2008

[220] Articles 20.2(b)(iii), 21.1(b), 21.2(iii), 22a(b), 22b(b) and 23 of Regulation (EC) No 216/2008

[221] Article 22(a) of Regulation (EC) No 216/2008

[222] The legal basis for such approval is: Regulation (EU) No 216/2008, *supra* note 132, Article 20.2(b)(ii). See also: EASA, 'Agency issues first European Single Production Organisation Approval to Airbus', Press release of 21.07.2008,

[223] Article 21.2(b)(ii) of Regulation (EC) No 216/2008

[224] Commission Implementing Regulation (EU) No 628/2013 of 28 June 2013 on working methods of the European Aviation Safety Agency for conducting standardisation inspections and for monitoring the application of the rules of Regulation (EC) No 216/2008 of the European Parliament and of the Council and repealing Commission Regulation (EC) No 736/2006 (OJ L 179, 29.6.2013 p. 46)

regulatory framework addressed under point (2) is an enabler of the automatic recognition of certificates, as it gives confidence to all the EU Member States that the level of implementation of EU safety requirements which is necessary to recognise certificates as provided for under Article 11 of Regulation (EC) No 216/2008 is achieved.

When it comes to enforcement, the EU Member States are primarily responsible for taking action in case of identified non-conformities or violations of EU legislation. In particular, Regulation (EC) No 216/2008 obliges the Member States to "lay down penalties for infringement of this regulation and its implementing rules". However, similarly to the EU oversight mechanisms, the enforcement at national level is supplemented by enforcement mechanisms which exist at the EU level, and which can be activated in case the national system does not take appropriate corrective measures in a timely manner. It is the primary responsibility of the European Commission, as the 'Guardian of the Treaties' to activate the EU level enforcement mechanisms, which can take two main forms: (1) an infringement against a non-compliant EU Member State taken under Article 258 of the Treaty on the Functioning of the European Union (TFEU), or (2) initiation of the procedure envisaged under Article 11 (2) of Regulation (EC) No 216/2008 with a view to determining if a certificate issued by an EU Member State effectively complies with the provision of that regulation and its implementing rules.

When it comes to enforcement competences of EASA, these are limited to the actions that the Agency can take as a competent authority with respect to organisations, devices or products that it certifies. This effectively means that the enforcement competences of EASA are limited to revoking, suspending or limiting the certificate that it has issued, or taking an action by means of an Airworthiness Directive when the Agency has identified that an unsafe condition exists with respect to a product that it has certified. When a "more nuanced, flexible and graduated response to a breach of the rules, compared to the withdrawal of a certificate" is warranted, the Agency has the possibility of recommending to the European Commission the imposition of a financial fine or a periodic penalty payment.[225] However, under the current legal framework it is the responsibility of the European Commission to actually impose such a fine or penalty payment.

(5) Safety Analysis & Promotion

With the gradual transition towards safety management and performance based approaches in aviation safety regulation and oversight, the role of safety analysis and promotion are becoming increasingly important functions of the EU aviation safety system.

The recently adopted EU Regulation on reporting, analysis and follow-up of occurrences[226], currently in transition towards implementation, is expected to improve the capabilities of the industry, the Member States and the EU to draw safety lessons from the analysis of occurrences, notably by mandating the collection and analysis of occurrences to determine necessary mitigation actions. It also strengthens the exchange of information between the

[225] Commission Implementing Regulation (EU) No 646/2012 of 16 July 2012 laying down detailed rules on fines and periodic penalty payments pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 187, 17.7.2012, p. 29)

[226] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007

Member States and with EASA and ensures that the Commission, EASA and Member States collaborate through a network of analysts with the view to support the adoption of the European Aviation Safety Plan.

The EU has also published the European Aviation Safety Programme[227], which describes the functioning of the EU aviation safety system, and regularly releases new editions of the European Aviation Safety Plan, which identifies the main risk areas and reports on the status of implementation actions which have been identified as the best mitigations for the identified risks. In 2014, a fourth edition of the European Aviation Safety Plan[228] has been issued.

(6) International Cooperation

In view of the global nature of the civil aviation sector, international cooperation is essential to maintain network safety, ensure fulfilment of EU Member States' obligations under the Chicago Convention, reduce redundant regulatory oversight and promote EU views regarding civil aviation safety standards and rules throughout the world. There are a number of tools that the EU uses in this respect: (a) Bilateral Aviation Safety Agreements, (b) Working Arrangements; (c) Technical cooperation projects, and (d) cooperation with ICAO.

(7) Accident Investigation

Despite aviation safety being currently at record high levels, accident investigation remains the ultimate safety net of the EU aviation safety system, which will step in to correct deficiencies once all the other safety barriers have failed. In addition to investigating the causes of aviation accidents and serious incidents, safety investigation authorities contribute to the improvement of the system by conducting safety studies and participating in analysis of safety information in the European Central Repository.

In 2010 the EU has adopted a new Regulation on the investigation and prevention of accidents and incidents in civil aviation.[229] This Regulation strengthened the accident investigation function in the EU, notably by establishing the European Network of Civil Aviation Safety Investigation Authorities (ENCASIA), clarifying the role of EASA in safety investigations, transposing ICAO Annex 13 requirements concerning safety recommendations and establishing an EU database of safety recommendations, better protecting the rights of the victims of aviation accidents and their families, and finally affording a higher level of protection to safety information collected during the investigations.

[227] SEC(2011) 1261 final, 25.10.2011
[228] http://www.easa.europa.eu/system/files/dfu/sms-docs-European-Aviation-Safety-Plan-(2014-2017).pdf
[229] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (OJ L 295, 12.11.2010, p. 35)

ANNEX VIII

FILING OF DIFFERENCES WITH ICAO SARPS BY EU MEMBER STATES ON THE BASIS OF EASA RECOMMENDATIONS

Background

EASA developed Compliance Checklists (CCs) for a number of Annexes to the Chicago Convention. By November 2014 EASA drafted and consulted with the Member States the CCs for Annexes 1, 6 Part I, 6 Part III (CAT only), 8, 14 Volume I, 16, 18 and 19. This covers around 31% of entries in the ICAO Electronic Filing of Differences (EFOD) database (there are 10 800 items in the EFOD in total). Some of those checklists are now being revised with a view to the last ICAO amendments to the annexes in question. In addition new CCs for Annex 6 Part II and for Annex 10 are being developed. The purpose of this activity is two-fold:

1) To provide ICAO with information required for the continuous monitoring of EASA by ICAO in accordance with the EASA-ICAO Working Arrangement on Continuous Monitoring Activities of 30 July 2014;
2) To provide the Member States and other interested countries, members of the PANEP and EASA International Cooperation Forum, with ready-made material to be used in the CCs they must submit to ICAO as required in their Memorandums of Understanding on Continuous Monitoring Activities;

The added value of this activity is a common statement on compliance and differences of EU safety rules with ICAO SARPs, helping the Member States to fulfil their obligations towards ICAO in a uniform manner. The material prepared by EASA is based purely on EU rules and does not consider the actual implementation by the Member States including possible derogations, exemptions and alternative means of compliance.

Methodology of the study

The study was based on a sample of 14 ICAO standards for which EASA indicated category C difference ('less protective' or 'not implemented') from Annexes 1, 6 and 19. The information analysed came from 23 Member States.

The annexes were chosen based on their scope (Annexes 1 and 6) and existence of differences in the EASA CCs (which excluded Annexes 16 and 18). Annex 19 was chosen due to its recent publication and the fact that the CCs for this Annex were the first ones to be shared with Member States in 2014. The structure of Annex 8 (repeated numbering of SARPs in each of its parts) made it impossible to identify particular entries without access to the full CCs of each state. Annex 14 was not chosen because the corresponding implementing rules (Regulation (EC) No 139/2014) are not yet applicable. The Member States taken into account are those that indicated any differences against the SARPs of the three above-mentioned annexes.

Result of the study

The analysis of the content of the differences indicated in EFOD by the 23 Member States (322 items) revealed, that EASA's recommendation was followed in only 29.19% of cases, with significantly higher results in case of Annex 19. The cases when the recommendations were not followed include mostly no information provided, outdated references to European rules (JARs or EU-OPS) or to national rules. Three Member States followed the EASA CCs almost to the letter. The results are presented in the table below.

Table: Are EASA recommended CCs followed?

ICAO Annex reference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	YES	NO	% of compliance
Annex 1																										
2.1.10.1	N	Y	N	N	N	Y	N	N	Y	N	N	N	Y	N	N	N	N	Y	N	N	Y	N	N	6	17	26.09%
4.2.2.2	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	Y	N	N	Y	N	N	5	18	21.74%
4.4.1.1	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	Y	N	N	Y	N	N	3	20	13.04%
Annex 6 Part I																										
4.3.6.2	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	3	20	13.04%
6.3.1.2.1	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	3	20	13.04%
6.5.3.1	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	3	20	13.04%
8.2.1	N	Y	N	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	Y	Y	N	Y	6	17	26.09%
8.7.1.1	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	Y	N	4	19	17.39%
Annex 19																										
3.1.3	Y	Y	N	N	Y	N	N	N	N	N	Y	N	Y	Y	N	N	Y	Y	Y	N	Y	Y	N	11	12	47.83%
3.1.4	Y	Y	N	N	N	Y	N	N	N	N	Y	N	Y	Y	N	N	Y	Y	N	N	Y	Y	N	10	13	43.48%
3.2	Y	Y	N	N	N	Y	N	N	N	N	Y	N	Y	Y	N	N	Y	N	N	N	N	N	N	7	16	30.43%
4.1.1	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y	N	N	Y	Y	Y	N	Y	Y	N	10	13	43.48%
4.1.4	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N	Y	Y	Y	N	Y	Y	N	11	12	47.83%
4.1.5	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y	N	N	Y	Y	Y	N	Y	Y	N	12	11	52.17%

ANNEX IX

KEY FIGURES FOR THE QUANTIFICATION OF ECONOMIC IMPACTS

The following generic key figures have been used when quantifying the economic impacts:

Item	Value	Source
Average labour costs (cost of employment without overheads) EASA and Commission per person-year	EUR 95 000	http://easa.europa.eu/system/files/dfu/Working-for-us.pdf. Assumed to be average of grades of highest function group.
Average labour costs at National Aviation Authorities per person-year (cost of employment without overheads)	EUR 55 000	Average of Germany, Netherlands, UK, adapted to average EU/EFTA Member State level based on Purchasing Power Parity estimate. This excludes overheads and staff related expenditures of National Aviation Authorities on e.g. training.
Discount rate for calculating Net Present Value	4%	Commission: Annexes to Impact Assessment Guidelines.

Source: Support study on resources

ANNEX X

THE USE OF EN-ROUTE CHARGES TO FINANCE EASA ACTIVITIES IN THE FIELD OF ATM/ANS

Rationale

The objective of this measure is to mirror with respect to EASA the solution normally used at the Member State and EUROCONTROL level, whereby the relevant ATM/ANS authority tasks are financed by air navigation charges based on the user pays principle. The user pays principle is enshrined in Regulation (EC) No 550/2004 on the Single European Sky.[230]

Regulation (EC) No 216/2008 transferred a number of tasks concerning ATM/ANS rule-making, safety analysis and oversight by law from EUROCONTROL to EASA. While a number of activities were in principle discontinued by EUROCONTROL, including ATM audits and rulemaking, a number of areas continue to exist where activities between EASA and EUROCONTROL are duplicated or where there is a potential for present or future duplication (see table below). These areas include rulemaking, occurrence reporting and analysis, safety review and actions, reporting on implementation of SES regulation and consultation. Furthermore, the user charges were not transferred, and thus at EASA these tasks are now de facto financed from the general EU budget. It is proposed to correct this and to return to a user-pays environment for all ATM/ANS related activity.

In EASA accounting the user-pays principle is already established, notably in the field of certification. EASA has a cost accounting system in place which allows for separation of user and budget financed activities. There is thus no risk of double charging within EASA.

With regard to EASA, the activities affected by the proposed measure are as follows:

- standardisation inspections to be carried out in accordance with Articles 24(1) and 54 of Regulation (EC) No 216/2008;
- activities to support National Supervisory Authorities (NSA), including in the areas under the duty of EASA in the context of the NSA coordination platform established by the Commission;
- rulemaking activities in accordance with Article 19 of Regulation (EC) No 216/2008, including those stemming from SESAR deployment; and
- SES monitoring and involvement in the development and implementation of the performance scheme, as far as the safety key performance area is concerned.

This discussion relates only to general authority tasks. It does not concern EASA's tasks in issuing and renewing certificates and reviewing declarations of ATM/ANS operators and manufacturers. These are already remunerated through fees paid by the certified organisations in accordance with Article 59(1) (c) of Regulation (EC) No 216/2008.

[230] Article 15 of Regulation (EC) No 550/2004 provides that the costs to be included in the air navigation cost-base may include costs incurred by national supervisory authorities and/or qualified entities, as well as other costs incurred by the Member States.

Resource needs

The above translates into the following resource implications (in number of full time equivalents - FTE):

Domain	*EASA*	*Member States*	*EUROCONTROL (approximate)*
ATM performance scheme (safety area)	+5		-5
rulemaking	+3		-8
Flexible use of airspace	+1.5		-3
Compliance verification	+0.5	Potential significant savings from the current EUR 90 million spent by MS on oversight, by pooling and transferring tasks to EASA or to each other	-2
SES reporting	+3		-12
ATM regulatory and standardisation roadmap, including team leader	+1.5		-5
ATM safety data validation and analysis	2		-3
TOTAL CHANGE	**+16.5**		**-38**

Taking into account that there are already 23 FTE at EASA involved in ATM/ANS related tasks, in particular in standardisation inspections and rulemaking, the total resource needs at EASA in the ATM/ANS area amount to 39.5 FTE.

Cost impact

Under the proposed measure, the costs of EASA activities in the field of ATM/ANS would be set in separated accounts within the EASA budget; these costs will then be included in the cost base for air navigation charges and attributed to EU Member States through sharing-keys (similarly to the existing sharing-keys used for EUROCONTROL costs). Their inclusion in the cost base for air navigation charges will make them subject to the EU performance scheme. The costs of EUROCONTROL should be reduced accordingly, reflecting the discontinuation of the tasks mentioned in the table above. The common charging scheme including with respect to en-route charges, is established by Commission Implementing Regulation.[231]

The above table expressed in FTEs produces the following financial outcome based on an average unit cost of EUR 150 000 per FTE at EASA and EUR 263 000 at EUROCONTROL[232], mainly due to the different tax regime (both include overheads such as real estate, IT etc.):

In million euro	*EASA*	*Member States*	*EUROCONTROL (approximate)*
Additional	+2.475		
Existing	+3.450		
Total	**+5.925**	**-X (several 10s of millions to be saved in the medium to longer term)**	**-9.994**

[231] Commission Implementing Regulation (EC) No 391/2013 of 3 May 2013 laying down a common charging scheme for air navigation services, (OJ L 128, 9.5.2013, p. 31).
[232] EUROCONTROL Agency Business Plan 2015 – 2019, p. 48.

The net saving for airspace users thus amounts to over EUR 4 million immediately, and potentially more following savings in Member States' oversight needs.

The above figures are calculated on the basis of FTE costs including overheads and taxes in order to demonstrate all the savings potentially to be achieved by internalising in EASA the tasks for which the EU makes use of the expertise of EUROCONTROL today. Plain salaries in EASA and EUROCONTROL on the other hand differ only slightly.

Moreover, nearly EUR 3.5 million would be saved for the EU budget, as 23 FTE would no longer need to be financed from the EU contribution. These resources could be reallocated to finance additional EASA tasks envisaged under the preferred policy package.

ANNEX XI

METHODOLOGY FOR CALCULATING FUTURE RESOURCES NEEDS OF THE NATIONAL AVIATION AUTHORITIES UNDER THE BASELINE SCENARIO ('FUTURE RESOURCES GAP')

In order to make an estimation of future growth in workload and resource requirements for Member States' aviation authorities under a baseline scenario, an analysis was conducted of the relationship between a number of indicators related to the level of industry activity, the level of workload of national authorities and the associated number of staff resources, respectively. The relationship was assessed for three different years (2003, 2008 and 2013) in order to provide a view of the growth trends for the years 2020 and 2030.

Using this model, development in the size of the industry is measured by means of the total number of aircraft on national register and the total volume in IFR flights; to measure workload, the total number of Air Operator Certificate (AOC) holders is used; and for national authorities resources, data on the technical staff in the three largest domains, airworthiness (AIR), operations (OPS) and personnel licensing (PEL), is used.

It is assumed that a growth in the level of industry activity will increase the workload in the national authorities. As workload increases, so too will the resources required of national aviation authorities, although at a certain point this should be offset by more efficient working methods stemming from the transition to risk based safety oversight planning. On the other hand, it is clear from the resources support study,[233] that that budget constraints in Member States are considered among the most important causal factors in relation to staffing levels.

Because of the limited number of Member States with data available across all three periods referred to above (2003, 2008 and 2013), we look only at the year 2013, for which most Member States (18 total) provided data, in order to calculate an estimate for the total budget and resources in all States participating in the EU aviation safety system and to predict the baseline trend and future scenario. This calculation is done as follows: an average is taken of the total budget amount of the 18 states, and then multiplied by 31 (total number of states participating in the EU aviation safety system). It is then estimated, for each change in the level of industry activity for the years 2020 and 2030, future resources needs, assuming a continuation of the baseline scenario. This is calculated based on an elasticity approach to the industry activity and resource variables as follows:

i) The development in the size of the industry is measured by means of the total amount of aircraft on national register and the volume of "instrument flight rules" (IFR) flight in Europe both indicate *an increase*. Regarding aircraft on national register, the total number of aircraft on register of all states that submitted data grew from 75 554 in 2003, to 79 620 in 2008 and to 88 057 in 2013. This represents an overall increase of 16.5% over the 10 year period;

ii) Regarding IFR traffic, the number of flights grew from approximately 8.5 million in 2003, to 10.1 million in 2008. However due to the economic crisis, air traffic has seen a slow recovery, reaching approximately 9.447 million flights in 2013 – an 11% increase over 2003 levels, though nearly a 6.5% decrease over traffic in 2008. According to EUROCONTROL latest *Challenges of Growth* forecast, traffic will reach the 2008 peak again by 2016 and grow by approximately 1.8% annually over

[233] ECORYS, Resources support study, (2015), p. 110.

currently levels by 2030, with faster growth expected in the initial years between 2015-2020 (approximately 2.5% annually until 2020);[234]

iii) In terms of workload, it is expected that the number of AOCs - taken as a proxy measure for workload in national authorities - will be affected by the growth in industry activity levels. While the results of the analysis show a strong, positive linear correlation between the variables for passengers and the number of AOCs for each of the periods assessed, the trend in the number of AOCs held shows an increase from 1 221 in 2003 to 1 304 in 2008, followed by a decrease to 1 201 AOC holders in 2013. Thus the total period experienced an overall decrease of 2.4% with respect to 2003. No clear explanation could be found for this trend other than the economic downturn since 2008. Notwithstanding this finding, it can be expected that, all else being equal, an improved economic climate would have the effect of reversing the trend; therefore, for the purpose of this analysis, an increase in the overall workload is assumed.

iv) Summing up the total technical staff of the three largest domains (that is OPS, PEL and AIR) for all States that submitted data, provides totals of 1 573 in 2003, 1 728 in 2008 and 1 659 in 2013. Hence the trend is initially an increase of 9.9%, followed by a decrease of 11%. With respect to 2003, 2013 shows an increase of 5.5%.

v) Regarding budget, the total of the 18 States that provided data for 2013 was EUR 581 464 245. This means an average of EUR 32 303 569 per State. Multiplying this figure by 31 (total number of states participating in the EU aviation safety system) gives an estimate of the total amount of EUR 1 billion. Including the budget of EASA an estimate of the total budget is EUR 1.13 billion.

Table 1: Baseline trends, 2003-2013

Baseline	2003	2008	2013	% change, 2003 - 2013
Total technical NAA staff (AIR, OPS, PEL only)	1 573	1 728	1 659	5.5%
Total NAA staff	n/a	n/a	5 100	n/a
Total NAA Budget	n/a	n/a	EUR 1 billion	n/a
Total Budget (NAA + EASA)	n/a	n/a	EUR 1.13 billion	n/a
AOCs held	1 221	1 304	1 201	-2.4%
Aircraft	75 554	79 620	88 057	16.5%
IFR traffic	8.5 million	10.1 million	9.447 million	11.1%

[234] EUROCONTROL, Challenges to growth 2004 Report. EUROCONTROL, Brussels: 2004. EUROCONTROL Challenges of Growth 2013: Summary report, June 2013. EUROCONTROL Seven-Year Forecast - Flight Movements and Service Units 2014-2020, September 2014.

Looking forward, a number of studies[235] have been consulted to make a prediction on future growth. For the number of aircraft on register, an annual growth of 3% is estimated across Europe until 2033; and a growth rate of 2.5% per annum in IFR flights until 2020, followed by slower growth until 2030. For the latter, the 1.8% average annual growth over the whole period (2014-2030) was used to estimate the IFR flights in 2030. Based on the figures collected for 2013, total aircraft on register is estimated to reach 108 000 by 2020 and 145 000 by 2030. This represents an increase of 23% by 2020, and an increase of 65% by 2030. Regarding IFR traffic, total growth is estimated to reach 11.2 million in 2020, and 12.8 million in 2030, an increase of 19% and 35% over the 2013 figures respectively. See Table for an overview of these estimates.

Table 2: Gap assessment

Industry growth	2020 total	2020 / 2013 - % change	2030 total	2030 / 2013 - % change
Aircraft on register	108 000	23.0%	145 000	65.3%
IFR traffic growth	11.2 million	18.9%	12.8 million	35.4%
Estimated resource growth needed	**2020 total**	**2020 / 2013 - % change**	**2030 total**	**2030 / 2013 - % change**
Total EASA staff	698	7%	No additional change	No additional change
Total CA staff	5 487-5 572	7.6% – 9.3%	5 987 – 6 200	17.4% - 21.6%
Total CA Budget	EUR 1.021 billion– EUR 1.026 billion	2.1% - 2.6%	EUR 1.049 billion - EUR 1.061 billion	4.9% - 6.1%

Taking the above industry growth rate estimates for the years 2020 and 2030, together with rate of change in the number of NAA staff from 2003 to 2013, an elasticity analysis is subsequently conducted to assess the potential proportional change in the number of National Aviation Authority staff for a proportional change in industry level activity. It should be noted that the results are to be interpreted with caution, as there are clearly many other indicators that influence workload. Based on the total staff and industry growth rates calculated during the last decade, combined with the estimates for future industry growth provided above, it can be predicted that:

⇒ the need for additional staff to carry out the workload will increase by roughly 7.6 – 9.3% by the year 2020 of the base figure of around 5 100 total National Aviation Authority staff in 2013, amounting to between 5 487 to 5 572 total staff needed;

⇒ By 2030, total staff needed is expected to increase by between 17.4 – 21.6% over the current level, which represents between 5 987 to 6 200 individuals.

The above increases can be considered somewhat conservative, as the resources support study also showed that there are currently shortages in staff in certain National Aviation Authorities. As such, the current figure of 5 100 total staff that served as the basis for the assessment does

[235] Airbus, Global Market Forecast 2014-2033, Flying on Demand, 2014; Airbus, GMF book 2014-2022, 2014.

not reflect the present actual need for resources at National Aviation Authority level. The increase in staff necessary at EASA is based on analysis of the EASA Annual Staffing Plans, which call for approximately 698 additional staff by the end of 2017 (up from 638 at the end of 2013). Taking into consideration EU's intent to reduce the number of additional staff required at EASA as foreseen in the Staffing Plans, it can be expected that, the current gap of 50 FTE is maintained in 2020 and 2030. As a comparison, the FAA forecasts that it will need a staff increase for its Aviation Safety workforce of 11% in 2023 compared to 2013.[236]

The same proportional increase is applied to the total budget of NAAs, which indicates total budget needs in 2020 will amount to EUR 1.021 billion - EUR 1.026 billion, and between EUR 1.049 billion - EUR 1.061 billion in 2030. Thus, the projected gap in NAA budgets, compared to the current budget levels of approximately EUR 1 billion, is estimated at EUR 21-26 million in 2020 and EUR 49-61 million in 2030 (annually).

This increase has been valued by multiplying the additional FTEs by the average wage level of National Aviation Authority staff in Europe (see Annex IX). These are 'plain' wages costs and exclude overheads and employee related costs such as training.

The above figures are clearly indicative, as an overall resource forecast model in this area does not exist. Nevertheless, it is clear that if industry activity and associated demand for new aircraft will grow according to forecasts, this will impact National Aviation Authorities in the workload increase. These estimates do not factor in the impact of the transition to risk based approach however, which in the longer term should reduce the need for some resources.

[236]FAA, Aviation Safety FY2014 Workforce Plan.

ANNEX XII

CONTRIBUTION OF POLICY OPTIONS RELATED TO 'QUALITY AND MANAGEMENT OF RESOURCES' TO THE REDUCTION OF FUTURE RESOURCES NEEDS IN MEMBER STATES – DETAILED CALCULATIONS

In Annex XI an estimate on the gap of resources towards 2020 and 2030 has been presented. This Annex presents detailed calculations of how the different policy options related to the quality and management of resources contribute to reducing this resources gap. The calculation is not presented for PO 1.2 (Enhanced cooperation within the system), which should have a positive result on the use of resources in Member States, but the scale of this impact is expected to be rather limited. These calculations were performed using the data submitted by Member States in the context of the support study on resources.[237]

Policy Option: 1.3(a): Joint oversight system with voluntary transfer of responsibilities & 1.3 (b) Emergency oversight support mechanism

PO 1.3(a) and PO 1.3(b) are expected to have overall the same effect on the reduction of the future resources needs in Member States. The Emergency oversight support mechanism is designed as an exceptional measure not to be applied on a routine basis, and therefore its impact on the resources is very difficult to assess up-front.

Both PO 1.3(a) and PO 1.3(b) are expected to achieve a reduction in the resources gap by a reallocation of tasks from NAAs that are less specialised in performing a given type of activity, to others that are more specialised in doing so. In addition, where Member States will take up opportunity to transfer the responsibility for a given activity to EASA, this is expected to have economies of scale effects, as was the case for Type Certification centralisation under the current mandate of EASA.

In order to assess these impacts, the following methodology was followed, using as an example the OPS domain, and where it is assumed that NAAs with the least in-house expertise in OPS delegate the relevant tasks to the NAAs with most in house expertise in the same domain:

1. Identifying 6 out of 28 NAAs (that have provided relevant data), with the least experts in OPS, as well as the 6 NAAs with the most experts in OPS;
2. Calculating the average staff/AOC ratio for each of the 2 above identified groups, which results in the following:
   ⇒ 'Larger OPS NAA' average ratio: 0.60 (4 out of 6 of NAAs are within the range 0.27-0.94)
   ⇒ 'Smaller OPS NAA' ratio: 0.97
3. Estimating the decrease in resources if the OPS operations of the 'smaller OPS CAs', were performed by the 'larger OPS CAs'. To do this, we calculate the staff that would be needed (on average) to produce the same amount of output by assigning the AOCs of the 'smaller OPS CAs' to the 'larger OPS CAs', which results in the following:
   ⇒ AOCs issued by the 6 'smaller OPS CAs': 51;

[237] ECORYS, Resources support study, (2015)

⇒ Staff needed for the AOCs issued by the 6 'smaller OPS CAs': 49.25;

⇒ Staff needed if these AOCs where produced by the 'larger OPS CAs' (high estimate): 51*0.27 = 13.88;

⇒ Staff needed if these AOCs where produced by the 'larger OPS CAs' (low estimate): 51*0.598 = 30.52;

Resources gap reduction in 2013 (assuming instant implementation): approximately 19-35. FTEs:

1. This resources gap reduction concerns year 2013. By 2020, the need for resources is expected to grow by 8.45% (average of 7.6% – 9.3% band) and therefore the reduction in the resources gap due to this option is expected to grow proportionally to 20-38 FTEs. By 2030, the need for resources is expected to grow by 19.5% (average of 17.4% – 21.6% band) and therefore the reduction in the resources gap due to this option is expected to grow proportionally to 24-46 FTEs.

2. This corresponds to a reduction in the budget required to fill the resources gap of about EUR 1.0-2.0 million/year (2013), about EUR 1.1-2.1 million/year (2020) and about EUR 1.3-2.5 million/year (2030). The present value of this during the entire 2016-2030 time frame amounts to EUR13.0-24.6 million. This is valued by applying the average wage costs as presented in Annex IX to the required resources in FTEs. These are 'plain' wages costs and exclude overheads and employee related costs such as training.

The above is a global estimate of the potential impact on reducing the resources gap. The actual impact depends on the actual number of NAAs that would voluntary transfer tasks as well as the number of tasks that they would transfer.

Policy Option 1.4: A single aviation safety authority

Under PO 1.4 EASA is the competent authority for aviation safety in the EU and allocates tasks to the NAAs. We assume that at least for the 3 largest domains of oversight activity (AIR, OPS, PEL), the implementation of tasks, for each domain, will be reallocated from the least efficient NAAs to those that achieving the highest performance quality.

This is different from the calculation approach proposed for PO 1.3 where the transfer is based on a voluntary basis and therefore the assumption was that the transfers take place from smaller to larger NAAs regardless of their efficiency.

In order to calculate the impacts of PO 1.4 on the reduction of future resources needs the following steps were followed:

1. Creation of a basic resources/output ratio for each of the 3 largest domains considering a representative indicator for the workload under each domain. The selected indicators for this exercise are: aircraft in registry for AIR; AOCs issued for OPS; and ATOs supervised for PEL.

2. Calculation, for each of the 3 above domains of the average resources/output ratio for the 20% (6) most efficient, the 20% (6) least efficient NAAs, as well as the average efficiency of the NAAs with a good performance according to EASA standardisation inspections.[238]

3. Calculation of the sum of the output of the least efficient NAAs (i.e. total aircraft on the register of these NAAs; total AOCs and ATO approvals issued by these NAAs) and the sum of the resources needed for performing this output by (i) the most efficient NAAs and (ii) the NAAs with the best standardisation performance.

4. Estimation of the resources needed if the output referred to in point (3) was to be performed by the most efficient NAAs or by an average efficiency rate of the most standardised NAAs. The resources needed in each of these 2 cases are calculated by multiplying the output of the least efficient NAAs with the resources/output ratio for the most efficient NAAs and that of the most standardised NAAs respectively for each of the domains examined. These figures are presented in the table underneath (rounded-up).

Ratio resources/output				Least efficient NAAs resources needed				
	Most efficient	Least efficient	CAs with best performance	Least efficient CAs output	Actual	Performed by most efficient	Performed by CAs with best performance	Resources gap reduction (FTEs)
AIR	0.0063	0.0366	0.0116	2966 a/c	108.45	18. 541	34.41	74-90
OPS	0.2638	1.281	0.4323	226 AOCs	289.60	59.61	97.70	192-230
PEL	0.0735	1.070	0.0988	43 ATOs	46	3.16	4.25	42-43
							Total (2013)	**308 - 363**
							Total (2020) Growth 8.45%	**334-393**
							Total (2030) Growth 19.5%	**368-433**

5. We estimate the range of resources impact to be between the 2 calculated values as an indication that scale efficiency will be also achieved after the activities are allocated to the most standardised NAAs.

6. This resources gap reduction concerns year 2013. By 2030, the need for resources is expected to grow by 8.45% by 2020 and by 19.5% by 2030 (see Annex XI) and therefore the reduction in the resources gap due to this option is expected to grow proportionally to 334-393 FTE by 2020 and to 368-433 FTEs by 2030.

7. The above corresponds to a reduction in the budget required to fill the resources gap by about EUR 16.9-19.9 million/year (2013), about EUR 18.4-21.6 million/year (2020), and about EUR 20.2-23.8 million/year (2030). The present value of this during the entire 2016-2030 time frame amounts to EUR 209-246 million. This is valued by applying the average wage costs as presented in Annex IX to the required resources in FTEs. These are 'plain' wages costs and exclude overheads and employee related costs such as training.

[238] These is defined as the average efficiency rate of the CAs reported in the EASA standardization reports as having no supplementary Class C or D comments for 2012 and 2013.

ANNEX XIII

CORRELATION BETWEEN EFFECTIVENESS OF STATE SAFETY OVERSIGHT AND ACCIDENT RATES

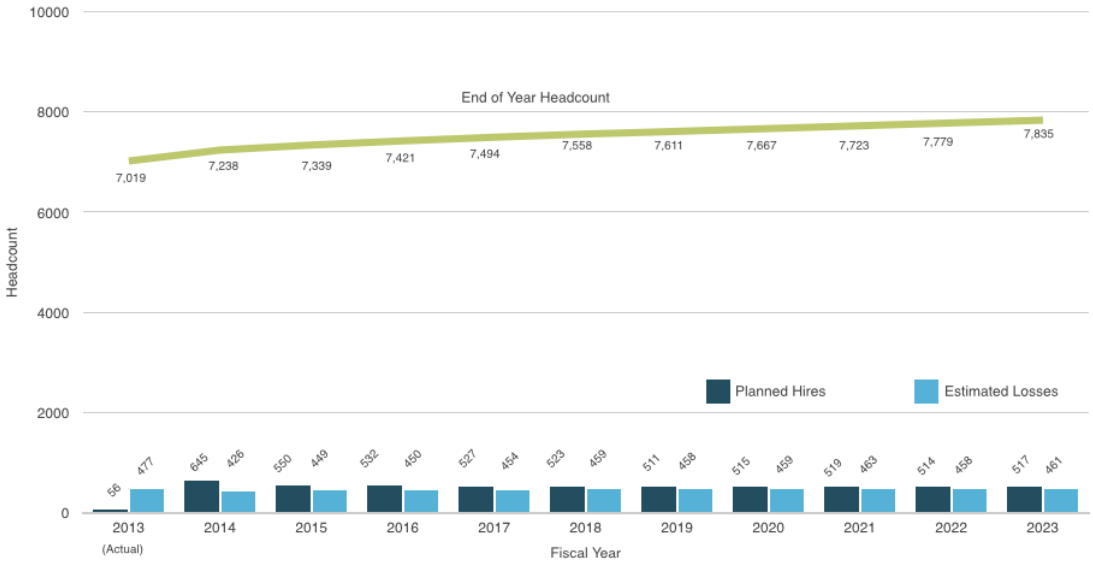
Table: Critical Elements of State Safety Oversight System and Their Correlation with Accident Rates

Critical Element	*Correlation with Accident Rates*
CE-6: Licensing, certification, authorisation and/or approval obligations	Very strong
CE-7: Surveillance obligations	Very strong
CE-3: State civil aviation system and safety oversight functions	Strong
CE-4: Technical personnel qualifications and training	Strong
CE-8: Resolution of safety concerns	Strong
CE-1: Primary aviation legislation	Medium
CE-2: Specific operating regulations	Medium
CE-5: Technical guidance, tools and provision of safety critical information	Medium

Source: ICAO, Report on the USOAP Comprehensive System Approach, Analysis of Audit Results, Reporting Period April 2005 to December 2008, Second Edition.

ANNEX XIV

PROJECTED AVIATION SAFETY WORKFORCE TRENDS IN US



Source: FAA, Aviation Safety FY 2014 workforce plan

ANNEX XV

EXAMPLES OF PERFORMANCE BASED REGULATIONS

Example: Fatigue risk management as introduced by Commission Regulation (EU) No 83/2014 ("Flight Time Limitations" Regulation)

The traditional regulatory approach to managing crew member fatigue has been to prescribe limits on maximum daily, monthly, and yearly flight and duty hours, and to require minimum breaks within and between duty periods. Prescriptive flight and duty time limits represent a simplified view of safety where being inside the limits is safe while being outside the limits is unsafe. This has two effects: (1) there will be pilots flying inside the limits who are unfit, and (2) there will be pilots that are not allowed to fly as they are outside the limits who are actually fit-to-fly. The former has a negative safety impact, the latter a negative economic impact. By applying a data-driven performance based approach based upon scientific principles and knowledge as well as operational experience which aims at ensuring that relevant personnel are performing at adequate levels of alertness (a Fatigue Risk Management System) the actual achieved level of safety performance is optimized and the negative impacts are reduced.

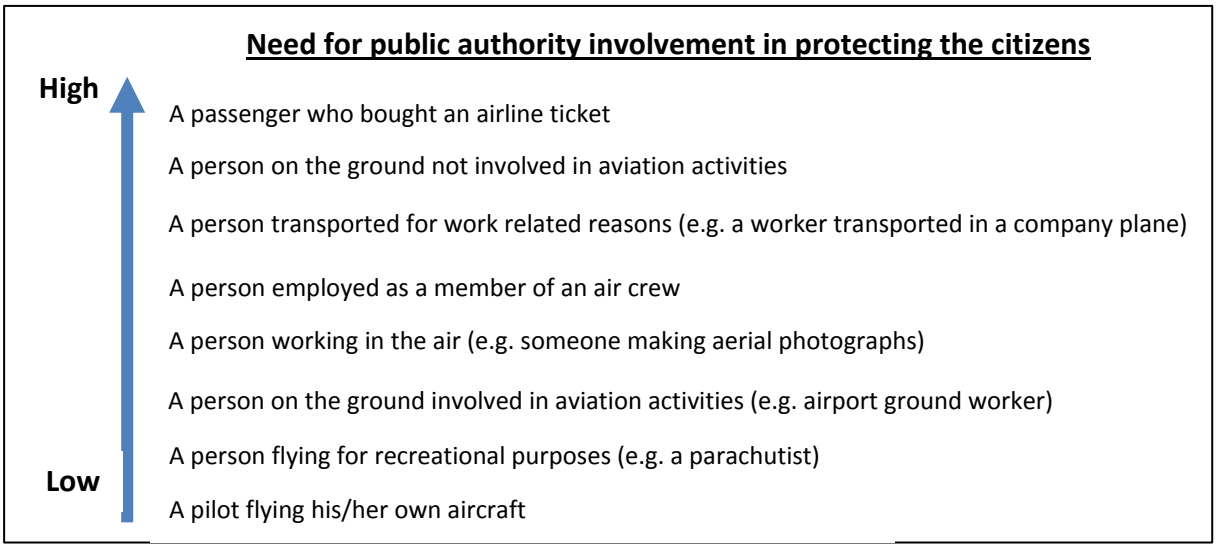
Example: Proposed reorganisation of Certification Specifications 'CS-23' (EASA Advance Notice of Proposed Amendment 2015-6)

The reorganisation of the current CS-23 introduces a new concept whereby the EASA certification specifications will be replaced by objective requirements that are design-independent and applicable to the entire range of aeroplanes within CS-23. These objective requirements will be accompanied by acceptable Airworthiness Design Standards, where the design-specific details are captured. The new concept of objective rules of a higher abstract level accompanied by Airworthiness Design Standards allows the use of appropriate and proportionate standards as Acceptable Means of Compliance catering to the specific needs of different aeroplane categories covered. This flexibility is intended to encourage the introduction of safety enhancing features and reduce certification costs. Future amendments of these Airworthiness Design Standards will have to follow an industry consensus process only, which will allow for a faster adoption of new technologies and better up-to-date standards. Acceptance of these standards as Acceptable Means of Compliance to the objective rules will remain the responsibility of EASA.

ANNEX XVI

Risk Hierarchy Concept

The public consultations clearly showed that the general public, stakeholders and Member States expect the intensity of regulatory interventions to be proportionate to the level of risk posed by the different aviation activities, and to the ability of the user to control that risk. When the risk for the general public is low and the user has direct control over the risk, as is the case for example for recreational flying, the level of regulatory intervention can be lower. Where the risk for the general public is higher and the users have no control over the risk, as is the case for high capacity air transport, the level of regulatory intervention is expected to be high.



ANNEX XVII

SAFETY MANAGEMENT SYSTEMS, SAFETY PERFORMANCE SCHEMES AND PERFORMANCE BASED RULES

This annex gives an overview on the concepts of safety management systems, safety performance schemes and performance based rules, which form important elements of the policy options in the domain on proportionality and safety performance, and their possible advantages on safety. This overview is largely based on the findings of the support study on resources[239] as well as the EASA report on 'A Harmonised European Approach to a Performance Based Environment'[240].

1. Safety Management Systems:

A safety management system is a pro-active system that identifies the hazards to the activity, assesses the risks those hazards present, and takes action to reduce those risks to an acceptable level. It then checks to confirm the effectiveness of the actions. The system works continuously to ensure any new hazards or risks are rapidly identified and that mitigation actions are suitable and where found ineffective are revised.[241] An essential component of safety management systems is 'safety assurance', which requires safety performance to be measured and monitored using safety performance indicators and targets. Safety management applies to organisational, State and regional level and to all domains of aviation. It helps recognise interactions and interdependencies of the aviation system (EASA)

2. Safety Performance Scheme:

A 'safety performance scheme' is a scheme in which the safety performance is measured and monitored. Such a scheme relies in particular on the use of measurable and pertinent safety performance indicators based on a continuous collection and analysis of data. It can also include the adoption of relevant safety performance targets. Such a scheme contributes notably to monitoring whether an action which was implemented positively impacted on the level of aviation safety and can thus support reorienting efforts where appropriate. (Study)

3. Performance based rules:

Performance based rules refers to rules setting a desired measurable outcome defined in terms of performance, but the detail of achieving it is not prescribed (although best practice guidance may be provided). Performance indicators can be used to provide evidence of achieved levels of performance.

4. Advantages of performance based rules:

Experience has shown that simple compliance with prescriptive regulations does not guarantee safety alone. Performance based rules offers improvements by proposing safety performance indicators, targeting safety objectives and efficiently mitigating risks through a

[239] ECORYS, Performance Scheme and Performance Based Approach in the context of aviation safety (Support study on performance), Final Report, (2015).

[240] http://easa.europa.eu/newsroom-and-events/general-publications/harmonised-european-approach-performance-based-environment

[241] Communication from the Commission to the Council and the European Parliament, Setting up an Aviation Safety Management System for Europe; (COM(2011)670), p. 3.

better focus on the outcome rather than only on the way something has to be done. It provides flexibility in the implementation rather than developing prescriptive rules for every eventuality.

The key advantages of performance based rules are:

- Better focus on achieving the desired performance.
- Improved understanding of risks and clearer identification of the required mitigations.
- More tailored oversight activities that focus activities on the areas of greater concern or need.
- Efficiency through a better targeting of resources.
- Better legislative adaptability and flexibility.
- Improved focus on the individuals in the aviation system and their role in safety.
- Will lead to a more active involvement and interaction of all actors in managing the system.

5. Process for developing performance based rules:

A standard EASA rulemaking process would be followed as is the case today. Depending on the type of measure (implementing rule / or soft law material) the outcome of that rulemaking process would be either an opinion for the Commission or certification specification, acceptable means of compliance, or guidance material.

EASA when developing a rule either establishes a rulemaking group with the involvement of industry and Member State authorities or develops the rule/proposal in-house.

The priorities are defined in the rulemaking programme which is approved by the EASA management board (so the Member States) as part of the EASA work programme following opinion of the EASA advisory board (composed of the industry representatives). The rulemaking programme is linked to the European Aviation Safety Plan which identifies the issues of greater concern where a mitigating action has to be taken.

However not all the risks require a rulemaking approach. Sometimes a safety promotion action, increased standardisation or guidance material is sufficient. Performance based rules can refer to acceptable industry standards, which then also reduces the rulemaking effort.

ANNEX XVIII

WORKSHOP ON PERFORMANCE SCHEMES AND PERFORMANCE BASED APPROACH IN THE CONTEXT OF AVIATION SAFETY

Brussels, 10 February 2015

Conclusions

- There is a need to clarify the concepts as not everyone understands 'performance' and related terms the same way

1. Necessity of introducing performance elements in the EU system

- There was an overall agreement on the need to go forward with both Safety Performance Scheme (SPS) and the Performance Based Approach to the Regulation of Aviation Safety (PBA)
- With regards to the feasibility of SPS, the availability and accuracy of data is a key issue
- Any change should be supported by a clear identification of its benefits (safety, economic etc…)
- There is a necessity, both for SPS and PBA, to be gradual and to build over time on the basis of experience and capacity

2. Safety performance Scheme

- There was an overall agreement on the need and benefits of measuring aviation safety
- However it was recognised that certain specific areas might not be covered as they are not measurable
- The development of an SPS will require time and should be a gradual process following a pragmatic approach
- A SPS should rely on the industry input- it should follow a bottom up approach rather than a top down one
- The introduction of SPS should follow a logical sequence of events (bottom up process):
  - The industry level with maturation of SMS and the State level with maturation of SSP should follow
  - Then the EU level with a possible development of EU SPIs
  - Finally, building on those experiences, EU SPTs might be developed.
- Different SPIs and SPTs may be defined for the various aviation sectors
- There is a need to take into account the possible unintended consequences of SPTs on safety

- Based on ATM experience, it should start with a safety monitoring phase for some years (with SPIs) before the definition of SPTs
- The key success elements for SPS are:
  - A stable and effective SMS
  - Well-designed SPIs and SPTs
  - A strong Just Culture supporting reporting of data
  - An adequate oversight from the competent authorities (training needs)

3. Performance-based approach to the Regulation of Aviation Safety

- The introduction of Performance-Based Rules (PBR) should be gradual
- A mix of options 2.1 and 2.2a might be the good way forward
- The introduction of PBR should start with selected areas
- It should not exclude the possibility for certain industry stakeholders to continue applying prescriptive rules
- Industry shift to PBR should build upon strong and mature SMS
- A proportionate way of regulating aviation safety might include the set-up of high level PBR in the legislation and the details in soft law
- There was no general answer whether PBR should replace or complement prescriptive rules. This has to be assessed according to topic and type of rule.
- Setting up both prescriptive and PBR on the same issue will be challenging for the oversight. The level playing field should be maintained
- From industry perspective the international dimension should be taken into account when introducing PBR.
- Oversight will be a key issue in the development of PBA: adapt oversight capabilities to PBR will require time and careful consideration
- Developing collaborative oversight between authorities might support oversight in a more complex regulatory framework (with both PBR and prescriptive rules)
- Shifting to PBR/PBA is expected to bring safety improvements.
- PBR might also bring economic benefits.

ANNEX XIX

Executive seminar on European aviation safety

Florence, 23 February 2015

The main conclusions of the seminar were as follows:

(1) Performance based approach and risk based approach to regulation and oversight:
   a) We have already embarked on this transition. However there is a need to clarify what these concepts really mean in detail.
   b) This transition will mean a change in philosophy of working methods and required skill sets for regulated organisations and authorities. Although performance based approach may not be always applicable, the overall objective should be not to just add additional layer of regulation, but to implement a genuinely new approach;
   c) The European Aviation Safety Plan and the State Safety Programme/Plan will be essential tools in this transition.

(2) Optimisation of resources:
   a) It is not realistic to expect that it will be possible to significantly increase the resources – this is a political reality;
   b) There is a need for changing the working methods, and the transition to a performance and risk based approach is part of the answer;
   c) Reallocation of tasks and of resources should be considered;
   d) EASA and National Aviation Authorities should work as a single system, but not necessarily a single organisation;
   e) The pooling and sharing of inspectors should be facilitated; harmonised training and working methods are key to this;
   f) When it comes to EASA budget, there is a need to clearly differentiate between funding provided by industry and funding coming from the public budget. The part of the budget funded by industry should reflect the needs of the industry;

(3) Scope of the system:
   a) There is a need for a regulatory framework for RPAS;
   b) There is a gap as regards ground-handling, as well as security aspects of airworthiness;
   c) There is a need for better coordination of research on aviation safety, and there is a role for EASA here;
   d) Cyber-security work needs to be better coordinated in EU;
   e) EASA could provide add value in technical aspects of aviation security more broadly, provided it does acquire the necessary expertise;

ANNEX XX

GENERAL INFORMATION ABOUT THE EU GROUND-HANDLING MARKET AND SAFETY OF GROUND HANDLING SERVICES[242]

1. General overview of the EU ground-handling market

It is difficult to estimate accurately the size and importance of ground-handling market in the EU, due notably to: (i) the diversity of ground-handling services: the present Directive 96/67/EC distinguishes 11 categories of services, each one including several activities; and (ii) the fact that the companies intervening in these markets can be airports, airlines or independent companies, that do not necessarily publish public separate data for their ground-handling activities or for each of their ground-handling activities.

Commission and stakeholders' estimations assess the revenues of ground-handling in Europe to lie between 6 and 10 billion euros, and the employment in the ground-handling sector to be at the minimum 60,000.[243] Global ground-handling market value was assessed to be around 31 billion euros in 2007 (KPMG, 2008[244]) but this figure seems underestimated. The market is still very fragmented with over 400 operators worldwide and a combined market share of 20% for the top 4 handlers (according to Swissport, 2008[245]): it has not witnessed the same level of regroupings as experienced by other aviation sectors such as the duty-free provider industry. However, this assessment is more or less verified depending on the considered ground-handling category.[246]

Figure 7 below presents more detailed information about the number of ground handling companies in EU member states.

2. Profitability of the ground-handling sector

Currently the independent ground handlers use a wide range of business models and their ground handling business profitability varies significantly. The profit margins or Earnings

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[242] The information presented in this Annex is based on the analysis performed by the Commission for the purpose of the 2011 proposal for a Regulation of the European Parliament and of the Council on ground-handling services at Union airports and repealing Council Directive 96/67/EC. The information concerning safety of ground handling in the EU has been provided by EASA.

[243] IAHA estimates the number of workers to be around 60,000 for its members; Booz and co study found that approximately 40,000 people were working in the sole ground-handling independent companies, but put a warning that this figure is certainly underestimated.

[244] Source: www.groundhandling.com/GHI%20Conf/downloads/updated%20papers/2008/04.02%20Robin%20Cartwright,%20KPMG.pdf.

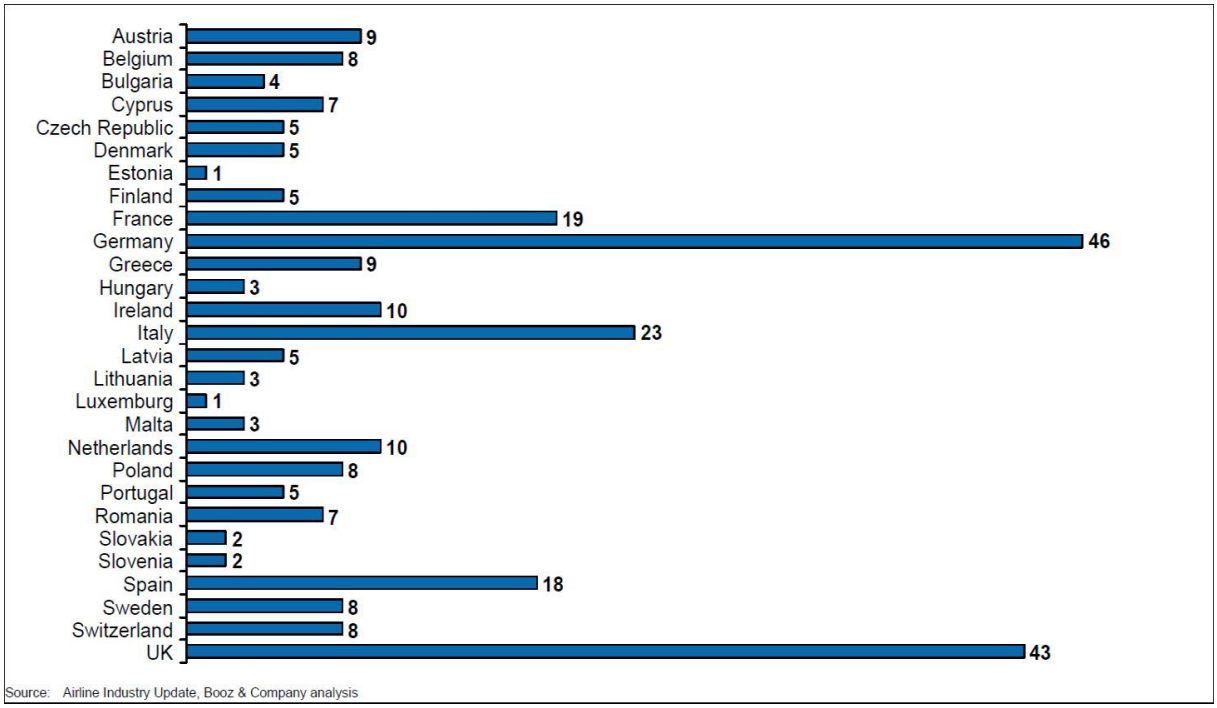
[245] Source: http://www.swissport.com/download/publications/swissreporter_2008_18.pdf.

[246] The catering services market for instance is relatively consolidated at global level with 3 main operators: LSG Sky chefs (30% of market share), Gate Gourmet (24%) and Servair (9%). On the contrary, other services such as aircraft internal cleaning services (which are a subcategory of category 6 "aircraft services") are still very often subcontracted to local cleaning companies, thereby representing extremely fragmented markets. For ramp and cargo handling services, some EU ground-handling players have gained market shares all over the world and are amongst the main providers worldwide. For instance SAS ground services is present at more than 160 airports in 40 countries worldwide (incl. 25 EU countries); BBA at 200 airports worldwide (inc. 7 EU countries); Swissport: 176 airports in 38 countries worldwide (12 EU countries); Servisair: 128 locations worldwide (incl. 8 EU countries); Menzies Aviation: 124 stations in 28 countries worldwide (incl. 8 EU countries); WFS: present in 120 airports etc.

Before Interest, Tax, Depreciation and Amortisation (EBITDA) as a % of revenues are in single digits and thus reflect the nature of the ground-handling business as a relatively commoditised, low cost margin business. This contrasts to the airline services industry with very low margins (3-4% over the period 1995-2008 source IATA) and airport business with higher margins of 10% on average (source: Infofinancials) representing some degree of local monopoly power.

Staff costs represent the vast majority of the handlers' costs (ranging from between 66% and 75% of costs).

Table: Number of ground-handling providers in the EU 27 and Switzerland, 2008 (Pax, Ramp, Cargo, Fuel, Flight Support and de-icing)



3. Detailed overview of safety issues in ground-handling

Aviation safety risks that arise from ground handling can be divided into the risks to passengers and personnel during the turnaround and those that have a knock-on effect during flight. There is a significant cross-over between health and safety in the workplace (on the ramp) and aviation safety. The ICAO definition of an accident includes injuries to people on the ground when an aircraft is being prepared for flight or when passengers and crew have not yet disembarked. In general, if an individual is injured by an aircraft or falls from an aircraft, it falls within the definition of an accident and the remit of occurrence reporting and is thus captured by the data.

Risks on the ramp include:

- Collisions between ground vehicles and aircraft causing both injuries and aircraft damage. Examples include a vehicle towing airstairs that tried to drive under the wing of an aircraft or tug drivers injured in collisions with aircraft;
- Injuries to passengers, crew or ground handlers as a result of falling from open aircraft doors or integral airstairs. This has been a particular problem where procedures are not followed or are inadequate, resulting in airstairs being removed from an aircraft without warning.

- Aircraft damage during pushback, for example caused by tow-bar failures.
- Incorrect pushbacks, such as turning the aircraft the wrong way or pushing back into taxiing aircraft.
- Poorly maintained ramp areas, such as slippery aprons from excessive de-icing, damage to aircraft from so called Foreign Object Damage (FOD), unreadable signage,

One occurrence that spans ramp and inflight safety risks is damage to aircraft where the damage is not reported when it happens but only found later. Reluctance to report such damage can stem from problems with just culture and from contractual obligations with regard to the cost of the damage.

In flight risks associated with ramp errors include:

- Loss of Control in Flight and Runway Excursion, related to
    - loading errors causing weight and balance problems
    - inadequate de/anti-icing
- In-Flight Fire related to
    - cargo or baggage fires
- System/ Component Failures and Malfunctions, related to
    - damage caused during the turnaround process
    - de/ anti-icing errors (such as fluid ingress into systems and components)
- Aircraft structure/ pressurisation problems
    - This is a particular risk for composite aircraft where the exterior surface of the aircraft can appear undamaged, but significant damage has occurred below the surface. This risk will increase as yet more composite aircraft enter service.

The majority of fatal accidents worldwide involve people struck by rotating propellers, falling from aircraft or being sucked into engines. A minority involve loading errors that subsequently cause control problems in flight. These have so far only occurred on cargo flights and so the number of fatalities is low relative to other aviation accident types, although cargo can also be carried on passenger flights. A higher number of fatalities occur where de/ anti-icing errors have happened, since these have occurred on both passenger and cargo flights.

More unusual but nevertheless severe and sometimes high-profile occurrences include:

- During the winter of 2005 and for some following winters, over-use of anti-icing fluids led to control restrictions on aircraft with non-powered flight controls such as the DHC-8, EMB 145 and BAE 146. See UK AAIB Report EW/G2006/01/14.
- Incorrect application of de or anti-icing fluid has led to contamination of the APU, resulting in fumes in the cabin and, on a few occasions, the complete disintegration of the APU.

3.1. Specific accident and incident data

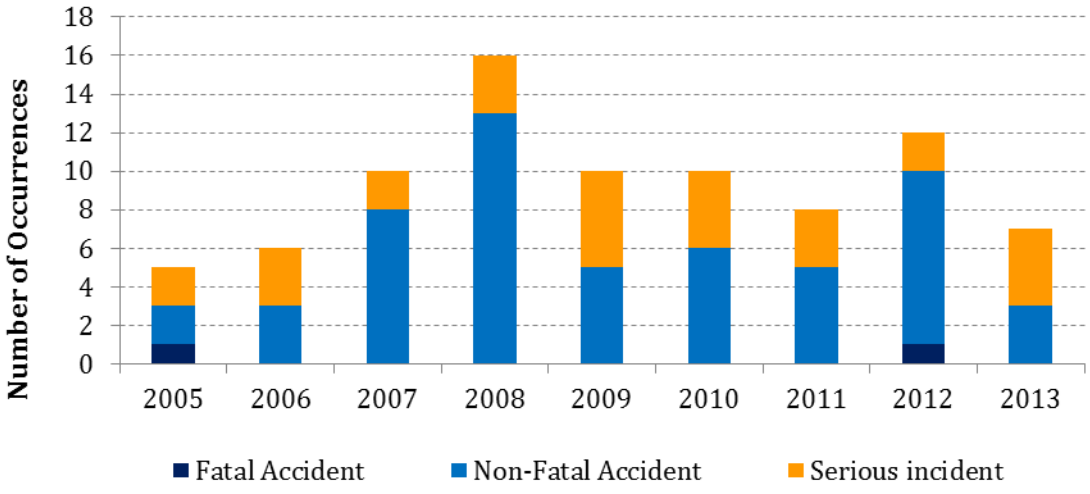
Figures presented in this section are for Part-CAT large aeroplanes where EU/EFTA Member State was the State of Occurrence, Registration or Operation.

The ADREP database has records of seven fatal accidents in the last 20 years and a total of eight fatalities.

- 06 Jul 1996, HAL748 - Marshaller walked backwards into propeller - 2 POB - 1 OG Fatal - No Damage
- 18 May 1997, ATR72 - Ground mechanic struck by propeller while removing a chock - 53 POB - 1 OG Fatal - No Damage
- 12 Jan 1999, F27 - Aircraft pitch up following flap deployment due to load exceeding aft CofG, subsequent load shift and collision with building - 2 POB – 2 Fatal - Aircraft Destroyed
- 05 Sep 2001, B777 - Ground fire during refuelling, killing aircraft fueller - 26 POB - 1 OG Fatal - Minor Damage
- 17 Sep 2002, ATR72 - Ground Handler struck by propeller during parking - 37 POB - 1 OG Fatal – Minor Damage
- 01 Feb 2005, A319 - Cabin crew fell from rear door when steps removed before closing - 104 POB - 1 Fatal - No Damage
- 11 Nov 2012, A320 - Loading operative caught between loader and baggage door - 5 POB - 1 Fatal - Substantial Damage

Since 1st January 2005, ground handling occurrences have formed 6% of fatal accidents, 15% of non-fatal accidents and 2% of serious incidents. During that time, there were 84 ground handling related accidents and serious incidents (Figure 8). The apparently low proportion of serious incidents relates to a lack of risk perception when accidents only nearly happen – because the aircraft is usually on the ground, it is assumed that what happened was not serious.

Table: Number of ground handling occurrences per year



Injury statistics (Table 11) from the European Central Repository over a six year period show no overall trend in the numbers of injuries, except that there has been an increase in minor injuries.

Table 15: Injuries associated with ground handling incidents

Year	Fatal	Serious	Minor
2009		1	7
2010		3	2
2011		2	4
2012	1	1	17
2013		3	12
2014			11
Total	**1**	**10**	**53**

Over 20,000 risk-bearing ground handling occurrences were reported to the European Central Repository (ECR) in a six year period by member states, an average of approximately 3,500 per year. However, the number of all types of occurrence reported to the ECR has increased over the past six years as changes within Member States enabled better reporting. To normalise the figures compared with overall reporting, the proportion of ground handling occurrences reported to the ECR in comparison with all occurrences reported was calculated, showing that between 9 and 11% of risk-bearing occurrences related to ground handling in the period 2009-2014. This is a high proportion of occurrences for a sector that is not directly regulated and the figures do not include records that are not considered severe enough to be classed as occurrences, but which may be costly in terms of aircraft damage and delays. Work with ground handling companies and airlines have identified significant under-reporting in this sector, due to the lack of understanding and guidance relating to ground handling reporting.

Further analysis of ECR data showed that in 2013 ground handling occurrences were more common than aerodrome occurrences, security problems, bird strikes, airborne conflict, power-plant malfunctions and runway incursions, to list but a few. It was the fourth most commonly applied occurrence category, behind "other", ATM/CNS errors and system or component failures.

Analysis of event codes shows that the majority of RAMP occurrences relate either to loading errors or to near-collisions and collisions on the ramp or during parking and pushback. Collisions can be either with ground servicing vehicles or with other aircraft. As stated above, these collisions/near collisions and loading errors carry in-flight safety risks as well as causing problems on the ground. A request to the Network of Analysts regarding unreported damage to aircraft as a result of collisions revealed that reporting varied, with one country estimating that 5% of aircraft damage was found later instead of reported at the time, while a second country put this estimate as high as 14%. Although this is a current safety risk, the introduction of composite aircraft increases the importance of reporting collisions and near collisions, owing to the difficulty in detecting damage to composite materials.

3.2 Ongoing safety initiatives

European and international safety initiatives have been initiated with the intention of raising the profile of ground handling, streamlining airline auditing of ground handlers and improving safety. Examples include:

- **UK Ground Handling Operations Safety Team (GHOST)**: actions have included awareness campaigns for aircraft loaders during the Olympics, advisory material to support reporting and just culture campaigns, , amendments to CAP 168 – Licensing of Aerodromes

- **ECAST Ground Safety Working Group (GSWG)**: research into human factors in ground handling, proposals for a standardised ground handling training syllabus and coordination with other initiatives;
- **IATA ISAGO and IGOM:** the IATA Safety Audit of Ground Operations has developed a common audit programme for ground handlers and airlines, with the aim of reducing the number of audits a ground handler must undergo and raising the standard of audits. The IATA Ground Operations Manual Task Force meets twice per year to attempt to standardise ground handling operations;

Part of the problem with voluntary initiatives is that the cost of the initiatives adds to the cost of service in a very competitive environment for contracts. Furthermore, the attendees to such groups are often the safety managers or members of the safety team, but not the budget holders or managing directors. Anecdotally, many of those responsible for safety in ground handling companies would prefer to have regulation in place because it strengthens their case for investments, however this will not necessarily be supported by their senior management, unless it can be made clear that the same regulations and oversight will also apply to their competitors.

Despite these initiatives, the occurrence data does not indicate any significant change or improvement in ground handling safety. There is no indication that voluntary initiatives have been effective at a European level. Although initiatives such as the GHOST have been productive, they work because they are local and involve targeted actions. Thus, motivation to join in the initiatives is better and follow-up is easier. This in some cases one-to-one and personal approach cannot be replicated at a European level.

3.3 International developments

Since 2012 the International Civil Aviation Organisation (ICAO) has also been looking at the safety of ground-handling services. The problem statement from ICAO in the related job-card to the Aerodrome Panel (AP, now the ADOP) states *"(t)hat there is a need to look at the safety, efficiency and standardisation issues associated with ground handling and determine the status and future needs for ICAO provisions in relation to ground-handling at aerodromes".*

In the beginning of 2015 the ICAO task force under the ADOP will report on its results and come forth with the following identified primary safety issues:

- Mass and balance, load distribution and securing;
- De-icing;
- Ground collisions.

The group will also present the following recommendations in its imminent report:

1. SMS for Ground Handlers;
2. ICAO Circular on industry best practices (industry standards);
3. In the long term ICAO Annex dedicated to ground handling (very unlikely);
4. Oversight not decided but presumably aerodrome operator proposed.

At the same time ADOP group concedes that SMS does not resolve the operational safety issue with ground collisions, which is really more a matter for the aerodrome operator and the enforcement of local apron and runway safety procedures. At the same time it is also realised

that full SMS might be excessive with non-aircraft safety related ground handling services (such as catering) and that therefore probably a selection of the most relevant ground handling categories be necessary.

Furthermore there are difficulties in implementation, as the idea of oversight over ground handling by aerodrome operator conflicts with aircraft operator's responsibility for its subcontractors. Any future ICAO or EU provisions would have to ensure to minimise the duplication of responsibilities and give a correct dimensioning of oversight resources and at the same time empower the aerodrome operator vis-a-vis ground handling service providers.

In its work, the Task Force is collaborating with the Safety Management Panel (SMP) and the Air Operations Panel (OPSP).

3.4 Conclusions on safety of ground-handling

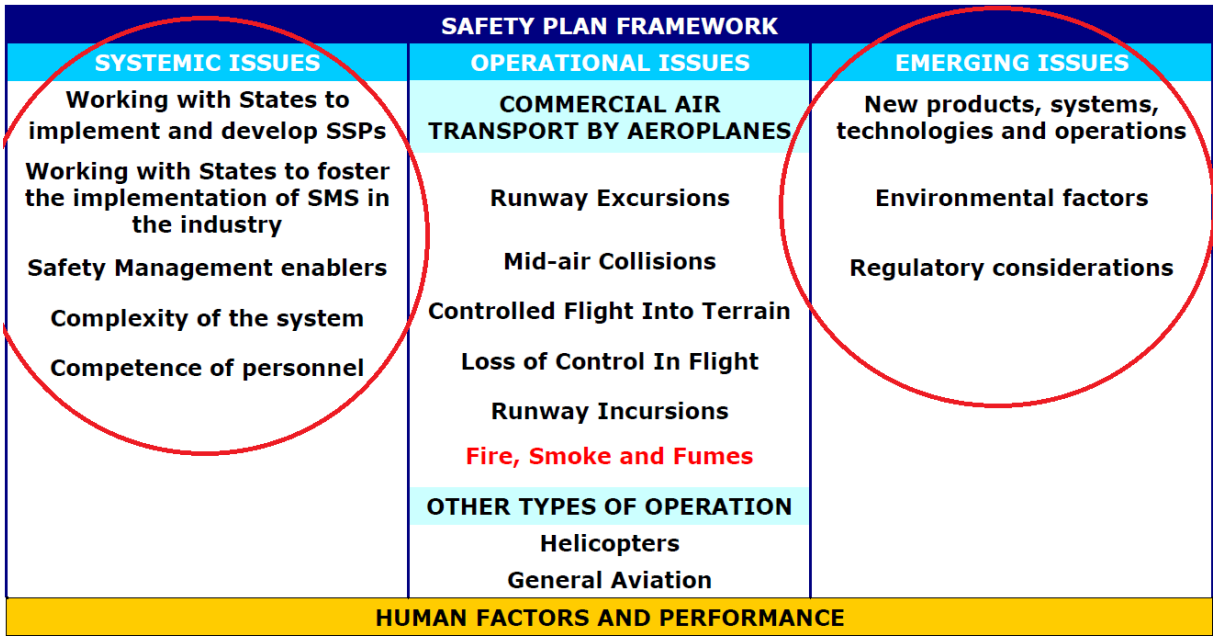
Errors on the ramp form a significant proportion of accidents and incidents involving commercial aeroplanes each year (10%). The majority of accidents occur on the ramp itself and the majority of fatal accidents involve one fatality. However, some of the errors that occur during the turnaround have serious consequences during flight, such as loss of control, runway excursion or in-flight fire.

Additional conclusions are as follows:

- Errors involving ground handling have clear in-flight safety risks that have caused fatal accidents, accidents and serious incidents.
- In addition to in-flight risks, there are risks on the ramp to passengers and personnel. The definition of Annex 13 includes these injuries, therefore they fall within the purview of aviation safety regulation and not just local health and safety.
- Ground damage to aircraft is very common but is an increasing risk, owing to the difference in appearance between significant damage to conventional aircraft and composite aircraft. As the number of composite aircraft in service increases, ground damage becomes a higher in-flight safety risk.
- Recent data shows that ground handling occurrences form approximately 10% of all aviation safety occurrences and this figure has not changed significantly over the past 5 years.
- There is no evidence that Europe-wide voluntary safety initiatives have had a significant impact in improving ramp safety.

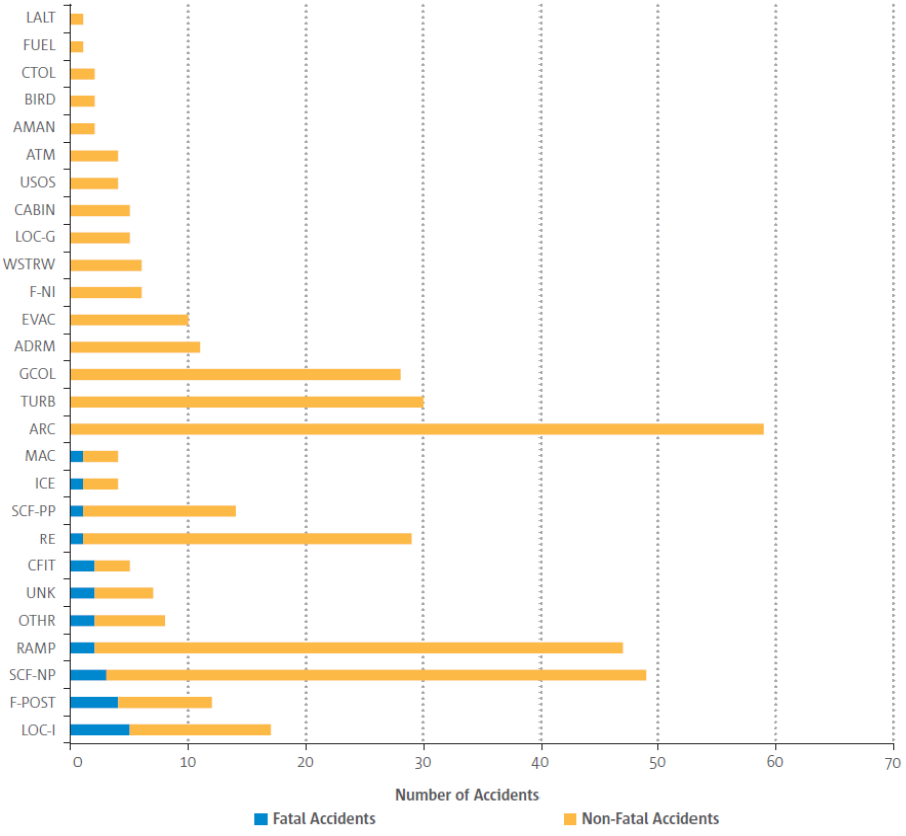
ANNEX XXI

MAIN ISSUES AFECTING THE EU AVIATION SAFETY SYSTEM



Source: European Aviation Safety Plan (edition 2014-2017)

Figure 5: Categories of fatal and non-fatal accidents involving EU/EFTA operated aeroplanes (2004-2013)



Source: EASA, Annual Safety Review (2013)

ARC	Abnormal runway contact
AMAN	Abrupt manoeuvre
ADRM	Aerodrome
ATM/CNS	Air Traffic Management/Communication Navigation Surveillance
BIRD	Collision / near Collision with bird(s)
CABIN	Cabin safety event
CFIT	Controlled flight into or toward terrain
CTOL	Collision with obstacle(s) during take-off and landing
EVAC	Evacuation
EXTL	External load related occurrence
F-NI	Fire/smoke (non-impact)
F-POST	Fire/smoke (post-impact)
FUEL	Fuel related
GCOL	Ground collision
GTOW	Glider towing related event
RAMP	Ground handling
ICE	Icing
LOC-G	Loss of control — Ground
LOC-I	Loss of control — In-flight
LOLI	Loss of lifting conditions en-route
LALT	Low altitude operation
MAC	Airprox/TCAS alert/loss of separation/near midair collisions/midair collision
OTHR	Other
RE	Runway excursion
RI-A	Runway incursion — Animal
RI-VAP	Runway incursion — Vehicle, aircraft or person
SEC	Security related
SCF-NP	System/component failure or malfunction (non-powerplant)
SCF-PP	System/component failure or malfunction (powerplant)
TURB	Turbulence encounter
UIMC	Unintended Flight in IMC
USOS	Undershoot/overshoot
UNK	Unknown or undetermined
WSTRW	Windshear or thunderstorm

Annex XXII

Overview of the draft Network Information Security (NIS) Directive

The NIS Directive was proposed by the Commission in 2013 and at the end of 2015 was in the final stages of negotiations between the European Parliament and the Council. The proposal aims to ensure a high common level of cybersecurity in the EU, by:

The proposed NIS Directive is a key component of the overall EU cybersecurity strategy and would require all Member States, key internet enablers and critical infrastructure operators such as e-commerce platforms and social networks and operators in energy, transport, banking and healthcare services to ensure a secure and trustworthy digital environment throughout the EU. The proposed NIS Directive lays down measures including:

(a) Member State must adopt a NIS strategy and designate a national NIS competent authority with adequate financial and human resources to prevent, handle and respond to NIS risks and incidents;

(b) Creating a cooperation mechanism among Member States and the Commission to share early warnings on risks and incidents through a secure infrastructure, cooperate and organise regular peer reviews;

(c) Operators of critical infrastructures in some sectors (financial services, transport, energy, health), enablers of information society services (notably: app stores e-commerce platforms, Internet payment, cloud computing, search engines, social networks) and public administrations must adopt risk management practices and report major security incidents on their core services.

The proposed NIS Directive does not mandate specific technical requirements, which can be developed at sectorial level.

ANNEX XXIII

GLOSSARY OF MAIN TECHNICAL TERMS

Acceptable Means of Compliance (AMC): are non-binding standards adopted by EASA to illustrate means to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

Air Operator's Certificate (AOC): certificate delivered to an undertaking confirming that the operator has the professional ability and organisation to ensure the safety of operations specified in the certificate.

Air Services Agreements (ASA): international agreement which governs the conditions and procedures for the conduct of international commercial air transport operations.

Annex II aircraft: Aircraft listed in Annex II to Regulation (EC) No 216/2008, and which are excluded from the scope of that Regulation and its Implementing Rules.

Certification Specifications (CS): 'Certification Specifications' are technical standards adopted EASA indicating means to show compliance with the essential requirements to Regulation (EC) No 216/2008.

Commercial air transport (CAT): means an aircraft operation to transport passengers, cargo or mail for remuneration or other valuable consideration.

European Organisation for the Safety of Air Navigation (EUROCONTROL): An international organisation established in 1960 to work for seamless, pan-European air traffic management.

General aviation (GA): those flight activities not involving commercial air transportation or aerial work, and where aerial work means operations used for specialized services such as agriculture, construction, photography, surveying, observation and patrol, aerial development, etc.

Guidance Material (GM): is non-binding material issued by EASA to assist in the understanding of the Regulation (EC) No 216/2008, its Implementing Rules and Certification Specifications.

State aircraft: means aircraft while carrying out military, customs, police, search and rescue, firefighting, coastguard or similar activities or services.

International Civil Aviation Organisation (ICAO): Specialised UN body established by the 1944 Convention on International Civil Aviation. The aims and objectives of ICAO is to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport.

Instrument Flight Rules (IFR): Rules and regulations established to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals.

Instrument rating (IR): A privilege given to a pilot to flight under IFR.

Maximum take-off mass (MTOM): The maximum takeoff mass of an aircraft is a value defined by the aircraft manufacturer. It is the maximum mass at which the aircraft is certified for take-off due to structural or other limits. MTOM is usually specified in units of kilograms or pounds. The mass is a fixed value and does not vary with changes in temperature, altitude or runway available

Network Manager: A body designated under the Single European Sky legislation to perform certain functions and duties with respect to the management of European ATM network. In 2015 the functions and duties of the Network Manager were entrusted to EUROCONTROL.

Qualified Entity (QE): Means a body which may be allocated oversight or certification tasks by EASA or by a national aviation authority under Regulation (EC) No 216/2008.

Annex XXIV

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EUROPEAN
COMMISSION

Brussels, 7.12.2015
SWD(2015) 262 final

PART 2/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

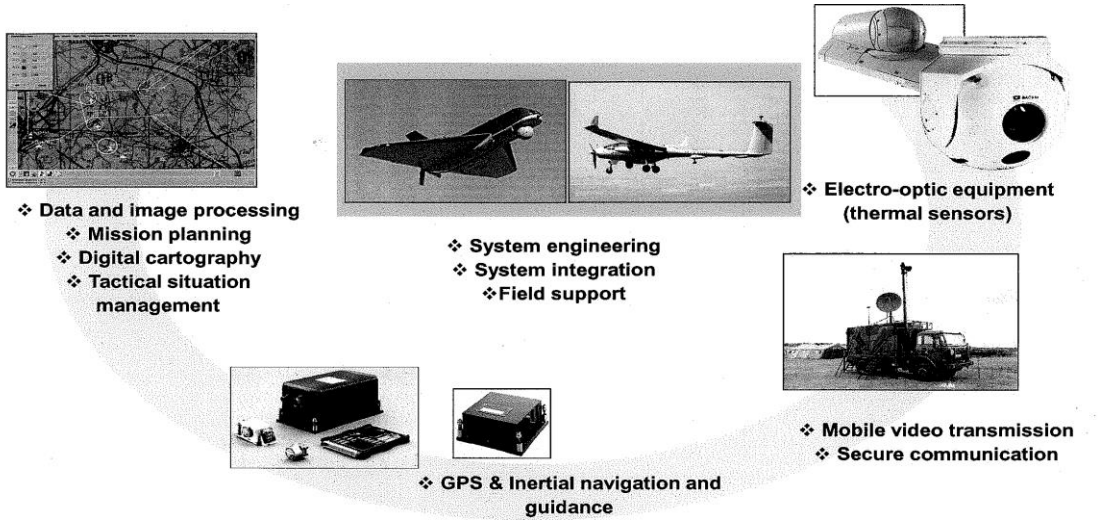
on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and repealing Regulation (EC) No 216/2008 of the European Parliament and of the Council

{COM(2015) 613 final}
{SWD(2015) 263 final}

SECTION 1: INTRODUCTION AND POLITICAL CONTEXT

Unmanned aircraft have been considered a possibility since decades. Their existence is acknowledged in the Chicago Convention, which regulates international civil aviation since 1944. In reality such aircraft have until recently been used almost exclusively by the military. Technological progress has now reached a point where civil aviation applications have become technologically feasible and economically viable. It is the combination of innovation in ever lighter and stronger materials, software development, data processing and miniaturisation at ever lower cost which makes this development possible. Annex VI provides general background information on drone technology.

Graph 1: The bundle of drone technologies



Source: Safran presentation, 2015 [1]

In particular the category of remotely piloted drones, called Remotely Piloted Aircraft Systems (RPAS), has been expanding rapidly in recent years. It is estimated that about 10% of civil aviation will be unmanned in just ten years' time from practically none today. [2] Just as the productivity of many jobs now depends on internet or mobile phone use, drone services will become an important tool and part of many businesses, supporting the competitiveness of various industries. The most obvious sectors where drone applications have already started are agriculture, television and movie industry, and aerial services such as inspections of pipelines, railway lines or electric lines. Drones will also become integrated in transport and logistics chains. Finally, there are more innovative sectors, such as energy provision or satellite coverage where drone operations may enable new methods of production and delivery.[3] In the longer term, drone technology may not only enable new applications but also transform air transport itself, as technologies steadily take over more and more tasks from humans also on

1 This graph represents military equipment, but is of course also applicable to commercial operations.

2 Marsh&McLennan, (2015) p1.

3 Annex IV provides more background information.

large aircraft. [4] Drones thus carry the promise of a disruptive technology, opening up previously impractical unavailable or uneconomical aerial applications and replacing existing services at a dramatically lower cost.

Drone manufacturing, operation and maintenance are likely to see strong growth. The public consultation found that all stakeholders envisage applications to develop within five years for professional activities (99%) or for daily life purposes (80%). [5] Together with the contribution of new drone services to the competitiveness of other sectors, a strong direct and indirect impact on growth and jobs may be expected.[6] The world market is forecast to more than double by 2022 and represent by then around 4bn euro per year. Europe would represent about 25% of the world market.[7] In terms of jobs, for Europe, employment is estimated to increase to about 150,000 jobs by 2050 in manufacturing [8] hence excluding drone operator services employment. In the USA, a study forecasts that in the first three years of integration of drones in the national airspace more than 70,000 jobs will be created with an economic impact of more than $13.6 billion. The number of jobs created through new drones activities in the US is estimated to exceed 100,000 by 2025. [9] In any case, drone activities start off mostly in countries where drone rules are adopted – see Table 1.

The full potential of drones will only be realised if they can safely fly in non-segregated airspace – alongside manned aircraft. [10] This is not the case today, as drones face operational restrictions and diverging national standards. A number of other legal, operational and technical issues linked to the civil use of drones, like liability and data protection, also hamper their deployment.

1.1 EU LEGAL CONTEXT

Drones fall under the definition of aircraft, as laid down in the Chicago Convention system. This means that the aviation rules, principally safety rules, apply to drones and drone operations.[11]

In the EU, Regulation (EC) 216/2008 ("Basic aviation safety regulation") establishes the principles for EU safety rules and division of tasks between EU and national authorities. Detailed safety rules have been adopted in the form of Commission implementing regulations covering all aspects of aviation safety: airworthiness, operations, crew licensing, rules of the air. The EU is competent for regulating unmanned aircraft above 150kg, with some exceptions. [12] The weight criterion was not introduced to regulate the bigger unmanned

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4 See also Annex VI for more information.

5 The exceptions are the air navigation service providers where only 40% did see daily applications happen in such short time period.

6 Annex VI provides an overview of the most commonly referenced market studies.

7 TEAL group 2013 Market Profile and Forecast

8 Estimate provided by ASD, the AeroSpace and Defence Industries Association of Europe.

9 AUVSI, (2013), *"The Economic Impact of Unmanned Aircraft Systems Integration in the US"*, 574p.

10 Segregation – keeping the drones away from manned air traffic – is burdensome and complicated to manage and reduces the overall capacity of the aviation network. After all, it is expected that manned aviation will evolve to single-pilot operations and, eventually, to unmanned operations.

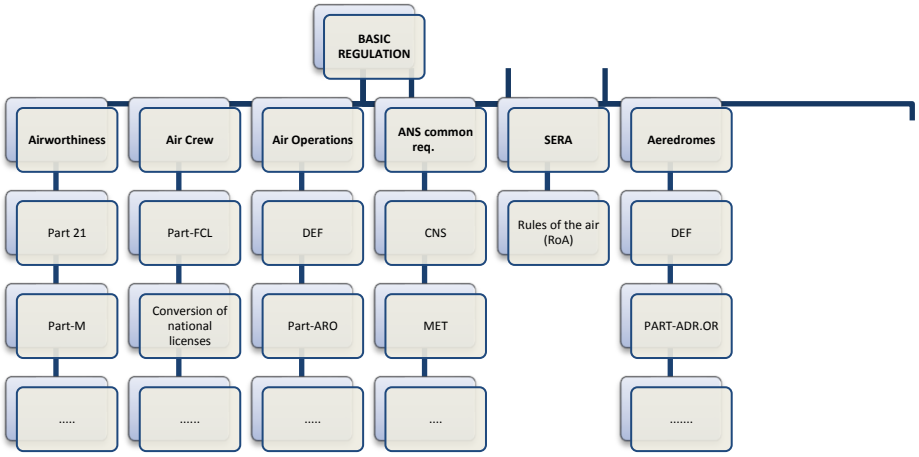
11 Other relevant rules concern liability, privacy and data protection, and environment. They are given in Annex IV.

12 Except those used for military, customs, police, search and rescue, firefighting, coastguard or similar activity or services (article 2 basic regulation) or specifically designed or modified for research, experimental or scientific purpose to be produced in very limited numbers (annex II Basic regulation).

systems, but to avoid that the EU would regulate model aircraft. The current regulatory framework is ill suited for drones and drone operations and would lead to burdensome regulation.[13] No specific rules have been developed yet, but the European Aviation Safety Agency (EASA) has received two applications for type certification.

The basic aviation safety Regulation functions at three levels – as compared to more typical EU product safety rules which functions in two layers. Typical product safety directives lay down quite specific requirements which are then detailed in European industry standards. The standards serve as acceptable means of compliance but are not strictly speaking binding. In aviation safety regulation, the basic Regulation only lays down the general framework, including procedures and essential (safety and other) requirements. Detailed binding rules are adopted in delegated acts.[14] The essential requirements and the underlying delegated acts address the following core areas in respect of flight operations: airworthiness (the aircraft must be capable of flying safely); operations (how flights are planned, prepared and executed); and air crew (what specific knowledge, competences and skills flight crew must have). The three core areas are completed by requirements for the "infrastructure", i.e. aerodromes and air traffic management (the safety requirements for the 'infrastructure' of aviation).

Graph 2: Regulation (EC) 216/2008 and the structure of delegated acts [15]



The essential requirements translate in a series of delegated acts. For instance, airworthiness needs to give detailed rules to make an aircraft airworthy ("Part 21") and to indicate how the aircraft must be properly maintained ("Part M"). For air crew, detailed rules determine exactly what competences flight crew must acquire to obtain their license ("Part FCL"). The technical rules may be completed by specific industry standards. In aviation, most standards are developed by the aviation specific body EuroCAE.[16]

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13 Supported by the public consultation. See Annex III for more details on the consultation process.

14 Delegated acts are European regulations adopted by the Commission that amend and complement legislation adopted by the European Parliament and Council. In this case, the substance of the delegated acts could be compared to the Annexes of the Product Safety Directives, like e.g. the Machinery Directive (2006/42/EC).

15 The technical terms indicate specific areas, as explained below.

16 The European Organisation for Civil Aviation Equipment is a non-profit organisation dedicated to aviation standardisation since 1963, where CEN/CENELEC/ETSI are providing "general industry" standards. The US counterparts are the SAE (Standards of Automotive Engineers), RTCA (Radio Technical Commission for Aeronautics) and ASTM (American Society for Testing and Materials).

The basic EU framework for aviation safety regulation, which is mainly established by Regulation (EC) 216/2008 is complemented by other EU legal instruments. The most relevant in the safety area are the rules on accident investigation and on occurrence reporting and analysis.[17] These rules refer to Regulation (EC) 216/2008 and also exclude drones below 150kg. As drones are aircraft and become integrated in the aviation system, significant drone incidents should be reported and accidents should be investigated if that contributes to the overall safety of the system. Beyond safety, other relevant rules relate to EU product safety regulation, privacy, insurance and environmental rules. Section 2.4 below and Annexes IV and V provide more details.

In the absence of a specific EU regulatory framework on lighter drones below 150 kg, certain aspects of these drones are already subject to product safety directives under the general market surveillance framework of Regulation (EC) 765/2008.[18] This is the case e.g. for the General Product Safety Directive 2001/95/EC, which provides that economic operators must guarantee the safety of consumer products placed on the EU market. Similar horizontal legislation also applies to materials that are used in aircraft manufacturing, where especially the chemical treatment is sometimes safety critical. [19]

The Radio Equipment Directive 2014/53/EU provides that equipment must effectively use the radio spectrum and not cause harmful interference. The Machinery Directive 2006/42/EC provides obligations to manufacturers, including labelling and providing information to the end user on the safety risks of the product. The smallest drones which are only used for leisure may also fall under the scope of the Toy Safety Directive 2009/48/EC. These directives however do not contain any precise reference to drones.[20]

Privacy issues are covered by Article 8 of the European Convention for the Protection of Human Rights and Fundamental Freedoms and Article 7 of the Charter of Fundamental Rights of the European Union. The right to protection of personal data is set out in Article 8 of the Charter of Fundamental Rights of the European Union, in Article 16 of the Treaty on the Functioning of the European Union ('TFUE') and is regulated in Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data. The processing of data is regulated in Regulation (EC) No 45/2001, [21] insofar as it is carried out by Union institutions and bodies in the exercise of activities all or part of which fall within the scope of Union law.

As regards environmental performance, drones are not subject to the noise and gaseous emissions standards laid down at EU level, such as the directive on noise emission in the environment by equipment for use outdoors. [22].

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17 Annex IV gives the exact references.

18 See AnnexIV.7 Product harmonisation legislation

19 EASA and the European Chemicals Agency have established a working relationship with regard to the implementation of REACH.

20 See Annex IV.7 for more details.

21 Regulation (EC) No 45/2001of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the institutions and bodies of the Community and on the free movement of such data

22 Directive 2000/14/EC of the European Parliament and Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. This statement applies to drones with a weight of less than 150kg.

1.2 EU POLICY CONTEXT

For years drones have been used for military purposes. The European Summit of 19 December 2013 on the Future Defence Policy made a commitment to enhance Europe´s military (drone) capabilities, including through regulatory as well as R&D activities; and welcomed efforts to integrate drones into the European civil aviation system as from 2016.[23]

This impact assessment constitutes the follow-up to the Commission Communication "A new era for aviation – Opening the aviation market for remotely piloted aircraft systems [RPAS] in a safe and sustainable manner" published on 8 April 2014. This Communication concluded that "the RPAS market poses a real opportunity to foster job creation and a source for innovation and economic growth for the years to come. It also poses new challenges related to safety, security and respect of citizens' rights which must be tackled before RPAS can be used on any serious scale in a civilian environment. The lack of harmonized regulations across Europe and of validated technologies forms the main obstacle to open the RPAS market and to integrate RPAS in European non-segregated airspace. Industry is urging rapid steps towards the establishment of an enabling RPAS regulatory framework."[24]

The Transport Council, in its meeting of 8 October 2014, welcomed the Commission initiative to start working on a European regulatory framework for drones. The EU Presidency, with support of the Commission, organised a high level conference on drones, where the aviation community established the basic principles for the integration of drones in the aviation system in the so-called "Riga Declaration".[25]

This initiative is part of the European Commission's "Aviation Package for improving the competitiveness of the EU aviation sector", included in the 2015 Commission Work Programme. This package also includes a wider revision of the basic aviation safety Regulation (EC) 216/2008 that should reflect 10 years' experience of the EU aviation system. The revision should make the aviation system more flexible and performance based. It is therefore envisaged to include in that proposal also the necessary new framework rules relating to drones, in line with the conclusions of this impact assessment.[26] The proposal will then open the way for the adoption of more detailed rules with their own regulatory impact assessment once the legal basis is created. Drones will in particular benefit from the greater flexibility that the safety framework will offer, as the rules and procedures would become better accommodated to the risk of the operation – which in the case of drones ranges from practically none to risks equivalent to risks associated with manned aviation.

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[23] The Council… underlines the need to intensify EU-level cooperation on RPAS. In this regard, it encourages the European Commission to establish the regulatory framework for an initial RPAS integration into the European Aviation System by 2016. It supports appropriate R&D activities for this integration to be undertaken by SESAR (Single European Sky ATM Research) Joint Undertaking as soon as possible, as well as close synergies between EDA, SESAR Joint Undertaking and the Member States in the development of technologies needed for air traffic insertion and anti-collision and complementarity between EASA and EDA in the development of a pertinent certification system;

[24] COM/2014/207 final.

[25] See Annex VII - http://ec.europa.eu/transport/modes/air/sign-up/index_en.htm.

[26] The new basic aviation safety Regulation would implement policy option 2, while leaving open the precise way of implementing suboption 2.1.

1.3 INTERNATIONAL CONTEXT

There are no international rules on drones yet except for the requirement under the Chicago Convention on international civil aviation to obtain a specific authorisation to operate a drone from the national competent authorities.[27]

The **International Civil Aviation Organisation (ICAO)**, the UN body dealing with international civil aviation created in 1944 by the Chicago Convention, has adopted a circular and an RPAS manual, introducing some basic definitions and principles on the rules of the air.[28] ICAO recently launched an institutionalised process to develop standards and recommended practices. Such ICAO standards are included in Annexes to the Chicago Convention. They are binding on States, but they require transposition into national law in order to affect the participants in civil aviation such as aircraft operations. Also, the standards are often quite generic and require additional detail in national law to be made truly operational. Most of these standards are now transposed in the European ICAO States through EU Regulations. The same would be applicable for any new ICAO standards on drones. Two important limitations are to be noted. Firstly, ICAO standards are binding only for international traffic, i.e. in practice only for large drones used in specific operations which require crossing borders. Secondly, States (in this case the EU) may deviate from ICAO standards and "file a difference" to ICAO, provided their alternative approach is able to meet the objectives of the ICAO standards. This offers a degree of freedom to organise drone operations inside the EU, with the caveat that alternative approaches may not be recognised by third countries for operations in their airspace. The ICAO Manual on Unmanned Aircraft states recognises this where it states "states may agree mutually upon simpler procedures through bilateral or multilateral agreements or arrangements for the operation of specific remotely piloted aircraft or categories of remotely piloted aircraft. This will reduce the workload on RPAS operators and the state authorities. The same objective may be reached through regulatory measures at regional levels."[29] Finally, it should be remembered that the need for "filing differences" is greatly reduced when the EU and its Member States are effective in shaping ICAO rules to meet our needs. European States carry considerable weight in ICAO both through their number and the size of their aviation industry, and through the expertise they bring to the discussions at ICAO.

The **Joint Authorities for Rulemaking on Unmanned Systems (JARUS)** was set up as an ad hoc intergovernmental forum to discuss drone regulation. It enables exchange of information and best practices among a large number of industrialised states but it cannot adopt binding rules.[30] EU Member States and EASA are engaged in the JARUS process (EASA now chairs it), as it offers an opportunity to work towards a global consensus on the approach to drone regulation. The EU experts will also drive the ICAO process and will ensure coherence between the activities of the two organisations. The EU is committed to follow as far as possible the JARUS process and find consensus; however, the JARUS

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27 Art. 8 of the Chicago Convention.

28 Amendment 43 to Annex 2 to the Chicago Convention on the rules of the air. See annex for the reference.

29 Chapter 3 of the ICAO RPAS Manual, Doc. 10019 AN1507 of 2015

30 JARUS is an international group of Aviation Authorities, comparable to the former Joint Aviation Authorities, with an ever growing global membership. At the moment of preparation of the report, the membership included AT, Australia, BE, Brazil, Canada, CH, China, CZ, DE, DK,SP, FI,, FR, GR, Japan, Ireland, Israel, IT, MT, NL, NO, PL, Qatar, Russia, Singapore, South Africa, SV, UK, USA are members, together with Eurocontrol and EASA.

process should not prevent the EU from adopting the necessary rules to regulate drone operations in Europe when consensus may not be found (in due time).

Non-EU countries are also working towards the adoption of drone specific rules to allow civil operations. Active countries for the operations of civil drones, for instance Japan, Canada, New Zealand and Australia, have adopted national rules. In Japan, the regulations were conceived specifically for the agriculture sector and are managed by the Ministry of Agriculture. Only recently, Japan amended its aviation act to regulate drones in a more general way.[31] Australia has adopted specific drone rules for commercial air work (e.g. aerial photography). The requirements include a pilot licence, but the level of the requirements is relatively easy to meet. The recreational use of drones remains free and only flights that risk mixing with manned aircraft are forbidden. Also New Zealand has very few limitations for operations with drones up to 25kg, as long as the operation is not conducted close to an airport, remains in the line of sight of the pilot and below 400ft, and the operator has the consent of people whose land is overflown.[32] Canada has been providing over 3,200 operating certificates in the period 2007-14 on the basis of a risk assessment of the operator for individual operations or for a type of operations ("blanket certificate"). Recreational use of drones up to 35kg is free. Currently Canada is reviewing its rules in order to reduce the number of cumbersome individual risk analyses. The U.S. Federal Aviation Administration has adopted a roadmap[33] and is mandated by the U.S. Congress to allow drone civil operations starting from 2015. Progress has been slower than expected, and the US has, until now, pursued a quite restrictive policy. Based on the ICAO 'authorization process', the Federal Aviation Authority (FAA) has been granting individual exemptions to operators from 2012 onwards. Given the increasing backlog, the FAA has recently moved to blanket exemptions until a general rule for small drones will be adopted (expected for 2017).[34]

Industry is also involved in the above forums of ICAO and JARUS, and is working towards the development of industrial standards. The standardisation body for aviation EUROCAE has established two specific working parties on drones. However, the standard-setting agenda is difficult to decide in the absence of a clear regulatory agenda.

SECTION 2: WHAT PROBLEMS ARE TO BE ADDRESSED?

2.1 DESCRIPTION OF THE MAIN PROBLEMS

2.1.1 The current regulatory system hampers market development

The existing aviation rules do not properly address the specificities of drones. Drones include many different types of aircraft performing a variety of different missions, ranging in terms of maximum take-off weight from grams to more than ten tons, in terms of maximum speed from hovering to more than 1,000 km/h, in terms of flight endurance from a few minutes to

[31] Since the security forces found a drone on the roof of the Prime Minister's building in April 2015, the authorities have introduced operating restrictions to ban flying in the vicinity of official buildings, dense residential areas and particular places that attract crowds.

[32] http://www.caa.govt.nz/rules/Part_101_Brief.htm

[33] https://www.faa.gov/uas/media/UAS_Roadmap_2013.pdf

[34] See Box 2 p. 18 for more details.

months and in terms of lift technology from rotor to fixed wing to lighter than air. This means that drones are able to perform a wide range of operations that was not at all conceivable with manned aviation.[35]

Compared to traditional aviation, drone operations would cover a wider span of risk, from very low risk operations to operations with risks equivalent to manned aviation. In addition, it is expected that, in terms of numbers, most drone operations would represent a low safety risk, e.g. crop spraying which takes place away from other air traffic and outside residential areas. Drones and drone operations are expected to outnumber, potentially quite significantly, the number of aircraft currently in use because of their low cost and multiple uses, including many new applications. Today's aviation rules and oversight system were developed for a much smaller population and number of movements than what we can expect in the future.

Graph 3: The wide range of drones and drone operations

[35] See Annex VI for more details.

Given the innovative design and concept of operations of drones, it is impossible for drones to meet some of the most basic requirements and underlying assumptions of conventional aviation, such as having a pilot on board or taking off from an airport. Especially smaller drones cannot apply many of the methods and technologies used in large manned aviation to ensure safety, e.g. the filing of flight plans and communication with air traffic control, or the carriage on board of radars, transponders and collision avoidance systems. Those methods and technologies are either disproportionate to the operational risk, too difficult (heavy) to carry or present such high cost that most drone services would be uneconomical.

In the absence of dedicated rules for drones, drone operations at the moment need to be allowed to derogate from the standard rules by means of *individual authorisations*. This approach is not sustainable considering the expected growth in the number of drone manufacturers and operators starts to grow, as individual authorisations are resource-intensive for the administration and costly for the applicant. [36]

Moreover, individual authorisations typically imply strong operational limitations (e.g. a limited geographical zone, or time of day) because these authorisations are not capable of solving some of the key underlying issues, such as the safe interaction of drones with other aircraft in the air.

Experience illustrates the impact of (the absence of) dedicated rules on the market. Japan is the oldest and most telling experience. The Japanese market was regulated in the nineties for agricultural purposes only. This has resulted in a high number of operators not found in any other sector in the Japanese economy or in any other country.

The conventional aviation approach is the starting point for regulating drones in states which already developed and adopted rules, resulting sometimes in complex processes to obtain authorisations and therefore very limited numbers of operations. New concepts, like an 'operation centric approach' – whereby the rules and the evidence required to demonstrate that the rules are complied with, are made proportionate with the risk of a particular (type of) operation – are slowly taking hold, driven by JARUS and based on experience, in a limited number of countries, like Finland, Switzerland and Austria – and are getting more and more support through this truly global reflection and discussion process. Also the UK and France have put in place relatively accommodating rules on drone operations.

The number of operators in the EU is concentrated in those Member State who managed to put in place dedicated rules for drones, and their numbers grow rapidly. For example, the number of commercial operators in France grew from less than 100 in 2012 to more than 1,000 in 2015. The Polish CAA issued not a single Operator Certificate in 2012 and only five in 2013; the number grew to 316 in 2014 and up to mid-2015, already more than 1,000

[36] Or for the administrations, as authorities are not acquainted with the new phenomenon. All categories of participants of the public consultation confirmed differences in national legislation (91%), lack of common rules applicable to all types of drones (91%) and gaps in the current EU legislation (93%) as important barriers.

certificates were issued. However, because of the operational limitations, nearly all the authorisations concern low risk operations with small drones. More sophisticated services such as goods delivery can in practice not be deployed, limiting market and business opportunities.

Table 1: Number of approved commercial operators[37]:

Country/ region	Number of approved commercial operators
Australia	*100+*
EU	*2,500+*
Japan	*14,000+*
South-Korea	*130*
USA	*1,000* [38]

Further upstream, the difficulty to bring drone services to the market also prevents investment decisions to be made in relation to drone design and manufacturing. Despite having a strong industrial basis in aeronautics (a yearly turnover of close to €140bn and employment of 500,000 specialised personnel), including numerous small and medium-sized companies in the supply chain, Europe risks missing the opportunity to become a leader in this new industry. Numerous market surveys on drones have been conducted.[39] In general these studies forecast a market of several billion euro a year (often including military and state operations).

What is more, the difficulty to start legal drone operations has pushed some operators to do so illegally. Authorities report increasing difficulty to deal with this phenomenon. [40] Irregular operations are likely to represent particularly high safety risks, besides other public policy concerns.

2.1.2 Drone operations cause risks which are not adequately addressed by existing rules

Drone operations present a number of issues which are not, or much less, present in civil aviation in general. They concern safety, security, privacy and data protection, environmental protection and liability. [41]

With regard to safety in the air and on the ground, although drones do not carry people on board, a drone crash may depending on the energy involved in the crash potentially cause injuries or fatalities on the ground or in other –manned– aircraft. Even small drones can interfere with air traffic: many drones can climb hundreds or even thousands meters high,

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37 Frost&Sullivan, 2015, *Unmanned Aerial Systems*, Presentation UAV DACH, April 2015.

38 For the US: there is no general rule allowing commercial operations. Since the publication of the Small UAV rule consultation in January 2015, the speed of granting exemptions has been increased significantly. At the moment of drafting of this report – August 2015, more than 1,000 exemptions were granted – see http://www.faa.gov/uas/legislative_programs/section_333 and UAVSI (2015).

39 See an overview in annex V.

40 Koen Meuleman, president Belgian drone association, in UK House of Lords, 2015, p. 20. At the moment of preparing this report, 17 Member States do not have specific drone rules in force.
The Dutch Inspectorate published a report in June 2015 on the number of incident reports on model and drone incidents in the period 2013-14. About 25% of the reported cases concerned professional activities without the required authorisation;

41 In the case of liability and insurance a dedicated study (see section 2.3) indicated that the current legislative framework sufficiently covers drones. Even if some MS have raised concerns in this respect there is no sufficient evidence that the current rules on insurance would be prohibitive for drone operations. The problems concern the levels of the fees and above all enforcement. Consequently, amending the rules on insurance is out of scope of the current initiative.

where they could collide with commercial jetliners, especially near airports. [42] Several events of drones flying in close proximity with other aircraft have been reported and have worried the pilot community.[43] Although in theory the necessary rules are in place to prevent such risks (e.g. it is forbidden to fly at such altitude), those rules are often not enforceable. The likelihood to be caught flying illegally is small given the difficulty to link a drone to its pilot. Moreover, drones have limited safety features because of weight and cost limitations and are vulnerable to loss of power or loss of control (e.g. because the communication link with the pilot is lost), or to collision because of pilot error. Remote pilots may also lack awareness of the risks they are taking if they have had no aviation training. There is a serious risk that these safety incidents could multiply with the growing number of drones. [44]

Concerning *security*, as noted in COM(2014)207 and reflected in the draft European Parliament own initiative report of MEP Jacqueline Foster, [45] drones offer new opportunities for illegal activity including surveillance (espionage, target reconnaissance) or the carriage of an offensive payload [46] (bomb attack, or even the delivery of weapons to a prison courtyard). [47] While such criminal offenses may also be carried out with traditional aircraft such as helicopters, such traditional measures are much less accessible (cost, skills required, registration/identification) and are more easily detected than drones. These unauthorized and illegal uses will be the main security threats of drones. Furthermore, due to the remote command and control technology, drones have greater vulnerability in certain respects than manned aviation, and remain particularly exposed to hacking where a legitimate drone may be taken over for criminal purposes. The fact that drone operators may remain anonymous poses a serious problem to law enforcement authorities, who have difficulties to intercept or prevent certain operations or to identify or apprehend the operator. These risks need yet to be resolved.

Security issues should be considered from the system perspective, where especially its robustness against external attacks should be assessed. In particular, command and control appears to be a weak link in the security chain. In this context, safety and security aspects are intrinsically linked. A suboptimal safety approach will also lead to a suboptimal security outcome. SESAR, the Single European Sky Air Traffic Management Research, is already working on these technologies, which may then be translated into rules for drones falling under national or European competence.

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42 For instance, The Telegraph, “Drone was 'within 20ft' of crashing into passenger plane landing at Heathrow” 12.12.2014, online version.

43 The European Cockpit Association has adopted a particular position on this issue to express its concerns (ECA, 2015). https://www.eurocockpit.be/pages/remotely-piloted-aircraft-systems-drones.

44 Many individual incidents have been reported in newspapers and it takes time before these numbers will be well reflected in official reports. In the UK the CAA, together with the pilot association BALPA launched a drone operator awareness initiative (http://www.caa.co.uk/application.aspx?appid=7&mode=detail&nid=2468);
In the US pilot safety reports on drones have increased from 238 reports in all of 2014 to more than 650 until early August 2015 (– see FAA: pilot reports of close calls with drones soar in 2015 - https://www.faa.gov/news/updates/?newsId=83445)..
The Dutch inspectorate also observes a significant increase of incidents with a model aircraft or a drone involved (http://www.ilent.nl/Images/Infoblad%20Drones_tcm334-366571.pdf).

45 Own-initiative report “Safe use of remotely piloted aircraft systems (RPAS), commonly known as unmanned aerial vehicles (UAVs), in the field of civil aviation”, available as a draft (2014/2243(INI)) at the time of writing. This includes an opinion of the LIBE committee.

46 Payload is the technical term used to describe all things that a drone can carry. This may be cargo, but also all kind of cameras or sensors.

47 Data link is also considered a weak link in the overall ATM community and is therefore a priority in the drone activities of the SESAR work programme.

In addition, drones can invade *privacy* in ways which other aircraft cannot do, by flying very close to persons or into their "private space" such as a home garden. Moreover, many drones carry recording or sensing equipment, be it for navigation or for the purposes of photography or remote sensing. The data captured by that equipment is likely to be stored and/or processed, raising data protection issues. Strictly speaking, the data protection issue is caused not by the drone itself but by its payload (camera, sensor), which may also be mounted on other vehicles or on fixed structures and is already subject to general privacy and data protection rules. In other words, drones raise indirect privacy and data protection concerns, by increasing the possibilities for deploying such cameras and sensors.

Specific analysis has shown that there does not appear to be a need to amend the legal framework in this respect at EU level. [48] These rules are currently under revision and the adoption of the new General Data Protection Regulation would further help to ensure a better protection of the data subject's rights when data are processed by introducing new tools like the accountability principle, the data minimisation principle, Data-Protection-by-Design approach, the obligation to carry out a Data Protection Impact Assessment, etc.

In principle, the security and privacy/data protection risks are addressed by the existing legislation. However, there are serious concerns about the extent to which the existing legislation can be enforced effectively by competent authorities. The main problem with oversight concerns the light category of drones that could be easily obtained and controlled and for which it is difficult to identify who is the actual operator. The enforcement authorities – aviation authorities, privacy and data protection authorities, security forces or police – currently are missing the basic user information to enforce the rules and effectively intercept an operation.

Even if today these issues remain limited in scale, and problematic occurrences have been limited, they have often received strong media attention, leading to concerns in the sector about potential public opposition. [49] Studies have shown that public support already varies significantly depending upon the application or the location. [50]

Concerning the *environmental* risks, most drones rely on electrical power and therefore emissions are not a major issue, but noise should be addressed. The challenge will be to deal with the smaller drones, which may be flying closer to residential areas and people and may cause noise nuisance. Specific drone noise standards and/or operating restrictions may be needed. [51] When combustion-engine drones will replace manned aircraft in some operations,

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48 *Privacy, data protection and ethical risks in civil RPAS operations*, Rachel L. Finn, Anna Donovan and David Wright, Trilateral Research & Consulting, LLP, Laura Jacques and Paul De Hert, Vrije Universiteit Brussel, November 2014.

49 See European Commission (2014), "*Civil drones in society – Societal and ethics aspects of remotely piloted aircraft systems*", JRC Science and Policy Reports (Philip Boucher), Luxembourg, 50p. http://publications.jrc.ec.europa.eu/repository/handle/JRC91671.. This study also refers to surveys. Many positive press articles have appeared since, see e.g. The Guardian (2014) on Humanitarian Drones to deliver medical supplies to roadless areas.

50 See European Commission (2015), "*What comes to mind when we talk about civil drones? An early exploration of citizens' perspectives on civil drone development*", JRC Science and Policy Reports (Philip Boucher), Luxembourg, 46pp [limited distribution]. See also European Commission (2015), "*Ethics dialogues: Experiencing ethics through 'things': open IoT, civil drones and wearable sensors*", JRC Science and Policy Reports (Philip Boucher, Susana Nascimento, Lucia Vesnić-Alujević and Ângela Guimarães Pereira), Luxembourg, 80pp, http://publications.jrc.ec.europa.eu/repository/handle/JRC93162.

51 For instance, the City Zürich has introduced instructions for drones that would significantly restrict the operations, also for electric drones – see Martin Steiger, (2014), "*Regulierung von Drohnen im zivilen Behördeneinsatz in der Schweiz*", in Sicherheit & Recht, 2014/3. In the US, the FAA has started an outreach campaign to states and other partners to make

the level of emissions will be reduced as they are typically lighter. In cases where drones are equivalent to traditional aircraft, equivalent noise and gaseous emissions standards are to be applied to contain the environmental impact. [52]

Furthermore, unavoidably *accidents* with drones will happen, which raises the question of dealing with damage to people and property. Liability and compensation regimes are well established in the world of air transport, but if drones operate outside those regimes liability and compensation may become an issue. Also, contrary to traditional aircraft, which are all registered, it is currently very difficult to establish the identity of the owner/operator of a drone.

While the number of drone operations is expected to grow rapidly, a similarly rapid growth in incidents may cause economic and social damage to the sector. If the underlying issues are not adequately addressed, the public may actively oppose development and apply pressure upon the political leadership to impose strong restrictions on drones. This could be avoided by addressing the risks early on, and preventing incidents to the greatest extent possible. If, however, regulations are too conservative and restrictive, development of drone-based services may not reach their potential, leading to missed opportunities for jobs and growth.

2.2 THE UNDERLYING PROBLEM DRIVERS

2.2.1 Problem driver 1: Responsibilities for drone regulation are divided, leading to diverging requirements in the internal market

Some EU Member States are developing or have developed national rules for simple operations, well below 150kg. By the middle of 2015, specific drone rules have been adopted in AT, DE, DK, ES, FI, FR, IE, IT, NL, PL, SE and UK. Other countries have established only a high level framework or are in the process of adopting rules, notably BE, HU and MT. [53] This means that the exemption process still applies in 17 Member States. [54] The main features of the existing national regimes are shown in Table 2.

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people aware of drone no-fly zones: https://www.faa.gov/uas/no_drone_zone/. Also private initiatives have popped up to declare such no-fly zones (for safety, privacy or environmental reasons).

52 Some initial noise tests in the US indicate that noise levels in overflight at 150 meters can be in the order of 25 to 55 dB(A) SEL. When correcting these levels to distances that may be common for some of the proposed task (delivery of packages) the actual noise levels perceived by citizens could go up by another 10 or more decibels. If such operations would be of a frequent nature this could well reach levels where the noisier drones would be considered annoying by a significant percentage of the population.

53 The draft BE legislation has been published for consultation.

54 In the public consultation especially the operators confirmed the exemption process as very problematic. Different authorities apply very different standards and these change over time and under circumstances. To some extent, the evolving standards reflect a growing expertise of both the administrative side and the operators' capabilities.

Table 2: Main features of selected Member State drone legislation

Member State	Drone categories	Categories of permitted operations	Area allowed to be overflown
AT	Below 5kg MTOW (maximum take-off weight) Between 5-25 kg Between 25 -150 kg	VLOS (visual line of sight) only	Undeveloped, Unpopulated, Populated, Densely populated
DK	Below 7kg MTOW Between 7-25 kg Between 25 -150 kg	VLOS only – <100m AGL (above ground level)	150m from road and buildings; never over densely built-up areas
FR	Below 2kg MTOW Between 2-25 kg Between 25 -150 kg	S1= VLOS < 100m distance from pilot S2= VLOS, within 1,000m distance from pilot - <50m AGL S3= VLOS, within 100m distance from pilot S4= observations – 150m AGL	S1= unpopulated area S2= unpopulated area S3= populated area S4= unpopulated area
DE	Below 5kg MTOW: Länder Above 5kg: federal competence	VLOS only, <100m AGL	
ES	2 main categories: Below/Above 25kg	<2kg: BVLOS & AGL<120m <25kg VLOS 500m and AGL<120m >25kg: subject to the imposed by CAA	**<2kg :** only away from habited places **<25kg :** only away from habited places **Above 25kg:** specific conditions
IT	2 main categories: Below/Above 25kg CAA may provide simplified procedures for drones <2 kg	"V70": 70 m (230 ft) max AGL and 200 m radius "V150": 150 m (500 ft) AGL and 500 m radius	At least 150 m from congested areas and at least 50 m from persons and property
PL	Two main categories: Below 25kg MTOW Between 25 -150 kg	- VLOS - BVLOS (in segregated airspace)	Outside aerodromes and landing side (5km); outside controlled traffic zones, and R, D airspace zones.
SE	Below 1.5kg MTOW or <150 joule Between 1.5 and 7kg or <1,000 joule Between 7 -150 kg	S1= VLOS , Below 1.5kg S2= VLOS, 1.5 and 7kg S3= VLOS, >7kg S4= BLOS Always < 120 m AGL	Distance RPAS/persons and property: >50m
UK [55]	Below 20kg MTOW excl. fuel/incl. battery Between 20 -150 kg	Max speed : 70 kts; 400ft AGL < 500m distance from pilot	>150m from buildings >100m from people

Terminology:
MTOW: maximum take-off weight;
AGL : above ground level;
VLOS: visual line of sight (pilot must be able to always see the aircraft;
BLOS: beyond visual line of sight.

The weight criterion is used in most of the countries, in conjunction with other criteria such as the area overflown, the line of sight and the altitude above the ground level. The problem is

[55] IE has adopted similar rules**.** The member States not included in the table have an exemption regime where CAA treat the applications and where additional authorizations from other administrations may be necessary, e.g. to fly with cameras over city centres.

that the weight is a real cut-off threshold, which suddenly renders operations with somewhat heavier drones impossible, even if the risk to third parties does not increase, for example, flights over non-populated area in restricted airspace. The cross-border provision of drone-based services, like infrastructure inspections, or the roll-out of EU wide operations organised according a particular operational model, such as home deliveries, is severely hampered. The need to meet diverging requirements simultaneously forces operators to meet the strictest requirements on all criteria (weight, operations area, altitude, speed, line of sight, etc.). In some cases, national requirements are mutually exclusive. Moreover, authorisations must be obtained separately in each Member State as there is no mutual recognition.

The fragmentation of rules also affects manufacturing. It tends to be "structuring", i.e. manufacturers will design their aircraft in a way to fit a particular regulatory environment. It is impossible to devise an aircraft type optimal for all national markets, even if it was to be used for the same type of operations. However, the ability to market drones across borders is indispensable for creating economies of scale and lower product development costs by avoiding the need for different types or models for different national markets. The need for cross border market access also applies to drone operations. For instance, a highly specialised offshore infrastructure inspection company must be able to operate beyond its home country to serve niche markets in other countries with offshore infrastructure if it wants to create a sufficiently large client base. The box below illustrates the difficulties.

Box 1: Daily problems of an SME:

Gatewing, a Belgian SME, produces a successful drone which is globally marketed as far as Australia. Its newest product weighs 2.5kg and operates best at 120m above ground level for aerial inspections. The Company has difficulties entering the Swedish market, given the threshold of 1.5kg. [56] *It is not worth to develop a drone for the Swedish market, where companies have taken this threshold as a given. The same Company is obliged to sell the old version of its drone in the French market, which just falls within the 2kg limit. It cannot sell its newest product, as this is 500g heavier even though the extra 500g accounts for equipment which makes it safer to operate.*

Similarly, Gatewing is confused as its drone has to produce a specific noise in case of emergency according to Danish law, while it must remain below a specific noise level in all circumstances according to Austrian law.

Gatewing sold on a regular basis drone systems in Spain. The market was closed for six months before the adoption of drone rules half 2014. Since the adoption of national rules, the Spanish market has become the most important market in the EU.

In the online consultation a vast majority of respondents identified differences in national legislation (91%), lack of common rules applicable to all types of drone operations (91%) and gaps in the current EU legislation (93%) as important barriers. [57] These views are shared across the various categories of stakeholders. Regulators concur with the views of other stakeholders that differences in national legislation (79%) and lack of common rules (83%) pose barriers to the industry.

For companies the segmentation of the market with diverging national rules, if rules already exist, does not constitute a fertile basis to develop drone activities.

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[56] Beyond the threshold of 1.5 kg the practical modalities are heavier and the company has experience that these are more difficult to respect by customers.

[57] See Annex II for more details.

2.2.2 Problem driver 2: Individual authorisations are too costly and too time and resource intensive

ICAO in principle forbids drone operations with unmanned vehicles, unless States give individual "special authorizations" for each operation of unmanned aircraft on their territory. [58] In some cases, additional authorisations are required to cover the payload or service, e.g. for filming or photography. In Europe all drone operations still require special authorisation, with the exception of certain low-risk operations with small drones in some Member States who have put in place generic regulation. However, even for those operations a general licence or authorisation is still required.

Box 2: The US Exemption process: [59]

Commercial activities are forbidden in the US. Six test sites were recognized late 2013. Operators must request a special FAA commercial Section 333 exemption. The first such exemption was granted in 2013 for a drone overflying the arctic waters.

More exemptions are granted on a piecemeal basis to industries with the greatest needs – oil and film industries. The GAO stated in its 2014 US Congress testimony that "During our ongoing work, FAA has granted seven section 333 exemptions for the filmmaking industry as of December 4, 2014. FAA officials told us that there were more than 140 applications waiting to be reviewed for other industries, for uses such as precision agriculture and electric power line monitoring, and more continue to arrive." In March 2015 the FAA started issuing 'blanket' exemptions to speed up the process. By August 2015, the number of exemptions had risen just above 1,000. [60]

Amazon, a US online retailing company, also applied for an exemption. By the time the FAA granted the exemption, Amazon declared that it already was obsolete, as the drone mentioned in the request was already replaced by a newer model. Amazon moved for testing purposes to Canada, the UK and the Czech Republic.

A very high number (83%) of respondents to the online public consultation cited the burdensome character of the current national authorisations process in the EU Member States, both in terms of cost for administrations and industry. Individual authorizations give rise to a lack of legal certainty with regard to substance and duration. The applicant simply does not know exactly whether his specific operation will be approved and the treatment of the requests for exemption can take from weeks to months, depending on the complexity of the operation, [61] and operators find it hard to keep a client on hold for such a long period before being able to conclude or execute a contract. Moreover, if the number of drone operations and drone operators continues to grow, the authorities will have difficulty to cope with the number of applications in the absence of additional trained staff, which may lead to further delays.

Some states do not charge (yet) the operators for obtaining a permit, like in France, Malta or Spain, or charge below cost price, e.g. in Swiss where fees are legally restricted to SF700 or in Sweden where the rates for an approval is about SEK3,800 (about €380). In the Netherlands and the UK the rates are most cost covering. A Dutch certificate of airworthiness costs €4,640 (renewal at €928); an operator certificate costs €1,856 (renewal at €232); and a training school approvals costs €825. In the UK the permissions depend on mass, with an

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58 Article 8 was part of the original text conceived in 1944..

59 This case is best documented and is also representative for the EU states without drone rules, as demonstrated by the on-line consultation.

60 GAO, (2014). Meanwhile the FAA has reviewed its exemption policy and facilitated the process. See: http://www.faa.gov/uas/legislative_programs/section_333/ and AUVSI (2015).

61 This is an estimate given by experts. The average assessment time to obtain an exemption was around six months in The Netherlands.

initial application costing £112 (£56 for renewal) for aircraft weighing 7kg or less; for aircraft between 7 and 20 kg, this charge is double; in addition, companies must pay for the appropriate pilot competency assessments (private charges).

In general, companies do not complain about the amounts charged (if charged only once); the real cost are the numerous hours of work required to produce the necessary documents, like an operations manual or a safety management manual, especially if these documents have to be tailor-made for each Member State. The costs to develop a handbook for a specific regulation can be estimated at about €6,000 (based on 80 hours at EUR 75/h); for a safety and maintenance manual at about €12,000 (based on four weeks of work for the development of the plan at EUR 75/h). The cost of attending a training school is estimated at about €1,000. [62] It is especially the multiplicity of these diverging rules which make these costs soar for companies. There are no precise estimates known of this administrative burden on overall turnover of SMEs.

Especially drone operators (82%) and industry associations (91%) qualify individual authorizations as very problematic. This view is not shared by the issuing authorities: only 30% of the regulators consider individual authorisations problematic.

Individual authorizations constitute a bottleneck for developing drone activities and are a burdensome process for administrations.

2.2.3 Problem driver 3: The existing methods of civil aviation regulation are not always well suited to the specificities of drones

The main shortcomings of the current aviation rules are the contradictions between the (1) concept of operations of manned as opposed to unmanned flight, (2) the perception of risk, and (3) the difference in the nature of the operators and manufacturers.

Firstly, the fact that the existing aviation rules were conceived for large manned aviation makes them not well suited for drone operations. In the conventional concept of operations, the pilot on board is central to the safety of operations. There is no definition of a "remote pilot" nor of a "ground station", which means drones are unable to meet current safety rules. Concepts of control of drone operations, such as "line of sight" are missing. Besides, drone technologies provide another step of automation that may allow for remotely piloted aircraft systems, single-pilot operations or further automation where one pilot could be in charge of several drones at the same time, for a swarm of drones, or where the command of a drone is transferred in flight from one ground station to another.

In terms of navigation, drone operations are not bound by airports, which are in fact specific fixed points of entry and exit of the airspace. Different types of drones are able to fly from right above the ground with very low level operations, at a few meters from persons or property, to 15-25 kms, far higher than the flight levels currently used for commercial air traffic. The European harmonised rules of the air in general do not regulate civil or commercial flights below 500ft (about 150m), exactly where smaller drones would operate intensively – or where also larger drones would be more present, as their take-off or landing are no longer confined to traditional airports. Operations below 500ft are not systematically regulated in national rules and reserved mainly for special missions of light aircraft and

[62] Costs taken from the Notification 2015/0035/NL of the Dutch Ministry of Infrastructure and Environment in preparation for its drone proposal. The cost for a working hour was assumed €75 on average.

helicopters with which drones could easily interfere in the absence of specific rules. [63] Drones are also incapable of meeting the most basic requirements of separation (from obstacles) as currently applied in civil aviation, at least in most of the expected types of operations.[64]

Secondly, the perception of risk is fundamentally different: manned aviation is considered to be always risky as at least the pilot is at risk in case of an accident. In the case of drones and especially smaller ones, most accidents would involve only the loss of the drone and possibly other material damage. What needs to be managed in the case of drones, is the risk to others – be it people on the ground or other aircraft. Risk can be mitigated in many cases by staying clear of people on the ground or other aircraft. In other situations, the potential risk factors need to be analysed in their own right, to identify the most relevant contributors and decide the most appropriate risk mitigation measures.[65] Clearly, the level of rigour applied to safety management in manned aviation, involving strict controls on aircraft design, production and maintenance; pilots; operations, with (in most cases) ex ante licensing and continuous monitoring, is disproportionate to the risk posed by many drone operations.

Thirdly, most manufacturers and operators involved in the drone sector are unlike those involved in civil aviation generally. With the exception of the lightest end of leisure aviation, traditionally civil aviation has involved a relatively limited number of specialised organisations, both in manufacturing and operations. They are capable of ensuring compliance with a large number of detailed aviation-specific rules, and to adapt their organisation to the complex requirements of aviation safety regulation. They are also individually overseen by a public authority. In the drone sector, the number of actors involved and the nature of their business – which is typically not aviation-centric, will make it difficult to sustain an intrusive regulatory approach in an effective way. The affordable and easy operation of drones gives the possibility to almost everybody to become an airspace user by operating a drone, but it cannot be assumed that all actors have a strong aviation culture and are aware of the safety consequences of their actions.

These shortcomings can be found not only in the basic aviation safety Regulation (EC) 216/2008. Also other legal instruments are not really fit for dealing with unmanned systems either. For instance, under the normal application of the rules on accidents investigation or incident reporting, an accident between two (smaller) drones would trigger a full and expensive accident investigation, while having to report any drone incident however small would impose an excessive burden on the operator. The negative consequences limited to small material loss with no safety implications certainly do not justify such excessive requirements. [66]

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[63] For instance, only in DE some 100,000 missions were flown by rescue helicopters. This number results in some half million low altitude operations (on average 2.5 take-off and landings per mission). If one adds police or military helicopter flights, more than 1M low level operations take place in DE alone (Rüder and Scheck, 2014).

[64] The Standardized European Rules of the Air specify: SERA 5005 (f) minimum height in VFR: Except when necessary for take-off or landing, or except by permission from the competent authority, a VFR flight shall not be flown: 1) over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a height less than 300 m (1 000 ft) above the highest obstacle within a radius of 600 m from the aircraft; (2) elsewhere than as specified in (1), at a height less than 150 m (500 ft) above the ground or water, or 150 m (500 ft) above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.

[65] The Swiss Federal Office of Civil Aviation developed a useful risk assessment methodology.

[66] Some national investigating authorities have already been involved in drone accidents. The European group of accident investigation authorities ENCASIA has started developing a specific manual on drone accidents. A ballpark estimate of a light aircraft accident investigation would be in the range of about €15,000 for the investigating authorities (in addition to costs for the ministry of justice or the police etc.). With a ballooning of drone numbers, accidents are expected to increase. Not every accident or incident between two drones would deliver safety critical lessons.

All categories of respondents concur with this analysis (93%), including regulators (92%) and 100% of the twenty industry associations that replied on the online consultation.

2.2.4 Problem driver 4: The oversight and law enforcement authorities lack proper information and instruments

Over time, manned aviation has developed its own oversight and law enforcement mechanisms, especially driven by the civil aviation authorities. While large drone operations will fall under the conventional aviation enforcement mechanisms managed primarily by national civil aviation authorities, especially operations of smaller drones will lead to another set of challenges for enforcement authorities. This issue was particularly highlighted when a number of drones overflew French nuclear plants or the Paris city centre. Also incidents of drones flying in the close vicinity of airports have been reported. Drones are also found flying over crowded beaches, causing safety, (environmental) nuisance and privacy problems. Authorities are struggling how to respond. Police forces may be first in line to respond to inquiries from concerned citizens. There are no common tools in place to prevent infringements in an automated way and police forces have no means to enforce the correct application of the rules.

As drones are a new phenomenon, experience needs to be built up as to how existing rules on safety, data protection and privacy, security and environmental protection, or liability/insurance can be implemented. Guidelines are often not available, and those who are engaged in drone operations have insufficient awareness of the rules.

This view is supported by stakeholders views expressed in the public consultation which point that for example for privacy there is no need for new rules, but rather a better application of existing rules, with a closer collaboration between the civil aviation authorities and national data protection authorities.

Moreover, if an incident or accident happens, [67] enforcement authorities encounter problems with the identification of the operator and enforcing operator liability – where the drone has no number plate or other means of identification, where the operator may not have sufficient insurance, or has been flying illegally. [68] These problems do not arise in civil aviation in general: all aircraft are registered and ex ante controls establish compliance with rules and requirements; and non-complying operators can be grounded at an aerodrome. There are currently no requirements for drones to be equipped with embedded identification, privacy by design, security by design, communication/interception or geofencing [69] capabilities as a precondition for placing on the market. The control of operations is performed differently depending on the Member State, but is often based on individual authorisations. However, even with the requirement for authorisation of each operation, the ease of misuse of drones requires efforts to prevent and eliminate any potential unauthorised or improper use of drones.

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67 See evidence and warning of pilot associations in previous footnotes under section 2.1.2.

68 For instance the Danish Ministry of Transport report (2015) identifies the lack of identification as one of the most important issues to be tackled. Without such identification, enforcement becomes near impossible.

69 Geofencing is the capability to forbid drones to fly in a particular airspace. Airports can be "geofenced", meaning that the GPS and autopilot of the drone know that it cannot fly into airport areas. Geofencing can therefore also be used for security or environmental purposes.

With regard to safety, 28% of the respondents found that drones should not be allowed to overfly city centres at low altitude. Only a fraction of the operators (20%) and industry associations (14%) find such low altitude flight problematic. The exceptions are here the air navigation service providers, where 75% find such low level flights problematic. On enforcement, stakeholders generally agree (76% in general - 85% for regulators) that drone operations pose particular enforcement problems.

2.3 MOST AFFECTED STAKEHOLDERS

Drones will become, eventually, a normal part of the daily life of every citizen, in a professional context and in a private sphere as a customer or private drone operator. All citizens may also be impacted in their fundamental rights if no appropriate protective measures are taken.

Besides citizens, the stakeholders most affected by the regulatory deficit are the EU drone industry (drone manufacturers, payload developers, operators and ancillary service providers such as training organisations), the Member States (with specific administrations like civil aviation or data protection authorities) and EASA. The fragmentation between EU and national competencies and between the national rules leads to regulatory complexity that is especially problematic for SMEs which are most active in developing new technologies and innovative types of operations. [70]

As drone technologies offer innovative ways of working and new services, businesses that could benefit from drone services are affected in their efforts to remain competitive, from traditional aerial services over logistics companies to big industries like construction, mining, transport, energy provision. The barriers to efficient use of drones hamper these companies growth potential and can reduce their competitiveness versus companies in other parts of the world benefiting from drone services.

Existing civil aviation operators, especially general aviation and helicopter operators – as well as other operators at and around airports – are affected by the arrival of large numbers of relatively unsophisticated drones, which could diminish safety in the airspace where they also operate. Model aircraft enthusiasts could be affected if they are captured in new drone regulations.

[70] See box 1 highlighting the daily problems of an SME. "Fragmentation is hampering competitiveness" was endorsed by 77% of the respondents of the online consultation and by 89% of the industry associations.

Table 3: Overview of affected parties by the problem

Stakeholder	*Description*	*Key interest*
EU citizens	All EU citizens affected by risks related to drone operations and as possible clients of drone services or users of drones for private purposes	Access to innovative services with high welfare and job potential, but with properly addressed safety, security and privacy risks
Drone manufacturers and operators	Drone manufacturers and operators with many SMEs and start-ups.	(i) need for (clear) rules for producing and operating drones to make a business case and take investment decisions; (ii) produce rules proportionate to risk to keep regulatory burden as low as possible
Member States (civil aviation, data protection, law enforcement authorities	Regulating and enforcing authorities in aviation, privacy or security	(i) Ability to cope with demands/expectations of growing drone sector (need to develop regulations, organise licensing and oversight); (ii) Need to enforce public policy (safety, privacy, security)
Industry in general	Many businesses may include the use of drones in their operating environment	Ability to include drone services into their value chains to lower costs or provide innovative services
Airspace users	Commercial airlines performing daily ca. 27,000 flights in the EU, together with hundred thousand private pilots	Airspace users (especially general aviation and helicopters) want to keep "their" airspace safe. Model aircraft enthusiasts do not want to be affected by drone rules.

2.4 BASELINE SCENARIO

Under the baseline scenario the identified problems would not be addressed and most likely be aggravated with the growing popularity and use of lighter drones. Available drone market forecasts assume that the legislative framework will follow the technological developments and would not hamper the market development (see Annex VI). The legislative framework for drones is widely anticipated in all markets, so it is hard to assess what if the current situation is maintained. Nonetheless, it is also quite evident that specific rules for drones at Member States level usually lead to rapid expansion of drone operations (see 2.1.1.).

Concerning the increasing risks caused by drone operations, there are again no official reports known showing the trends in the number of incidents and accidents with drones. [71] One should, however, not dismiss an increasing number of press reports on such incidents, with safety experts fearing it might be a matter of time before a drone brings down a passenger plane.[72] The restrictive legislative framework does not seem to address all risks, as they are not effective in preventing unauthorised or inappropriate use of drones. Consequently, with no policy change the risks are expected to become more serious.

[71] The US FAA has published, in August 2015, a list of drone incidents. A Dutch report analyses incidents with drones and models alike for the period 2012-14.

[72] http://www.dailymail.co.uk/news/article-3251543/Drone-owners-forced-register-devices-tracking-database-four-near-misses-aircraft-past-month-alone.html

Below the expected evolution of problem drivers is presented.

a) Evolution of problem driver 1: Responsibilities for drone regulation are divided, leading to diverging requirements in the internal market

As things stand, it is likely that divergent and patchy approaches to the drone rules between Member States will develop for drones below 150kg, as described in the section on problem driver 1 above. It is, however, difficult to predict in which direction the national regulations will go, but current experience shows that it is highly unlikely that uniform rules would be adopted, despite the work at international level.

At the international level, ICAO has produced some guidance material for countries which is used for Member State action and to facilitate the application of individual authorisations. The ICAO process that could lead to formal requirements started in autumn 2014, and concrete results could be expected in coming years only. If successful, these generic international requirements would then need to be translated into national or European jurisdictions to become enforceable laws. This would mean that full harmonisation could not be guaranteed.

In order to advance more quickly, a number of European and other aviation authorities have grouped together in JARUS, Joint Authorities for Rulemaking on Unmanned Systems. JARUS is a flexible structure that should be able to produce proposals for requirements for drones in a timelier manner. As a purely voluntary intergovernmental body, JARUS has suffered from a lack of clear and decisive governance, although recently improvements were made by clarifying leadership and secretarial support. In addition, JARUS cannot adopt rules by itself. They need to be transposed into national law. The past expertise, also from the Joint Aviation Authorities, clearly demonstrates that the transposition would most likely lead to different versions of "JARUS rules" and an attempt to coordinate the transposition into national law on a voluntary basis has in practice no chance to deliver a real single market in Europe.[73] For instance, some Member States are proposing rules that go against some fundamentals of an operation-centric approach like sticking to the distinction between recreational and professional use (while also expertise in other states have demonstrated that this distinction does not function) or imposing 'means of compliance' that are disproportionate to the risk, for instance requiring a private pilot licence for a chimney sweeper who from time to time wants to inspect the roof with a drone or for the photographer who wants occasionally take a picture with a drone. Besides, not all Member States are in a position to follow the JARUS work. At best, the JARUS process will contribute to sharing best practices and helping countries to avoid mistakes made by first movers, and probably contribute to conceptual similarity of approaches between States. If industry standards are developed harmonisation could benefit, but JARUS has so far not been able to steer standard-setting work.

The EU's SESAR programme is planning to work on developing technologies and standards, inter alia to improve "command and control" and "sense and avoid" capabilities of drones. These technologies are important to make drones fly and react like manned aircraft, so that the "rules of the air" can be respected. At the end of the day, the purpose is to integrate drones in the aviation system where safety depends on the actions of various actors and where drones have to adapt to the rules of the other air traffic. This is comparable to the road sector, where the advantage of driverless cars cannot be used if such driverless cars had to drive on separate

[73] Such divergence in national rules and practices is for instance revealed during EASA standardization inspections, whenever new areas which used to fall under international requirements, be it from ICAO, JAA or Eurocontrol, came within the scope of applicable EU rules.

lanes. On the other hand, if driverless cars are to enter the traffic and share the roads with piloted cars, they must be able to follow all traffic rules. Under the baseline scenario, the results from this work could then be integrated by Member States and EU/EASA, each within their area of competence. The streamlining of R&D work of SESAR with the subsequent regulatory validation by EASA should increase the pace of innovation.

All in all, differences in national drone rules are expected to continue restricting the ability of companies to take advantage of cross-border markets. This would lead to further fragmentation of the EU market, hampering development of both manufacturers and operators, and, indirectly, for the wider economy.

b) Evolution of problem driver 2: Individual authorisations are too costly and too time and resource intensive

Some Member States might continue pursuing a proactive approach, abandoning where possible the individual ex-ante authorisation in favour of generic operating rules to favour the growth of the drone sector, whereas other Member States will stick longer to an ad-hoc authorisation policy. In general, though, there are no developments in the pipeline that would eliminate the system of individual authorisations for any segment of individual authorisations. As mentioned above the work in ICAO could facilitate individual authorisations, but would not replace them with blank approval of certain operations.

The product market legislation, which generally applies to the lightest category of drones and allows for placing some drones on the market, does not address the issue of operation authorisations. Only aviation authorities that are in charge of the implementation of the rules of the air and can impose capability limitations on small drones or a unique identification tool or a national register in the context of operations in civil airspace, allowing for a 'type-approval' operations. However, there are no institutional links foreseen in the existing legal instruments between aviation authorities and industry that would enable industry to respond to specific aviation requirements (e.g. small drones should only be authorised to fly at a certain distance from an urban environment or airport, to be used by persons having received minimum aviation safety training and who are listed in a national register). As exactly these aviation safety requirements would support mutual recognition, the current situation of divergent and fragmented national approaches hampers the true development of the internal market for lighter drones.

Finally, the baseline path is likely to put pressure on Member States' public administrations, which may in turn constrain drone market development. In those Member States where such staff is paid from the general budget and not from industry fees, the authorities will have difficulties to cope. If authority approvals become a bottleneck, the effect will be to "ration" access to the market and to slow down innovation.

c) Evolution of problem driver 3: The existing methods of civil aviation regulation are not well suited to the specificities of drones

There is no work on-going to make the currently existing civil aviation rules better suited for the specificities of drones. The revision of the Regulation (EC) 216/2008 has still not be been proposed by the Commission and "a possibly reviewed Regulation (EC) 216/2008" cannot be treated as a baseline. There is also not much work on-going to amend the rules for drones above 150 kg, but for this category the current approach is less problematic, as it requires similar level of supervision as manned aircrafts. Consequently, a single market could be developed for drones above 150kg within the current legislative framework. Based on concrete certification applications from manufacturers EASA would work out a certification basis and related operational requirements, which could serve as a basis for the adoption by the Commission, where needed in the form of Commission Regulations under Regulation (EC) 216/2008. However, it is expected that the civil market for large drones will

remain limited in the short to medium term, as market pressure is clearly being felt strongest in the smaller segment.

Moreover, for drones below 150 kg it would be also difficult for Member States to come up with their own more 'drone tailored' rules, as they would not fit well in the general civil aviation framework e.g. the current rules of the air do not foresee civil or commercial flights below 500ft, so only individual authorisations at Member States level can approve drone operations at low altitude. The lack of proper coverage in the EU legislation of the concepts of 'remote pilots' or 'ground station' will not assure a uniform approach to safety.

d) Evolution of problem driver 4: The oversight and law enforcement authorities lack proper information and instruments

The current organisation of market surveillance remains a further challenge, caused by the patchwork of numerous provisions spread across several different pieces of EU legislation. Although the ongoing revision of the EU framework on product safety and market surveillance [74] is expected to strengthen market surveillance capabilities in the Member States, it remains to be proven how these changes are able to cope with a rapidly expanding drone market and the related safe use of the airspace.

Concerning privacy and data protection, drone operators must respect citizens' privacy and data protection fundamental rights and comply with the existing EU and national rules: these rules are technology neutral, regardless of whether the data are collected by a smartphone, CCTV or a camera on a drone. Specific analysis has shown that there does not appear to be a need to amend the EU rules.[75] Nevertheless, the new General Data Protection Regulation[76] should ensure, when adopted, a better protection of the data subject's rights when data are gathered by means of a drone using new tools like the accountability principle, the data minimisation principle, data-protection-by-design approach, or the obligation to carry out a data protection impact assessment. As regards privacy, Member States will continue to develop rules and administrative procedures they deem necessary in combination with their aviation safety rules to ensure further protection of the right to privacy, for which no secondary legislation exists at EU level.

In all, on privacy/data protection, the problem appears to be not primarily a regulatory deficit, but an enforcement deficit, where police and security forces lack the appropriate tools to enforce. Despite the existence of a general legal framework, a growing number of security and privacy incidents are occurring. Some Member States are actively developing ways to address security and privacy issues but this process is in the early stages. It would be accelerated by exchange of information and best practices, which could occur through established European networks of data protection authorities and police services, but this is yet to be developed. Enforcement is hampered in the absence of drone design features to enable identification of the operator, to prevent it from entering certain areas ("geofencing") or to prevent it from being hijacked or stolen through cyber-attack. A single Member State would in practice have difficulty to impose the necessary product standards on (global) manufacturers. As long as these issues are not resolved, public acceptance of drones will be affected and Member State authorities may restrict the legitimate sale and operation of drones,

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[74] COM(2013)74 final

[75] Trilateral Research & Consulting and VUB, (2014).

[76] The Commission proposal COM/2012/01 is still under discussion in the European Parliament and Council and could be adopted by the end of 2015.

slowing down market development. At the same time they will often fail to curb the unauthorised or even criminal use of drones because they lack enforcement tools.

Finally, growing expertise with drone activities, also from non-EU states, shows that the baseline path is likely to put pressure on Member States' public administrations, which may in turn constrain drone market development. In those Member States where such staff is paid from the general budget and not from industry fees, the authorities will have difficulties to cope. If authority approvals become a bottleneck, the effect will be to "ration" access to the market and to slow down innovation.

All in all, there is a serious risk that the current situation will lead to further fragmentation between national markets and between the national and European safety approaches. Manufacturing industry and operators, often SMEs, will struggle with a multitude of national and European safety rules, leading to a suboptimal take-up of innovative technologies to support jobs and growth. The combined application of un-adapted EU product (safety) rules and national requirements will cause problems of mutual recognition and hinder product markets. The lack of relevant common product standards will also reduce the capacity of administrations to effectively deal with citizens' concerns in the field of safety, security, privacy and data protection, environmental protection, and product and operational liability.

SECTION 3: WHY SHOULD THE EU TAKE ACTION?

Article 100(2) TFEU provides a legal basis for the EU aviation policy. As it stands, large drones (above 150kg) are already covered by EU rules adopted on that basis, namely Regulation (EC) 216/2008. In addition, Article 114 TFEU provides a legal basis for harmonisation measures concerning the EU's internal market. The question as to the appropriate legal basis for any possible EU legislation on drones remains to be determined at a later stage, in particular in function of the aim and content of the intended measures.

Taking into account that the new technologies allow ever lighter drones to interfere with "manned aviation", for which already EU rules exist, the intended EU legislation on drones should also cover all types of drones in order to act coherently and thus prevent that drone operations negatively impact the safety of existing aviation activities.

Drone manufacturing has a cross-border dimension since many drones are bought online, are imported or at least have imported parts. Mutual recognition in the internal market is difficult to achieve in the presence of detailed national standards and rules. If type design certification is carried out at the national level, manufacturers would see their investment and transaction costs increase as they attempt to meet diverging requirements in small segmented markets, thus hampering also their global competitiveness. From the perspective of drones as "aeronautical products", national markets do not provide sufficient scale to develop such global technologies. For instance, critical safety measures such as the identification of the drone or geofencing require industry standards that, for instance, determine the exact technical requirements for an electronic chip that sends out the identification signals. National rules cannot deliver regional or global solutions for manufacturers, who would be confronted with a high number of different technical specifications. And such strong safety measures are exactly required to contribute to the adequate enforcement of existing rules e.g. on privacy, where, in an ideal world, police officers could be given an app to easily identify the drone (owner).

Also with regard to drone services, many operators are developing cross-border activities. For instance, infrastructure inspections, from oil rigs to rail tracks, are being organised at an international level. The point is that even if the operations have a limited scope (e.g. inspect

an oil rig or a bridge and do not cross borders), operators should be in a position to use the same drone and the same operating requirements with the same pilot at different places in Europe to really develop their businesses, especially if they operate in niche markets. Large delivery companies have expressed their intentions to organise their services at the European level which requires common rules.

Subsidiarity should, however, apply at the level of the implementation of the common operational rules, e.g. Member State authorities will carry out local risk assessments and decide which airspace shall be open or closed to drone operations, and under which conditions. Most of the light drones operations have a local dimension and it should be for the local authorities to assess the level of risk and authorise the specific type of drone operations. This way a mayor should be in a position to impose local restriction to protect particular residential areas, comparable to the situation where municipalities decide to restrict road traffic in city centres and declare pedestrian-only streets.

In addition, as is the case for civil aviation in general, Member States remain responsible for most oversight tasks and they thus mostly manage the direct relationship with manufacturers and operators. As a general rule Member States remain responsible for enforcing (common) safety, security, privacy and environmental rules.

In addition, it is intended to rely as much as possible on industry standards as the drone sector is a high technology and fast developing sector. However, industry needs a stable basic regulatory framework to plan and rightly focus their investments and innovation efforts in drones.

Finally, the initiative should also be such as to facilitate the enforcement of EU and national rules in areas such as security and privacy in relation to drones. For instance for security, safety operational measures such as a registry of operators or geofencing capability should make security enforcement measures more effective. [77]

The public consultation revealed that the consulted stakeholders widely support action at the EU level. Some 80% of the respondents agree with a full harmonization of the drone rules with an implementation by national authorities. This view is shared by national regulators (82% support – with none against), by drone operators (81%) and by associations (71%). Only 15% of respondents find that the drone technology is not sufficiently mature to be regulated (none of the regulators is of this opinion; 30% of individuals find regulations premature). Two of the fourteen replying authorities find that regulating small drones should remain a task of the competent national authorities.

Only EU basic rules for the whole range of drones, regardless of weight, offer a consistent regulatory framework for drone manufacturing and operations in the EU internal market, and have the ability to overcome the main problems identified in this report.

[77] See problem description under 2.2.4.

SECTION 4: WHAT SHOULD BE ACHIEVED?

4.1 GENERAL POLICY OBJECTIVE

The general policy objective is to enable the development of drones and drone services in a safe, secure and sustainable manner and in full respect of citizens' fundamental rights.

The aim of this initiative is, in accordance with the logic of the current safety regulatory framework as established in Regulation 216/2008,[78] not to address each of the specific problems in detail, but to adopt, in the first instance, the basic principles and essential requirements within the EU aviation safety framework for the safe development of drones in the EU. This will be achieved through setting essential requirements complemented by the necessary empowerments for the Commission to adopt the necessary more detailed implementing rules. These detailed rules would be adopted in due course on the basis of a separate impact assessment where appropriate, and followed by the development of adequate industry standards. These empowerments and the adoption of the detailed rules on the basis thereof would of course be subject to the general requirements of the Treaties in this regard (Art. 290 and 291 TFEU), inter alia as regards the control exercised by the European Parliament and the Council (for delegated acts) and the Member States (for implementing acts).

4.2 SPECIFIC OBJECTIVES

The **first specific objective** is to adopt common rules to create a single market for drone manufacturing and drone operations so that manufacturers may easily place their products on the market and operators may provide drone services to the economy.

The most important EU legal instrument to be reviewed in this context is Regulation (EC) 216/2008 to specify the responsibilities of the EU and abolish the current threshold of 150kg that defines which aircraft and aircraft operations fall within its scope; to identify existing or new actors competent for safety management and oversight; and to establish the principles of the EU safety policy, imposing safety requirements on the aircraft, the operator and the (remote) pilot.[79] [80] These rules should be complemented by detailed rules specifying how different category of drone operations should be authorised and supervised.

The **second specific objective** is to mitigate the specific risks and problems arising from the use of drones, notably in the fields of safety, security, privacy and data protection, and environment. Addressing those issues will be critical to ensure public acceptance of drones as an increasingly common part of daily life.

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[78] Currently under review. The fundamental approach taken in this Regulation to work with Essential Requirements, Delegated Acts and Standards is not put into question.

[79] Regulation 216/2008 is currently under review and a separate impact assessment was undertaken. This impact assessment report on drones takes the other into account to ensure coherence between the two parallel reports. This report also goes beyond safety and assesses the need for regulatory action in other fields like privacy, liability, security or environment; and it gives special attention to internal market aspects.

[80] In case of SMEs operator and pilot may be the same person/function. For bigger companies the operator is the company responsible for providing the drone service, with the help of a pilot or several pilots.

With respect to aviation *safety*, in practical terms, the EU rules will need to be specifically adapted to the manufacturing and operation of drones and in order to open the market they need to provide modalities for safe drone operations. While addressing the safety issues, the initiative should also consider security, privacy and data protection, liability and environmental aspects. Particular attention will be paid to enforcement of rules applicable to mass produced small drones. Correct application of the rules should be facilitated by embedding safety features: small drones should not be able to fly too high or too far. And the pilot of the drone should always be identifiable.

As regards *security*, measures need to cover the design and manufacturing processes, together with the operation of the drone or of the airspace. The EU already provides for rules in the security area, namely airport inspections as adopted after 9/11. In drones especially command and control are security sensitive – which already may be covered under (cyber) safety certification. The intended framework should foresee the possibility for the Commission to adopt detailed rules. For operations, geofencing capabilities are a good tool also to deal with security issues, including avoiding accidental intrusion into a security sensitive area.

Concerning *privacy/data protection*, the initiative does not intend to establish new substantive rules, but only to make sure that the proposed safety solutions would also facilitate compliance with the applicable privacy and data protection rules. For instance, an identification or tracking requirement for each drone needed for safety monitoring would also help complying with the transparency obligation of drones' operations and facilitate enforcement action for the data protection authorities in case of infringement of the applicable privacy/data protection rules. Moreover, the scope of this report is limited to drones as "flying devices" and not to regulate cameras and sensors as such. These items have to respect existing relevant rules, including privacy and data protection.

With respect to *environmental protection*, the essential requirements should also cover environmental standards on nuisance e.g. from noise and gaseous emissions.

A very large majority of participants in the public consultation of all stakeholder groups support these overall policy objectives. 97% sees the need for EU action as drones are a promising source of jobs and growth. At the same time, the right balance should be struck between the development of the drone market and provision of the adequate protection of safety, security and privacy (91%).

The aim of this initiative, in accordance with the logic of the current safety regulatory framework as established in Regulation (EC) 216/2008, [81] is to adopt, in the first instance, the basic principles and essential requirements within the EU aviation safety framework [82] for the safe development of drones in the EU. The essential requirements provide the legal basis for more detailed rules to be adopted by the Commission, which will be adopted in due course, so that these more detailed rules can be introduced into the EU legislative framework by means of delegated acts and further lead to the development of industry standards. While this initiative would introduce the obligation for drone identification, the identification requirement needs to be detailed (which drone needs to be identifiable at which distance and what information exactly needs to be given) in the Commission acts adopted on the basis thereof. Then the industry standard can be developed to set the exact technological modalities

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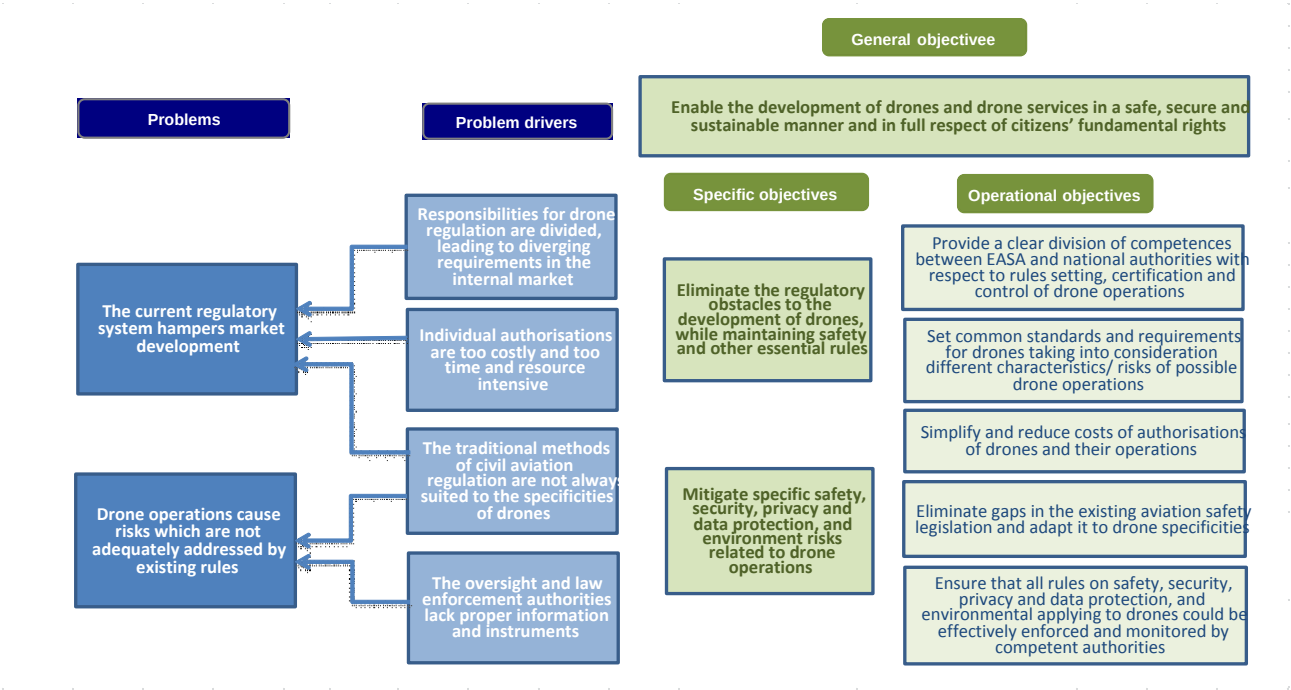
[81] Currently under review. The fundamental approach taken in this Regulation to work with Essential Requirement, Delegated Acts and Standards is not put into question.

[82] As explained in 1.1,

(e.g. electronic chip with specific technical characteristics, e.g. emission power and on interoperability).

The impacts of these specific measures will be assessed separately when necessary (e.g. through a Regulatory Impact Assessment by EASA). The concrete safety measures that could be taken, such as mandatory registry of operators, the identification of drones or the geofencing capacities then should not only help to maintain the current high levels of safety, but also to contribute to the correct application of existing rules in other areas like privacy. For instance, when a person finds a hovering drone above his or her private garden an intrusion on privacy, the identification of the drone (e.g. through an app available to the police or to the general public) imposed by safety rules, helps to enforce the right to privacy.

Graph 4:: Problem tree with corresponding objectives



4.3 CONSISTENCY WITH OTHER EU POLICIES

This initiative is an integral part of the Commission's "Aviation Package for improving the competitiveness of the EU aviation sector". It is also consistent with the strategic objectives of the European Commission. Drone manufacturing and operations will contribute to 'Jobs and Growth' and a 'Deeper and Fairer Internal Market with a Strengthened Industrial Base'. Leadership in developing the drone industry will also strengthen the EU as a "Global Actor", as a standard-setter and exporter of aviation products and services.

The initiative also intends to make the design and operations of drones more consistent with the wider aviation policy framework, which is to a very large extent harmonised at EU level. Drones will become another aerial vehicle to provide services in the European aviation market within the context of Regulation (EC) 1008/2008 on common rules for the operation of air

services in the Community.[83] As drones share the same airspace with other aircraft, the safety of drone operations must remain coherent with the overall aviation safety policy, based on Regulation (EC) 216/2008. Finally, drone operations must also be consistent with air traffic rules as laid down in the EU Rules of the Air. [84]

As this initiative would go beyond the formal aviation certification procedures and introduce flexible verification methods to check conformity especially for low risk drone operations, the consistency of the initiative with the product safety framework needs particular attention. [85]

SECTION 5: WHAT ARE THE VARIOUS OPTIONS TO ACHIEVE THE OBJECTIVES?

5.1 GENERAL CONSIDERATIONS

The starting point of the analysis was the Commission Communication on drones (COM(2014)207) that identified a number of areas as concerns, which might require regulatory action, including safety, security, privacy, liability and insurance, or environment. During the development of this impact assessment, it has emerged that a number of those issues identified in Section 2 will not require new action at EU level, or do not call for consideration of different options. The scope of the actions that are to be analysed in this impact assessment can therefore be narrowed, as described below.

Essential requirements on safety, security and environmental performance

All aircraft and aircraft operations in the EU are subject to "essential requirements" laid down in the European Parliament and Council Regulation No 216/2008. Most of these high-level requirements relate to safety (e.g. "the aircraft must be designed and built in such a way as to be able to fly safely in all the conditions for which it is intended"), but also other considerations are made e.g. in relation to environmental performance or security. The essential requirements for drones and drone operations will follow the same logic as those for other aircraft: they will include requirements relating to the capability and reliability of the drone (called "airworthiness" for conventional aircraft), to the conduct of the flights ("operational rules"), and to the skills of the pilot ("pilot licensing").

The essential requirements are a limited number of overall general principles that determine the safety of a flight, that do not change over time with evolving business models, types of operations, or evolution in technology. At the same time, the essential requirements determine the scope of the detailed rules to be adopted by the Commission, which give the detailed operational substance of the requirements. *That is why the essential requirement must cover all determinants of aviation safety and are not different under the three policy options, as shown below in* ***Table 4****.*

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83 This regulation focuses on "air services" (a flight or a series of flights carrying passengers, cargo and/or mail for remuneration and/or hire) and does not make a distinction between manned or unmanned aircraft.

84 Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation.

85 The current product safety rules were described in section 2.4. Section 5.3 on the description of the policy options describes the interaction between this initiative and the current product safety rules.

For instance **for safety**, on airworthiness, the essential requirements will state that the unmanned aircraft must be designed in such a way that experience has shown it is safe; and that these aircraft must be safely controllable and manoeuvrable; for operations, the essential requirements will state that the operations must be conducted as to minimize the risk for people on the ground and in the air; and that the operator is responsible for all commands.

For environment and security the essential requirements will determine the necessary "embedded" security and environment features of drones. For security, the requirements would relate to data-link that should be made robust against cyber-attacks. For environment the essential requirements should ensure the environmental sustainability of the aircraft in the same way as other aircraft are already required today. The enforcement of security or environment objectives can be facilitated through measures that will be developed on the basis of the safety essential requirements, like the mandatory identification or geofencing capabilities. *The essential requirements for security and environment will not differ under the three policy options.*

Privacy and data protection

Firstly, the policy options presented below do not detail different ways of addressing the problems related to the area of privacy and data protection. The public consultation, the formal opinions of the data protection authorities, the Ministers of the Transport Council and an external study have during the course of the impact assessment process delivered a broadly shared view[86] that there is no need for new EU legislation in this area, as the existing EU rules are technology neutral and adequate to address the issues identified. The on-going revision of the EU data protection legal framework, will, if and when this leads to a new Regulation as proposed by the Commission, help to further improve the means available to protect personal data and privacy.

The focus will need to be on facilitating the *enforcement* of the existing framework. The relevant authorities are aware of this need and have the necessary legal instruments to do so. They need to develop practical *guidelines on how the existing rules shall apply to drones and to their operators*.

In addition, the product (safety) rules which will be adopted on the basis of the current initiative will include measures to aid their enforcement, such as the introduction of electronic or physical means to identify the operator/owner of a drone. Those measures will also benefit the enforcement of other, existing, rules in the field of data protection, privacy, security and liability. The need to support all these different objectives will be reflected in the "essential requirements" to be adopted under this initiative (see Table 4). The detailed rules will contain practical requirements, e.g. on how a register of drone operators/owners will be managed. The stakeholders, including authorities, responsible for privacy, security, etc. will be consulted on those detailed rules as part of EASA's process related to the preparation of the Commission acts in question.

Insurance and liability

Similarly, the questions of insurance and liability will not be examined, taking into account the specific study[87] that concluded that the current insurance framework under

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86 The public consultation revealed a limited number of stakeholders are in favour of specific drone rules in this area, especially aviation regulators and air navigation service providers.

87 See under 2.2 Consultation; under 3.2.3.3 the description of the rules in place; the Steer Davies Gleave (2014) study in Annex I; and the results of the online public consultation in Annex III.

Regulation EC/785/2004 on minimum insurance requirements for air carriers and aircraft operators provides sufficient cover and protection also for drone operations; and taking into account the results of the public consultation. The study concludes that the problem lies in the *absence of drone safety rules*, which triggers illegal (and hence un-insured flying) and the *application of the rules*, where reliable information on drone operations and drone incidents collected under future safety rules will help to provide the evidence base to set the appropriate insurance fee levels. Also the question of identifying the owner/operator of a drone will need to be addressed, but this is also needed for safety and other reasons.

Rules on air navigation

Furthermore, the *rules of the air for low level operations* will have to be developed in any policy scenario aiming at opening the airspace to drones. These are implementing rules developed on the basis of ICAO work, and which are under discussion in the framework of Single European Sky. They apply to all air traffic regardless of whether a particular aircraft is regulated under national or EU law (see annex IV). Such adapted rules of the air would provide "traffic rules" that local authorities could use to regulate drone traffic over particular zones or cities, just as cities are now able to define pedestrian areas or one way streets. The detailed impacts of the changes in these rules are not in the scope of this impact assessment and will be analysed once a new implementing regulation is prepared by EASA.

Accident investigation

With regard to accident investigation and occurrence reporting, it is also clear that these rules will have to be amended to reflect the investigation and reporting of relevant incidents involving drones, i.e. where such incidents can yield information that will help to improve safety in the future. Thus, again all policy options above baseline envisage the *amendment of the rules to extend the scope to drone-relevant accidents and occurrences*.

Implementation responsibility

This report does not examine in detail the division of *implementation responsibility* (i.e. who is in charge of certification, oversight of operations or licences). Today, implementation responsibility in aviation is shared between the Member States and the EU, including the EASA Agency. A radical reassignment of responsibilities related only to drone certification and oversight either to the Member States or to EASA would run counter to the cooperative system functioning today in civil aviation oversight. Besides, the future modalities of this system are the subject of a parallel impact assessment on the revision of Regulation (EC) 216/2008 governing EU aviation safety policy. This report concluded that the cooperative system should be maintained and reinforced. Therefore, this impact assessment solely focuses the analysis on the *regulatory responsibility* of the national versus EU level and the nature of the regulatory techniques and instruments to be used.

In conclusion, the options presented below are limited to examining which instruments should be used to set the product (safety) and operational (safety) requirements for drone operations, and more specifically on how compliance with those requirements will be controlled. For the other areas for which concerns were identified the rules would be aimed at facilitating the enforcement of existing rules, for instance on privacy, data protection or liability. The present initiative does not relate to the adoption of new substantive rules concerning these latter areas.

5.2 DISCARDED POLICY OPTIONS

- Voluntary initiatives/ soft law

As drone operations are aviation safety critical, any approach based purely on voluntary action has been discarded as not realistic in terms of delivering high safety performance in a way that is coordinated with other air traffic. However, this does not mean that every drone operation must be regulated top-down; the regulatory framework can rely on industry self-assessment or self-declaration of conformity (from operators) and industry standards for drone design (from manufacturers).

- Maintaining the current division of tasks between EU/EASA and MS

Also a minimalistic approach is discarded, whereby the aviation safety Regulation (216/2008) is slightly amended to include basic drone concepts, such as definitions of "remote pilot in command", "ground station", and "drone system". These changes would facilitate the proper regulation of drones above 150kg, which is already within the scope of that Regulation, but they would not address the problems identified for lighter drones, which are likely to dominate the market for the foreseeable future. The impact of such policy option would be very similar to the baseline scenario as described in section 3.4.

- New division of regulatory tasks on the basis of weight categories

A policy option with a different weight criterion for allocating responsibilities between the EU and national level on the basis of mass is not considered.[88] The 150kg limit was introduced in the EU aviation safety Regulation at a time when the technology was such that only large, mainly military, drones were flying. Today, the situation is very different: most drones appearing on the market are well under 150 kg. There is broad consensus between stakeholders that the existing division of tasks between EU and national authorities does not correspond to a regulatory logic. Introducing another weight criterion, e.g. 5 or 25 kg, would be equally arbitrary. It is widely considered that weight is not the only, or most appropriate, criterion to properly indicate the risk of drone operations. For instance apart from mass the speed of a drone also determines the force of an impact and subsequently the safety risk it creates, and the most important risk factor is in fact the nature and environment of any given drone operation (e.g. hovering over crowds). Besides, some risks could be mitigated by the installation of safety systems on board (e.g. a parachute) and thus make a heavier drone safer than a lighter one.

Besides, excluding even the lightest or the least risky category of drones from the scope of the European legislation would harm the wider, existing EU aviation safety policy. Even the smallest drones can pose a risk to regular aviation and hence it is important that the basic rules are harmonised at the EU level, even if they are limited (e.g. a simple requirement not to fly above a certain level), while Member States are given the opportunity to properly assess the local risks and apply the rules accordingly.

- A stand-alone legal regime for drones outside the civil aviation safety Regulation (EC) No 216/2008

Initially, it was envisaged to consider a stand-alone Regulation governing all aspects of drone operations. This Regulation would address all the issues identified in the 2014 Commission Communication through drone-specific rules on safety, air navigation, security, privacy and data protection, environmental protection, liability. Progressively, it became clear that in most of those areas no new EU rules were needed, as the existing EU legal instruments would also

[88] The participants of the public consultation agreed that the current weight criterion is obsolete and the rules must focus on additional risk factors such as the speed of the drone (89%); the reliability of the system (96%); the place where the operation is carried out (96%); and the type of the operation (92%).

cover drone operations. The areas where new EU rules are needed are safety (and security), air navigation, and environmental protection. These areas are already covered by Regulation (EC) No 216/2008 for conventional aircraft. Therefore, although drones present their own specificities and are quite different from conventional aircraft in a number of ways, it would still be preferable to embed the special drone rules within the wider civil aviation framework. This will favour mutual consistency between the different segments of aviation, which is important in particular as all aircraft must safely interact within the same airspace. Moreover, it may be expected that drone technologies migrate to conventional aviation in the future, e.g. where remote piloting would become a support function even for manned flights in the interests of safety and/or operational efficiency, thus blurring the distinction between manned and remotely piloted aircraft.

5.3 DESCRIPTION OF THE POLICY OPTIONS

- **PO0 – baseline scenario**

PO0 is the baseline scenario as described in paragraph 2.4. Drone safety rules would be developed on the basis of the existing division of tasks between the EU and national authorities. The EU is competent for drones with an operating mass of more than 150kg. EASA is competent to prepare detailed rules for that category, to be adopted by the Commission, and for the type certification of large drones. Member States are responsible for rulemaking for and certification of drones below the 150kg threshold. The baseline scenario also assumes the continuation of voluntary coordination of national rules based on the ongoing work in JARUS. Existing EU internal market product rules apply.

- **PO1 – extension of the conventional EU aviation regulation to all drones**

PO1 would integrate drones in the EU legislative framework using the conventional civil aviation approach with the existing certification and licensing procedures, as some Member States do when adopting national rules. [89] This would mean integrating all drones into the existing EU aviation safety policy framework, in particular Regulation (EC) 216/2008 and other relevant legal instruments. It would involve legislative amendments to expand the current scope of that Regulation from heavy drones (above 150kg) to all drones. The "essential requirements" developed for manned aviation would be adapted to drone operations (to cover specificities such as remote piloting) and included in the amended Regulation, including rules and procedures regarding the certification of the aircraft, certification of the operator and licensing of the pilot. It would thus affect all companies involved in the "airworthiness" of drones, including software developers or maintenance companies, and all personnel dealing with drone operations, including training providers or inspectors.

Under this option EASA would prepare specific opinions covering all aspects of drone operations, on the basis of which the Commission could adopt these as detailed rules that could be amended in a flexible way to reflect the evolution in technology. Among these, EASA would develop the so-called "certification basis", i.e. the design standards to be met by drones in order to obtain a type certificate. Every manufacturer would need to apply for a certificate before placing a drone on the market. National aviation authorities would ensure

[89] See higher under 2.1.1. For instance, some Member States introduce a drone pilot licence with reference to either ultra light aircraft requirements (as in FR) or to the private pilot licence (like in BE).

appropriate oversight by checking the certificates and operating licences, issued on the basis of common rules.

In line with the existing approach for 'manned' aviation, such opinions and rules could include security or environmental certification matters as well, as e.g. security and safety certification are very close for the "command and control" function. All manufacturers and operators would be known to the authorities and relevant safety information such as databases on drone operators or on drone operations could be made available to privacy authorities and security and law enforcement agencies. Drones and drone services would benefit from mutual recognition throughout the EU.

Relation of PO1 to the planned review of Regulation (EC) 216/2008

If a new basic aviation safety Regulation is adopted based on the Commission proposal envisaged for later in 2015, without that new Regulation containing any specific rules on drones, more options for operation centric and proportionate regulation will become available to supplement the conventional approach for "manned aviation". [90] Option PO1 would correspond to the "conventional approach" to aviation safety which will still be part of that Regulation and would co-exist alongside the new risk-based and flexible approaches. It is important to evaluate this option as it has been the default approach in aviation for many decades and, for example, has up to now still inspired the work of ICAO or the U.S. FAA on drone regulation.

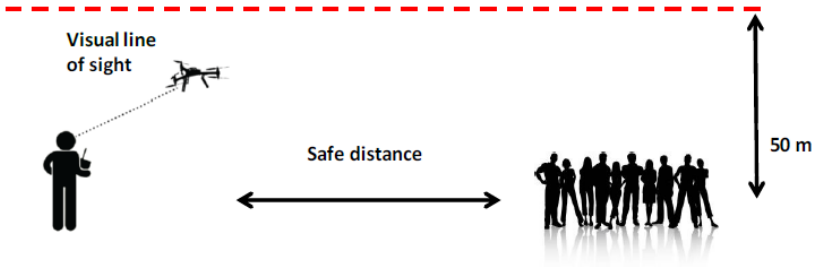
For example, certain more detailed rules to be adopted on the basis of that new Regulation could allow the replacement of the EASA type certificate with a manufacturer declaration, or the EASA certification basis could be wholly replaced with an industry standard. Under this new Regulation, if and when it is adopted, the Commission, supported by EASA, would choose the most appropriate approach for those rules to be developed on a case-by-case basis. Whereas the detailed rules are to be adopted in the form of delegated acts or implementing acts, as appropriate, the main substantive rules and essential requirements to be included in the framework aviation safety Regulation must lay down the main product and operational requirements, e.g. to lay down whether product conformity may be established by means of a manufacturer declaration or only by means of a (EASA) certificate, or whether pilots must obtain a licence in all cases or not. The choice of option will thus affect the drafting of the new basic aviation safety Regulation.

- **PO2 – "Operation centric" EU legislation on drones**

Under PO2 the Commission, with the help of EASA, would develop a departure from the conventional approach to aviation safety regulation and develop an operation centric approach to integrate drones in the EU aviation system. Similarly as in PO1, the scope of Regulation (EC) 216/2008 would be amended to include all drones and a set of essential requirements would be included in the amended Regulation. The starting point of this approach would be the risk of a particular (type of) operation. It would allow for regulatory differentiation from low risk operations to risks of operations equivalent to 'manned' aviation, and thus for "proportionate" rules and "scalable" methods to demonstrate that the rules are complied with. This approach is developed by JARUS and introduced in some Member States like AT, FL and CH. Other Member States are following these principles too, like the UK and FR.

PO2 builds on PO1; it does not involve a replacement of the conventional approach described in PO1, since for the highest risk operations, such as drones operating from airports and in the same airspace as manned passenger transport aircraft, the rules and procedures would be equivalent to the conventional aviation approach, entailing formal certification and licensing by aviation authorities. In addition to certification of the aircraft, certification of the operator and licensing of the pilot as foreseen under PO1, PO2 would include scalable rules reflecting the range of risk profiles in different operations and would enlarge the range of compliance demonstration procedures with more flexible instruments that are suited to apply to low risk operations, such as operator declarations instead of certificates, or, for very low risk operations, no demonstration of compliance of the operator at all. Although the precise detailed rules to be developed by EASA and adopted by the Commission would be subject to appropriate separate impact assessment at a later stage, the following could be anticipated by way of illustration of a scalable, operation centric approach. For example, for the operation shown in the graph below, no specific prior authorisation might be required from the authorities for the drone, the operator or the pilot.

Graph 5: Description of a low risk operation within established safety parameters



This, however, would not mean that these drones are not regulated, but that rules could be limited largely to aircraft embedded requirements (e.g. for identification or geofencing purposes, or maximum performance such as a speed or distance limit). Detailed rules would set the precise operational limitations, and essential requirements would be translated into standards that could be developed by industry and could be recognised by EASA and national aviation authorities. Manufacturers or importers could self-declare the conformity of their products. Enforcement would be left to police and other authorities, like data protection authorities or security forces, but in principle not to the aviation authorities.

For operations involving higher risks, the rules and procedures would be scaled up gradually depending on the risk assessment of the operation. The conventional approach would apply to drones and drone operations at the higher end of the risk scale, and enforcement in that category would be for aviation authorities.

As is the case today for implementing rules adopted under Regulation (EC) 216/2008, EASA would prepare specific opinions following public consultation and regulatory impact assessment, covering all aspects of drone operations. They would then be adopted by the Commission as delegated acts, supported by guidance material issued under EASA's authority. As in PO1, national aviation authorities would ensure appropriate oversight.

Drones and drone services would benefit from mutual recognition throughout the EU, as all drones and drone operations which meet the common rules would be able to cross border with one certificate or declaration, without further national rules or procedures. The uniform application of the rules is overseen by EASA.

When required and similarly to PO1, the rules and industry standards could include security ("security by design") and environmental (in line with the "outdoor noise" rules) issues – again on the basis of the type of operation that the drone is expected to perform. Also information on drone operators and operations could be made available to enforcement agencies and data protection authorities.

The "essential requirements" reflecting this approach would be consistent also with the general objectives and methods of planned revision of Regulation (EC) 216/2008, which aims for a more risk-based and proportional approach by expanding the regulatory options available to EASA and the Commission.

Relation of PO2 to the planned review of Regulation (EC) 216/2008

If a new basic aviation safety Regulation is adopted based on the Commission proposal (without specific drone rules), the rules would fit the approach under PO2, giving more scalability in the means to demonstrate compliance with the basic safety rules. For example, certain more detailed rules could allow the replacement of the EASA type certificate with a manufacturer declaration, or the EASA certification basis could be wholly replaced with an industry standard. Under this new Regulation, if and when it is adopted, The Commission supported by EASA would choose the most appropriate approach in the detailed rules to be developed on a case-by-case basis. Whereas the detailed rules are adopted in the form of Commission acts, the substantive rules and essential requirements to be included in the "revised" Regulation (EC) 216/2008 must lay down the main product and operational requirements, e.g. to lay down whether product conformity may be established by means of a manufacturer declaration or only by means of a (EASA) certificate, or whether pilots must obtain a licence in all cases or not. The choice of options will thus affect the drafting of the "revised" Regulation (EC) 216/2008.

- **PO2.1 – sub-option applying EU product legislation to low-risk drone operations**

PO2.1 is defined as a sub-option of PO2. It builds on PO2 and would add product safety mechanisms used in other sectors in the internal market (including market surveillance mechanisms) for drones used in operations involving the lowest level of risk. It is expected that most drone operations will take place in the lower risk category. These mechanisms could therefore cover the large number of mass produced drones which are offered for sale in retail shops and on the internet, to hobbyists and certain professionals (e.g. photographers).

Concretely, PO2.1 proposes for the lowest risk operations, to complete the *operational* aviation rules and restrictions introduced in PO2 (e.g. defining the perimeters to which low risks operations are confined) with a *product legislation* mechanism which is based on the "New Legislative Framework"[91] covering the essential requirements for placing a product on the EU market. PO2.1 would hence introduce the possibility to rely on market surveillance mechanisms to ensure the compliance of these types of products before being placed on the market (manufactured or imported in the EU).

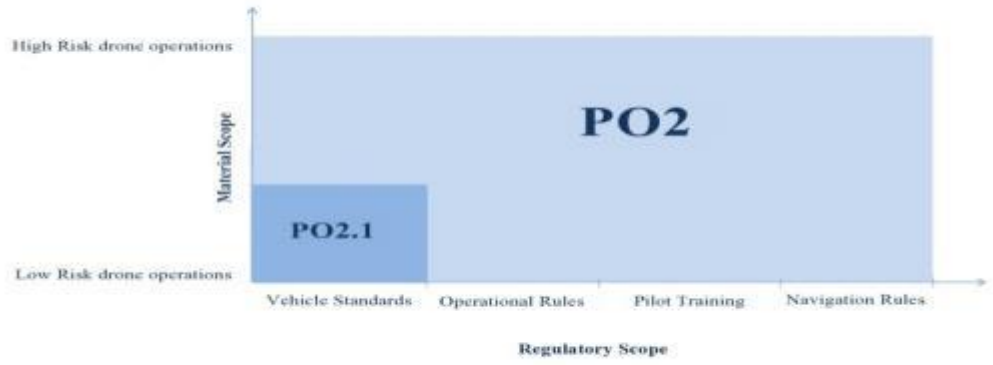
[91] Under the so-called "New Legislative Framework" Regulation (EC) No 765/2008 and Decision No 768/2008/EC bring together all the elements required for a comprehensive regulatory framework to operate effectively for the safety and compliance of products with the essential requirements for protecting the various public interests and for the proper functioning of the Single Market.

CE marking could indicate conformity of the non-mandatory harmonised standards developed by industry as acceptable means of compliance with the requirements. Similarly as in PO2, these harmonised standards could cover not only safety, but also other areas of public interest such as environment and security. The CE marking could also provide essential information to Member States' authorities as well as other relevant parties such as distributors. PO2.1 could also include a requirement for the publication of a user manual explaining the technical use of the drone (including the operational restrictions), the associated risks (safety, security, privacy, etc.) and the related obligations (insurance, registration).

The conformity assessment is under the responsibility of the manufacturer, with the possibility of the involvement of a third party (notified or in-house accredited conformity assessment body). Depending on the risk covered, different conformity assessment modules would be provided.

The graph below shows how sub-option PO2.1 fits into PO2:

Graph 6: How PO2.1 relates to PO2



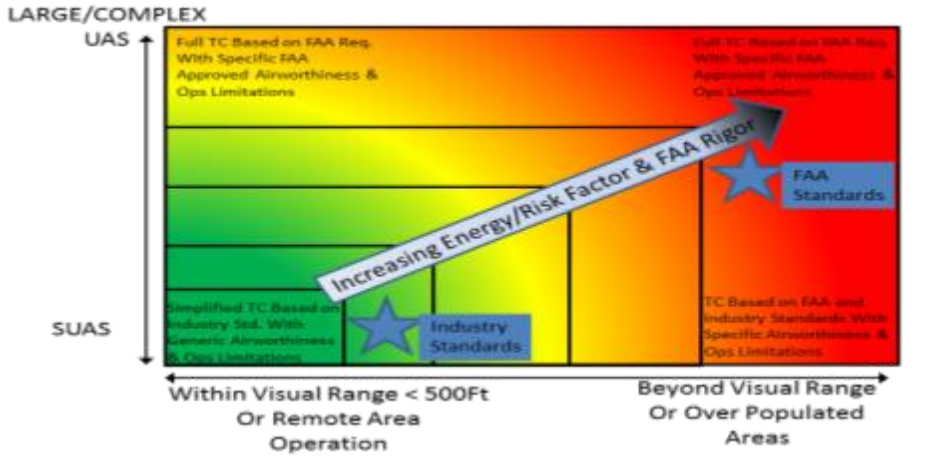
PO2.1 differs from PO2 only in relation to the (mass market of) drones performing low risk operations. All other drones would follow the approach described under PO2. This dimension is represented on the Y-axis in the graph above. Moreover, PO2.1 only deals with product standards (e.g. embedded altitude limitation; how to avoid that the blades are dangerous for the user; how to avoid harmful radio interference, etc.). The operational, pilot and navigation rules would follow the approach defined in PO2, even for the lower risk operations. For example, the operational rules could limit flight altitude to 50m to avoid that the drone becomes a danger for the other air traffic e.g. a low flying police helicopter. The product standard may specify which methods can be used to limit the flying capabilities of the drone effectively to 50m altitude.

Then it is up to the drone manufacturer to decide for which market to produce. The process is illustrated in **Graph 7** below. [92] If the manufacturer wants to go for the mass production of low risk drones (pictured in the bottom left corner of **Graph 7**), he must meet the standard laid down for this category and may then place his product on the market without the involvement

[92] This graph is taken from an FAA presentation in 2014.

of the civil aviation authorities. The operator of this drone will, however, be subject to the operational, pilot training and navigation rules laid down under civil aviation law. Ideally, the drone standard reflects the operational restrictions imposed by civil aviation authorities on low risk operations ("safety by design"). However, embedded safety may not prevent all risks, e.g. geofencing technology may not be able to prevent flying over crowds even if such operations are prohibited for untrained pilots. The operator thus remains liable for exceeding the operational limitations. The manual provided with the drone should provide information on the operational limitations linked to the operation of that type of (uncertified) drone. If the manufacturer deems his drone capable of performing a wider span of operations with higher risks or if he cannot meet the low risk product requirements, he cannot offer the drone under the product safety standards of the low risk category. The manufacturer will fall under the rules described in PO2 (the top right corner in **Graph 7**).

Graph 7: How PO2.1 is triggered [93]



Acronyms:
TC – type certificate – certificate issued for a specific type of aircraft;
UAS: Unmanned Aerial Systems;
SUAS: Small Unmanned Aerial Systems.

PO2.1 could be implemented in either of two ways: in the form of detailed rules adopted in the framework of the aviation Regulation (EC) 216/2008, or in the form of a new product safety Directive. Under aviation rules there would be three levels of rules. Firstly, Regulation (EC) 216/2008 would contain the basic principles and essential requirements, which EASA and the Commission would develop further in detailed rules, adopted as Commission acts. They would in turn be supported by industry standards, giving specific methods on how to comply with the requirements. A new product safety Directive would combine the first and second levels in the 'aviation approach' into a single legislative text; the standards would be identical to the aviation approach.

This legislation, whether developed under Regulation (EC) 216/2008 or as a separate product safety Directive, would in any case also need to ensure consistency with horizontal EU product legislation (e.g. Radio Equipment Directive or the General Product Safety Directive).

93 The graph exactly demonstrates the choice that the manufacturer must make; and its shows that the approach of regulatory intensity in accordance with risk is well shared at the global level.

PO2.1 would in principle replace those horizontal product safety rules (e.g. the EMC Directive) in respect of drones, as has been the case for other product-specific legislation. [94]

With regard to enforcement under PO2.1, Member States would ensure the effective surveillance of their market and take appropriate measures to withdraw non-compliant products, while the Commission would facilitate the exchange of information between market surveillance authorities (e.g. by listing non-complaint drones under the RAPEX information system – this is the system under the market surveillance legislation by which information on non-conform products is notified EU wide). While under this sub-option there is no formal intervention of the civil aviation authorities (EASA or national authorities) on the conformity of drones with product specifications. The *operational* rules and oversight would remain within the purview of the civil aviation Regulations and oversight authorities, as envisaged in PO2, the aviation authorities remain the source of the operational limitations that need to be embedded in the product safety standards.

During the advanced public consultation of EASA, the overwhelming majority of stakeholders agreed with the market monitoring approach for low risk operations. A limited number of stakeholders urged to apply this approach also beyond low risk operations; and a limited number of stakeholders, including air navigation service providers and the pilot association were critical to the idea of calling upon non-aviation authorities.

Relation of PO2.1 to the planned review of Regulation (EC) 216/2008

If a new basic aviation safety Regulation is adopted based on the Commission proposal (without specific drone rules), PO2.1 would add additional flexibility. Whereas PO2.0 already foresees industry declarations, PO2.1 makes a particular means of compliance possible ("CE marking") and establishes the link with the product safety surveillance mechanism that would alleviate the tasks of CAAs.

* * *

Table 4 below summarises how each option would work in practice, and how each option builds on the previous one (additional elements shown in bold).

Essential Requirements

The concrete proposal to be included in the basic aviation safety Regulation would take the form of a number of "Essential Requirements", similar to the existing ones for "manned aviation": aviation must remain safe, regardless of the technology used; and covering the three main domains "Airworthiness", "Operations" and "Air Crew". The cells regarding the Essential Requirements are filled with an example to show how these could look like for the three main domains "Airworthiness", "Operations" and "Air Crew". As explained in Section 5.1, the three policy options would not differ with regard to the Essential Requirements. The essential requirements would also concern (cyber) security (data link) and environment (noise and emissions).

[94] For example, Directive 2014/90/EC on Marine equipment, Directive 2012/27/EU on energy efficiency and Directive 2012/19/EU on waste electrical and electronic equipment are examples where the 'new approach' was applied in other areas and on other legal basis.

Methods to demonstrate compliance with the Essential Requirements

The difference between the conventional aviation approach under PO1 and the operation centric approach analysed under PO2 lies fundamentally in the "scalability" of the means of compliance in function of the risk of the particular operation or type of operations, and the ensuing delegated acts. The compliance with the essential requirements can be demonstrated with a range of methods or, in some cases, it may even not be necessary to demonstrate compliance at all. For simple operations under PO2, the methods of compliance will be easy to fulfil, or even non-existent, but under PO1 a pilot for example would always have to demonstrate his competence through a licence prior to flying even simple operations. In case of complex operations with a high risk for people on the ground or in the air, the demonstration requirements would however be the same under the two options (e.g. a pilot licence is a precondition for flying). Under PO2.1, CE Marking – focusing on features of the product – is added to the list of methods to demonstrate that the product complies with the airworthiness requirements. PO2.1 is similar to PO2 with regard to the other means of compliance.

Table 4: Practical implementation of the different policy options

	OPTION 1	**OPTION 2**	**OPTION 3**
Provisions included in the basic aviation safety Regulation (new proposal based on this impact assessment)			
Essential requirements for airworthiness	"Drones shall not have hazardous design features …."		
Essential requirements for on operations	"Drones shall be operated in a way that minimises the risk to people on the ground and in the air…."		
Essential requirements for air crew	"Pilots shall possess the required knowledge and skills …."		
Available methods to demonstrate compliance			
	Prior third party authorisation (Certificate or Licence)	**No prior autorisation required** **Self-declaration** Prior third party authorisation (Certificate or Licence)	No prior authorisation required Self-declaration **CE marking** Prior third party authorisation (Certificate or Licence)
Delegated Acts to be adopted on the basis of the new basic aviation safety Regulation			
	Details the essential requirements	Details the essential requirements, **including how to assess and mitigate different levels of operational risk**	Details the essential requirements, including how to assess and mitigate different levels of operational risk
	Details the modalities for demonstrating compliance through prior third party authorisation	**Details which means of compliance is required in which case (i.e. depending on the operational risk)**	Details which means of compliance is required in which case (i.e. depending on the operational risk)

		Details the modalities for demonstrating compliance, **including for self-declaration**	Details the modalities for demonstrating compliance, **including for CE marking**
Industry standards			
	Industry-wide agreed means to comply with certain essential or detailed requirements		
Enforcement			
	Aviation Authorities Data Protection Authorities	Aviation Authorities Data Protection Authorities **Police**	Aviation Authorities Data Protection Authorities Police **Market surveillance authorities**

Delegated Acts

The detailed rules to be adopted by the Commission (probably delegated acts, but that remains to be determined) give the detailed operational substance of the requirements and also indicate the method to demonstrate compliance. The options differ significantly at the level of these detailed rules. In particular, under PO2 and PO2.1 these rules will need to lay down the precise criteria to distinguish between "low-risk" and "high-risk" operations and on that basis clarify which method to demonstrate compliance operators will be required to conform with. These criteria should be developed in the Commission acts because they are likely to be highly dependent on technological development and market developments which cannot be easily foreseen. It will be necessary to have the ability to adjust those criteria in the light of developments and on the basis of experience, including feedback from accident and incident investigations. This would not be possible if those criteria are fixed in the basic aviation safety Regulation.

Industry Standards

Industry standards may be straight derived from essential requirements when these are sufficiently clear.. In such case, a detailed rule may simply refer to a standard. In most cases however, industry standards will be elaborated on the basis of the detailed rules, for example on highly technical aspects such as the precise features of a geofencing capability. Industry standards are already used to complement Commission acts for conventional aviation, but they could play a much bigger role in a new and as yet largely unregulated area such as drones, provided the industry is capable of developing them (in time). The intention is to prefer industry standards over detailed provisions in delegated acts where possible.

Enforcement authorities

For enforcement, the conventional approach of PO1 foresees enforcement by aviation authorities. Safety rules, like the identification requirement or geofencing, would allow other authorities to enforce existing rules under their jurisdiction. In this respect there is no difference between the analysed options. Under PO2, in addition to the aviation authorities, it is foreseen that general enforcement services (i.e. police forces, subject to subsidiarity) would become competent for the enforcement of rules related to simple drone operations, notably where no prior authorisation is required to operate and where private citizens would tend to call the police rather than contact the civil aviation authorities. Under PO2.1, the oversight

would be extended to the placing on the market of drones, market surveillance authorities controlling the compliance of the product with the related requirements. For the enforcement of the rules covering other areas, like privacy/data protection or security, there is no difference between options 1, 2 and 2.1.

Table 5 explains how the various policy options tackle the identified problem drivers.**Table 5: Overview of the policy options and linkage to the identified problem drivers**

POLICY MEASURES LINKED TO THE PROBLEM DRIVERS	*POLICY OPTION*			
	0	*1*	*2*	*2.1*
Driver 1: Responsibilities for drone regulation are divided, leading to diverging requirements in the internal market				
1. Baseline scenario	X			
2. Common EU regulatory framework for all drones and division of responsibilities under EASA system		X	X	X
Driver 2: Individual authorisations are too costly and too time and resource intensive				
3. Baseline scenario	X			
4. Introduction of common safety requirements for all for all drone operations		X	X	X
Driver 3: The existing methods of civil aviation regulation are not well suited to the specificities of drones				
5. Baseline scenario	X			
6. Developing implementing rules and standards specific to drones – as opposed to manned aviation		X	X	X
7. Adapting the rules on the basis of the risks of operations			X	X
Driver 4: The oversight and law enforcement authorities lack proper information and instruments				
8. Baseline scenario	X			
9. Enabling consideration of other aspects (security, privacy…) in the safety standards and requirements for drones		X	X	X
10. Applying market surveillance mechanisms for demonstration of compliance for low risk drones				X

The three considered policy options address the first two problem drivers. Common rules will establish a clear allocation of tasks and responsibilities (driver1). These rules will replace the unsustainable and costly system of individual exemptions (driver 2).

All policy options also will provide the legal basis to develop concrete detailed rules to cover the identified safety issues (driver 3), such as remote piloting or the use of drones by operators outside the aviation sector (who lack aviation training). Further on driver 3, the rules of PO1 will take the traditional 'aircraft' based approach, while PO2 (and subsequently the sub-option PO2.1) will focus on risk of a particular (category of) operation (s) as a starting basis with the view to keeping rules proportionate. This will lead to scalable rules and more adapted procedures to assess conformity.

The three considered POs may also offer possibilities, including a legal basis, to facilitate the enforcement of 'non-safety' legislation. For example, embedded technology allowing the identification of the drone could help in the application of privacy laws; embedded geofencing capabilities will avoid that drones fly over security/privacy sensitive areas (driver 4).

The add-on is PO2.1 that introduces a specific market instrument to facilitate the putting on the market of low risk drones (as to be defined within PO2), that would complete the rules on actually operating the drone (e.g. the standard that limits the drone of flying higher than a certain height , for instance 50m high).

In all, the three options are internally consistent as they tackle the identified problem drivers.

The policy options presented in the online-consultation did not go in such detail as do the policy options presented in this section. However, the underlying principles correspond. The stakeholders are not satisfied with the current situation. None of the regulators could agree with the baseline scenario. An overwhelming majority of consulted stakeholders agree (91%) that an EU initiative should lead to mutual recognition of licences and certificates, with 100% support of regulators and industry associations. All categories of stakeholders also agree to move away from the current weight focused approach (PO1) towards a more operation centric approach (PO2). There is also broad agreement among consulted stakeholders are nearly unanimous that other factors should be taken into account: speed (89%), reliability of the system (96%), place where the operation takes place (96%), the type of the operation (92%) and the quality of the drone operator (93%). These views are broadly shared between the different categories of respondents, where all regulators are 100% in agreement on these items. [95]

SECTION 6: WHAT ARE THE IMPACTS OF THE DIFFERENT POLICY OPTIONS AND WHO WILL BE AFFECTED?

Drones are a new phenomenon and evidence of their (economic or safety) impact is in many cases either unavailable or preliminary. Where available data are available, they have been provided, but given that the market is still in its infancy in many cases such data should be taken with a caution. In other cases the report completes general data with specific information or information from the public consultation. It may be some time before impacts of drone operations are reflected in official reports. For instance, while newspapers regularly report on drone safety incidents, there are hardly any official reports quantifying the impact.

Also, considering that the proposed policy options would only set the framework, the precise impact e.g. on reducing administrative costs or on market growth, cannot be quantified before the detailed rules are developed. Besides, putting adequate drone rules in place is only a precondition for market growth and not a guarantee of a certain growth rate, so this initiative is more an enabler for subsequent legislative and market changes. Furthermore, the authorisations of specific operations will to a large extent remain at a local level, so there will be a degree of variability in the extent to which safety, security, privacy and environmental concerns are addressed, which again makes it difficult to make even rough estimates on the level of resources needed.

Given the high degree of assumption when assessing the impacts, it is also difficult to be very precise in identification of differences in the impacts on different market players. It is clear that manufacturers would be more concerned with product rules while operators with rules on operations and pilots. At the level of the initiative, though, there will be no rules that would favour one group over the other (e.g. putting more responsibility on manufacturers and less on operators). Besides, as mentioned before the initiative will not touch upon the division of competences among different public bodies. Consequently, the impacts are described in a general manner and do not make distinctions among public authorities and business stakeholders.

[95] Only one regulator of the fourteen found that the place of the operation was not so crucial.

6.1 ECONOMIC IMPACTS

6.1.1 The internal market dimension

All policy options above baseline would better stimulate the development of the internal market compared to the baseline, where the fragmentation hinders the swift development of the drone market. The market for small (civil) drones is expected to evolve rapidly with robust figures in the coming years, estimated between a few hundreds of millions to billions per year.[96] Several of those studies also take the introduction of drone rules as a condition for the market to take off. Adoption of additional EU rules would thus be positive for drone market expansion. There is no study known which would estimate the productivity gains in user industries following the application of drone services, like the transition from fixed lines to mobile phones improved the productivity of so many workers in the overall economy.

In Europe, many operators complain that operating drones remains arduous and that obtaining authorizations a burdensome and slow process. [97]

The considered policy options would all set the frame for internal market for drone manufacturing and services and hence constitute a huge improvement as compared to the fragmented market that would result under the baseline. The difference lies in the efficiency and speed with which the objectives can be achieved.

PO1 would set a solid foundation for the internal market by creating harmonised rules for all drones and their operations. By incorporating drones under the manned aviation rules the legal certainty and coherent approach to aviation should be assured, eliminating the national differences and barriers for entering national markets. This would benefit in particular the segment of heavier drones (but below 150kg), as instead of a set of various rigorous requirements in Member States, common rules would be proposed.

However, even if applying some flexibility and proportionality under the current EASA system, the rigorous requirements for approval of new risk mitigation methods or burdensome validation of new technologies would not be advantageous for the low risk category of light drones that are mainly used by private persons or small companies. Experience gathered from the application of the large commercial aviation rules on the light aviation community (“general aviation") has taught that heavy-handed approach of commercial aviation may lead to overregulation and bad compliance, and eventually affects the smooth functioning of other segments of aviation market. Furthermore, companies involved in drone manufacturing and operations are often not familiar with the aerospace working environment. For them learning and adapting to the EASA system approach would be very burdensome both in time and cost and consequently would negatively impact the commercialisation of drones and expansion of services using small drones. Thus, despite the overall positive effect of harmonised rules on the functioning of the internal market, option PO1 could be less advantageous for the development of smaller drones market segment in cases where the rules in given Member State were less rigorous than those planned under PO1, like Finland or Austria.

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96 An overview of existing market studies is given in annex VI.5.

97 Le Monde, 8 September 2015. The tone in this article reflects the numerous other articles on this issue and the outcome of the public consultation. For instance, Redbird, a French drone company, wants to expand beyond the FR market, as expressed by its CEO: "Si nous voulons atteindre une taille critique qui fasse de nous un interlocuteur au niveau mondial, il n'est pas concevable de rester en France." (Le Monde, 8.09.2015 - http://drones.blog.lemonde.fr/2015/09/08/pluie-de-dollars-sur-les-drones/), even if FR was one of the first states to introduce drone legislation that promoted drone operations.

PO2 would be more advantageous for the market growth of drones with low risk operations and fast evolving technologies. It would allow for setting concrete performance objectives at implementing rule level (on the basis of general principles set by this initiative and then elaborated in industry standards) PO2 is the most promising way to keep the regulatory burden proportionate to risk. Harmonised legislation and European standards would allow for easier marketing of drone products across national markets. It would also allow operators and pilots, offering sometimes highly specialised niche services (e.g. inspection of offshore installations) to be recognised and offer their services abroad. By applying rules proportionally to the risks and the scalability of the evidence required to demonstrate the safety of the operation ("means of compliance"), the market segment of smaller drones should not be stifled by overregulation. That is especially important for SMEs active in the smaller drone market; and for payload developers, who need a seamless transition between classes of operations in terms of regulatory burden and risk mitigation, to avoid that a somewhat heavier payload would lead to a drastically heavier authorisation procedure.

The **sub-option PO2.1** would be even more appropriate for the manufacturers of mass produced types of drones falling under the low risk category.[98] Industry standards do already partly exist and most EU companies are familiar with conformity assessment procedures. It would apply the CE marking system to low-risk category of drones (to be defined in the detailed rules), which is a widely known and applied system in the EU, and consequently allow for easy compliance with respect to procedural requirements. This approach would also facilitate new market entries for companies which are not familiar with aviation safety regulations. However, while it can be reasonably assumed that the general framework on market surveillance provided by the EU harmonisation legislation is appropriate to ensure the conformity of the product "drone", it remains unlikely that the same mechanism can be used to monitor the safe operation of drones by private, and in particular by professional users. Operations are not monitored through the product market surveillance and the co-legislators might strictly limit the application of the EU product legislation to very simple operations by private persons only. Consequently, companies using CE marked drones for more risky operations would still be subject to verification and possibly authorisation by competent aviation authorities or qualified entities.

On the top of harmonisation of the rules, the benefits of the proposed policy options in terms of stimulating the growth of the internal market will stem mainly from the proportionality of requirements to the risks. However, the level of requirements will only be set via the following Commission acts setting out detailed rules, so it is impossible at this stage to estimate in a quantitative way what impacts the policy options considered here would have.

6.1.2 Impact on competitiveness

It is expected that the proposed POs would improve competitiveness of the EU drone industry as compared to the baseline situation and facilitate access to third country markets, not only because the products could be certified or validated (and then recognized in third countries on the basis of Bilateral Safety Agreements), but above all because EU companies would expand their operations, gain valuable operational expertise which would allow them to compete in the global market.

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[98] Depending on the module chose for demonstrating compliance, PO2.1 might not be appropriate for custom-made drone types which are produced uniquely or in small quantities.

It is clear that many companies await clarity as to the manner in which the drone market is regulated before making any investments. The rapid rise of (blanket) exemptions by the FAA, from six in the course of 2014 to 1,000 in August 2015 is raising the market expectations in the US that the FAA would soon open the market. [99] Investments have been pouring in the US recently and US drone companies have been able to attract some $100M investments, including from big Silicon Valley companies. The investments have been made not only in drone manufacturers but also in companies specializing in aggregation and analysis of big data, so that a shift can be observed from manufacturing and operation to provision of (high value) services. DJI, the Chinese manufacturer, that attracted $75M investments, would facilitate this evolution and would equip part of its drones with the capability to transmit all data in real time.

The conventional certification processes of **PO1** are considered a quality mark for EU products for a global market. The experience from the aeronautical manufacturing sector is that most third countries do not impose additional conditions beyond holding the EASA airworthiness certificate for placing products on the market. Generally speaking, the EASA certificate in PO1 is a powerful advantage for the products and operators when entering foreign market compared to the baseline, where individual certificates are issued by Member States.

However, in case of low-risk drones the process of a formal certification procedure might be too burdensome in terms of time and cost for EU manufacturers and consequently make them less attractive for investment and less competitive versus companies in other regions where it would be cheaper and easier to place on the market and operate low-risk drones. Due to the complex authorisation system it could also take too long to market new promising technologies, thus not enabling the EU companies to gain a competitive edge. This would affect directly the competitiveness of drone businesses, but also indirectly that of other industries which would like to integrate drone services in their value chains (see Box 3 below). In particular SMEs not familiar with the requirements of the civil aviation safety system would be deterred from incorporating drone operations into their business processes.

Box 3: Indirect competitiveness gains: example of cost reductions achieved by integrating drones in existing business processes

The US conducted a large scale law enforcement census of aviation use of the 900 aircraft operated in the enforcement agencies. [100] *The median cost per aviation unit for an average fly time 1,100 hours was $347,000 for operations; $167,200 for maintenance and $80,000 for fuel – or about $540 per operational hour. The operations concerned vehicle pursuits, counterterrorism, firefighting, search and rescue. The swift introduction of drones can reduce this cost to a fraction of 'manned' aviation. Only the cost of the purchase of the aircraft is a multiple of the cost of a drone (several hundred thousands or even millions for a helicopter compared to $13,700 for a drone unit with sufficient capabilities to execute similar missions).*

These costs for the US Department of Justice are indicative for all public authorities and private businesses which are shifting manned aviation operations towards drone operations. So intends the French railways company to deploy drones on a wide scale for infrastructure verifications instead of helicopter or ground inspections. The training for a large commercial helicopter to carry out aerial surveillance work amounts to about $150,000; training a drone operator could cost as little as $2,000. [101]

99 Le Monde, 8 September 2015, referring to a CB Insight report, due to be published later this year.

100 See Volpe (2013) p. 73.

101 Marsh (2015) p. 17.

The flexibility of **PO2** to deal in a proportional way with the wide range of operational risks and fast evolving technologies would allow for faster deployment of new technologies and consequently allow for building the competitive edge of EU companies. In addition, the rules and standards developed under PO2 would be more in line with the rules in third countries with regard to substance (following JARUS) and process (involvement of an aviation authority), while still being set via internationally recognised EU system, involving also EASA. The similarity between the EU rules/risk approach and third countries rules would facilitate the access to these third countries' markets.

Sub-option **PO2.1** seems to be more flexible for industry to make the low-risk drones available on the EU market. It is the market segment where costs will be an important factor requiring easy complying with and non-burdensome rules for companies to be price competitive. Under this option, conformity assessment procedures would be adapted to the risks involved and the public interest to be protected which would ensure an efficient and cost effective way forward.

However the drone market is a global market and trade negotiations over the last decades have shown that third countries, such as the US, often have a different approach and do not accept the EU validation process, especially if performed by non-aviation authorities. It can be assumed that these countries take a regulatory approach which is based on the "conventional approach" (PO1) i.e. which is quite prescriptive and requires an authorisation process involving the public authority, and hence are reluctant to recognize this validation process.[102] All in all, it is assumed that PO 2.1 would have similar benefits to PO2 due to uncertainties about the recognition abroad of CE marking as a proof of airworthiness.

As mentioned above drones would also have a positive impact on the competitiveness of companies in various sectors by enabling performing some activities more efficiently and effectively e.g. filming, surveillance, infrastructure or crop monitoring. The difference between the POs also depends on the speed at which the rules could be delivered, their adaptation to the market specificities and their recognition abroad. Once again it is extremely difficult to give any quantifications of the impacts of the proposed options, given the detailed rules will be adopted via delegated acts and the fact the international market regulation is not well established and difficult to predict.

6.1.3 Impact on innovation

All proposed POs would improve innovation compared to the baseline situation, where fragmentation hampers investment and the development of EU wide businesses. National markets, segregated by a patchwork of national rules, do not provide sufficient scale for developing standard-setting global technologies. The EU level can provide sufficient scale. Also, the lack of any drone rules in more than half of the EU Member States, and the lack of specific drone rules for a large section of (larger/higher-risk) drone operations in practically all Member States create uncertainty and forces companies to postpone important investment decisions, also in research. [103] Although the analysed POs will also take time to deliver fully-fledged drone rules, announcing a clear direction for future rules (e.g. by publishing a proposal for an EU Regulation, or through EASA consultations on proposed rulemaking) would help to shape expectations and give more market predictability necessary for long-term R&I decisions of companies.

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[102] So do the draft Belgian rules prescribe a real private pilot licence for all drone pilots, as soon operations have a professional character, even for operations with smaller drones.

[103] See higher in 6.1.2.

PO1 would have the merit of setting a clear and tested general framework over the baseline. The conventional certification method to be applied to drones under PO1 has over the past decades delivered robust progress on innovation in materials, designs and automation. Fly by wire is a good example. [104] However, large passenger aircraft are developed by a small number of companies and over a long time period (in the order of 10 years), allowing for on-going interaction between the company and the oversight authority and the ability to adapt the so-called "certification basis" (the product standard) to the new technologies. The same method is unlikely to be effective for quickly developing technologies where the focus is more on continuous update of software rather than testing fixed-type hardware. Smaller drones market is also likely to involve numerous dispersed companies, many of whom are SMEs or start-ups unfamiliar with aviation safety management processes, for which product development in cooperation with market oversight authorities (aviation authorities) would be an impediment. The certification methods and requirements under PO1 would not prevent innovation as such, but they would be perceived as a high barrier for many companies and would not be able to keep up with the speed of innovation, especially in the smaller and/or custom-made drone markets.

PO2 would address the shortcomings of PO1 by relying on conventional certification methods only for those drone projects which are similar in design and in development time as traditional aircraft. Other drones or drone components would benefit from reliance on industry standards and self-declaration or other forms of third-party conformity assessment which are sufficiently flexible to meet the industry's needs. It would have very positive impact on innovation, in particular in the lighter segment of drones and among SMEs, which would no longer be stifled by tight connections with the regulator. On the basis of the available evidence it is hard to assess the differences in impact between PO2 and PO2.1 on innovation.

6.1.4 Administrative burden for drone manufacturers and operators

The administrative burden on manufacturers and operators stems from the cost, in terms of price and duration, of obtaining conformity assessment (e.g. certification) and of operating authorisations (licences) and of maintaining these certificates or licences ("continuing oversight", as market surveillance is called in the aviation sector). [105]

Under the baseline, in the absence of effective mutual recognition, sales or operations throughout the EU require multiple (in principle 28) certification and licensing procedures to be conducted for drones below 150kg. Drones above 150kg benefit from the single EASA certification and mutual recognition, like other aircraft. Moreover, the EASA certificate is considered to be a reference approval globally, and in effect opens many third country markets without further time-consuming procedures. Common European rules under **PO1**, PO2 and PO2.1 would expand those benefits to all drones and hence already significantly reduce administrative costs for businesses.

PO2 would go beyond PO1 in keeping manufacturing and operating costs for businesses low. The cost of authority oversight is proportional to the level of involvement, i.e. certification work is invoiced at cost price (even if in practice flat fees are now used, they are calculated on the basis of average real cost). As the involvement of authorities would be low for the lower-risk end of the drone market, the initial cost would also be low. The costs of a certification are

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104 Fly by wire is the technology that replaces the "traditional" mechanic and manual flight control by an electronic interface, so that the pilot's commands are transmitted "by (electric) wire". In the time of its introduction, it was a technological revolution for the aviation community. Now it is a well-established practice.

105 See higher under 2.2.2 where more details on costs are given.

avoided for the manufacturer. In the case of self-declaration of conformity, the cost would be lowest. The operator, at least for the lowest risk operations, would in principle incur no cost at all - the requirements are embedded in the vehicle. When the operator falls outside the lowest risk, costs will be kept low by specifying requirements by type of operation. This would in particular reduce costs for SMEs which can very precisely choose the type of drone (and the required safety assurances) in function of their particular operational needs. The purpose of the operation centric approach is exactly to make operators aware of the risk and hence the associated costs of the product/service. Given the wide range of risks, the costs for operators will vary from nil to a couple of thousands euros, depending on the complexity of the operation.[106]

Where continuing oversight relies on existing market surveillance, as in **PO2.1**, there would be a limited recurring cost for the manufacturers (again depending on means for demonstration of compliance to be set in the necessary detailed rules). For this option, however, there may still be a small cost related to operational authorisations (e.g. the cost incurred by the authority to review a risk assessment submitted by an operator) or to continuing oversight (called "continuing airworthiness oversight" for traditional aircraft). Another advantage of PO2.1 over PO2 could stem from the fact that CE marking system is better known among non-aeronautical companies than aviation safety rules are and could be more easily followed. As PO2.1 addresses mass production, the resulting additional cost per product is insignificant. Thus, PO2.1 is considered as slightly less burdensome than PO2.

Of course, the impact of these costs on competitiveness and on the end user price will depend strongly on the scale of production, as it is typically a fixed cost. Whereas mass-produced drones could probably support even the cost of conventional aircraft certification, for custom-made smaller drones this cost would be prohibitive and it would effectively prevent such products from being developed. Again the real administrative burdens could only be estimated in light of the detailed rules set out in Commission acts.

As all drone activities are of safety concern (even operations of low risk can have disastrous consequences in terms of aviation safety), no blanket derogations or exemptions can be granted to SMEs and micro-enterprises. However, as explained in 6.1.1 the burden for the SMEs would be kept as light as possible at the lower risk end of drone operations, regardless the size of the company. Safety remains the overriding principle.

Finally, a one-off negative impact could arise with the introduction of new EU rules notably for those drones which have already been marketed under national laws. In future detailed rules, grandfathering provisions will need to be considered to address the costs of the introduction of new rules.

6.1.5 Impact on resources of national administrations, EASA and Commission

In general, as the proposed options would lead to drone market opening, there is a risk that the workload for oversight authorities would increase compared to the baseline. The increase of drone activities should be balanced against the greater efficiency of oversight and enforcement tools in the case of common rules as compared to their efficiency in case of national rules.

Most administrative costs are borne by industry, in accordance with the user pays principle, so the increased cost of resources should be covered by the increase in revenues from the fees.

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[106] See 2.2.2 on the costs of a regulatory handbook or a safety manual. If less safety aspects need to be considered, the safety manual will be simpler and less costly.

Besides, considering that most Member States would eventually allow for certain drone operations, a common oversight under EASA system should be more advantageous, especially following the planned revision of Regulation (EC) 216/2008, and less resource incentive for public administrations. In this context, it is very difficult to give any quantitative impacts on resources of the proposed options, before the responsibilities and division of tasks is specified in the follow-up detailed rules and only some general considerations of the impacts of the policy options are considered below in terms of optimal allocation of resources.

In addition to the traditional 'aviation' costs, data protection monitoring may lead to an additional burden for national administrations, where close monitoring or notification of drone operators and operators may need to be required to provide the evidence for data protection authorities or even for citizens who may want to know which operator has been flying close to his property.

For (police) enforcement cost (and need for additional personnel) is also hard to estimate, as it depends on the chain of parameters, such as the number of drones flying; the quality of the rules (with regard to their enforceability); the behaviour of the pilots (e.g. depending on the efficiency of awareness campaigns or on the quality of the training); and the technology (to which extent can tracking, monitoring and supervision be automated). [107]

It is estimated that no additional resources would be required for the European Commission and EASA to establish new rules stemming from any of the proposed policy options. [108] EASA deals with the regulatory drone activities within the current resources envelope; Member States would save a limited amount of resources insofar as the Commission and EASA would take over the rulemaking tasks from them. This is especially important for Member States which have not yet adopted specific drone rules. Additional certification activities by EASA would be financed through fees and charges paid by industry, which may require increased (industry-financed) staff levels. The division of tasks for oversight and authorisation of drone operations would be shared between EASA and Member States in line with the existing collaborative system.

Under the baseline, Member States would have to cope with the growth of the drone sector on the basis of national legislation and would not be in a position to rely on the mutual recognition of products and services. In that sense, all analysed POs are an improvement as compared to the baseline (for Member States in which drone operations are allowed).

PO1 would require a quite intense involvement of authorities in certification and validation tasks and in "continuing oversight". Notably the national aviation authorities would be challenged to deploy the appropriate resources to manage the licensing and oversight of the expected large numbers of drone businesses, using quite different modi operandi from traditional aviation (e.g. unlike drones, traditional aircraft can always be located at an aerodrome). This may exceed the workload of authorities required under the baseline as most of the Member States have less resource intensive rules applying to the lighter category of drones – but is compensated by the mutual recognition effect of the certificates and licences.

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107 Technologies exist that allow for simultaneous tracking of hundreds of thousands of drones at a global scale. These tracking platforms can develop into a world-wide fully automated tracking system. The chip (of a particular provider) connecting to the tracking infrastructure weighs (currently) 31g and be installed in the overwhelming majority of drones.

108 Currently three EASA officials are working on developing drone rules – coming from other departments and combining these tasks with other responsibilities.

PO2 would offer a substantial improvement in terms of optimal use of resources as compared to the baseline, as easier and more flexible procedures would be introduced. However, the main task of national authorities, i.e. the operating authorisations and the continuing oversight will still be necessary at every location. This burden can be partially reduced by relying as much as possible on risk-based oversight techniques and by subcontracting or delegating the activity to "qualified entities", which is the equivalent of "notified bodies" under Regulation (EC) No 216/2008 [109] These costs are passed on to the industry. [110]

However, this possible burden reduction depends on actual uptake of this possibility, including the question of financing. The growth of the drone sector will increase workload for other authorities such as the national data protection authorities or police (to deal with accidents or security incidents), but this is also expected for the baseline. Their task, however, will be facilitated to some extent by embedding certain features such an identification capacity into drones on the basis of agreed product standards. The effective additional burden for e.g. police will depend on a range of factors, such as the number of drones flying around, the effectiveness of awareness campaigns, the behaviour of drone operators, or the degree of annoyance of the general public, that triggers the concrete call to the police.

PO2.1 would create least costs for national aviation authorities. PO2.1 puts the oversight burden for the lowest risk but with the highest number of drones on the existing market surveillance mechanisms.[111] This of course would require some additional work for market surveillance bodies, as it is the case whenever a new product appears on the market. It is a separate issue going beyond this impact assessment to assess if these bodies have adequate resources to cope with new technologies of drones, but already under the baseline they are responsible for the surveillance of light drones placed on the market. Option 2.1 would provide more clear rules in this respect and facilitate this work. Overall, the reliance on already existing mechanisms and infrastructure, covering also other product markets to achieve larger economies of scale, would be less costly than the alternative whereby aviation authorities need to expand and maintain a dedicated aviation mechanism covering drone activity outside traditional aviation channels (e.g. on-line sales). However, this advantage would only apply to the (limited) segment of drones (with large numbers however) covered by an internal market Directive, and the aviation authorities would still need to ensure oversight of operations.

6.2 SOCIAL IMPACTS

6.2.1 Impact on aviation safety

All POs, including the baseline, aim to guarantee primarily air safety. The difference lies in the efficiency and effectiveness of the safety strategies. The selected POs are superior to the baseline also from a pure safety perspective, as safety evidence could be used to improve the

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109 Qualified entities or notified bodies are organisations that perform aviation safety duties, like audits or certification tasks, either on behalf of the Civil Aviation Authorities or on its own behalf.

110 See 6.1.4.

111 See EP Report A7-0033/2011 on the Revision of the General Product Safety Directive and market surveillance and in particular par. 35 recognizing the flow of products bought online that do not comply; and par. 36 calling on COM and Member States to ensure proper training of officers and to improve communications between customs and market surveillance authorities.

system at the EU level; and authorities can focus on better implementation instead of rulemaking.[112]

Including all aspects of drone regulation under the EU framework would ensure a comprehensive approach to aviation safety and offer the best assurance to avoid safety hazards arising from gaps, inconsistencies or overlaps among the different segments of the aviation sector. **PO1** would use the robust conventional aviation certification and licensing processes to mitigate safety hazards and keep the aviation system safe. The EASA safety system is one of the safest in Europe so applying it to drones would also assure a high level of safety provided it can be properly enforced. However, experience in light or leisure aviation has taught us that overburdening low risk operations could lead to a climate of indifference to rules or to illegal operations. Stringent enforcement measures would be required to maintain PO1 effective in delivering the highest level of safety.

PO2 should be more suited than PO1 to assure compliance as the rules would be more adapted to the type and level of risk of drone operations. The risk based safety framework would allow for setting appropriate safety performance targets for which industry would come up with the appropriate standards. Both the rules and the procedures would offer flexibility necessary to cater for the divergence in risks that drone operations entail. In doing so, manufacturers, operators and authorities can focus efforts and resources where the risk is greatest, leading to better implementation and enforcement in practice. It is hard to clearly foresee if PO1 would provide safer framework than PO2, as the safety gains of the former would come from restrictions of certain operations while the gains of the latter would stem from better covering all drone related risks, while at the same time allowing for more operations increasing the overall risks. This is the reason why some Member States prefer PO1, even if in the long run this solution might not be sustainable from the perspective of market and technology development.

The sub-option **PO2.1** would address safety features of some category light drones [113] with product safety and general market surveillance mechanisms. Some safety benefits could be delivered here by alleviating the tasks of the aviation authorities. However, the challenge would be to make sure that the product safety standards are well coherent with the overall aviation safety chain and fully reflect the high safety culture of traditional aviation. Another challenge would be to connect product market surveillance well with the aviation sector oversight, which is still responsible for all drones operations, causing potential coordination problems. Consequently, there are concerns that this dual safety oversight could increase the safety risks compared to PO2, even if it would be still better than the current baseline.

6.2.2 Impact on employment, working conditions and qualifications

There are no known studies on the concrete impact on employment – the available ballpark figures given in the market studies [114] refer to the potential of the drone sector, but do not help us to assess the different POs. In general, the impact on employment will greatly depend on

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112 Safety evidence is given under section 2.

113 All drones will be covered by safety requirements. The exact scope of those covered by product safety requirements will have to be determined by more detailed rules. In any case, it would be mass produced drones for recreational purposes or simple professional operations.

114 The mostly cited studies were produced by TEAL Group or Frost&Sullivan. AUVSI has produced estimates on employment. This study is however quite focused on the US situation. See Annex I for full references and Annex VI for details on available market studies.

the extent and speed to which the drone sector can expand (see sections 6.1.1 and 6.1.2), and more particularly how SMEs, active in the drone sector, get opportunities to develop.

PO1 will sustain employment in the traditional aeronautical industry. SMEs that are able to cope with the required certification processes will be able to develop their activities; however, the heavy procedures may become a hurdle for many other SMEs to enter the drone market. This could have stifling effects on employment growth in drone companies, with consequences for employment and working conditions in the wider economy. The more strict requirements under PO1 (most national authorities are likely to put in place a lighter regulatory framework) is expected, nonetheless, to be offset by the opening and growth of the European market. However, it is extremely difficult to give more precise estimations what would be the overall impact on employment, especially considering that there is no reliable baseline to refer to.

PO2 offers the most promising ways to kick-start the drone market and hence create employment. As rules are kept proportionate to risk, the threshold to start using drones in other industries, including for SMEs, will be kept as low as possible. Drone operators can easily enter the market and their growing expertise makes them evolve towards more complex operations. The same applies to the sub-option **PO2.1,** which could even have some more positive impacts on jobs in the low risk category market segment, but this difference is difficult to assess and is not expected to be significant.

Notwithstanding the positive effects, one could also expect some shift in employment. While new jobs will be created in drone sector, some jobs might become redundant. Dull, dirty and dangerous operations (such as infrastructure inspections) will be the first areas where the small drones will be used, leading partially to better working conditions but also reducing some jobs e.g. in helicopter operations. It is an open discussion if automation creates or reduces employment, despite positive experience in the past, but it seems that the vast opportunities to make complex and dangerous operations easier and more accessible via drones should have a positive effect on job creation. Besides, drone services will offer mainly new applications that do not affect any labour intensive market segment with high level of employment. Hence, it is expected that expansion of drone technology should have a net positive job creation effect.

In addition, mastering drone technologies improves the productivity of workers and hence makes companies more competitive. It also contributes to the "employability" [115] of workers: drone skills can be used in many industries and unemployed workers can use these skills as an asset to find quicker a job.

6.2.3 Impact on security

Option **PO1** is expected to better address the security risks than the baseline. Applying conventional aviation rules to drones under PO1 would make it possible to consider the whole security by design chain, as from the conception of the system, over the testing of critical subsystems, like the command and control functions, over the actual use. Several security aspects have significant overlaps with safety as both intentional and unintentional interference can exploit the same weaknesses, e.g. securing the data link between the remote pilot and the drone. Also geofencing is a measure from which both safety and security may benefit.

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115 Employability skills are the non-technical skills, knowledge and understandings that are necessary to gain employment and participate effectively in the workplace.

The impact of **PO2** would also be more positive than under the baseline scenario. Safety measures would be developed together with security performance objectives. Also industry standards could effectively deal with security, as long as they concern the drone and can be embedded. They could require applying specific means like geofencing or an identification capability. However, the security benefits under this option could be slightly lower than under PO1. In case of PO1 operations would be more restricted so the potential misuses with security impacts would be less. Under sub-option PO2.1 the same results could be achieved as in PO2 provided security also considered in the product safety essential requirement applying to the lightest drones.

6.2.4 Impact on privacy and family life

The analysed POs would not propose any specific substantive rules in the area of privacy and data protection for the reasons described in section 5.1. Besides, any embedded design privacy and data protection would mainly apply to the payloads (or drones with payloads) and go beyond the competencies of EASA as a body regulating aircrafts and not their payload, i.e. the cameras and sensors.

However, all options would allow for adopting safety measures that would also help in enforcing privacy and data protection rules, in particular identification requirements or geofencing. The baseline, which relies on national law, is less likely to be capable of imposing such product specifications effectively in particular on global manufacturers. There are no significant differences between the POs to be identified or quantified, considering the general level of the initiative, and the possible positive impacts on privacy are attributed solely on the basis the POs could assist effective enforcement of the existing rules once the follow-up Commission acts are adopted.

6.3 ENVIRONMENTAL IMPACTS

Again it is difficult to estimate the overall environmental impacts given that many developments of different nature have to be considered. On the one hand drone operations will to some extent substitute other transport activities and reduce the environmental impact (electrical engines, or smaller combustion engines than traditional aircraft – or taking vans from the road). Drones can also be beneficial to improving our environmental monitoring, management and protection capabilities (natural resources monitoring; wildlife, fisheries, pollution monitoring; detection of environmental crimes) using their ability to perform long endurance monitoring tasks. They can also enable precision agriculture with optimisation of water, fertilisers and energy use. More in general, drones can support the digitalisation of traditional operations with potential benefits in terms of optimisation of resource use. Besides, by stimulating innovative drone activities specific options would contribute for example to green electricity production or other measures of energy efficiency improvement (see Box 4). Thus, option PO2.1, followed by options PO2 and PO1 would be expected to have more positive impacts on environment than the baseline (in line with the degree they are positive to market growth and innovation).

Box 4: Wind turbine drones in the skies: the differences in POs applied

An energy utility company X wants to make best use of drone technologies and launch a series of high flying wind turbines at levels higher than commercial aircraft fly. Under PO1 the drone would need full certification; the company becomes a certified operator; and the drone pilot will be fully licensed with a specific endorsement of 'high sky operations'. PO2 would assess the concrete operation – from where the wind drone could be launched, where it best could fly and where it could conflict with other air traffic. A list of adapted mitigating actions would be established; Company X would choose the appropriate mitigating actions where e.g. a weakness in one area, e.g. slow climbing speed, could be compensated by a strong measure, e.g. temporary segregation of the airspace. The operator would have to demonstrate his capabilities for this particular operation; the pilot has to show, in a convincing way, his navigating skills for this drone. Approach under sub-option PO2.1 would not differ from PO2, as high flying wind turbines could not be qualified as a low risk operation and the product market rules would not be applicable, meaning the same measures as in PO2 would be used.

On the other hand drones will enable new services and thus increase air traffic, higher noise and emissions. This impact will offset to some extent the positive effects of better environmental performance (more for PO2.1 under which the increase in drone activity would be the highest, then slightly less for PO2 and PO1). It is impossible to assess the magnitude of those impacts as they will depend on the precise environmental standards for drones and future market developments. However, overall it seem reasonable to expect that lighter drones will have better environmental performance than manned aircrafts and for light drones the emission level should be less of an issue as most of them have electric engines. Consequently, the total impact is assumed to be positive compared to baseline with no distinction between the options.

In all, the two POs are an improvement as compared with the baseline. The two POs cover environmental standard setting for drones, which falls in the existing remit of EASA. Some of those operations will replace existing operations and reduce the environmental footprint of aviation, but there will be new, additional, operations too. Some of these will have indirect environmental benefits by improving resource use e.g. in agriculture. The direct impact of drones on emissions and noise is not clear-cut.

6.4 CONCLUSIONS

The results of the previous sections in terms of the impacts of the various POs can be summarised in the presentation below. The impact is "quantified" from '+++' as very positive impact to '---' very negative impact. The signs are approximate, but where they were in particular difficult to assess they were put in brackets.

Table 6: Summary table of impacts as compared to the baseline

	Policy Option 1	*Policy Option 2*	*Policy Option 2.1*
Economic impacts			
Internal Market	+	++	+++
Competitiveness	+	++	++
Innovation	+	+++	+++
Regulatory costs for business	+	++	+++
Resources of national administrations, EASA and Commission	−	0/+	+
Social impacts			
Aviation safety	++	++	++
Employment, working conditions and qualifications	0/+	+	+/++
Security	++	+	+
Privacy	+	+	+
Environmental impacts			
Emissions and noise	(+)	(+)	(+)

These conclusions correspond with the impacts as assessed by stakeholders of the online consultation (see Annex III part 2) – to the extent that the policy options are comparable. There is consensus across all categories of stakeholders that the current situation is not satisfactory. Stakeholders agree that EU action as described under PO2 [116] would have the highest positive impact, with significant differences comparing to PO1 and the baseline. Sub-option PO2.1.has some slight differences in impacts compared to PO2, but they will to a large extent depend on the way any of these options would be implemented.

SECTION 7: HOW DO THE OPTIONS COMPARE?

Table 7 above shows the need for regulatory intervention. Each of the considered EU actions is in overall terms an improvement on the baseline scenario. This section provides an assessment of how well the policy options contribute to the realisation of the policy objectives set out in Section 3.

116 This PO corresponds more or less to PO3 of the online consultation.

7.1 EFFECTIVENESS

As civil aviation is highly regulated, unhindered cross-border trade and services in the EU internal market is in practice only possible on the basis of common rules and standards. All options are therefore more effective than the baseline in delivering a framework which will help the market to develop.

The strong point of **PO1** is the full integration of drones in the aviation system, providing tested rules and implementation mechanisms. It addresses the regulatory failure by assigning tasks clearly and by setting clear rules for authorisations and oversight. Under this option also the need for standards dealing with security, environmental and even privacy/data protection areas could be addressed, while the rules would be adapted to drone specificities. The weakness, however, lies in the impact of the conventional aviation methods on the smaller drone market. As the experience in the general aviation sector, especially leisure aviation, has shown the smaller drone market might be overburdened by this approach, leading to suboptimal implementation or outright illegal operations. Ensuring compliance would require enhanced enforcement action, which would be difficult considering the dispersion and expected large number of drone operations. This would hamper the effectiveness of PO1 in practice.

PO2 is more effective in meeting the objectives than PO1. In PO2 the focus on the risks of an operation as a starting point makes that the rules more adapted to different operations. By establishing clear rules and implementation mechanisms at EU level, PO2 is effective at eliminating the regulatory obstacles. It would also allow addressing indirectly security, environmental and privacy/data protection issues like under PO1. Nonetheless, owing to its more proportional approach this option is likely to deal effectively with enforcement. The rules are expected be more accepted by operators, and by allowing for risk-based oversight would help the authorities to focus their efforts on the critical aspects of safety. By making it possible to allocate oversight tasks for the low-risk category of drones to police or other non-aviation authorities, authorities should be more effective in coping with large numbers of drone and drone operators expected in the future.

The effectiveness of sub-option **2.1** is similar to PO2; it proposes to rely, for the enforcement of product related rules, on another enforcement tool to achieve the objectives compared to PO2 (but for a high number of drones). Basing product requirements of the lightest and simplest drones on a product safety approach well known to industry and leaving the enforcement of product rules to market surveillance authorities should facilitate the compliance and awareness of the rules with regard to mass-produced small drones used in low-risk operations. The RAPEX system provides in addition a Rapid Alert System for dangerous products. However, one should acknowledge the known weaknesses of general market surveillance mechanisms which does not screen systematically all products but is based on a surveillance plan established by each Member State, which in some cases lead to unsatisfactory incompliance ratios, limiting their effective ability to monitor the mass market of lower-end drones. It has to be noticed the Commission launched in 2013 a package of legislative and non-legislative measures to strengthen market surveillance of products in the EU. Consequently, the effectiveness of PO2.1 and PO2 is assumed to be at a similar level, as neither civil aviation authorities would be in a position to guarantee a 100% watertight verification system.

7.2 EFFICIENCY

The processes under **PO1** were mainly developed for large passenger air transport. Such intrusive processes are appropriate for drone operations that entail an equivalent risk to manned aviation. For low risk operations, even if the processes are simplified as much as possible under the "conventional aviation" rules, they remain burdensome (e.g. there will be always a need for a certificate even if it would be easy to obtain). Hence, despite PO1's ability to address the specific objectives effectively, it does not do so very efficiently. It in particular do not address the fact that the conventional rules have a heavy-hand approach to risk and do not allow for proportional mitigation measures. This finding is also confirmed by the impact assessment on the revision of the Regulation (EC) 216/2008 that should lead to a more risk-based and proportional approach where possible. Consequently, for the low-risk and light drone the cost of compliance under PO1 would be quite high and limit the overall reduction of costs coming from the harmonisation of the rules when compared to the baseline.

The main idea behind **PO2** is to improve the efficiency of the safety regulatory framework for drones. It would focus on particular risks of a particular type of operation and modulates the rules and implementation mechanisms accordingly. In doing so, it is able to pursue a more tailored approach for each segment of the drone sector instead of PO1's "one size fits all". It avoids overshooting the safety, security, and other protection requirements for the lower-risk, lower-impact operations, and thus keeps costs for those operations low and making it economically viable to develop new drone related products and services. PO2 thus serves better than PO1 the overall objective of the development of drones and drone services market.

Sub-option **2.1** presents even an additional advantage by relying on a legislative framework – product safety directives – which is well known to the manufacturing sector, also outside the EU. It leaves product oversight to existing general market surveillance bodies for the lower-end segment of drones. Even if this would require additional efforts from those bodies, the current system is well established and best suited with oversight of a new product that should be safe for the user and poses little additional risks. For aviation authorities this task would be very burdensome, given the high number of products and not justifiable by the low risks to the aviation traffic. This task is also not new for market surveillance authorities as light drones are already sold in the EU under the presumption of compliance with product safety legislation. The demonstration of compliance would be easier for companies which are familiar with CE marking but not with conventional aviation approaches to the demonstration of compliance. Consequently, this seems to be most efficient in terms of division of tasks and in achieving the specific objectives.

7.3 COHERENCE

All policy options are coherent with the overarching objectives of EU policy. They contribute to the safety in the aviation sector and to a well-functioning internal market by relying on existing EU regulatory frameworks and concepts from the EU aviation and internal market acquis, which have proven their worth. They are also coherent with, and supportive of, other policy domains such as security, privacy, and data protection.

Besides, they respect the basic Treaty principles, like free movement of goods and services, together with equal treatment. Furthermore, the proposed options are in line with the Juncker Commission priorities, namely a new boost for jobs, growth and investment (by supporting the development of drone market and drone services), a deeper and fairer internal market (by removing regulatory obstacles in the drone market), an area of justice and fundamental rights (by addressing privacy and data protection issues as well as security threats).

The approach under **PO1** would not be contradictory to the changes proposed with the expected revision of Regulation (EC) 216/2008, but it would not take the direction of the changes into account. In contrast, Options **PO2** and **PO2.1** would be very much coherent with the shift in the approach proposed in the revision of Regulation (EC) 216/2008 which advocates for making requirements more proportionate to the risks.

Nonetheless, PO2.1 would create a dual aviation oversight system for the light category of drones. This risks that there might be some gaps and incoherencies in the implementation of the legal framework, as airworthiness and operational aspects would be oversight separately, despite close links between them. This would require a good coordination between civil aviation authorities and the general market surveillance authorities to avoid the risk of gaps or inconsistencies, which have not been established yet. Consequently, the overall coherence of the legal framework under PO2.1 is lower compared to PO2.

7.4 PROPORTIONALITY

The proposed policy options do not go beyond what is needed to achieve the policy objectives. They would bring with the scope of the EU legislative framework all drones, but in doing so they rely on a well-established EU approach in the field of civil aviation and the internal market. In particular the safety critical need to coordinate drone traffic with other aviation traffic, which shares the same airspace on the basis of detailed common EU rules, provides a strong case for integrating drones and drone operations fully into the remit of EU law, particularly if one takes into account that in line with the wider practice in civil aviation, implementation remains largely in the hands of Member States authorities despite the existence of the European Aviation Safety Agency.

Option PO2 aims to limit the burden of this regulation on both public authorities and industry by applying an approach which is proportional to risk and avoids burdensome over-protection. Sub-option PO2.1 does not differ much in terms of proportionality from PO2.

Option PO1, however, scores badly on this criterion, as it is expected that the large majority of drone operations will represent relatively low risks, well below those of passenger air transport. To some extent the requirements could be limited and made more proportional to the specific risks of various drone types, but this PO would not allow for significant simplification of heavy procedures under 'manned' aviation for drone operations of very low risk. Assuming that under all Member States would eventually develop proportional national rules (as it is now usually the case), PO1 is therefore inferior to the baseline on this criterion.

Table 7 gives a synthetic overview of the policy options' effectiveness with regard to the specific policy objectives defined in Section 4: What should be achieved?

Table 7: Effectiveness of envisaged Policy Options in light of specific policy objectives

Specific policy objectives	*Baseline*	*Policy Option 1*	*Policy Option 2*	*Sub-option 2.1*
EFFECTIVENESS				
SO1: Address the regulatory obstacles to the development of drones, while maintaining safety and other essential rules	0	++	+++	+++
SO2: Address specific safety, security, privacy and data protection, and environment issues to ensure public acceptance of drones	0	++	++	++
EFFICIENCY	0	+	++	+++
COHERENCE	0	+	+++	++
PROPORTIONALITY	0	--	+	++

7.5 CONCLUSIONS

The specificity of drone operations makes conventional aviation rules (PO1) sub-optimal in addressing all risks related to them in a proportionate manner. Whereas PO1 is effective and efficient in delivering on the objectives, it would be a step back from the baseline in terms of proportionality, especially in its effect on SMEs and in respect of low-risk drone operations.

PO2 and PO2.1 are both valid options: they are effective in addressing the problems and score well on proportionality. The focus on the different risk of different operations as the starting point is the best guarantee to keep rules and verification processes proportionate and to facilitate enforcement in the safety, security, privacy and environmental areas. Both the industry and the Member States agree on this approach. It is also the direction now taken in JARUS.

PO2.1 differs from PO2 only in relation to the product (and not the operational) rules affecting small drones. For that segment PO2.1 provides interesting options for the verification of the (self-) declaration of conformity and a market monitoring mechanism. Whether introduced on the basis of aviation rules or a specific product safety directive, these product safety mechanisms are well known in the industry and to the market surveillance authorities. PO2.1 scores better on efficiency by relying on mechanisms familiar to the manufacturing sector and to market surveillance authorities. The challenge will be to ensure coherence and to ensure a proper link with wider aviation rules and with the regulation of *operations* using those drones, which cannot be regulated in a product safety Directive and must remain within the remit of civil aviation rules and authorities. Therefore, PO2.1 may carry a slight coherence risk.

Finally, it is important to recall that, even if no new EU rules are called for in the fields of privacy, data protection and security, a complete and effective policy to achieve the safe development of drone operations in the EU will require that the measures under the preferred option be complemented by the other actions (operational objectives) described in section 8, including the development of guidelines and promotion/awareness material by the relevant

authorities in the fields of privacy, data protection and security.[117] The relevant authorities already have the means to do so.

By way of conclusion, PO2.1 is superior to the baseline on all criteria. It is the most efficient and proportionate option, and equally effective as PO2. Attention will need to be given to ensure coherence between the aviation rules and the product safety mechanisms. Overall, **PO2.1 is the preferred option.**

7.6 PROPOSED WAY FORWARD

The following actions could be envisaged to implement the preferred option PO2.1:

- The planned Commission proposal for a new aviation safety Regulation to replace Regulation (EC) No 216/2008, which is expected to be adopted before the end of 2015, would enlarge the scope of the Regulation to all drones, and include a new set of drone-specific "essential requirements" reflecting the operation-centric approach selected in this impact assessment. [118]
- As part of its engagement in the JARUS network, EASA is developing an approach to the detailed operation-centric drone regulation. EASA published a consultation document on 31 July 2015 that launches ideas to implement the operation-centric approach as developed within JARUS and based on expertise in Member States: how develop a categorisation of operations according to risk; how to best regulate the low risk operations; and which best practices can be built on. By the end of 2015, EASA intends to come forward with a technical opinion, based on this consultation. That opinion could serve as the basis for detailed rules to be adopted by the Commission on the basis of the future basic aviation safety regulation. On that basis, EASA will draft implementing rules which could be adopted as soon as the new EU legal basis is in place. Those detailed rules will be subject to their own public consultation and regulatory impact assessment; they are not covered in this impact assessment.

  Until such time as those detailed rules are adopted, the published draft rules prepared by EASA will help to shape the expectations and investment decisions of the industry and can support Member States in putting in place, or developing further, their national rules in such a way that the future transition to EU rules will be as smooth as possible. Member States will continue to submit their national rules to the Commission under regime of Directive (EC) 98/34/EC on the notification of technical regulations, and the Commission will evaluate those rules on that basis.
- EASA, through JARUS and in cooperation with Member States and industry, is determining an agenda for standard-setting. That agenda will focus on the standards needed to support the future rules and to deliver them within the right timeframe. This will imply, especially for a fast developing technology, that the Commission acts should be drafted in terms of performance objectives – not prescribing all the methods that would satisfy the objectives, which is a task for industry by setting the industry

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117 There was no need to consider different options for those actions, therefore they were not specifically assessed under the policy options and impacts sections. The rationale for this is explained in section 5.1 "Policy options - General considerations".

118 The necessary technical adjustments to the accident investigation and occurrence reporting Regulations would also be included.

standards. Manufacturers over the globe follow the standards and the work between the US and European standard setting bodies is coordinated – as manufacturers are interested in the due adoption of standards to develop their business, regardless of which standard setting body actually developed the standard.

- Meanwhile the Commission will also work within ICAO. With its specific focus on international air transport, it is generally expected that ICAO deliverables will focus on the more complex operations of remotely piloted aircraft systems, for which technologies are still not accepted for practical use. De facto, the principles of the drone approach will be driven by the experts within JARUS, including the European experts. Several of the key experts that have been working within JARUS are equally active in the ICAO context, and the outcome can be expected to be consistent across the different fora.[119] In any case, as explained in Section 1.3, the EU retains the possibility to "file differences" with ICAO standards, should this prove to be necessary.

- The Commission will need to consider the choice of the legal instrument to introduce the product safety mechanisms to cover the lower end of the drone market, notably whether to launch a separate legal initiative in the form of a product safety Directive. The category of drones subject to this legislation would need to be clearly defined. Manufacturers then are able to make a clear choice on the market they would like to serve: either they apply the product safety standards and are able to sell the low risks drones on the mass market; or they choose to target operations that carry higher risk and a different market segment.[120] In any case, a product safety initiative would be subject to appropriate impact assessment, which could benefit from the work at EASA. [121]

- The Commission will pay special attention to the enforcement of the rules and specifically with regard to operations of small drones. Without prejudice to Member States' competence, enforcement of small drone rules may fall within the competence of police forces. The police should then be in a position to easily assess a complaint and possible violation of the rules. The Commission will build on best practices in Member States where some civil aviation authorities are liaising with police to develop specific enforcement tools (tracking, apps etc.) to facilitate their task, which would be similar to car plate checking for road traffic control. Such enforcement tools would come on top of a wider strategy of better governance, starting with clear rules, awareness campaigns for the wider public, and embedded safety features of the drones (like the identification and geo-fencing).

- With regard to compliance with the relevant product safety legislation, the Commission will closely monitor the market surveillance activities in line with the individual plan established by each Member State. It may react where necessary, especially if there appear indications of serious incompliance ratios which may be reported through the Rapid Alert System for dangerous products.

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119 The chair of the ICAO panel (FAA – vice chair of JARUS) is vice-chair of JARUS; the vice-chair of the ICAO panel (UK) is an active member of JARUS.

120 See the description of PO2.1 in Section 5 for more explanation on the interaction between the two frameworks.

121 EASA Advance Notice of Proposed Amendment 2015-10 of 31 July 2015.

SECTION 8: HOW WOULD ACTUAL IMPACTS BE MONITORED AND EVALUATED?

As mentioned earlier the preferred policy option would only provide the regulatory framework that would need to be followed by more detailed rules and standards. The framework should make it possible to meet the following operational objectives:

- delete the current threshold of 150kg and provide a clear division of tasks between EU/EASA and national authorities with respect to rules setting, certification and control of drone operations with regard to drones below 150kg;
- set common (industry) standards and requirements for drones taking into consideration different characteristics/risks of possible drone operations;
- simplify and reduce costs of authorisations of drones and their operations;
- eliminate gaps in the existing aviation safety legislation and adapt it to drone specificities;
- ensure that all rules on safety, security, privacy and data protection, and environmental protection applying to drones can be effectively enforced and monitored by competent authorities.

The first step in monitoring the impacts of the initiative will be to verify if the expected outputs of framework have been delivered and if they led to the intended results. Table 9 presents how the immediate effects to be monitored.

Table 8: Output/results indicators

Operational objectives	*Core progress indicators*	*Source of data*
Operational objectives	*Core progress indicators*	*Source of data*
Provide a clear division of tasks between EU and national authorities with respect to rules setting, certification and control of drone operations	- Setting the division of responsibilities and allocating adequate resources* - Number of authorizations and certificates for different drone categories issued by EASA and national authorities	CAA EASA
Set common standards and requirements for drones taking into consideration different characteristics/ risks of possible drone operations	- Establishing of a risk classification scheme for drone operations* - Number of EU recognised standards on drones	DG MOVE EASA
Simplify and reduce costs of authorisations of drones and their operations	- Setting new authorisation methods for drones and their operations* - Cost of drone certification (airworthiness) - Cost of authorisation of drone operations	CAAs, Notified bodies Qualified entities EASA
Eliminate gaps in the existing aviation safety legislation and adapt it to drone	- Setting the drone rules*	Evaluation study

specificities		
Ensure that all rules on safety, security, privacy and data protection, and environmental applying to drones can be effectively enforced and monitored by competent authorities.	- Introducing specific measures in aviation rules important for the enforcement authorities* - Number of reported infringements in specific areas - Number of punitive measures on infringements in relation to reported infringements (as a measure of stricter enforcement policies)	CAAs National police reports Data protection authorities Evaluation study

* These are binary option indicators, measuring whether or not the necessary rules were proposed. It is assumed that the proposed rules will be comprehensive and complete in addressing the problem drivers (to be evaluated).

The timing for these outputs is not definite as many detailed rules will have to be preceded by consultations and separate impact assessments. Also the development of the appropriate standards will follow the work at international level so it is hard to set a benchmark and deadlines in this area. Given that there is no reference scenario for the baseline, it will be difficult to clearly measure the success of the initiative. The costs of authorisations will be compared to the current costs in various Member States, but one need to take into account that to make the system sustainable the fees should cover the authorisation costs.

The drone legislation will be solidly embedded in the EU aviation framework, with its comprehensive monitoring and indicators system, and the strong partnership between Commission, EASA, SESAR Joint Undertaking and Eurocontrol at the European level, and competent administrations at the national level. Each organisation will contribute to the monitoring of drone activities and functioning of the drone market. In addition, there is a permanent dialogue with relevant stakeholders, including industry bodies, which will provide additional feedback on the relevance of the proposed regulatory solutions.

With regard to monitoring the drone market functioning under the new regulatory framework, a collection of relevant indicators will be done on annual basis, The indicators will be collected from: the EASA open data bank on all the aeronautical products that it has certificated on a basis of safety and environmental standards (number of certified drone products), the national authorities data banks of approved operators (number of certified drone operators and pilots), Eurocontrol database on movements by aircraft which must file a flight plan (number of drone operations requiring authorisation). These indicators will show the effect of the EU drone rules. These indicators will also specify the drone types, so that a correct picture can be given on the status of open, specific and certified operations. In the case of the open category, national and industry reports would need to be used as there will no legal obligation to monitor low-risk drone operations.

As drones become part of the aviation system, drone incidents and accidents, which are defined as relevant for safety improvement purposes, will be reported or investigated under the revised accident and occurrence reporting rules. The existing data limitations should diminish over time as the data and reporting on drone accidents and incidents will be gradually accumulated. The safety information will be given in an anonymous way, but at least the lessons learnt from drone occurrences will well be reflected in the aviation expertise and included where needed in EASA's "safety risk portfolio" and the European Aviation Safety Plan, which steers future rulemaking activity.

The Commission, on the basis of exchange with EASA, Member States and existing stakeholder groups managed by EASA, will evaluate and review the efficiency of European rules on a regular basis as is the case for all civil aviation rules. Notably, EASA produces an annual aviation review, and the functioning of the overall system is regularly externally

evaluated as required by Regulation (EC) 216/2008. Such "Article 62 Panel Evaluation" is carried out every 5 years (the last one was prepared in 2013).

Table 9: Monitoring indicators of the possible impacts of the initiative on the drone market

Key indicators (source)	*Definition*	*Relevance*
Drone certification (EASA)	Number of drones certified.	This indicator would show growth of the most risky segment of drone market (large drones mainly)
Drone movements (Eurocontrol)	Number of flights performed in the ECAC region by drones which must file a flight plan.	This indicator would show trends in the use of larger drones.
Overview of national lists of approved operators (national administrations)	Number and type of all commercial operators approved by the national authorities	This indicator would reveal the growing use of drones and diversity of operations
Drone incidents and accidents (accident and occurrence reports)	Number and type of accidents/ incidents involving drones	The indicator would show the impact of drone operations on aviation safety and information on the specific risks and type of accidents involving drones
Size of the EU drone market and its growth rate (indicators to be developed - market monitoring study)	Total revenue of drone market/ number of companies manufacturing drones/ offering drone operating services	The indicators would show the drone market expansion

As indicated earlier, it is difficult to set the benchmarks for these indicators as the drone market is at early stage of development with many unknowns. The collected data will be compared with the currently available market forecasts and analysed more carefully in a qualitative way.

EXPLANATION OF SOME TECHNICAL TERMS

Chicago Convention is the international convention that regulates international civil aviation since 1944 and creating the International Civil Aviation Organisation.

Drones are unmanned aerial vehicles that are designed to fly without pilot. They can be either remotely piloted (in that case called Remotely Piloted Aircraft System or "RPAS") or fly automated, where the flight operator could be in charge for a number of drones flying at the same time.

EASA is the European Aviation Safety Agency, established by Regulation (EC) 216/2008. It is the "counterpart" of the US Federal Aviation Agency (FAA).

Essential Requirements are a limited number of overall general principles that determine the safety of a flight, that do not change over time with evolving business models, types of

operations, or evolution in technology. They are described in the basis aviation safety Regulation (EC) 216/2008

EuroCAE is the European Organisation for Civil Aviation Equipment is a non-profit organisation dedicated to aviation standardisation since 1963, where the three general industry standard setting bodies CEN/CENELEC/ETSI are providing "general industry" standards

Fly by wire is the technology that replaces the "traditional" mechanic and manual flight control by an electronic interface, so that the pilot's commands are transmitted "by (electric) wire". In the time of its introduction, it was a technological revolution for the aviation community. Now it is standard practice.

Geofencing is the capability to forbid drones to fly in a particular airspace. Airports can be "geofenced", meaning that the GPS and autopilot of the drone know that it cannot fly into airport areas. Geofencing can therefore also be used for security or environmental purposes.

International Civil Aviation Organisation is the UN body dealing with international civil aviation created in 1944 by the Chicago Convention

Joint Authorities for Rulemaking on Unmanned Systems (JARUS) is the group of national experts working on requirements for unmanned systems.

Payload is the technical term used to describe all things that a drone can carry. This may be cargo, but also all kind of cameras or sensors

RAPEX information system – this is the 'Rapid Exchange of Information System" under the market surveillance legislation by which information on non-conform products is notified EU wide.

Remotely Piloted Aircraft Systems (RPAS) are the drones that are piloted remotely.

SARPs are Standards and Recommended Practices, that are "secondary" requirements, not found in the Chicago Convention but in its annexes.

Segregation is the term used when drones have to fly in airspace well separated from "manned" aircraft. Segregating airspace is generally a burdensome and complicated manner to manage and it reduces the overall capacity of the aviation network. It could be compared by having to create separate lanes for driverless cars on the road, instead of driverless cars being able to use all road infrastructures. That is why drone integration is so important.

SESAR is the Single European Sky Air Traffic Management Research programme, managed by the SESAR Joint Undertaking.

Qualified entities or notified bodies are organisations that perform aviation safety duties, like audits or certification tasks, either on behalf of the Civil Aviation Authorities or on its own behalf, as described in Regulation (EC) 216/2008.

APPENDICES

ANNEX I - REFERENCE DOCUMENTS

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ANNEX II: PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

Lead DG: DG MOVE

Agenda planning reference: 2015/MOVE/005

This impact assessment is prepared by DG MOVE to support legislative action in relation to drones manufacturing and operation. The associated roadmap was published in 2015.[122]

Organisation and timing

An inter-service steering group was established in April 2014 and involves DGs CNECT – EMPL – GROW – ENV – HOME – JUST – MARE - MARKT – LS – RTD – SG, together with EASA and SJU. A first meeting was held on 18 March 2014; the second took place on 19 December 2014; the third on 17 July 2015. A further meeting took place on 9 September 2015 in particular to discuss the modalities for acceptance by the Regulatory Scrutiny Board. Finally, a written procedure was organised on 23 October 215, prior to re-submission.

Process of consultation

During the last five years, the Commission services [123] have regularly organised or participated in meetings with private and public stakeholders: [124] industry associations, like ASD (Aerospace and Defence Industry Association) or UVSI (the Unmanned Vehicle Systems International), public partners (EASA, SESAR Joint Undertaking, European Defence Agency, Eurocontrol, JARUS), and Member States. One of the most concrete deliverable of this consultation process was the "Roadmap for the Integration of Civil RPAS into the European aviation System", which was delivered to the Commission in June 2013 by a group of experts from various organisations. The conclusions of these conferences, and of the Roadmap, call for concrete regulatory action, to establish a regulatory framework to allow drone operations and create a favourable investment climate.

The Article 29 Working Party and national Data Protection Authorities (DPAs) were consulted and preliminary views were received. The Article 29 Working Party included drones in its 2014 Working Programme to deliver an opinion in the course of 2015.

The European Data Protection Supervisor issued a specific opinion on drones. [125] It concludes that drones may pose a substantial privacy and data protection issue, as the drone is a platform that can be combined with "other technologies such as cameras devices, Wi-Fi sensors, microphones, biometric sensors, GPS systems … and become powerful surveillance tools." Hence, there could be an interference with the right to the respect for private and family life.[126] The EDPS recommends that drone manufacturers are encouraged to implement privacy by design "by default"; and data controllers to carry out data "protection impact

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122 http://ec.europa.eu/smart-regulation/roadmaps/index_en.htm

123 See for instance CSWD(2013): JRC(2015) or http://ec.europa.eu/growth/sectors/aeronautics/rpas/index_en.htm

124 http://ec.europa.eu/growth/sectors/aeronautics/rpas/index_en.htm

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126 Annex IX explains the relevant privacy and data protection legislation.

assessments". Finally, action is needed that would facilitate the identification of the drone operator. [127]

A specific public consultation process was organised in the framework of this impact assessment from mid-August to October 2014, published on *'Your Voice in Europe'*. [128] The detailed results of this consultation are presented in Annex III Part 2.

The Latvian Presidency of the Council and the Commission organised on 5-6 March 2015 a high level meeting with public officials and industry representatives to discuss existing and future policy on drones. The conference concluded on five important principles to guide the regulatory framework in Europe contained in the "Riga Declaration", which is reproduced at Annex VII. The Riga Declaration calls, as a matter of urgency, for the establishment of a strong EU drone services market with common rules, which promote drone operations by keeping them proportionate to risk, but at the same time adequately protect the fundamental rights of the EU citizens.

The Commission's minimum standards regarding public consultations have been met. [129]

External expertise [130]

The Commission has ordered several specific studies. The most important recent EU studies underpinning this report include: the deliverables of the FP7 project Unmanned Aerial Systems in European Airspace (ULTRA) analysing the regulatory framework from the perspective of integration of light RPAS in the European airspace [131], the study on privacy and data protection risks in RPAS operations [132] and the study on insurance aspects of RPAS. [133]

The study on privacy concludes that the European and national regulatory frameworks in place are largely adequate to address the privacy, data protection and ethical impacts of drones. The privacy rules have a horizontal application and are technology neutral. The problem is not the lack of rules but rather raising awareness of the drone industry about their obligations to protect privacy and about enforcing the existing regulatory mechanisms.

Similarly, the study on liability and insurance requirements confirms that general national liability laws cover drone operations. It highlights the need to ensure an adequate marking of the drone (e.g. fire-proof plate identifying the operator and/or the manufacturer) in order to ease the identification of the liable party. Furthermore, the study confirms the applicability of insurance requirements in accordance with Regulation (EC) 785/2004 [134] to the professional use of drones.

This impact assessment report also takes into account a number of reports published by the U.S. General Accounting Office on drones in order to help the U.S. Congress pursuing a

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127 This is exactly one of the principles of the Riga declaration.

128 See Annex III.

129 COM(2002)704.

130 See Annex I - Bibliography for an extensive list.

131 http://ultraconsortium.eu/index.php/deliverable

132 Trilateral Research and Consultation (2014).

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134 Regulation (EC) No 785/2004 of the European Parliament and of the Council of 21 April 2004on insurance requirements for air carriers and aircraft operators.

better informed policy.[135] These reports are also relevant for the EU situation as the aviation regulatory framework is similar in the EU.

Beside the studies, EASA is building up expertise on the safety aspects of drones and has started to prepare the ground for future rulemaking and certification activities. It already issued two notices of proposed amendments in 2010 and in June 2014 to reflect the latest thinking on airspace management of ICAO.[136] EASA has also become active in both JARUS and ICAO. The knowledge gathered in those forums in recent years is equally taken into account.

Finally, the UK House of Lords published in March 2015 an authoritative report on the "Civilian Use of Drones in the EU". The report "support[s] the Commission's aim to create an internal market for …civil drones" and "the Commission's move towards adopting a risk-based approach to safety regulations for …drones." [137]

Consultation of the Regulatory Scrutiny Board

This impact assessment report was reviewed by the Commission Regulatory Scrutiny Board (RSB) on 14 October 2015. Based on the RSB recommendations, the report was revised as follows:

Future regulatory framework: describe more clearly the envisaged essential requirements and how they are identified, and clarify what will be left to delegated acts	A table was added at the end of the options section 5.3 (pages 43-45), showing the main envisaged essential requirements and the differences between the options in terms of the available means of demonstrating compliance. It shows more clearly how every option builds on the previous one. The text introducing the options section was expanded to clarify that the options examine different means of demonstrating compliance and ensuring enforcement, but do not differ on the essential requirements (page 43). It also explains how the essential requirements will be identified and how the delegated acts will be developed.
Future regulatory framework: clarify whether some identified problems would be addressed by other initiatives	Section 5.1 (pages 33-34) was expanded to cover all the issues (privacy/data protection, security, etc.) and for each of those indicate concretely how and where they will be addressed.
Options: Set out clearly what is an "operation centric" approach and how the options differ,	The description of option 2 has been modified to distinguish it more clearly from option 1 (Section 5.3, from page 38). Also the

135 See bibliography for a list of GOA studies.

136 Amendment 43 to Annex 2 to the Chicago Convention on remotely piloted aircraft systems (RPAS) into the EU Common Rules of the Air – currently put on hold to ensure consistency with the overall framework.

137 UK House of Lords, 2015, Conclusions 1 and 6 respectively, p. 67.

including with respect to enforcement	table at the end of Section 5.3 (page 442) shows the differences in enforcement.
Options: explain how different types of rules would co-exist	The description of option 2 in Section 5.3 has been clarified (pages 38 and 43 and following).
Options: provide more information on the discarded option of a stand-alone framework	This option is now explained in section 5.2 (page 36).
International context: explain how the initiative relates to work at ICAO and JARUS	Section 1.3 ("international context", page 8) now explains better the nature of the work in ICAO and JARUS. Section 7.6 ("way forward", page 64) explains how the Commission will manage the interaction with ICAO and JARUS in practice.
International context: provide more information on approaches in third countries	Additional information was added in section 1.3 (page 8) and in section 2.1.1 (page 10), notably on the regulatory approach in those countries where a significant number of drone operations are taking in place.
Baseline: give a more robust forward looking scenario of the likely evolution of problems	The problem drivers are better detailed and their evolution in the absence of further EU action (section 2.4 from p. 24 onwards).
Presentation: sector-specific jargon and acronyms should be avoided or explained	This has been done throughout the text and a list of technical terms was inserted at the beginning of the report.
Enforcement by police: highlight potential enforcement issues	The report mentions enforcement by police as an issue that requires specific action (see sections 4.2 on p.30 and 7.6 on p. 65).
Efficiency of market surveillance mechanisms	The report indicates how the weaknesses of the mechanism may be addressed and that the safety situation will be monitored (see section 7.1 on p. 61 and section 7.6 on p. 65).
Introduce more precise reference to privacy and data protection issues	More precise information is given in the EU legal context p. 7; the relevant annex gives the reference to the relevant opinions.

The Board reconsidered the revised report and issued a positive opinion on 5 November 2015.

ANNEX III : ASSESSMENT OF THE APPLICATION OF THE MINIMUM CONSULTATION STANDARDS

Part 1: Consultation build-up towards this regulatory initiative

The Commission has been financing, from early 2000, research projects to promote unmanned aircraft. [138] This research already proposed the progressive integration of RPAS into non-segregated airspace on an equal footing with manned aircraft, as long as RPAS are able to respect existing aviation rules and to follow well-established procedures and operations. In particular, it is essential that the safety level is in no way lowered and that RPAS operators do not pose a higher third party risk in the air or on the ground compared to manned aircraft.

The Commission hearing (2009) with stakeholders to assess ways to support the emergence of RPAS concluded that costs for entry should be kept low: "The European legislation should be very simple, covering essential elements like the certification of RPAS, training and licensing of the pilots and flight crew, responsibilities and obligations of all stakeholders, liability security and insurance issues, licence to operate, reliability of the components, maintenance matters, and security aspects. The legislation should take into account the specificities of Light RPAS, but should ensure the maximum safety and security level, maintaining the current overall safety level. Rules and standards should be in equation with the aviation standards currently applicable for manned aircraft (equivalent level of safety), but should put the lowest possible constraints on manufacturers and users."

The Commission and the European Defence Agency conference (2010) agreed to set-up a High Level Group to come up with recommendations on structural, institutional and regulatory measures. The open "panel" discussions focussed on the safety issues, radio spectrum requirements, the societal dimension and RPAS research and development. 139 The European RPAS steering group has meanwhile adopted a concrete action plan: "Roadmap for the integration of Remotely Piloted Aircraft Systems in the European Civil Aviation System". [140]

The Commission services have given a good overview of the state of the drones market in Commission Staff Working Document (2012)259. Taking action in defining the way forward, DG Enterprise and DG Mobility and Transport conducted, from June 2011 to February 2012, an extensive consultation on the future of RPAS through 5 workshops, titled the UAS Panel Process.

Considering the emergence of RPAS, their potential benefits for European citizens and economy as well as the current lack of an internal market in this area, DG Enterprise and Industry and DG Mobility and Transport, in close consultation with other Commission services, launched, on 23 June 2011 at the Paris International Air Show, a broad stakeholders' consultation, the "UAS Panel Process", with the aim to contribute to the development of a

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138 See e.g. INOUI (Innovative Operational UAS Integration), 6th Framework Programme. Currently, R&D efforts within the 7th Framework Programme are financed under ULTRA (Unmanned Aerial Systems in European Airspace) to provide more precise and operational research. Also the SESAR Joint Undertaking is actively working on the RPAS integration.

139 As described in Commission Services Working Document – see higher.

140 The European RPAS Steering Group adopted this Roadmap in May 2013. The coordinated actions should lead to a step wise integration of RPAS as from 2016.

Strategy for the development of civil applications of RPAS in Europe. Such a strategy is likely to require concrete steps to foster the development of civil RPAS applications in Europe, including through regulatory, R&D and complementary initiatives, leading to the insertion of RPAS into non-segregated airspace.

Building on various initiatives already carried out by the European Commission in the past 7 years[141], the "UAS Panel Process" has analysed the barriers to a full exploitation of civil (commercial, corporate and governmental non-military) RPAS in Europe and discussed possible ways forward to overcome them.

The "UAS Panel Process" was open to most relevant stakeholders and involved Eurocontrol, the European Civil Aviation Conference (ECAC), the European Safety Agency (EASA), the scientific community, European Civil Aviation Authorities, ICAO, JARUS, Ministries of the Interior (border surveillance, police forces), the European Defence Agency, Ministries of Defence, European Space Agency (ESA), international military organisations, non-governmental organisations, international stakeholders, European citizens and broad industry representation from SMEs to global players which manufacture and/or operate RPAS.

This process mainly consisted of two elements:

(a) a call to all interested stakeholders to provide information and comments on the need for a *Strategy for RPAS in Europe* and

(b) the organisation of 5 thematic workshops from July 2011 to February 2012. Each of these workshops was prepared by individuals with highly recognised expertise in the following fields: UAS industry and market, UAS insertion into airspace, UAS safety, societal impacts of UAS applications and research and development needs. Overall, the workshops were attended by more than 800 participants.

The Staff Working Document (SWD(2012)259) published in September 2012, reports the outcomes of this consultation. Main conclusions were:

- RPAS present an important potential for the development of innovative civil applications (commercial, corporate and governmental) in a wide variety of sectors to the benefit of European society by creating jobs and achieving useful tasks.
- To unleash this potential the first priority is to achieve a safe integration of RPAS into the European air system as soon as possible.
- This requires the development of appropriate technologies and the implementation of the necessary aviation regulation at EU and national levels. Issues like privacy and data protection or insurance must also be addressed.
- It also requires an increased coordination between all relevant actors (EASA, national Civil Aviation Authorities, EURCAE, Eurocontrol, JARUS, industry etc.) and between regulatory and technological developments.

Stakeholders on their side decided to elaborate an RPAS Roadmap that proposes a series of actions to be taken for achieving RPAS integration into the European air system from 2016. On 20 June 2013 at the Paris Air Show, the Roadmap was handed over to the European

141 The European Civil Unmanned Air Vehicle Roadmap (UAVnet/CAPECON/USICO, 2005), the INOUI study (Innovative Operational UAS Integration, 2007), the Policy Statement on Airworthiness Certification of UAS (issued by EASA in 2009), the Hearing on Light UAS (2009), the High-Level-Conference on UAS (2010).

Commission, who will play a crucial role in its implementation, developing the necessary regulation, supporting the development of enabling technologies and addressing privacy and other societal concerns.

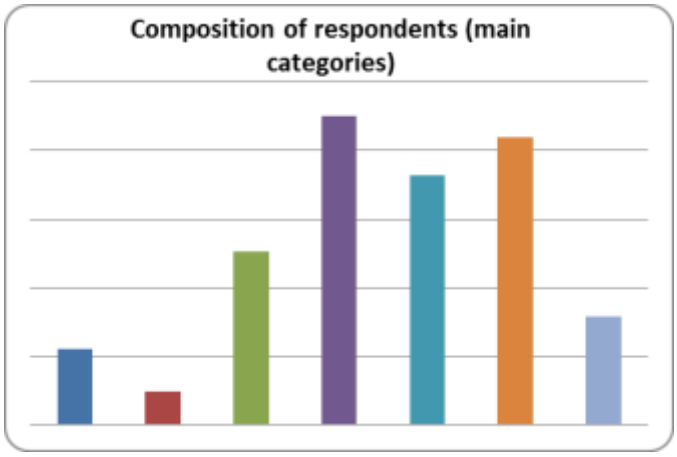
On 8 April 2014, the Commission has adopted a policy document which set out the Commission lines of action. These concern a mix of regulatory initiatives, R&D efforts and industrial support actions.

During the course of 2014, a consistent consultation process was managed with Member States, specialized authorities, industry stakeholders, NGO organisations. The most important were: meetings with Civil Aviation Authorities, consultations of stakeholders by JARUS and EASA, workshops on insurance and data protection/privacy, meetings with Data Protection Authorities. In addition, in the course of the impact assessment, a public stakeholder consultation took place and its results taken into consideration.

Part 2: Analysis of the Public Consultation on drones (here still labelled as RPAS)

Profile of respondents

253 individuals (23%) and organisations replied to the on-line public consultation on RPAS that was run from 14 August to 24 October 2014. The organisations mainly concerned RPAS operators (21%), R&D organisations & consultancy (18%), aircraft design, manufacturers and maintenance (13%), aviation associations (8%) and national regulators (6%).

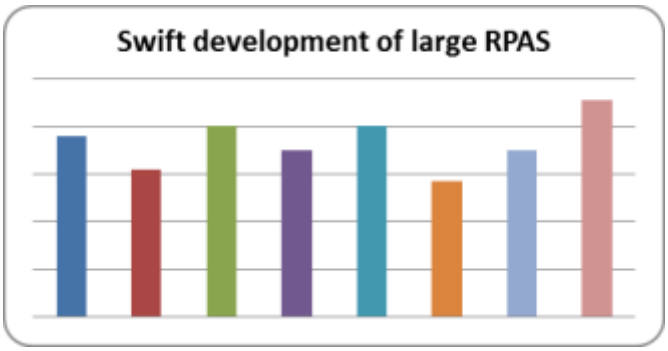


On X-axis, the categories of respondents: 1. National regulators; 2. ANSPs; 3. Design & maintenance; 4. Individual; 5. R&D and consultancy; 6. Drone operators; and 7. Associations.

Market development (Questions 1-10)

RPAS applications are mature and will create substantial business opportunities and commercial benefits (99%)[142]. Nearly all respondents foresee applications development within five years for professional activities (99%) or for daily life purposes (80%). Respondents see the market take off for all RPAS without making a substantial dichotomy between small and large RPAS; however more respondents see this happening for small (94%) than for large RPAS (76%).

142 The percentages given throughout the text refer to the number of respondents who agreed and strongly agreed, divided by the number of respondents who gave a substantial answer (so excluding the 'no opinion' replies.



On X-axis, the categories of respondents: 0. Total average; 1. National regulators; 2. ANSPs; 3. Design & maintenance; 4. Individual; 5. R&D and consultancy; 6. Drone operators; and 7. Associations.

Respondents are generally not of the opinion that the EU RPAS industry is lagging behind global competitors or that it is not competitive. In any case, an overwhelming majority finds that a strong and integrated RPAS market is the way to make the EU RPAS industry globally competitive (90%).

Current situation and issues to be tackled (Questions 11-27)

As with any new technology, RPAS also raise concerns. The public consultation confirms two major issues: the perception of safety and privacy. Only a marginal number of respondents (3%) claimed that RPAS should be kept out of the air because of safety or security reasons. Hence, the concerns are well identified and need careful management, including on environment or insurance. At the end of the day, the consultation confirms that, under specific modalities, potential benefits outweigh risks and threats (86%), including if RPAS start flying over city centres at low altitude. [143]

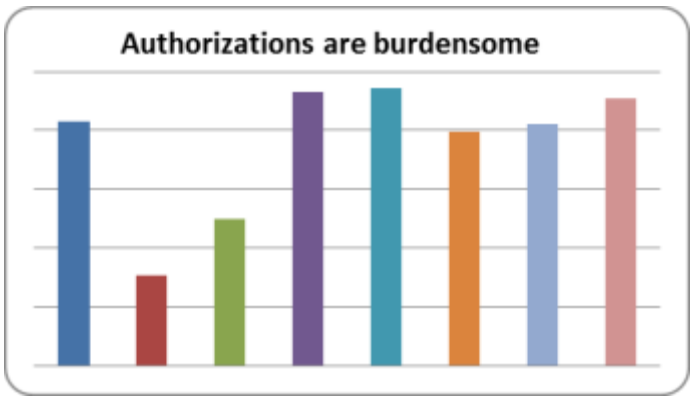
The principal causes for a suboptimal situation (Questions 28-47)

The consultation confirms fragmentation of the EU market, legal & technological uncertainties and safety, security and privacy issues triggered by RPAS operations as the major concerns which make the current situation unsatisfactory.

Firstly, a vast majority of respondents identify specific national authorizations for RPAS operations (83%)[144], differences in national legislation (91%), lack of common rules applicable to all types of RPAS (91%) and gaps in the current EU legislation (93%) as important barriers. Strikingly, only 30% of regulators consider national authorizations problematic but concur with the general consensus with regard to differences in national legislation (79%) and lack of common rules (83%). This divergence on specific authorization between regulators and regulated may require particular attention.

143 Only 29% of the respondents agree that RPAS should be forbidden to fly over city centres.

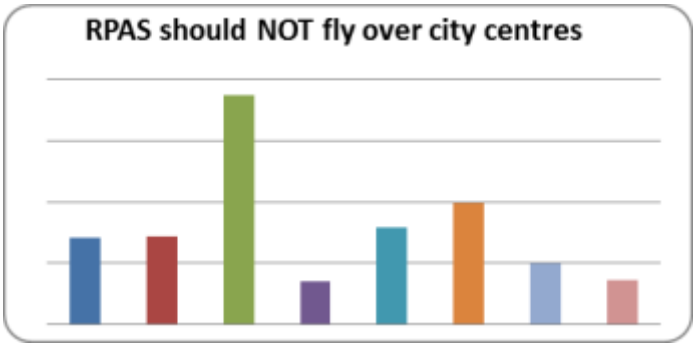
144 Nevertheless there were substantial differences among the respondents and only 30% of the national regulator found the duty burdensome.



On X-axis, the categories of respondents: 0. Total average; 1. National regulators; 2. ANSPs; 3. Design & maintenance; 4. Individual; 5. R&D and consultancy; 6. Drone operators; and 7. Associations.

Secondly, the public consultation confirms that technology driven markets like RPAS need a swift validation of technologies 67%) and light touch rules that allow innovative technologies to emerge (70%). Lacking international standards also cause uncertainty (88%).

Thirdly, most of the respondents are of the opinion that RPAS become cheaper and more capable thus there is a high risk of inappropriate use, even unwillingly (89%). However, only a small minority of respondents indicate that RPAS pose a danger to citizens as they can operate much closer to the ground (29%). This corresponds to general acceptance for RPAS flying over densely populated areas (71%).



On X-axis, the categories of respondents: 0. Total average; 1. National regulators; 2. ANSPs; 3. Design & maintenance; 4. Individual; 5. R&D and consultancy; 6. Drone operators; and 7. Associations.

Finally, existing rules on safety, security and privacy that apply to aircraft are equally applicable to RPAS. The consultation shows the need for specific provisions addressing use of RPAS (73%) or that a more coordinated approach in respect of implementation and enforcement of the existing regulations should be developed (76%). Less than half of the respondents (49%) are of the opinion that regulations cannot stop new threats. Similarly, vast majority of respondents state that a lack of harmonised insurance rules may lead to inadequate insurance coverage (89%).

The objectives of a possible EU intervention (Questions 48-49)

An overwhelming majority supports the overall policy objectives. 97% sees the need for EU promotion as RPAS are a promising source of jobs and growth. At the same time, the right balance should be struck between the development of the RPAS market and provision of the adequate protection of safety, security and privacy (91%).

Four main options to tackle the root causes (Questions 50-53)

The policy options are (1) to keep the status quo (7% of support), (2) build on existing competences to develop RPAS rules with preservation of current competence lines (35%); (3) introduce common rules and ensure local implementation gets most support (67%); and common rules with centralization of certification tasks in EASA is the second favoured option (60%).

What measures should be taken (Questions 54-89)

There is some urgency to come up with an enabling regulatory framework. Only a small minority of the respondents (15%) considers the RPAS technology not sufficiently mature or that international rules should first be developed (36%). The overwhelming majority is of the opinion that EU rules should reflect international standards (92%) – indicating the need to focus on the global market. Moreover, the new rules should apply equally to both light and heavy RPAS: the vast majority apparently agrees that the current 150kg division of competence is obsolete and the status quo gets little support (27%). Respondents strongly support the statement that safety rules should be harmonised at the EU level but implemented at the local level (77%) with lower support for central implementation by EASA (58%). The respondents like the possibility of having the choice of the certificating authority either national or European (63%). Moreover, the respondents support certification and licencing of lighter RPAS at local level (64%). In any case, there is a need for mutual recognition of certificates and licenses delivered in any Member State throughout the EU (91%).

Furthermore, the open consultation shows the need to move away from weight and take a set of factors into account, such as the type of the operation (92%), the quality of the RPAS operator (93%), the place of the operation (96%), and the reliability of the whole system (96%). Although, the consultation found some hesitation for shifting the responsibility from the manufacturer to the operator of the RPAS (54%), the majority of respondents agree that safety management systems of the operator are and effective tool to guarantee safety (75%). Respondents send a loud message of keeping safety rules proportionate to risk (93%) and with involvement of national authorities to issue authorisations for RPAS operations (78%). EASA, however, should be responsible for developing a common risk classification scheme (92%).

On security, only 41% finds that existing security rules can efficiently cope with threats. A small majority (59%) finds that closing gaps in safety rules would also improve security risk control, without having to introduce new security rules. In any case, the scope of EASA competence should be extended and the agency should integrate security considerations in its safety rules on RPAS (86%).

On the threat to privacy, a majority (68%) finds that the current regulatory framework is sufficient to deal with privacy issues and that national data protection authorities should remain responsible for effective enforcement of the right to privacy (76%). On the other hand, there is need for cooperation between civil aviation authorities and data protection authorities (79%) including data enabling identification of an RPAS operator. The need for specific data protection rules does not get a large majority (55%), but an overwhelming majority (88%) see the ability to identify the operator as the key to protect privacy.

The effectiveness of the policy options (Questions 90-145) [145]

The respondents assess the possible impact of the four identified policy options on the development of RPAS market and its potential to create jobs and growth. Doing nothing is not an option. The respondents rated the current situation as not satisfactory and gave weak support, with scores mostly between 30% and 40%. The second option – developing rules on the basis of current competences – gets some more support, mostly between 50% and 70%. The third option is rated as the most effective with support rates between generally 70% and 90%. The last policy option is also generally rated as effective, with somewhat lower ratings as for policy option three.

Table 9: Impact of policy option on policy objectives (PO)

Impact on:	**PO1**	**PO2**	**PO3**	**PO4**
Compliance costs for EU businesses	37	63	70	60
Compliance costs for national administrations	37	57	69	70
Compliance costs for EASA	35	57	56	47
Employment	43	69	87	78
RPAS market growth	41	70	87	79
Global competitiveness of EU operators	36	71	88	80
Global competitiveness of EU manufacturers	38	71	89	80
Innovation	43	74	89	81
Security	33	68	90	87
Safety in the airspace	34	69	89	86
Safety on the ground	32	66	88	85
Privacy protection	29	53	81	78
Citizens' trust in RPAS operations	29	60	89	84
Natural environment	38	60	78	75
AVERAGE IMPACT SCORE	**36.07**	**64.86**	**82.14**	**76.43**

Conclusions

In line with the conclusions of numerous conferences and studies, this public consultation with 253 respondents endorses all the more the need for urgent action at the EU level to tap the potential of RPAS. The contribution of RPAS technologies to jobs and growth is confirmed, for all ranges of RPAS.

The consultation confirms the view that the full range of RPAS is ready for development and that legal & technological uncertainty impedes a swift development. Specific authorizations and fragmentation are a real burden. Respondents identify safety and privacy as the most important concerns – which can be managed with an appropriate regulatory framework which keeps rules proportionate to risk and with a strong role for national authorities.

The current division of 150kg is generally deemed obsolete and EASA is to come up with a risk classification scheme where risk is made dependent on a range of factors. For security or privacy the consultation does point to the need for new rules, but more to a better application of existing rules, with a closer collaboration between CAA and national data protection authorities.

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145 The given percentage here refers to the number of respondents indicating a mixed and positive impact, relative to the total number of substantive answers.

The policy option with common safety rules and local application, together with improved implementation of security/privacy legislation is clearly considered as the most cost-effective way forward.

ANNEX IV: APPROACHES TO DRONE REGULATION

IV.1 Drones in the EU Member States

Today, every EU Member State has some drone activities, both for manufacturing or for operations. Only in Member States with drone legislation the (operating) activities are legal – unless an exemption was granted (based on the ICAO rule that all operations performed by unmanned vehicles must obtain a specific authorisation).

EASA is the competent authority for drones with an operating mass of more than 150 kg. For lighter drones a limited number of Member States has adopted drone rules – most have not. This fragments the European market. France has most approved operators: more than 1,000 on a total of about 2,500 EU operators. There are more than 100 RPAS manufacturers of very small to small drones with a weight below 150kg.

For drones above 150 kg EASA is currently working with two applications for certification:

- Camcopter S-100 rotorcraft from Schiebel (Austria)
- Atlanta aeroplane from Airbus D.S. (Spain)

Although there are no civil certification specifications for drones as of today, the Agency is working with the applicants to define a certification basis proportionate to the risk of the intended operations, the "operator-centric" approach – away from the "aircraft centric" approach.

IV.2 Drones in the world.

The US is generally seen as the leading drone country (followed by Israel). That is true for military drones (more than 7,000 – with substantial operational expertise in segregated airspace). Europe is a leader in civil drone operation when comparing the 2,500 European operators to the 2,342 operators in the rest of the world (of which 2,000 in Japan).[146]

1) Japan: With more than 2,000 operators and 20 years of experience, mostly for crop spraying drone civil operations are nearly exclusively used in precision farming. Japan was the first country to allow such farming activities in the mid-nineties and the number of operators boomed in a few years' time.

2) Israel: A very active manufacturing industry but focused on military drones. Thanks to the integrated civil-military air navigation services, drones can more easily be integrated in the airspace.

3) US: The FAA has already certified two models in the restricted category for aerial survey. Each operation requires a Certificate of Authorisation (COA) for public entities (e.g. Law enforcement, Universities, Military) and of exemption for commercial activities (around 30 are published). The first exemption was granted for an operation … above the Arctic. Most

146 Some sources put the number of approved Japanese operators at 14,000 (See Frost&Sullivan (2015);

exemptions were granted for oil and Hollywood companies; On 15 January 2015 the FAA published its long awaited Notice for Proposed Rulemaking for small drones (less than 25kg).

4) Others / mil /civil: Australia, China (many of the very small drones are manufactured in China) and South Africa are other active countries. Actually many countries (around 55) are developing drones because the technology does not necessitate heavy investments.

IV.3 How EU members and non EU members deal with drones – regulations.

Drone regulations and operating rules are in place in Austria, Czech Republic, Denmark, France, Germany, Ireland, Italy, the Netherlands, Poland, Spain, Sweden and the UK. There are approved flight schools in Denmark, UK and Netherlands and more than 500 approved drone pilots in the Netherlands and UK. [147]

All drone rules in place in Europe are tailored to the risk of the operation. Rules are "operator centric" instead of the classical "aircraft centric" approach of manned aviation. This shift in paradigm is necessary as the same drone can pose a different risk to third parties if it is operated on top of a football stadium or in the middle of the desert. The risk not only depends on the kind of machine, but on many more factor, like the area overflown, the expertise of the operator, the specific type of operation, etc.

For higher risk operations the Swiss FOCA developed a specific risk assessment process (GALLO). The process includes a total hazard and risk assessment to be approved by the authority and user friendly templates and guidance material. Austrocontrol and the French DGAC have similar processes with rules tailored to the risk of the operation. These examples of a practical approach are the stepping stones that the EU would use for developing its rules and processes.

The regulations already in place in a limited number of European States have allowed the - patchy - growth of civil operations in Europe. In countries like Switzerland the low risk operations like flying a two kg drone for video recording outside of the cities or populated areas and under direct visual contact of the pilot are open to small and medium companies without approval of the civil aviation authorities. The aviation authorities can concentrate their effort in the higher risk operations like flying over congested areas in cities, above crowds of people or far away from the pilots in line of sight. Self-declaration is also possible in other countries like in Spain.

Harmonisation of rules world-wide is very important. Two bodies deserve to be highlighted: ICAO and JARUS. ICAO is the world-wide organisation for Aviation and its standards and recommended practices (SARPS) are the basis for Member States rules. ICAO has set-up a specific panel to prepare such SARPS for drones where EASA and Member States are participating and have taken an active role. JARUS is a coordination body between National Aviation Authorities (EASA, EUROCONTROL and 18 of the EASA Member States are in there but also USA, Russia, etc.). JARUS is chaired by EASA and we plan to use JARUS to do the ground work and prepare rules that can in turn be proposed to ICAO and, to EU and other countries for adoption. One significant move for JARUS will be to incorporate Industry and the Military.

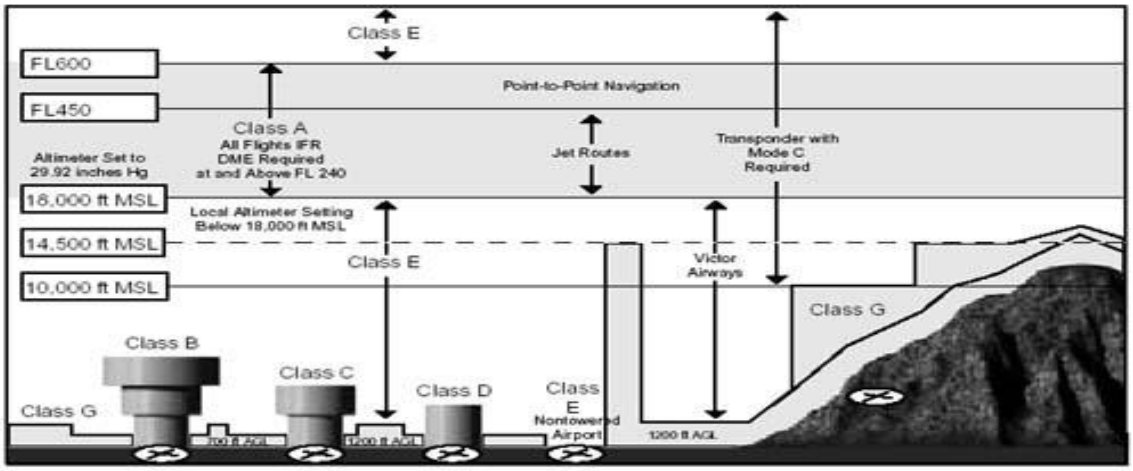
147 See higher table 2.

IV.4 How the airspace is shared among airspace users: commercial aircraft, smaller aircraft and drones – the importance of integration

Airspace is divided in several classes, from A to G. Class A is reserved for Instrument Flight Rules (mainly commercial air transport) where each aircraft receives air navigation service (i.e. an air traffic controller monitors all traffic in his zone under control). Classes B to D are given to the airspace in terminal areas. Class E is a kind of rest category – no air navigation services. Finally, Class G is in principle the lowest layers of the airspace, where each pilot has to watch for other air traffic (flying "Visual Flight Rules).

These classes start in principle as from 500ft. The airspace below 500ft has no rules – and hence would fit for (small) drone use. The integration of drones into the airspace has to be done in a different manner for the different classes of airspace and the different types of drone operation.

Graph 8: Overview of airspace classes



A flight in non-controlled airspace like class "G" under the direct view of the pilot (VLOS or Visual Line of Sight) has lower risk than the operation in the same airspace but far away from the pilots view (Beyond VLOS) because the class G airspace is used by general aviation aircraft and aerial work rotorcraft under Visual Flight Rules (VFR) and the separation with other aircraft has to be maintained by the pilot on board.

Most drone operations today in the EU ensure separation with other airspace users through the use of restricted airspace where only drones can be flown or keeping the drone at a maximum distance with respect to the pilot, under Visual Line of Sight (VLOS). This separation with respect to manned aviation has to be maintained unless it is demonstrated that the drone has the same capability to see and avoid other aircraft like the rest of aircraft with pilot on board can. The "see and avoid" technology is maturing and still needs validation. Hence the need to invest in the drone activities of the SESAR Joint Undertaking.

A stepwise approach is being followed in order to better understand the technology and ensure that the safety level of current manned aviation is not jeopardized. The ultimate goal is to fly drones under the responsibility of drone operators and cross borders in non-segregated airspace and over any populated territory.

Comparison US - EU

Approach / philosophy

military/security first	commercial/civil
tendency to give Drones specific treatment	Drones are aircraft and need to be fully integrated into the aviation system
strong vested interests approach (insider/outsider approach)	Drones will encompass, eventually, all aviation hence, drone is insider
US centred (as always)	open and internationally minded

R&D

Drones are linked into NextGen	Drones are fully integrated into the ATM Master Plan No specific Drone programme

Rulemaking

Preparation JARUS follower	Pro-active in JARUS
FAA rules (monopoly)	Combination national - EU rules Current patchwork of national rules EU rules under development EU law Commission implementing rules EASA guidance
Standards adopted by RTCA (but: not known how substantial)	EuroCAE is struggling and needs push

Timing

2015 as official deadline	2016
Delay already admitted	As from…

Operations

Military: 7,000 RPAs	???
State aircraft: ??	???
Commercial?	2,500 official operators – and growing 1 operator allowed to operate…..in Alaska Now several more: oil and film (biggest pockets)
6 US testing sites (Dec 2013)	Several testing sites, already for years incl. UK & ES.

The publication of the long awaited Notice for Proposed Rulemaking for small drones (below 25kg) on 15.01.2015 should be considered in this overall approach and philosophy. Firstly, this is just a consultation – not the publication of the rule itself. Secondly, the comparison shows that the FAA is not very favourable to smaller drones. That is well reflected in the

quite severe treatment of small drone – where the EU thinking is much more open towards the "open" category of low risk drone operations:

Pilot licence required

- No fly above people (not practical for flying in cities, the operator will have to fence the area overflown)
- Max speed and max. weight (we propose a max. weight + industry standard)
- No flights at night (in my opinion a drone could be seen at night better than during the day if it has enough lights and there are less airspace users)
- No objects can be dropped (no Amazon deliveries). We have not mentioned anything about dropping cargo, it might be better to drop rather than to land in bad weather.
- Aircraft must be registered

Also interesting:

- Wording: The pilot is called "operator", the machines are called "UAS".
- Max. weight is 25 kg with a micro UAS category up to 2 kg.

In all, the FAA has now shown its cards. The restrictive approach towards the small drones however does not mean that the US is unfavourable to drones in general. *It may be expected that the US will work hard to get bigger drones integrated in their national airspace system very soon.*

IV.5 Safety rules

Drones are aircraft – according to the ICAO. This means that the aviation rules apply to drones and drone operations. Safety rules allow aircraft to operate. This first part of this annex therefore focuses on aviation safety. The other part discusses environmental rules – some of which fall under the EASA remit.

Regulation (EC) 216/2008 – and EU rules in general – were principally conceived for "manned" commercial air traffic, as derived from the Chicago Convention, establishing ICAO and the current international aviation regulatory system in 1944. The conventional approach is based on the technologies developed after WWII. The system was able to cope with the major advance in aviation engineering and technologies, like progress in navigation[148], cockpit automation and the dramatic improvement in engine reliability. These technologies resulted in far higher reliability, safety records and a reduced number of crew in the cockpit, reducing from five in the fifties (two pilots, navigator, flight engineer and communicator) to the current number of two pilots, whose tasks are becoming more and more automated. The ICAO approach was taken over in European rules initially conceived for the A380 certification and then extended to other areas coming under EU and EASA competence.

Regulation (EC) 216/2008 is completed by other legal instruments, where the most relevant in the safety area are: (1) rules of the air, which regulate how aircraft can safely fly (based on

148 Even on the first jet powered commercial aircraft like the 707 in the 1950s required a four-crew cockpit with two pilots, an engineer and a navigator. An observation dome for star sightings assisted with navigation.

Single European Sky) [149]; (2) rules on accident investigation [150]; (3) rules on incident reporting [151] – how can we learn from safety lessons drawn from reported incidents.

The limits and the disproportionate effects of EASA detailed rules were highlighted when EASA rulemaking was extended to General Aviation, the sector of smaller aircraft, many of which are flown by their owners. "Traditionally much regulation has been blanket regulation, which aimed to cover all possible risks by saying something about everything although the vast majority of fatalities are caused by a small set of recurring causes." [152]

For general aviation, the blanket rules and their application "has led to a situation where persons participating in aviation only occasionally in their free time cannot actually remember all the rules, nor do they consider the majority of rules relevant to them." [153] The result is a culture of indifference and non-compliance. The Commission and EASA have accepted the limitations and have since 2012 started a process of simplification of rules and procedures to keep rules proportionate, to reduce the red tape of regulation and let safety oversight concentrate on the highest risks. [154]

IV.6 Insurance and liability rules

The study on liability and insurance requirements [155] confirms that general national liability laws cover drone operations. There is no harmonized liability framework in the EU. Damage caused by drones to third parties depends on national rules. Strict liability rules (i.e. the operator is liable without that the victim must demonstrate the fault) exist in the majority of EU states. For insurance, EU rules require drone operators to be sufficiently insured on basis of Regulation EC/785/2004. [156] This regulation offers a sufficiently functioning framework for insurance for drone operations. The problems encountered in practice concern the identification of the operator in case of an occurrence and the verification whether the operator was (sufficiently) insured. It may take a long time for victims to receive their compensation.

The study makes some practical suggestions, such as the need to ensure an adequate marking of the drone (e.g. fire-proof plate identifying the operator and/or the manufacturer) in order to ease the identification of the liable party, or a common insurance fund in case of an incident with an operator without insurance.

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149 Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010

150 Regulation (EU) No 996/ of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC

151 Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 Text with EEA relevance OJ L 122, 24.4.2014, p. 18–43

152 EC an EASA, "Roadmap for regulation of general aviation", Working Paper for EASA Committee, 18 November 2012.

153 IBIDEM.

154 See EASA website on the GA Roadmap.

155 Steer Davies Gleave (2014).

156 Regulation (EC) No 785/2004 of the European Parliament and of the Council of 21 April 2004 on insurance requirements for air carriers and aircraft operators

IV.7 Product safety rules

Introduction

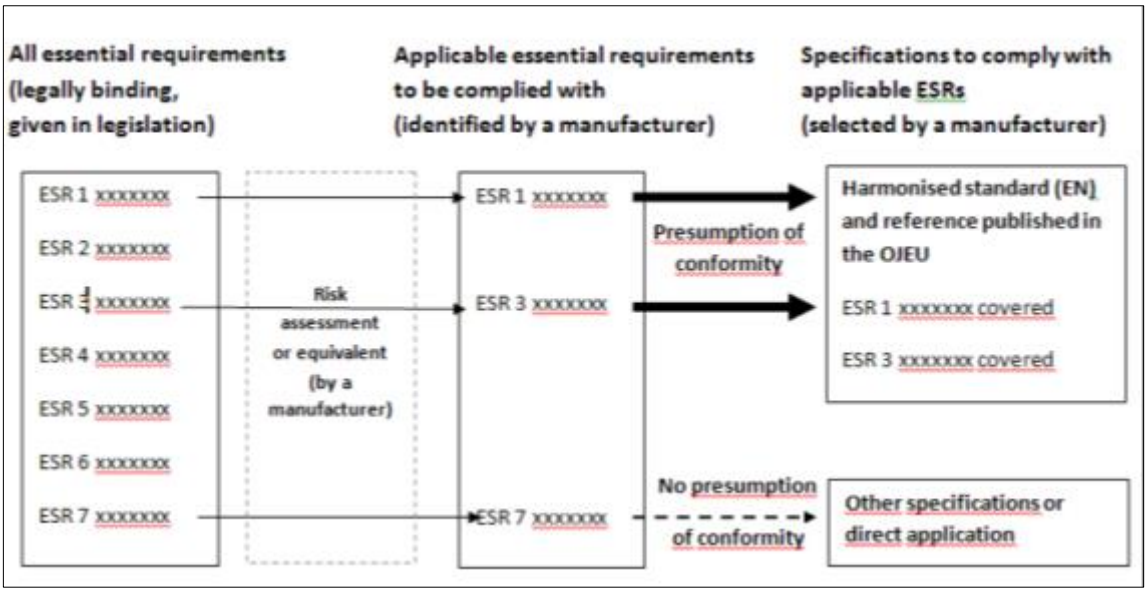
The Union Product legislation addresses product safety and other requirements insuring protection of people health. However, this legislation applies only from the moment a product is placed on the market until it reaches the end-user. Any operation or transaction by the end-user involving the product is not subject to Union harmonisation legislation. This means that this legislation can only contribute to ensure drone *airworthiness* for the operations presenting the lower risks. It must be combined with aviation rules addressing the safety of the flight to ensure the overall safe *operations*.

The Union harmonisation legislation presents the advantage that the certification of conformity falls under the responsibility of the manufacturer and not the authorities (like in general in aviation). Several legislations exist at EU and national levels to ensure that products placed on the market meet high safety, health, and environmental protection requirements.

In order to support the development of the Single Market and removal of barriers to trade, national rules have been harmonised in a number of sectors through the adoption of sector specific directives (Union harmonisation legislation).

Following the "New Approach" these directives only define essential requirements. In order to facilitate the presumption of compliance with these requirements, EU harmonized standards may be developed to define technical specifications of products that will benefit from an automatic presumption of compliance against the essential requirements covered by these standards, once published in the OJ. Compliance with harmonized standards is, however, not mandatory and other means of compliance may be used.

It is up to the manufacturer or his authorised representative (importer, etc.) to certify the conformity of its product with the relevant essential requirements of the applicable legislation. To demonstrate the conformity of its product with those essential requirements he must undertake a conformity assessment procedure, the first step of which consists in a risk assessment.



The conformity assessment procedure is defined in the legislation for each type of products. In case of low risk products or products manufactured according to EU harmonised standards this procedure can be limited to the establishment of a technical file. In other cases it may

require undertaking an EC type-examination procedure or a full quality assurance procedure with the involvement of a notified body.

Compliance with EU Product legislation is indicated by the CE marking. EEA states are not allowed to restrict the placing on the market of CE marked products, unless such measures can be justified on the basis of evidence of the non-compliance of the product.

As a general rule:

1) EU Product legislation does not apply when more specific legislation exists at EU level (however specific exemptions might be required in the legislation);

2) EU Product legislation applies when the product is placed on the market and to any subsequent operation which constitutes making available until it reaches the end-user. , **Any operation or transaction by the end-user involving the product is not subject to Union harmonisation legislation**.

Analysis of the relevant legislation

The following EU Product legislation might be relevant to drones:

a) General product requirements:
   - Outdoor Noise Directive 2000/14/EC
   - Radio Equipment Directive (RE) 2014/53/EU
   - Electromagnetic compatibility Directive (EMC) 2014/30/EU

b) Product safety requirements:
   - General Product Safety Directive (GPSD) 2001/95/EC to be replaced by a Consumer Product Safety regulation (CPSR)
   - Machinery Directive 2006/42/EC
   - Toys Safety Directive 2009/48/EC

Radio Equipment Directive (RED) 2014/53/EU[157]

Objective and scope

The aim of this directive is to protect the health and safety of the population with respect to electromagnetic emission, to ensure electromagnetic compatibility and harmful interference of radio equipment and an efficient use of radio spectrum (essential requirements, Article 3). The directive explicitly excludes airborne products falling within the scope of the Basic Regulation 216/2008/EC. The Directive will be complemented by delegated acts that define the essential requirements applicable to each category of products.

Relevance for drones

The Directive will apply to drones below 150 kg.

[157] Directive 2014/53/EU will be applicable as of 16 April 2016. Before that date the applicable requirements will be defined in the EMC and in the LVD

Electromagnetic Compatibility (EMC) Directive 2014/30/EU[158]

Objective and scope

The EMC Directive requires all electrical and electronic devices or installations to reduce the interference and disturbance with other equipment and to enhance their immunity. The directive explicitly excludes aeronautical products, parts and appliances which are covered by the Basic Regulation 216/2008/EC, from its scope.

Relevance for drones

The Directive may apply to drones below 150 kg, insofar as these are not covered by the Radio Equipment Directive.

Low Voltage (LV) Directive 2014/35/EU[159]

Objective and scope

The LV Directive ensures the protection of citizens from risks of electrical equipment with a voltage between 75 and 1500 V (direct current). It covers all health and safety risks of relevant equipment. The directive explicitly excludes specialised equipment for use on aircraft which complies with safety provisions drawn up by international bodies. For lower voltages the risks related to the use of electrical equipment are regulated under the General Product Safety Directive.

Relevance for drones

None, as far as the same risks are already covered by the Radio Equipment Directive.

Machinery Directive

Objective and scope

The overall objective of the Machinery Directive is to permit the free movement of machinery within the internal market, whilst ensuring a high level of protection of health and safety. It defines the essential health and safety requirements of a wide range of machines, parts and components. It formally excludes means of transport by the air.

Relevance for drones

158 Directive 2014/30/EU will be applicable as of 20 April 2016 and repeal Directive 2004/108/EC

159 Directive 2014/35/EU will be applicable as of 20 April 2016 and repeal Directive 2006/95/EC

In a first consultation, members of the Machinery Committee considered [160] that drones below 150 kg may be covered by the directive. Further clarification has been requested, which will also consider the applicability to remote control stations and possible gaps of essential safety requirements as currently formulated under the Machinery Directive.

Outdoor Noise Directive

Objective and scope

The aim of this directive is to protect citizens from noise emitted by specific types of equipment. It sets noise emission limits and provides a noise labelling obligation. The directive applies to a limited list of equipment, mainly outdoor machinery.

Relevance for drones

This directive does not apply to drones. The Commission has launched a study to assess a possible revision of the noise requirements and the types of equipment covered. Any change of these provisions will require the agreement of the co-legislator.

Toy Safety Directive 2009/48/EC

Objective and scope

The Toy Safety Directive lays down requirements for the safety of toys and applies to products designed to be used, whether or not exclusively intended for playing purposes, by children below 14 years. Annex I of the directive lists specific toys which are excluded.

Relevance for drones

The Toy Safety Directive does not specify whether drones are covered or not, but it can be reasonably assumed that only a limited number of very light drones of simple design do meet the definition of a toy.

General Product Safety (GPS) Directive 2001/95/EC

Objective and scope

The GPSD imposes general safety obligations which must be respected for many consumer products: "Economic operators shall place or make available on the Union market only safe products". It also establishes a market surveillance system which is tracking down and eliminating unsafe products from the European market.

On 13 February 2013 the Commission has proposed its revision[161] of this Directive in order to respond to the challenges of an increasingly global market and the need for further coordination and strengthening market surveillance activities.

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160 See minutes/opinion of the Machinery Committee as of …2015

161 COM(2013)75 final, Product Safety and market surveillance package

Relevance for drones:

Drones up to 150 kg are covered by the GPSD to the extent that the relevant risks are not covered by other EU harmonisation legislation. In return those risks which are covered by other specific harmonisation legislation, such as electromagnetic compatibility will not be covered by the GPSD.

ANNEX V – PRIVACY AND DATA PROTECTION RULES

Privacy is a broad concept referring to the right not to be observed in his/her own private life. Most drones operations (not only those involving personal data acquisition) run the risk to infringe this right. The simple fact that people see a drone operating close to them without knowing who operates it and for what purpose may create a change in their behaviour and hence infringe their right to privacy.

Privacy and data protection are two distinct but interconnected rights enshrined into the European law. The regulatory framework for privacy and data protection existing at EU level applies to drones. It is technology neutral to be able to cope with the constant evolution of technology. At national level, some Member States are considering the need to adapt some of their more specific privacy regulations (like the one on video surveillance or CCTV).

A dedicated study on privacy [162] concludes that the European and national regulatory frameworks in place are largely adequate to address the privacy, data protection and ethical impacts of drones. The problem is not the lack of rules but rather raising awareness of the drone industry about their obligations to protect privacy and about enforcing the existing regulatory mechanisms.

This view is supported by stakeholders views expressed in the public consultation which point that for privacy there is no need for new rules, but rather a better application of existing rules, with a closer collaboration between the civil aviation authorities and national data protection authorities.

In addition according to the Opinion of the European Data Protection Supervisor (see box below) "RPAS uses involving the processing of personal data constitute in most cases an interference with the right to the respect for private and family life … as they challenge the right to intimacy and privacy guaranteed to all individuals in the EU and can therefore be allowed only under specific conditions and safeguards. In any event, whenever personal data are processed by RPAS operated in the EU, which is common, the right to the protection of personal data … applies and the EU legal framework for data protection should be complied with".

In consequence, the use of drones for civil purposes must comply with fundamental rights to privacy and data protection and the related regulatory framework.

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162 See Trilateral Research (2014).

Box 8: The current privacy and data protection regulatory framework

Article 8 of the Council of Europe Convention on Human Rights ("ECHR") and Article 7 of the Charter of Fundamental Rights of the European Union ("the Charter") explicitly recognise everyone's right to respect for private and family life, home and communications. No secondary law exists at EU level concerning privacy, but Member States have developed legislations to cover specific areas (like video surveillance or CCTV). These legislations reflect the specificities of the national approaches to these different subjects.

Article 8 of the Charter recognises additional rights concerning to protection and processing (consent, access, rectification, fair processing, etc.) of personal data. More detailed rules on data protection are laid down in EU secondary legislation:
- the Data Protection Directive 95/46/EC which will likely be replaced by the proposed General Data Protection Regulation (GDPR)
- the Council Framework Decision 2008/977/JHA20 on the protection of personal data processed in the framework of police and judicial cooperation in criminal matters which might be replaced by a directive;
- and Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)

The application of the provisions adopted by the Member States pursuant to this Data Protection Directive is monitored in each Member States by the national Data Protection Authority (DPA). The DPAs gathered at EU level within the Article 29 Working Party has adopted an opinion on drones (1673/15/EN, WP 231). On its side, the European Data Protection Supervisor (EDPS) has adopted an opinion[163] *on drones in November 2014.*

163 EDPS Opinion of 26 November 2014 on the Communication from the Commission to the European Parliament and the Council on "A new era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner"

ANNEX VI : OVERVIEW OF MARKET DEVELOPMENTS AND MARKET STUDIES

VI.1 Overall developments

The development of drones started in the 1950s. Drones have been used by armed forces for decades. Recent conflicts and peace-keeping operations around the world have demonstrated their operational capacities and led to a quasi-exponential increase of military applications. Drones have become a crucial pillar for military activities. The European Summit of 19 December 2013 on the future defence policy called for enhancing Europe´s military capability including through regulatory as well as research and development activities.

But the civil applications involving drones have even bigger potential and it is expected that in the coming years civil applications will dwarf military ones.

Being remotely piloted, drones can perform tasks that manned systems would not be able to perform. They are well suited to perform long monitoring tasks (e.g. > 24 hours) or risky flights into ash clouds or in proximity of nuclear or chemical plants after major incidents. Drones can efficiently complement existing infrastructure (manned aircraft or satellites) to support governmental applications like crisis management, law enforcement, border control or search and rescue and firefighting. Drones can also deliver profitable commercial aerial services in various areas. Applications are, for instance, emerging in precision agriculture and fisheries, power/gas line monitoring, infrastructure inspection, communications and broadcast services, wireless communication relay and satellite augmentation systems, natural resources monitoring, media/entertainment, digital mapping, land and wildlife management, air quality management/control. Hundreds of potential civil applications have been identified[164]. Like the mobile phone, which was transformed from a communication device into a multi-service tool, the drones should be understood as a crossroads of innovation, which may lead to applications which are now difficult to imagine. Therefore, many more are expected to emerge once the technology is widely disseminated. Creativity, innovation and entrepreneurship will play a major role in the development of commercial aerial services.

The key technology for drones is in fact a combination of lighter materials, greater processing power, access to data, and progress in sensor capabilities. These technologies are also being used in manned aviation, where the next phase of automation is possibly the single-pilot operation. Eventually, drone technologies will feedback to manned aviation, which could, eventually, become unmanned.

In any case, drones make many more types of operations possible. As the small drones tend to gain in capability, these may take niche markets from incumbent aircraft operators or create new services, and may slowly enter the market of traditional aircraft manufacturers or operators. So could it be envisaged that smaller drones for cargo are developed, which are much quieter and hence able to also operate during the night at airport under night curfew.

The drone market is divided into the market of the platform, the aeronautical software (like navigation, surveillance, communication, stabilisation, localisation, detect and avoid, etc.), the payload (today mostly sensors), operations, and ancillary services, including training. As drone technology determines the direction of the aeronautical industry, it directs a sector of €140 bn and 500,000 European jobs (2013 figures). In addition, it may be expected that drone

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164 See "UAS Panel Process - Workshop 1 - Discussion Paper", UAVSI, Annex 5 and EC/EDA high level conference held on July 1st 2010.

operations will cover a much larger field of aerial activities than currently is the case. Aeronautical activities will also become integral part of many other industries like media, infrastructure surveillance and inspection, farming, construction, and many more.

VI.2 What is the advantage of drones today and in the future?

Today drones can already replace manned aviation when the risk of the operation is too high and cannot be mitigated by other means. Drones can be operated in contaminated or dangerous airspace, for example to gather data and support the first reaction after a catastrophe like a nuclear accident or an earthquake. They can also reach remote areas where terrestrial means of transport do not exist or are damaged and also places where normal aircraft cannot operate due to their size or performances.

Because UAVs are not burdened with the physiological limitations of human pilots, they can be designed for maximized on-station times. Additionally, drone pilots or operators can easily hand off controls of a drone without any operational downtime.

In the future the use of drones can reduce the cost of transport by air. Drones operated as freighters carrying high payloads at a lower cost reducing also the impact on the environment are becoming possible in the medium term; drones carrying small packages for the “last kilometre” could come soon (Experiments in France and Germany, Amazon plans its “Prime-air deliveries in the “near” future)

Drones may also be used as surrogate satellites (High altitude 20km) flying drones that can fly for days) in order to ensure full world Internet coverage (as promoted by Google and Facebook). Eventually drone technology will spin-off to manned aviation, where the “pilot” would be assisted by sophisticated automation or where the aircraft becomes fully automated.

Graph 10: A picture of the international supply of drone technologies

Source: Frost&Sullivan, 2015. [165]

From the demand side, EU companies want to use drone services to control costs or offer innovative services. From both demand and supply side, there is a strong European and/or global dimension. That statement is not only true for commercial users, but for all European citizens, who may buy through the internet on the global market.

Graph 11: A picture of the international demand for drone services (Unmanned Aerial Systems)

Commercial Uses for UASs

Fish and game monitoring/research	Aerial video/photography	Radiation measuring/atmospheric sampling
Oil pipeline inspection	Traffic/crowd monitoring	Search and rescue
Electrical wire monitoring	Small package delivery	Tunnel detection
Infrastructure inspection	Terrain mapping/surveying	Protection from MANPADS at large airports (Project Chloe)
Searching for natural resources	Construction site survey/monitoring	Charging wireless devices
Wildfire detection/suppression	Environmental monitoring/protection	Airborne wi-fi
Storm/natural disaster damage assessment	Archeology	Communications relays and temporary communications during outages
Man-made disaster damage assessment (i.e., oil spills)	Volcanology	Coastal/beach monitoring
Environmental change detection (floods, ice flows, erosion, etc.)	Atmospheric monitoring and measuring	Mineral detection
Flood potential monitoring	Hurricane monitoring/prediction	Avalanche monitoring/rescue
Meteorological study	Environmental rule compliance	Mining applications

Source: Frost&Sullivan, 2015.

165 Many consultants are closely following the drone market. This report regularly refers to a recent presentation of Frost&Sullivan that produced already in 2008 a report on the emerging drone market for the Commission – see Frost&Sullivan 2008.

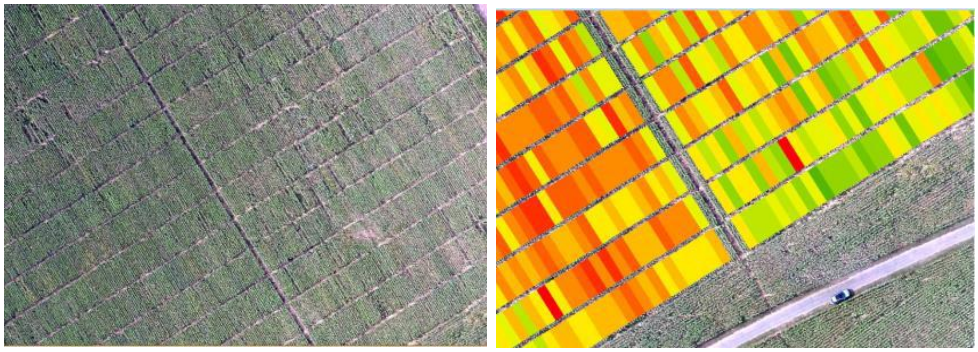
Box 6: Global market general overview: [166]

The US is strong with regard to military drones, where the US Army was an early adopter of the drone technology. The US is weaker with regard to commercial operations: the FAA still works on the basis of an exemption process. Some US companies therefore already developed their operations outside the US.
Africa has a great potential for drones, including for border patrol, wildlife conservation and agriculture.
The Asian and Pacific region has the highest number of commercial operations, especially thanks to the developed Japanese agriculture market. Australian and New Zealand markets are catching up fast, also due to the liberal rules.
The Middle East is transitioning from a drone purchasing region towards a drone developing region with strong industrial capabilities.
South American countries are steadily building indigenous drone capabilities. Brazil is the most active market.
Europe has a robust manufacturing capability, but "politics and red tape" can harm drone manufacturing and integration decisions.

Box 7: The productivity boost through precision agriculture

Farmers are confronted with ever pressing environmental requirements which impose a limited use of fertilizer or pesticides. This makes that some diseases can no longer be treated in the conventional way. Drones offer a way to apply precision farming, where the regular and detailed monitoring of crops allows for in immediate and dosed intervention, only where necessary. Affected crops could be immediately treated or out rooted. Precision agriculture based on drones produced evidence is expected to substantially improve productivity.

So could drones provide readily available information with a precision of a few centimetres on the growth evolution of plants, which enables the farmer to take immediately remedial action.



Source: Trimble

The development of drone technologies is supported by a dynamic industry. More than 400 drone developments across 20 European countries have been identified[167] involving companies of all sizes, from global aerospace and defence industries producing large systems for military and state applications to start-ups and SMEs developing small systems for commercial or corporate applications. The structure of the industry reflects the wide range of systems varying in size and performance (from the size of an Airbus 320 to a few grams).

166 See Frost&Sullivan, 2015.

167 See "UAS Panel Process - Workshop 1 - Discussion Paper", UAVSI

The development of large drones (>150 kg) has been the most dynamic growth sector of the aerospace industry[168] during the last decade. Drones technologies are a source of important spin-off to civil aviation and a key element of the future aeronautics sector. Presently, the U.S. and Israel dominate the sector although also other non-European countries show great potential to becoming strong competitors. The European aeronautics industry is still lagging behind and must quickly catch up to be able to compete on this global emerging market.

Drones are themselves multi-systems and involve a great variety of equipment and payloads. Beyond the RPAS manufacturers and system integrators the drone industry also includes a broad supply chain providing a large range of enabling technologies (flight control, communication, propulsion, energy, sensors, telemetry, etc.). The development of drone technologies is likely to create spin-offs with significant impact in many sectors.

SMEs represent more than 80% of the companies involved in the development, manufacturing and exploitation of light drone. Hundreds of developments of light drones (<150 kg) are currently on-going, often driven by start-ups, and associated with concrete applications. The expansion of the drone sector is actively supported in a number of European regions[169]. Boosted by local initiatives and policies, the cooperation between large industries, SMEs, research organisations and academia (universities) allow the development of local networks of drone expertise. Finally, innovative aerial services will help their customers to improve their own products and services or increase their own competitiveness. More than 400 drone developments across 20 European countries had been identified[170] in 2012 involving companies of all sizes, from global aerospace and defence industries producing large systems for military and state applications to start-ups and SMEs developing small systems for commercial or corporate applications. The structure of the industry reflects the wide range of systems varying in size and performance (from the size of an Airbus 320 to a few grams). This industry, part of it being unfamiliar with the aviation world, is looking to understand future regulatory developments before making further investments.

If their full potential is unleashed, drones are expected to bring important benefits to European citizens and the European economy as a whole – however, quantifying this potential is not so easy. The world market is forecasted to more than double by 2022 and represent by then $ 4,448 million per year. Europe would represent about 25% of the world market. [171] In terms of jobs, for Europe, employment is estimated to increase to about 150,000 jobs by 2050 in manufacturing [172] hence excluding drone operator services employment. In the USA, a study forecasts that in the first three years of integration of drones in the national airspace more than 70,000 jobs will be created with an economic impact of more than $13.6 billion. The number of jobs created through new drones activities in the US is estimated to exceed 100,000 by 2025. [173]

Drones therefore have a great potential to change the aviation landscape and society in general, provided that they have the proper regulatory framework to allow their development. Like any new technology, its uptake is expected to follow the typical S-curve, whose shape

168 World Unmanned Aerial Vehicle Systems Market Profile and Forecast, 2011 Edition, Teal Group

169 See for instance the AETOS cluster initiative supported by the French Aquitaine region

170 See "UAS Panel Process - Workshop 1 - Discussion Paper", UAVSI

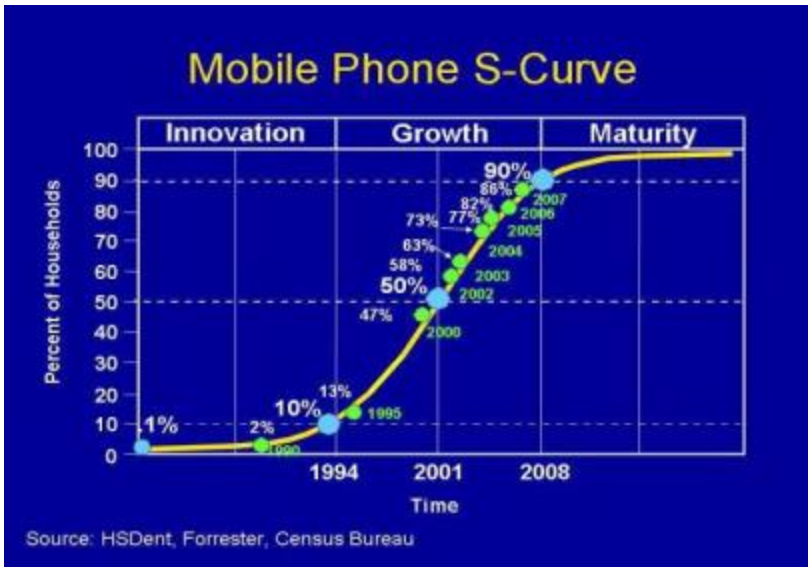
171 TEAL group 2013 Market Profile and Forecast

172 Estimate provided by ASD, the AeroSpace and Defence Industries Association of Europe.

173 AUVSI, (2013), *"The Economic Impact of Unmanned Aircraft Systems Integration in the US"*, 574p.

depends mainly on technological evolution, price and cost of major components, the regulatory framework and public acceptance.

Graph 13: S-shaped market development of new technologies



VI.4 Drone communication needs

A drone requires following communication links:

- Command and control link. Through which the drone is operated by the pilot sending commands to it. The pilot in command also receives information (control) about the status of the drone through this channel. It may be defined as a safety-critical system especially for the most stringent scenarios as those ones where the drone flies over population or surrounded by other airspace users. A safety-critical system may need to be protected in terms of frequency use.
- Payload link: The channel by which the payload information is and controlled. It will not be defined as safety-critical but protection may be needed against interception (data privacy) or jamming (security applications).
- Air Traffic Management related frequencies: ATC, ADS-B, detect and avoid, etc. The use of most of these frequencies is protected and reserved for aeronautical communications only. Drones, as any other airspace user, will just comply with the existing regulations for these systems though specific technical solutions and requirements may have to be defined.

Research is currently being carried out by SESAR Joint Undertaking to define precise requirements for all of these different links.

In general, national regulations in Europe for the use of civil drones do not define specific requirements in terms of frequency allocation. Requirements are specified in general terms, for instance, security[174] or integrity of the equipment.[175] Drones generally operate with open

174 "Spanish Estate official bulletin. Number. 163. 5th July 2014 Sec. I. Real Decreto-ley 8/2014, de 4 de julio, de aprobación de medidas urgentes para el crecimiento, la competitividad y la eficiencia"

frequencies as, for instance, aero-model tele-command frequencies or Industrial, Scientific and Medical (ISM) radio bands. These bands follow a regulation that defines maximum power emissions and the frequency band limits to use.

This is not enough for a wide, extensive and generalised use of drones in terms of Required Communication Performances and specially protection of spectrum in order to ensure no interference of the data link. Previous WRC12 and future WRC15176 has/will propose - regulatory means to facilitate the use of non-safety satellite service frequency bands for a very safety-critical application, the command and control link for drones in non-segregated airspace. Current R&D activities will identify the need of further regulatory measures for frequency allocation, especially for Line Of Sight (LOS) command and control link.

Aviation spectrum use: governance and legal requirements.

Aviation as a global and interoperable sector requires a harmonised allocation and use of spectrum. Two main international institutions have a role in regulating this at international level: ITU and ICAO.

The International Telecommunication Union (ITU), is a specialized agency of the United Nations (UN) that is responsible for issues that concern information and communication technologies. ITU coordinates the shared global use of the radio spectrum and assists in the development and coordination of worldwide technical standards. The ITU is active in areas including aviation. ITU also organizes World Radio-communication Conference (WRC) to review the use of the radio-frequency spectrum. It is held every three to four years. Last one was held in 2012. Next will be held in November 2015. UN Member States attend these WRC's.

ICAO aims at protecting aeronautical frequency spectrum for all radio communication and radio navigation systems used for ground facilities and on board aircraft. Therefore, ICAO defines its position at WRC's addressing all radio-regulatory aspects on aeronautical matters on the agenda. The ICAO Position for the ITU WRC's is developed with assistance of the Aeronautical Communications Panel (ACP) Working Group F (frequency). Member States and international organizations are requested to make use of the ICAO Position, to the maximum extent possible, in their preparatory activities for the WRC's at national level.

At EU level, The Network Manager, as one of its functions described in regulation 677/2011, will also provide the central function for the coordination of radio frequencies. NM is cooperating with the ICAO regional (EU) group, the FMG. DG MOVE can directly liaise with ICAO (in coordination with NM) to promote an EC position.

DG CNECT has the role of counsellor to CEPT ("Conférence européenne des administrations des Postes et Télécommunications") in which EU Member States (but also other states such as Russia) are represented. CEPT coordinates its MS's position to be submitted to ITU.

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175 "JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE Texte 8 sur 308 10 mai 2012 2.6. Intégrité du système de commande et de contrôle de l'aéronef télépiloté"

176 ICAO Position for the ITU WRC-15. Agenda item 1.5

With this in mind, the way in which EC position in aviation frequency use can be represented at WRC is triple: through ICAO, through CEPT (both entities will promote EC position to corresponding MS) and directly through EU Member States.

At national level, the frequency managers, and/or ANSPs are in charge of ensuring that regulation is followed by spectrum users by providing access to it and monitoring its use.

VI.5 Overview of existing studies

Most studies focus on military applications and the manufacturing industry. In addition, they have a limited European coverage.

Frost & Sullivan

This study (Part 1, Part 2) was commissioned by DG ENTR in 2007. It is not as such a market study. It's main purpose is to identify the necessary actions to support the development of this technology in Europe.

Teal Group

1) Market forecast 2014 -2024 (1.995 $)

Teal publish a yearly update of their global market forecast. Mainly focussing on military; recent editions cover payloads as well. The general conclusions of this study are broadly shared by other studies.

2014: $6.4 billion
2024: $11.5 billion (doubling) , 86% military and 14% civil
Cumulative: $91 billion in the next ten years (89% military, 11% civil)
US will account for 65% of total worldwide RDT&E spending on UAV technology over the next decade, and about 41% of the procurement

Market and markets

2) UAV Market Forecast & Analysis to 2014 - 2020 (4.650 $) **10/14**

The Unmanned Aerial Vehicles (UAV) market research report includes the detailed study of the UAVs in the defence, commercial, and homeland security sectors. This report provides a detailed analysis of the UAV market, during the next six years. It discusses about the industry, market, and technology trends that are currently prevailing in the UAV market.

The UAV market report analysis categorizes the global UAV market on the basis of class, sub-systems, payloads, applications, funding, regional, and country analysis This study covers some European countries. It is interesting for its methodology, in particular segmentation of UAV classes and the choice of applications.

The UAV market over the next few years is expected to exhibit a robust growth of 7.73%, during 2014 to 2020. The global Unmanned Aerial Vehicle (UAV) market is valued at $6,762 million in 2014 and is expected to show a robust growth, reaching $10,573 million in 2020, thereby registering a CAGR of 7.73%, till 2020.

3) Small UAV Market - Market Forecast and Analysis (2014 – 2020) (4.650 $) 2/14

By Application (Military, Commercial & Civil, Homeland Security), by Payloads, by Propulsion System, by Geography

This report provides a complete analysis of small UAVs for civil, military and security applications for the next five years. It also gives insight into the regional trends for spending and analysing the market share. It provides in-depth analysis of small UAVs on the basis of various payloads used like nuclear, biological and chemical detection, meteorology, telemetry systems and camera systems. It talks about the leading competitors in the small UAV market and apart from the general overview of the companies; it also provides financial analysis, products & services, and key developments.

The global small UAV market is estimated to be $218.10 million in 2014 and is expected to be $582.20 million by 2019. The market demand for small UAV technology is increasing because it is considered as an effective, low-cost alternative to manned aircraft. The market overall has numerous players for mini UAVs from Europe and the U.S. The players from these regions have the technical know-how and have the capability to bring updated applications in the market. The current trend of the market is its transition towards faster and efficient payload systems that have the ability to reduce the weight of the UAV significantly.

Socolofi Research

4) International Military and Civilian Unmanned Aerial Vehicle Survey, 8/14 (840$)

The fourth edition of the annual International Military and Civilian Unmanned Aerial Vehicle Survey identifies, assesses and provides market intelligence on all of the world's operators and manufacturers of unmanned air systems with profiles for over 700 different UAVs aimed at the civilian and military market. Major programmes, requirements and other areas of relevance are assessed to provide a detailed picture of the development and operation of these systems.

Strategic Defense Intelligence

5) The Global UAV Market 2015-2025 , **1/15** (4800$)

The Global UAV Market 2015-2025 Report, provides readers with a detailed analysis of both historic and forecast global industry values, factors influencing demand, the challenges faced by industry participants, analysis of industry leading companies, and key news.

The Global UAV Market is expected to experience a CAGR of 5.66% during 2015-2025. North America and Europe are expected to be the largest UAV markets, with a cumulative market share of more than 67%. The UCAV segment is expected to dominate the UAV market, with a share of 34%

6) Current Trends and Future Business Dynamics – UAS, 5/14 ($)

"Current Trends and Future Business Dynamics - Unmanned Aerial Vehicles/Unmanned Aerial Systems (UAV/UAS)" is a new report by SDI that globally analyzes UAV/UAS industry demand prospects, key markets, top investment regions, major challenges. This report also examines trends which are currently affecting the industry. Furthermore, it highlights key application areas and identifies UAV types which are projected to witness increased investment.

Globally, demand for UAVs/UASs will increase by an average of 19% over the next five years. The highest percentage of industry players foresee the future of UAV/UAS shaped by usage in non-defence areas. 'Surveillance' will be the largest application area for UAVs in the military domain over the next five years. 'US', 'China' and 'Russia' will record highest increase in demand for UAVs over the next five years.

LUCINTEL

7) Global UAV Industry 2012-2017: Trend, Profit and Forecast Analysis, June 2012

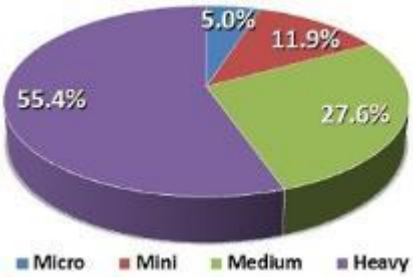
Study rather similar to the one from TEAL.

The global UAV industry experienced a robust growth over the last five years and is expected to continue its growth momentum reaching approximately US $10.7 billion in 2017.

Market info group

8) The Future of Unmanned Aerial Vehicles in Europe – Civilian and Military Market Outlook – 2013-2021, 10/12, (4.995 $)

This report analyses the state of Unmanned Aerial Vehicles (UAVs) in Europe with a focus on the defence and government applications market, and gives an overview of the future of private UAV markets. Specifically, the report examines, analyses, and predicts the evolution of technologies, markets, and outlays (expenditures) associated with UAVs manufactured and/or flown by these European countries: UK, France, Germany, Italy, Netherlands, Spain, Switzerland, Turkey, Sweden, Belgium, Greece, Romania, Denmark, Czech Republic, Finland, Bulgaria, Poland, Norway, Austria.
For each examined country, this report covers, in depth, these market sectors: Communications •Agricultural •Industrial •Fire Fighting •Border Control •Security and Law Enforcement
This work focuses specifically on benefiting government and private industry leaders who need to guide their institutions toward opportunity or away from risk. For their benefit, we include "Opportunity Alerts" in a number of places where such foresight will prove especially profitable.



UAVs in Europe – Military Market by Technology – 2020

9) Unmanned Aerial Vehicles (UAVs) for Commercial Applications Global Market and Technologies Outlook – 2011-2016 , 11/2010, (4.995 $)

This study is already a bit old but is focussed on commercial applications

Military and para-military applications for UAVs certainly came first and will remain the more mature for the next few years. But UAVs for Commercial Applications promise to soon generate an order of magnitude more economic activity than their

military predecessors. This report provides you with the data and analysis needed to understand a truly unique market. It does so by combining the background, technical explanations, government regulations and qualitative analysis that make the picture come alive. Readers benefit from realistic perspectives based on decades of front line experience. This is not the wishful thinking of industry associations. This insight produces three separate and plausible market Scenarios that, together, prepare readers for any likely market change over the next five years. The report covers all types of UAVs: •Stratospheric UAVs •Jet Stream UAVs •High Altitude UAVs •Medium Altitude UAVs •Low Altitude UAVs •Micro UAVs •Aerostats
The report identifies, analyses and forecasts these Commercial UAVs topics, among others: •Global On-Demand Imagery & Sensing Market •Global Persistent UAV Communication Market •Global Internet Access Served by Persistent UAVs Market Value by Region •Global Satellite Entertainment Revenue Forecast by Region •Payloads Overview and Analysis •Sensor Coverage Analysis •Suggested Operating Concepts •Market Forecasts by Market Sector •Market Forecasts by Region •IPTV Opportunities Analysis •Market Forecasts by Technology

Business Insider

10) THE DRONES REPORT: Market Forecast For The Growing Business Opportunity In Commercial Aerial Drones

The study predicts that 12% of an estimated $98 billion in cumulative global spending on aerial drones over the next decade (2013 – 2023) will be for commercial purposes.

WinterGreen Research

11) Commercial Drones Market (price 4.000 $) **1/15**

The study is designed to give a comprehensive overview of the commercial drone market segment. Research represents a selection from the mountains of data available of the most relevant and cogent market materials, with selections made by the most senior analysts. Commentary on every aspect of the market from independent analysts creates an independent perspective in the evaluation of the market. In this manner the study presents a comprehensive overview of what is going on in this market, assisting managers with designing market strategies likely to succeed.

Commercial Drones: Markets Reach $4.8 Billion By 2021

Visiongain

12) Small Unmanned Aerial Vehicle (UAV) Market 2014-2024 (price 4.000 $) **6/14**

Potential for Micro, Mini, Nano & Hand Held Drones in Military, Law Enforcement, Security & Civil Applications

The comprehensive report contains highly quantitative content, delivering solid conclusions benefiting your analysis and illustrating new opportunities and potential revenue streams to help you remain competitive. This definitive report will benefit your decision making and help to direct your future business strategy.

The small UAV market is likely to become one of the major economic and technological stories of the modern age, because of the wide variety of applications and the added value related to these unmanned machines. However, the world market for small UAVs is currently being restrained, largely by regulation of unmanned operations in civilian airspace. But impending regulatory changes are expected to unlock the huge potential of this technology. The report's analysis indicates that the small UAV market sector will reach $1.33bn in 2014 with significant potential for growth. Growth will be defined by the pace of development for UAV technology in the different countries, and will be driven by demand for small UAVs from across a range of lucrative sector applications.

13) Top 20 Unmanned UAS Companies 2014, 5/14 (2914$)

Although increasingly competitive, the global UAV market is currently highly consolidated with a few leading companies dominating global sales. Primarily this is a result of US dominance of the market over the past decade. However, incumbent positions are increasingly under threat from new and existing competitors offering a range of cost–effective UAV capabilities and innovative technologies. Considerable uncertainties will characterise the UAV market in the near future, especially regarding the uncertain legal and regulatory framework governing commercial UAV use.

AUVSI

AUVSI, the US industrial drones' association commissioned this study when FAA got the mandate to develop drones' regulation. It is limited to US and concludes that agriculture will be AUVSI's findings show that in the first three years of integration more than 70,000 jobs will be created in the United States with an economic impact of more than $13.6 billion. This benefit will grow through 2025 when we foresee more than 100,000 jobs created and economic impact of $82 billion. The study is however Contested.

Other market info

Small report UAV RoudUp 2013 ,
2015 CES Trends to Watch
National studies (ex: France and security market)

ANNEX VII– RIGA DECLARATION

RIGA DECLARATION
ON REMOTELY PILOTED AIRCRAFT (drones)
"FRAMING THE FUTURE OF AVIATION"
Riga - 6 March 2015

Today Europe is taking a decisive step towards the future of aviation. The European aviation community gathered in Riga to exchange views on how, and under which conditions, drones can help create promising new opportunities in Europe, offering sustainable jobs and new prospects for growth both for the manufacturing industry and for future users of drones in all sectors of society. Drones offer new services and applications going beyond traditional aviation and offer the promise to perform existing services in a more affordable and environmentally friendly way. They are a truly transformational technology.

The Latvian Presidency of the Council of the European Union, European Commission representatives, Directors General of Civil Aviation of the EU Member States, data protection authorities and leaders of manufacturing industry and service providers confirmed the importance of joint European action, building on the orientations given in the EC Communication on opening the Remotely Piloted Aircraft Systems (RPAS) market.[177]

The aviation community stressed the necessity for European regulators to ensure that all the conditions are met for the safe and sustainable emergence of innovative drone services. At the same time regulations must help the industry to thrive and adequately deal with citizens' concerns.

The aviation community established the following principles to guide the regulatory framework in Europe:

1. **Drones need to be treated as new types of aircraft with proportionate rules based on the risk of each operation.**

The provision of drone services must not be less safe than is accepted from civil aviation in general. The incremental integration of drones in the aviation system must not reduce the level of safety presently achieved in civil aviation. Although no-one is on board the drone, people in other aircraft or on the ground could get hurt in case of an accident or an unscheduled landing. The way safety is regulated must be proportional to the operational risk involved.

Rules should be *simple and performance based*, to allow a small start-up company or individuals to start low-risk, low-altitude operations under minimal rules and to develop, with light-touch risk-based regulation, similar to the modern product safety regulations applied in other sectors. Higher risk operations would be gradually subject to more stringent regulations or operational limitations. At the other end of the spectrum, where the operational risk is highest, such as with large drones operating alongside manned aircraft, the regulation will need to be quite similar to that applying to manned aviation, with strict standards on the

177 COM(2014)207 on a New era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner. See also the EESC opinion TRAN/553 of 15 October 2014.

design, manufacturing, maintenance and operation of drones, as well as on the training of drone pilots and maintenance personnel.

2. **EU rules for the safe provision of drone services need to be developed now**.

Safety rules, including on remote pilot and operator qualifications, should be developed at the European level by the European Aviation Safety Agency, building on the experience developed in the EU Member States. The essential requirements should be *harmonised at the global level* to the maximum extent possible, and full use should be made of the established cooperation in the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) and at ICAO, and should be completed by international industry standard setting bodies. Important efforts need to be put into resourcing these activities, especially JARUS, in order to ensure that the progressive risk-based approach is consistent with what is done in the rest of the world.

This basic regulatory framework should be put in place without delay, in order to help the private sector to take well-informed investment decisions, and to provide a basic set of rules for the many operators who are increasingly eager to begin providing services. The *European Aviation Safety Agency* should consult stakeholders by the middle of 2015 on the regulatory framework for the operations of drones and on concrete regulatory proposals for low-risk operations. *By the end of 2015*, the Agency will use the results of the consultation to propose a position on these matters. The proposal for the revision of the basic European Safety Regulation, which the European Commission has announced for 2015, should contain the necessary new provisions and essential requirements for the progressive risk-based regulation of drones, based on the Agency's recommendations.

3. Technologies and standards need to be developed for the full integration of drones in the European airspace.

The success of drone activities and safety regulations also depends on the financial effort to develop and validate key missing technologies and the ensuing required standards. Both industry and public authorities stressed the need for *adequate investment* in the technologies that are required to integrate drones into the aviation system – the SESAR programme. CleanSky and other initiatives should complete the SESAR investments. That would create spin-off benefits for traditional aviation and so frame the future of flying.

4. **Public acceptance is key to the growth of drone services.**

The respect of *citizens' fundamental rights*, such as the right to privacy and the protection of personal data, must be guaranteed. Many drone services involve data-gathering such as filming, etc. The responsible authorities, such as the national and European Data Protection Authorities, should develop the necessary guidelines and monitoring mechanisms to ensure the full respect of existing protection rules, including in relation to drones. Rules need to clarify what is acceptable and what is not, and they require to be properly enforced.

Drones may cause nuisances and negative externalities, such as *noise*. These nuisances need to be addressed, possibly at the local level, to maintain public acceptance.

Drones also pose potential *security* risks. The design of drones can and should take into account those risks by using methods such as cyber-defence or geofencing. However, the malicious use of drones cannot be entirely prevented by design or operational restrictions. It is the task of the national police and justice systems to address those risks.

5. **The operator of a drone is responsible for its use.**

When a drone service is delivered in prohibited airspace, in an unsafe manner, or for illegal purposes, the authorities should be able to act and hold the operator accountable. Where lacking, this will need to be clarified in national law. Moreover, in order to enforce

responsibility, it will be necessary for drones to have at all times an *identifiable owner* or operator. The regulator should seek the least bureaucratic way to achieve this. For instance, the mandating of electronic identity chips on drones – "IDrones" – as is today envisaged in some states, could be formalised through a safety rule, which would contribute to the effective implementation of privacy and security requirements. Standardised web-portals in the Member States for the registration of operators and their operations could be another solution. The involved authorities need to work closely together.

Drone accidents will happen. Member States should clarify the applicable *insurance* and third-party liability regime and monitor the compensation mechanisms for potential victims. The establishment of compensation funds to cover victims of accidents caused by uninsured drone users, as used in the motor insurance sector, could be envisaged. *Reporting* on drone incidents should be integrated into the overall incident reporting requirements. Systematic and coherent incident reporting will improve safety and will be instrumental for insurance companies in their risk analysis on which third party liability insurance premiums are based.

To allow a short reaction time, the development of drone services and drone technologies needs close monitoring. To this end, the EU should establish an easy access for SMEs to information required for drone manufacturing and service provision, together with an observatory to keep track of the growing number of operations in Europe and the evolution of innovation. This monitoring will permit informed decisions relative to the establishment of priorities for future legislation. It will also help regulators to learn from experience and verify that the rules are fit for purpose, namely to ensure that new technologies and drone services can develop in full respect of the required high levels of safety, security, privacy and environmental protection. An annual progress report should be published.

The European aviation community gathered in Riga today is committed to working together on the basis of these principles to allow businesses to provide drone services everywhere in Europe as from 2016 onwards.