About the Royal Aeronautical Society [RAeS]

The Royal Aeronautical Society (the Society) is the world’s only professional body and learned society dedicated to the entire aerospace community. Established in 1866 to further the art, science and engineering of aeronautics, the Society has been at the forefront of developments in aerospace ever since.

The Society seeks to; (i) promote the highest possible standards in aerospace disciplines; (ii) provide specialist information and act as a central forum for the exchange of ideas; and (iii) play a leading role in influencing opinion on aerospace matters.

The Society has a range of specialist interest groups covering all aspects of the aerospace world, from airworthiness and maintenance, unmanned aircraft systems and aerodynamics to avionics and systems, general aviation and air traffic management, to name a few. These groups consider developments in their fields and are instrumental in providing industry-leading expert opinion and evidence from their respective fields.

About this paper

The aim of this paper is to provide a politically independent and non-commercial analysis of the complex area of technical and safety regulation of aviation and aerospace (and not economic regulation or access to routes) across Europe to raise awareness of the importance of ensuring that whichever regulatory regime is agreed by March 2019 does not disrupt the air travelling consumer, business performance and, ultimately, the UK economy.

This paper sets out how the European aerospace regulatory regime came about and why, how the transition from national to supra-national regulation went and what the costs and benefits of the current arrangement provides the UK and European countries. Finally, the paper will discuss some of the options the Society sees available to the UK and EU institutions to ensure that whichever path is chosen, it does not lead to a diminution of commercial success, consumer choice and, most importantly, safety standards either in the short or medium term.

This paper has been compiled with the input from experts from within the Society in the fields of, among others, airworthiness and maintenance, aviation law, airline economics, air transport, air traffic management, flight operations, general aviation and unmanned aircraft systems.

This paper issued to a wide range of stakeholders, including politicians, civil servants and officials, industry leaders as well as the press and media.

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# CIVIL AVIATION REGULATION: WHAT FUTURE AFTER BREXIT?

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Aerospace1 is a global, interconnected industry. Through international supply chains, mobile workforces and flexible business models, provides a modern, competitive service for business and leisure customers. The UK has the second largest civil aerospace sector in the world, generating £32bn of turnover2, and can boast the biggest aviation network in Europe, and the third largest in the world, while London has the busiest airport system of any city in the world3.

A global air transport service requires a global regulatory framework. The International Civil Aviation Organization [ICAO] provides this framework through a regime of standards and practices. These standards and practices need to be interpreted and enforced at the national level. In the case of Europe, as the manufacture and operation of aircraft, air travel and air traffic management, and – what is seen by many as the most significant emergent growth area of aviation – unmanned aircraft systems, have become more international, regional organisations have become critical enablers of efficient supply chains and new business models, providing consistent regulations and safety management.

Aviation is a safety-critical sector and innovation within the European regulatory regime for this economically important industry has contributed to UK and European industry global competitiveness and influence, while flying today is safer and offers more consumer choice than ever before.

As the UK and EU grapple with delivering Brexit, it will be important that decision makers and negotiators are fully aware of and understand the complexities of European aerospace and aviation regulation before all Member States agree on the future status of the UK vis-a-vis the EU regulator – the European Aviation Safety Agency [EASA].

Today, the UK is inextricably linked with EU Member States [and some non-Member States] on aerospace and aviation regulation. If continued UK membership of EASA cannot be agreed, those negotiating Brexit on both sides need to fully understand the implications and likely impact. The process of reconstituting the UK CAA so that it has the competence to carry out, and be seen to carry out, those aspects of a National Aviation Agency’s [NAA] role currently delegated to EASA will be a mammoth challenge.

As a registered charity, non-commercial and apolitical organisation, the Royal Aeronautical Society is well placed to provide a balanced assessment of the current regulatory regime and provide recommendations. The Society and its members hope that this paper provides a valuable contribution to the complex negotiations underway and serves to help secure the best outcomes for the people that use and are involved in this critically important sector.

Air Chief Marshal Sir Stephen Dalton GCB LLD [Hon] DSc[Hon] BSc FRAeS CCMI
President, Royal Aeronautical Society

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1 Includes civil and defence aerospace and aviation.
3 Department for Transport [2017] Beyond the horizon; The future of UK aviation. London, HMG.
Executive Summary

Aerospace is today trans-boundary in nature at an industrial level and via air links crossing the globe, transporting people and goods to developed and emerging markets. For this key contributor to the UK and EU economies and economic growth to operate with maximum efficiency and safety, requires a common set of harmonised rules.

The creation of common aviation legislation and regulations in Europe, which started through co-operation agreements 50 years ago, has been positive for aviation safety not only in Europe, but on a global level as well. It has supported the continued success of the European [including the UK] aerospace industry in the global market products and services. Reciprocally, it issues European certificates for non-European products.

From a safety perspective, co-operation across national boundaries has brought strong confidence to authorities and the public about how safe it is to fly. Through a high, consistent level of aviation safety across Europe, the number of accidents has fallen over the years and so has the number of fatalities.

Flight safety internationally benefits from European co-operation that brings virtually all of Europe onto one level playing field. European regulations are largely harmonised with those of US and Canada through a collaboration based on mutual trust with the respective national authorities. The close working between EASA and its bilateral partners [USA, Canada and Brazil], based on mutual trust and a harmonisation of regulation, stands as an example to the rest of the world’s aviation community.

Far from diminishing UK influence in global aviation, the EASA regime has provided a conduit for UK influence on aviation safety and security around the world; indeed, the UK has been a major driver of ever-closer alignment on regulatory

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It is critical to the aerospace sector that following Brexit there is an aviation regulatory regime in the UK and Europe that allows industry to be competitive and develop innovative products, that supports the provision of a choice of quality services for the consumer, and allows aviation safety standards to be maintained and improved using the latest technology. Moreover, for the UK there needs to be a fully-functioning regulatory system from day one – 20 March 2019 – otherwise there could be disruption to air travel and business operations impacting the air travelling consumer, business performance and, ultimately, the UK economy.

This paper identifies three options open to the UK and the EU. The UK could: [i] remain a full member of EASA; [ii] take an off-the-shelf participation option as Switzerland and Norway have done; or [iii] withdraw from EASA and repatriate all regulatory powers back to the UK Civil Aviation Authority, potentially contracting some activities back to EASA. Transition arrangements would be needed with these having to be extensive for the third option for the UK and the EU aviation sectors to achieve the safety, consumer and industry outcomes outlined above in both the short and the long terms.

The case for the first option is very strong: the UK should remain within EASA.

matters across Europe and the negative impacts of its withdrawal would be felt across the continent, to such an extent that EASA would likely be diminished in stature as an organisation.

The EASA system is not without its imperfections. Its requirements for the General Aviation community have been described as over-burdensome and disproportionate; however, this has also been said of the UK Civil Aviation Authority and positive changes in this respect have recently been implemented in Europe and the UK.

As the UK Government commits the country to honouring the 2016 EU referendum result to leave the Union, it is vital the UK seeks to maintain its influence on the development of aviation rules across the globe. Currently this influence is achieved to a significant extent through the EASA rulemaking programme, and through EASA with other countries such as the USA and China. A key outcome of negotiations should be to preserve as far as possible influence on the regulation-setting process within EASA. The UK and EU must also avoid regulatory divergence on safety rules between any separate UK regime and EASA, which would undermine UK competitiveness, create barriers to trade and investment and compromise the achievement of continued safety improvement.
Role and Development of EASA

Global Standards for a Global Industry

The regulation of the global aerospace industry begins at the global level. The Chicago Convention, a multilateral treaty signed on 7 December 1944, established the Provisional International Civil Aviation Organisation [PICAO], which in 1947 became the International Civil Aviation Organisation [ICAO], now a specialised agency of the UN. The main purpose of ICAO is to enable the ‘safe and orderly development of international civil aviation’\(^6\). To undertake International Air Transport activities, each nation must be a signatory. The UK is a signatory to the Chicago Convention and, therefore, has obligations to honour.

Standards and Recommended Practices [SARPs] agreed at the ICAO level must be interpreted and enforced by National Aviation Authorities [NAA], or in the case of Europe today, the regional organisation – EASA via regulations agreed by the European Union institutions. Prior to 2002, the UK met this need through its NAA, the UK Civil Aviation Authority [CAA], albeit abiding by the JAA [Common European] Regulations.

The NAAs of countries which are part of the EU have retained a limited number of functions in relation to:

[i] safety oversight of national industry against EASA rules and standards.

[ii] the grant of production, maintenance and training approvals.

[iii] oversight of aviation safety falling outside the EASA regime.

Concept of European Co-operation

Historically, Europe has provided a high level of flight safety. One contributor to this may be that Europe started to move towards harmonised rules, developing its own rules incrementally, with the UK being one of the major driving forces behind the creation of a common set of regulations.

In the 1950s, the national regulator of Sweden, Norway and Denmark created Skandinavisk Tilsynskontor [STK], a joint inspection office between the three Scandinavian civil authorities, created specifically to oversee the operations of a consortium of the three national flag carriers. In the 1960-70s, Concorde and the Airbus A300 were certified using common standards by the UK and France. In the 1980s, the Airbus A320 was certified through requirements set by a team of four national authorities. Finally, in the 1980-90s, restrictions on the movement of goods and people across national boundaries, that hitherto had hindered the cross-border movement of maintenance, services, aircraft and licensed

States began to harmonise their requirements and practices via the Joint Aviation Authorities (JAA) which began work in 1970 [when it was known as the Joint Airworthiness Authorities]. The JAA, the ‘Arrangements’ document for which was signed by Members States in 1990\(^6\), provided a pragmatic approach to achieving a pan-European aviation regulation; however, differing national interpretations of harmonised standards limited the efficiency of regulation and increased compliance costs for the sector, undermining the competitiveness of the European aerospace sector.

Despite significant JAA achievements on harmonisation of type certification of large aircraft, approved maintenance organisation and operations and licensing, the JAA was frustrated by national habits, disparate languages and different adoption/implementation rates.

As a result of the shortfalls of the JAA approach, discussions on the establishment of a European safety body in the EU began in 1996 but it was only in 2002 that the EU decided to create EASA as a self-standing Community body constituting the centrepiece of the EU aviation safety policy\(^7\), believing it would provide a significant improvement in the execution of certification and rulemaking tasks. It would also reduce fragmentation at the international level, by providing the global aviation community with a European interlocutor with enhanced authority and credibility\(^8\) and, crucially, legal personality.

**From JAA to EASA**

With the intention of preserving the JAA legacy, ie worldwide reference regulations, a spirit of co-ordination and co-operative rule-making, the EU decided to introduce legally binding rules across all Member States. Through Regulation [EC] 1592/2002\(^9\), the EU established EASA, a separate legal entity, with its own organisation and management, and empowered the new regulator to develop and manage common EU rules for the airworthiness and certification, and for technical maintenance of aircraft and other aerospace products, as well as for environmental issues.

European Commission Regulation [1592/2002 – Basic Regulation] provided the foundations,

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\(^{6}\) JAA Training Organisation: The European Joint Aviation Authorities.

\(^{7}\) European Commission, DG Mobility and Transport: Air – European Aviation safety Agency (EASA).


The harmonised European regulatory regime has supported the growth and success of many companies including pan-European companies, such as Airbus and Leonardo, as it provides single approvals/uniform regulations within Europe, and a single source for regulatory policy and regulatory development. The level of harmonisation of EASA and FAA rules has also assisted European companies, reducing the work and costs required to sell products developed in Europe to operators based in the USA and in other countries that base their regulations on those of the USA. European and US joint ventures such as the CFM56/LEAP\textsuperscript{14}, a family of high-bypass turbofan engines, and the IAE V2500\textsuperscript{15}, two-shaft high-bypass turbofan engine, which powers the Airbus A320, McDonnell Douglas MD-90 and the Embraer KC-390, have also benefited from the high level of harmonisation between EASA and FAA rules.

A Smooth Transition?
The transfer of responsibilities from the UK CAA to EASA in 2003, when the European regulator first acquired significant responsibilities, was not a

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\textsuperscript{14} CFM International: The CFM56 Engine.
\textsuperscript{15} International Aero Engines: The V2500 Engine Program.
should the UK CAA be asked to take back control of the activities currently with EASA rather than an indication that EASA is problematic today. It is also important to note that the transition of the full range of activities that EASA is responsible for today has taken place over many years, as outlined in the next section. A shorter transition, should the UK CAA take back all regulatory activities, can be expected to be more difficult to achieve without impacting safety, consumers or industry.

Getting to EASA today

At the establishment of EASA it was the explicit intention that the Agency would gradually extend its remit to Flight Crew Licensing [FCL] and Airline and Airports Operations [OPS].

The first expansion of EASA’s remit [first extension] was formalised by the regulation [EC] 216/2008 that terminated and replaced the original basic regulation [1592/2002]. Several of [the material] decisions of the 1592-regulation were continued in the 216-regulation. The novelty of the
Every NAA, which is home to an operator of an aircraft, must satisfy itself that the aircraft meets the appropriate certification standard. The achievement of EASA or FAA certification is generally a pre-requisite to this, hence essential for the aircraft manufacturer and system suppliers to achieve foreign sales. The Chinese are intent on challenging the dominance of European and US aircraft manufacturers but neither the FAA or EASA have certified yet a domestically-built Chinese passenger aircraft as they do not currently recognise Chinese certification procedures, which has limited the countries to which China can sell its aircraft. Chinese aerospace companies and EASA are forging closer ties over aircraft manufacture and certification supported by European aerospace companies which wish to have a more straightforward route to market in China and the Chinese aerospace industry, which wishes to expand its sales globally.

As states, like China and Russia, and companies try to enter or increase their footprint in the competitive global aerospace market and challenge European and US pre-eminence, their national regulators will have an important role to play in creating favourable conditions for firms to succeed. Due to the positive international reputations of EASA and FAA standards, national regulators for these emerging players and states are typically not developing their own standards but are basing their safety regulations on those of the EU and US. This is partly because the EASA and FAA regulations have resulted in safe aviation, with a level of regulation which is, for the most part, not overly burdensome on industry, and partly because if aircraft are going to be operated in Europe, the USA, or any other country which recognises their regulations, then the EASA and FAA regulations will need to be met.

Global Leadership of Aviation Safety

Aviation safety is increasingly a co-operative, global effort. EASA partners with civil aviation authorities, and regional and international organisations to enhance aviation safety worldwide, support the free movement of European products and services and promote European and global safety standards. In addition, EASA sponsors European Commission bans on foreign airlines that fail to meet the regulatory oversight standards of the EU from operating to and from the EU, providing protection for UK and European passengers.

Today, EASA is recognised along with the US Federal Aviation Administration (FAA) as one of the two pre-eminent civil aviation regulators.

216-regulation is primarily that it expands the EASA remit to include air operations [OPS], certification of flight crew [FCL], requirements for aviation organisations [OR], requirements for government supervisory authorities [AR] and requirements for third country operators [TCO]. The expansion of EASA's remit took a third step through the regulation [EC] 1108/2009. The regulation changes the basic regulation 216/2008, and extends EASA's remit to include airports [aerodromes], air traffic management [ATM] [See Appendix B] and air navigation services [ANS].

The EASA Basic Regulation is currently under review within the EU with a further revision planned for 2018. While still under discussion, this revision is likely to make EASA's role at the international level clearer, including more explicit requirements related to the European Aviation Safety Plan, and allow new products/technologies that threats, such as drones and cyber security, to be addressed.

23 European Commission, DG Mobility and Transport: Air – The EU Safety List
ground-handling, RPAS [remotely piloted aircraft systems, more commonly known as drones] and security, in order to cover, in a comprehensive way, all aviation-safety related topics’ and be more proportional, flexible and proactive to increase the level of safety in European aviation. The revised Basic Regulation mentioned above will introduce some elements of the Vision 2020 proposals.

Paying for EASA

EASA is an agency of the European Commission; however, in contrast to nearly all the other agencies, a large proportion of its funding comes directly from industry for services rendered. Industry pays EASA directly for certification activities and support to products in service. In 2016, EASA’s budget was €140m with two-thirds funded by industry fees and charges and a quarter funded through the EU Budget [£36.5m], which is funded by Member States combined contributions [see Figure 1].

Budget in 2016: 140 M€

Figure 1: EASA Budget in 2016, European Commission.

EASA – Vision 2020

EASA has ambitions for the future aviation regulatory system. In 2015, the Agency published Vision 2020, which made proposals for the European Commission to extend EASA’s interventions in new domains, such as airport...

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The achievement of the highest levels of safety requires that all the sub-systems within aviation [such as airports, Air Traffic Management (ATM)] [See Appendix A], General Aviation [See Appendix B] and unmanned aircraft systems [See Appendix C], construction and maintenance of aircraft, engines, aircraft systems and components, air-operations, personnel and others] and that the interactions between the sub-systems are understood, controlled and function effectively. Given the complexity of not only the complete system but also the sub-systems and the safety critical nature of flying, having an independent central body that develops rules, supported industry experts, for these sub-systems and for the total system is a necessary approach. Rules can be developed that not only provide safety within each separate part, but rules can also promote and optimise air safety by protecting the interfaces between all the parts of the aviation system. It also provides the opportunity to look at the entire system as a unified object of control and ensure regulation allows industry to operate efficiently.

Today, in addition to providing excellent standards from a safety perspective, European regulation and the EASA regulator aims to facilitate the free movement of European aerospace products and services not just within Europe but worldwide by ensuring the safety standards are proportionate, common in different countries, and applied consistently in different regimes. This helps minimise bureaucratic trade processes and unnecessary financial transactions that undermine global competitiveness.

Repatriation of all regulations from the European level to the UK level is theoretically feasible, though gaining the competence to work to UK regulations by Brexit is problematic, but the question should not be whether it is possible but whether it is advisable or desirable.

Design and Approvals

For companies to be able to design products, and indeed most system and components, for aircraft within the European system companies must be approved by EASA, that is they get a ‘Design Organisation Approval’ or DOA. If the UK CAA were to take back responsibility for safety regulation, these EASA approvals would lapse. A new UK system would need to be put in place by the CAA, with the CAA providing regulatory oversight of
additional work required to certify products in the UK and then cross-validate the products with EASA to get an EASA certificate, with a UK-EU bilateral agreement. A bilateral could also mitigate the need for an EASA DOA. However, this would take time to develop and would be dependent on EASA having confidence in the competence of the recently recruited CAA staff.

The situation for modifications designed in the UK would be the same as for new products. The extra work needed to clear modifications, which may be small and needed in a short timescale, would not only impact manufacturers but also aircraft operators. Modifications can be as small as the installation of a new carpet.

Once products are in service the regulator has a responsibility, along with the accountability of the design organisation, for Continued Airworthiness – that is for making sure that the aircraft continues to meet all appropriate safety standards. To meet this responsibility EASA review and assess the safety impact of issues that arise in service on products and issue airworthiness directives that mandate airlines to act on their aircraft to return the product to a fully airworthy state. This responsibility would fall to the UK CAA were they to take back all NAA activities.

EASA is also regularly engaged with manufacturers on assessing new technology, and its implications for product certification. Potentially manufacturers would have to discuss such implications with the UK CAA, EASA and the FAA in future.
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The description above makes it clear that design and manufacturing companies interface with EASA throughout a product’s life cycle, from developing new technology, to certification, in service modification and in service safety related actions. This makes a ‘cut off’ type transfer of responsibilities difficult to achieve and means that a large and technically competent team needs to be ready to take on the responsibilities.

**Maintenance and Airworthiness Records**

Aerospace companies based in countries without aviation regulatory compliance with EASA [or the FAA] find selling aerospace products and providing aviation services to the US and Europe, and indeed other countries outside their immediate jurisdiction, difficult and subject to additional work. This is because EASA and the US FAA standards form the benchmark for products and services so companies will be required to show their products match up to these benchmark standards.

For example, should a European [or non-European company for that matter] seek to purchase an UK aircraft, aircraft parts and/or contract UK maintenance services for which the airworthiness had been overseen by a UK company compliant with UK safety legislation, extra checks would need to be performed to bring the aircraft, parts and/maintenance standards up to those of the destination country’s NAA. For UK-based airlines seeking to operate outside the UK, additional maintenance checks might need to be carried out before departure to the destination.

**Component Maintenance**

Component workshops based in the UK would cease to be EASA Part 145 approved should the UK withdraw from EASA. Like airworthiness and maintenance, companies could feasibly still apply for certification directly from EASA, but this would not be as simple as the current process through the national authority on behalf of EASA, and any gap in approval at the time of Brexit would lead to disruption and loss of revenue. European customers might look for other suppliers if there was uncertainty as to whether or when UK companies could get EASA Part 145 approval.

Currently, through bilateral agreements with the EU, European registered aircraft are eligible to use components that meet European regulations [with an EASA Form One] or Canadian or Brazilian regulations. The same level of reciprocity is not in place for US components. US Certification - FAA Form 8130-1, is accepted in the EU only for new parts and not repaired ones.

**Airline Certification**

As EASA has responsibility for airline certification, the UK’s future in relation to EASA will likely have an impact on where airlines based in the UK serving Europe will choose to base themselves in the future. Airlines move their fleets across the liberal European
countries within which they can fly; however, pilots with any future UK-only pilot’s licence, would likely not be eligible for employment on EU-based airlines.

There is a process already available for certified pilots outside the EU to convert their licences into European ones but the process is not very simple. Prospective EASA-licenced pilots would be required to complete a medical examination and theoretical exams before doing any practical training, then flying a minimum number of hours.

Global Influence

As has been described, EASA is a globally recognised centre of aerospace regulation excellence, which both benefits the UK and gains from the UK’s active participation. The UK, through the Department for Transport [DfT] and CAA involvement, has had a major influence on EU and EASA rulemaking through its participation on the Management Committee and other specialist committees; indeed, many regulatory practices have been developed in the UK and then adopted by aviation authorities in other European Member States with the support of EASA.

EASA also currently has many UK nationals on its staff, including the Certification Director\(^\text{32}\), so benefits again from the aerospace expertise in the UK just as the UK benefits from the expertise of the EASA staff from elsewhere in the EU. Industry, both from the UK and other European countries, are also involved in many rulemaking and regulatory activities. EASA rulemaking will remain important when the UK leaves the EU so industry would lose the ability to significantly influence EASA rules should the UK leave EASA. EASA would not be able to call upon the support and expertise of UK industry.

As well as developing regulations, often at the same time as the FAA is developing rules in the same area, EASA also helps EU industry by supporting product certification with other authorities, developing bilateral aviation safety agreements [as support to the European Commission], discussing threats to safety with relevant authorities, and where appropriate providing training and guidance to other authorities. Industry would look to the UK CAA to take on some of this activity, including support to product certification and supporting bilateral arrangements, but this would be difficult until mutual trust was developed between the UK and other NAAs that the UK CAA had the relevant competence.

Pilot and Engineer Certification

The EASA Airline Transport Pilot’s Licence [ATPL] is a common licence standard that has been agreed by 28 European states. The EASA ATPL, Commercial Pilot Licence [CPL] and Private Pilot Licence are accepted at face value in all EU states. On behalf of EASA, NAAs issue pilot and engineer licences and approve training schools to conduct training within the national boundaries.

Outside the EU, EASA-registered pilots are unlikely to experience any changes to the airlines and market to where they are needed most to achieve maximum efficiency. Should the UK decide to withdraw from EASA it is likely that some UK-based carriers could locate themselves in Europe where a single, more efficient regulatory regime is in place to keep time and financial costs to a minimum.

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\(^{32}\) European Aviation Safety Agency: Certification Director – Trevor Woods
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Process of Withdrawal

There is no precedent of a country leaving EASA so it is impossible to rely on an existing exit strategy. Scenario planning is one way to plot what the regulatory environment might look like post-Brexit and what will be required to determine whether the benefits of national regulatory independence would outweigh the costs of remaining within EASA without the influence that comes from being a Member State.

In 2016, the European Parliament Directorate General for Internal Policies, Policy Department D Budgetary Affairs analysed The Cost of Non-Agencies with Relevance to the Internal Market, including EASA. The study assessed the ‘cost of non-agencies, ie the savings to MS [Member States] from the existence of the EU’s decentralised agencies’, including EASA, and uses a series of scenarios to ‘help assess what would happen if the EU agencies ceased to exist’. In the context of the Brexit challenge, there is no likely prospect of EASA being abolished; however, the scenarios and conclusions from this paper provide some useful indicative outcomes of aviation regulation being returned to national authorities, which are helpful in considering what the UK’s future outside of EASA would look like should that path be chosen.

Enhancing Aviation Safety

EASA has reorganised in the past few years to allow it to focus more directly on improving aviation safety, through the analysis of ‘big data’, as well as through sponsoring safety directed research. Use of big data to understand safety events and trends, and then to put solutions in place to prevent events and reverse adverse trends is still in its infancy but is one of the EASA priorities. This is helped by access to European data repositories, and will be supplemented by further data lakes – for example using operational data – as some of the EASA projects reach completion. The UK will be outside these initiatives which are aimed at enhancing aviation safety if it does not remain in the EASA system.

It should also be noted that any activity that puts extra work into the aviation system, or disrupts the system, requiring industry to duplicate effort or to complete bureaucratic tasks, will divert resource from assuring designs, products and their operation are as safe as they can be. While it would not be true to say that the disruption and extra work will directly lead to safety related events it is fair to say that some aspects of product safety assurance, that is the many barriers that prevent an incident happening, will be weakened with any disruption or extra work, including that associated with moving from the EASA system.

"Upon exit from the EU, the UK will no longer have status under the US-EU Safety Agreement. Additionally, the US-UK Bilateral Aviation Safety Agreement, now largely dormant, may need to be updated and put into place upon the UK’s exit from the EU. This is manageable, but will take time and depend on the clarity of the UK’s relationship with EASA going forward."

Michael Huerta, Administrator of the US Federal Aviation Administration, Speech to the UK Aviation Club, 15 June 2017.
The report concludes that NAA activities would involve being in a position to issue certificates, organisation approval and supporting validation of certificates and approvals in third countries, requiring the transfer of EASA staff to NAA. In an abolition-of-EASA scenario, some staff could be redeployed to NAAs but, as EASA will continue regardless of Brexit, there is no guarantee that EASA staff would be able or willing to return to the CAA or that the numbers of experts are available and could be deployed in the current timeframe of March 2019 when the UK is expected to cease to be a member of the EU. Furthermore, the UK CAA lost around 200 staff during the transition to EASA in 2002; however, only a small proportion went to work at EASA Headquarters in Cologne. Many left the CAA voluntarily or retired and were not replaced, making it difficult to recruit sufficiently qualified and available regulatory specialists. ADS estimates that it could take five to ten years, and an extra 300 staff, to equip the UK CAA to take over EASA’s responsibilities.

Based on the report scenarios, ‘while the costs to the EU budget would reduce, there would be a corresponding increase in costs for Member States’. As the UK CAA has a statutory obligation to cover the costs of its operations from the industry, this cost would have to be passed onto the sector via industry charges.

In relation to end-users, the costs of certifying products via EASA varies widely depending on the type of product. For each product, EASA then offers a flat fee in accordance with Commission Regulation [EU] No. 319/2014. If manufacturers were required to certify their products in the UK as well as Europe, their costs would increase, regardless of even whether CAA standards were recognised by EASA. The report did conclude that larger NAAs, like the CAA, could deliver some services at a lower cost than EASA, but would only be true for existing competencies such as certifying airline operators. As certification responsibilities have been transferred from NAAs to EASA, including engines which ‘make up the bulk of certification activities, NAAs would see an increase in costs in re-establishing these competencies’.

The report concludes that NAA activities would involve being in a position to issue certificates, organisation approval and supporting validation of certificates and approvals in third countries, requiring the transfer of EASA staff to NAA. In an abolition-of-EASA scenario, some staff could be redeployed to NAAs but, as EASA will continue regardless of Brexit, there is no guarantee that EASA staff would be able or willing to return to the CAA or that the numbers of experts are available and could be deployed in the current timeframe of March 2019 when the UK is expected to cease to be a member of the EU. Furthermore, the UK CAA lost around 200 staff during the transition to EASA in 2002; however, only a small proportion went to work at EASA Headquarters in Cologne. Many left the CAA voluntarily or retired and were not replaced, making it difficult to recruit sufficiently qualified and available regulatory specialists. ADS estimates that it could take five to ten years, and an extra 300 staff, to equip the UK CAA to take over EASA’s responsibilities.

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Post-Brexit it will be to the UK’s socio-economic advantage and position in the world to maintain and develop its aviation sector. Effective safety regulatory arrangements will be needed to achieve this. It is also essential that a full set of regulations is in place immediately post-Brexit and continues to be in place, so that there is no disruption to airline operation, speed of response to safety assurance issues or development of commercial products. It is important for decision-makers to weigh the practicality, costs and benefits of different options for achieving this thoroughly, and quickly, given the limited time until the UK leaves the EU. Three post-Brexit options are considered below.

Depending on the outcome of negotiations, the biggest challenge for the UK and EU will be to guarantee a smooth transition to any new arrangement to maintain business and safety continuity. Given the complexity of the task at hand, the Department for Transport, through the UK CAA, should be considering now any necessary transitional arrangements needed to guarantee a soft landing whatever the outcome of negotiations.

**OPTION 1: FULL MEMBERSHIP OF EASA – A BESPOKE UK AGREEMENT**

Full membership and participation within EASA would enable the UK to access all the current benefits of being part of the EU civil aviation basic regulation system, including:

[i] Common standards and practices;

[ii] Automatic recognition of product certificates and organisational approvals in EU countries and streamlines achievement of certificates in USA, Canada and Brazil;

[iii] Access to a globally recognised, dynamic rule set with the ability to influence its development; and

[iv] Access to ‘big data’ safety data project, and EU safety research outcomes, to support improve the level of aviation safety.

Additionally, the UK would be able to take advantage of current EU bilateral agreements, and those currently being negotiated, when supported by tailored UK bilaterals with the relevant countries.

The Basic Regulation expressly allows non-EU Member States to be full members of EASA up to and including the Management Board, Committee and Technical Working Groups [and the revised Basic Regulation will do likewise, assuming it successfully passes through the legislative process]. The UK would have to negotiate and agree terms, and pay
into the EASA budget, based on UK share of ICAO contributions. Fees may be increased.

As a member of EASA the UK would be subject, to some degree depending on negotiations, to the European Court of Justice. This is an inevitable consequence of any kind of international arrangement - the UK is already subject to the International Court of Justice on its international treaty relations generally, unless a separate procedure can be agreed between the EU and UK, such as a joint UK/EASA committee whereby legal interpretation and implementation of the regulations is done by the UK and EU.

As a full participant in EASA, the UK would retain a role in the EASA rulemaking process, to the extent that EASA recommendations would still have to go to the European Commission or Parliament or Council, with industry members being able to participate in specialist rule-making task groups and UK specialists being able to participate in the EASA Committee.

OPTION 2: MEMBERSHIP OF EASA – OFF-THE-SHELF MODEL

For the same reasons provided under Option 1 for remaining members and participating fully in EASA, there is precedent for non-EU members to be full members of EASA, namely, Iceland, Liechtenstein, Norway and Switzerland. This would retain the majority of benefits listed above but entail some loss of influence with respect to evolving regulations.

OPTION 3: NON-MEMBERSHIP OF EASA – RELIANCE ON UK CAA

If continued UK membership of EASA cannot be agreed, the UK could empower the UK CAA to discharge all the UK’s ICAO responsibilities. This would require the UK CAA to rebuild its competence in the many areas of an NAA’s remit which are currently delegated to EASA. Given the large number [around 300] of additional specialist staff needed, and the new systems and processes that would need to be put in place and used by industry, this could not be achieved by March 2019. Most of the specialists who carried out these tasks in the CAA prior to EASA taking them over have gone to EASA, taken on other work at the CAA, or retired. Based on the UK’s experience of transference of regulatory responsibility to the European level back in 2002, there is no evidence to suggest that a ‘reverse transfer’ back to the UK would be less challenging.

Under this scenario, a multi-year transition would be needed, during which activities would gradually move under the CAA’s direction. If suitable transition measures were not put in place there would be disruption of services following Brexit, increased costs to business, and almost certainly loss of business to UK companies. The reasons for this have been covered in the section on how the system works today with EASA above. Indeed, if this scenario appears likely during 2018 it is likely that the uncertainty will already cause UK industry to lose business. Businesses which have operations in multiple countries might decide to move some activities out of the UK and other businesses might move out of the UK. Clearly this would not be an option in every case. In any event, such moves would not be beneficial to the UK economy.

A transition period with high levels of change is not good for product safety assurance, as it takes the focus away from assuring every task is done correctly and from continuous improvement requiring additional work that does not add to safety. This situation would be worse if the transition period was badly managed, or indeed if there was an attempt to manage with no transition period and all the competent resources and system were not in place at Brexit.
Once the UK CAA had established full competence, then they could certainly lead a fully functioning NAA. However, it would have several disadvantages relative to Options 1 and 2, such as:

[i] the need for additional certification activity with the UK CAA has well as with EASA, the FAA and other NAAs that require specific cross-validation activity.

[ii] other duplication of effort for products and services managed from the UK and operated or exported elsewhere.

[iii] the risk that regulations in the UK will diverge from those of Europe and the USA meaning that industry would have to comply with additional regulations.

[iv] the risk that requirements in the UK would be more stringent than elsewhere, or be more stringently applied, leading to businesses choosing to move out of the UK.

[v] airlines [whether UK or EU-based] would find it difficult and costlier to move their fleets around the continent for efficiency. This would add complexity and costs to its business model potentially making it more expensive to fly.

[vi] lack of influence of the UK on safety regulations being developed across the globe.

[vii] inability to take benefit from EU-third country bilaterals.

[viii] lack of access of the UK to big data projects and potential improvements to aviation safety standards. Safety, by its very nature, benefits from the widest possible participation and broadest access to data: it is difficult to see how non-participation in EASA can be beneficial to safety for UK aviation consumers.

[ix] higher costs for industry.

Mitigating action could be taken to reduce the effects of some of these disadvantages. For example, an agreement might be reached whereby the UK had access to some EASA activities, for example the management board, as an observer. However, the regime would still be less efficient than being a part of the EASA system.

One option that might be open to the UK both to manage the transition period and potentially as a permanent feature of the system, is for the CAA to contract certain activities to EASA. Clearly this would rely on the resource being available at EASA, at a suitable cost, and would depend on EU policy. It would not however mitigate most of the disadvantages of this approach.

In a similar way, the UK could seek to contract certain activities to the FAA. This would be more problematic than contracting to EASA given the differences in the way the European and US aviation is regulated and the fact that UK industry complies with European regulations today. It too would be subject to national government policy, resource availability and cost.

The UK CAA taking on full powers has, arguably, one advantage. Should the UK wish to implement specific aviation safety requirements to meet local needs this may be easier to achieve. However, it should be noted that this is possible, and indeed has happened, under the EASA system.
When reviewing the trajectory of European regulation and the advent of EASA, Member States have adopted a pragmatic, flexible approach to aviation market oversight. By doing so, EASA is now a well-functioning, globally respected institution, leading [along with the US FAA] other countries in improving aviation safety standards across the world. Member States, the European Institutions and the UK Government are strongly encouraged to adopt a similar approach to the future of the UK’s relationship with the EU regulator to ensure that the practicalities of public safety and industrial performance are put first. The UK has been instrumental in advancing European regulatory standards and its loss would be felt at the European level; Europe would benefit also from the UK’s continued membership.

Despite the limited empirical advice available or available precedent of a Member State withdrawing from EASA, and because of the wide pool of independent expertise available from within the sector, maintenance of the UK’s members of EASA is the most cost effective and practical solution to maintain safety, access global markets, attract investment from around the world and maintain influence on European ATM rule-making. This paper has identified alternative regulatory arrangements that could be explored but we do not believe that these alternatives have any substantial advantages over continued membership.

A return to national oversight through the UK CAA can be expected to require additional financial and staff resource, neither of which are guaranteed to be available, not least in time for a transfer of responsibilities to take place in March 2019 [unless transitional arrangements can be agreed]. Based on the experience of the establishment of EASA back in 2002, which was by no means smooth at the outset but the teething problems from which have been resolved, it would be essential for the UK CAA to have full capability before a transfer of responsibilities.

Unlike the development of regulation, the return of regulatory oversight to the NAA cannot be through progressive evolution without potentially undermining industrial operation and, in the worst case, passenger safety. And it cannot be overlooked that looser co-operative arrangements earlier provided by the JAA process are now obsolete with the move to EASA.

Conclusion

“Let’s just imagine the UK was to withdraw from EASA altogether and adopt our own framework – although I’m yet to meet anyone of substance that supports that approach. It is of course theoretically possible and let’s just suppose we established the best safety regimes in the world, it would mean a major increase in UK regulatory regime, potentially represent a major barrier to track increased costs and yet we would also risk becoming a backwater in terms of wider impact...”

Andrew Haines, Chief Executive of the UK Civil Aviation Authority, GAD Speech, 1 December 2016

The UK Government should avoid, as far as possible, the creation of regulatory barriers or dual regulations that would make the UK aerospace and aviation sector less competitive a less attractive trading partner. Above all, there should not be a regression on the levels of safety achieved through European co-operation. From an operational and safety perspective, a set of UK standards which diverge intentionally or even unintentionally, from the European ones, will add complexity and cost to industrial operations, ultimately to be passed onto the end user, as well as undermining safety improvement over the longer-term.

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APPENDICES

APPENDIX A: SECTOR STUDY: AIR TRAFFIC MANAGEMENT

Today the entire UK Air Traffic Management [ATM] structure is subject to the EASA regulatory regime. EASA now covers the full spectrum of ATM activity from Air Traffic Control Officer licensing to equipment provision, and from operational procedures/requirements to Regulatory Authority requirements. The UK has made substantial investment over the past 15 years in adopting EASA standards and requirements.

In the same way that common standards benefits aviation safety and industrial performance and competitiveness, common ATM standards under the auspices of EASA have enabled the UK and the UK CAA to reduce their size and fees, and costs for the industry. EASA has adopted ICAO Standards and Recommended Practices [SARPs] and has aligned its requirements accordingly. Consequently, the number of national differences from ICAO SARPs has been significantly reduced. The EASA regime also provides a strong and effective counter-balance to the FAA and other ATM regulatory players.

EASA membership benefits the competitive ATM market that the UK supports [e.g. NATS participation in the Spanish control tower market and European operator service provision at UK airports]. If membership of EASA is relinquished, the UK will have less influence on European ATM regulatory matters after the UK has made significant investment in terms of time and intellectual effort. It would be a disappointing outcome if the UK was no longer able to benefit from the intellectual property it has created.

Outside EASA, the UK would have to re-create its own rules and regulations. This would be sub-optimal for the same reasons listed above:

[i] the UK does not currently have the expertise in some areas.

[ii] it would be extremely expensive to recruit and train human resource to provide this expertise; and.

[iii] this would inevitably lead to an increase in UK regulatory costs, which would have to be borne by industry, thus making the UK less competitive.

THE UK HAS BEEN INSTRUMENTAL IN ADVANCING EUROPEAN REGULATORY STANDARDS AND ITS LOSS WOULD BE FELT AT THE EUROPEAN LEVEL; EUROPE WOULD BENEFIT FEW ALSO FROM THE UK’S CONTINUED MEMBERSHIP.
A separate regulatory regime would add to the complexity of ATM operations across Europe and be expected to cost more than the slow but steady progress towards rationalisation fostered by the EASA system. Such an approach would create risk of diverging standards that would make the very necessary task of harmonising the broader European airspace – as well as making the UK’s ability to inter-operate with European neighbours to improve ATM efficiency [e.g. through Single European Skies] – that much harder to achieve.

From an operational and safety perspective, retaining the opportunity to help shape and influence EASA makes practical sense. Without this, the UK would have to invest significant amounts of resources domestically, as well as through Eurocontrol [an intergovernmental ATM body] and ICAO in order to have our point of view heard. The UK would be required to honour ICAO obligations and follow SARPs.

Dealing with ATM and Air Navigation Services [ANS], EASA has found a constructive way to co-operate with Eurocontrol, which will persist, and even deepen, as an important and extremely knowledgeable intergovernmental organisation within the air navigation services domain. Consequently, the UK cannot rely on Eurocontrol as a means of preserving influence on European ATM matters with aspirations of even closer Eurocontrol/EASA co-operation.

APPENDIX B: SECTOR STUDY: GENERAL AVIATION

The General Aviation [GA] community is a self-motivated, entrepreneurial sector and, by its very nature, requires proportionate regulation to thrive; however, EASA’s interpretation of its own scope has been over-ambitious in relation to GA. EASA has regulated in unjustified areas of light and sport aviation applying rules drawn from full commercial activity. Activities in the GA sectors are more appropriately nationally regulated, or even self-regulated, as has already been accomplished in the UK and other nations, facilitated by EASA.

EASA’s common design, production, certification and airworthiness rules have energised a pan-European GA market, catalysing worldwide trade. The economy, effectiveness and competitiveness of all involved organisations has been strongly harmonised by common European standards. The overhead and costs of putting these regulations in place are now stabilising under lighter regulation. The introduction of national regulation in these areas would be worthless and confusing, creating further unhelpful period of change.

Dealing with ATM and Air Navigation Services [ANS], EASA has found a constructive way to co-operate with Eurocontrol, which will persist, and even deepen, as an important and extremely knowledgeable intergovernmental organisation within the air navigation services domain. Consequently, the UK cannot rely on Eurocontrol as a means of preserving influence on European ATM matters with aspirations of even closer Eurocontrol/EASA co-operation.

Licensing of many activities in the GA sector has been a continuing challenge for EASA, which appears more adept at dealing on a strict commercial liability regime, more applicable to air transport operations and systems. The overly stringent criteria applied to individual licensed
engineers, and qualified flight instructors and their examiners will raise operating costs. To its credit, the UK has used its influence inside EASA to continuously oppose the imposition of what the GA community deem to be unnecessary high pilot medical standards, and more complex sub-divisions of licence privileges. Nevertheless, as explained earlier in this document, individual pilots now enjoy a common European licence enabling free range across Europe.

For the GA sector, the value of EASA has been mixed, but the overall balance has been more positive particularly in terms of trade, entrepreneurship and safety. By contrast, the prospects for UK redevelopment of its own rules applied to GA are wholly negative. The GA sector has been subject to continuous regulatory change and is likely to experience a further depletion in the active participants, enthusiasts and entrepreneurs, currently making a valuable contribution in innovation, technology and skills.

APPENDIX C: SECTOR STUDY: UNMANNED AIRCRAFT SYSTEMS [UAS]

For UAS, commonly known as drones, the UK currently operates an ‘Open’ and ‘Specific’ category though the ANO Article 94/95 small UAS regime and permission for commercial operations and powers to grant permits to fly exemptions.

In theory, the UK can certify drones of up to 150kg; there is currently no international standard. Since UAS operations are likely to take place on a domestic level for the foreseeable future, it might be regard as beneficial for the UK to develop its own standards without being tied to the EU regulatory regime. If outside the EASA structure, the UK could, for instance, certify UAS products over 150kg, but there is no guarantee that UK certification, as a stand-alone nation, would be accepted elsewhere in the long term. The result would then be an increase in the cost of certification worldwide, which would significantly impact export sales.

UK drone operators would not be automatically eligible for operational approval under the EASA ‘Specific’ category defined in the proposed new UAS regulations\(^{37}\). This enables the issuing of permanent operational approvals based on EASA ‘standard scenarios’. This approval is being designed to provide very significant flexibility and cost-savings compared to full certification of smaller drones. The EASA ‘Specific’ approvals will be accepted throughout Europe and, it is expected, across most of the world, and will be the first formal process for authorising


long-range UAS flights in non-segregated airspace. A UK unique approval process, even if similar to that of EASA, would not automatically be recognised across Europe nor the rest of the world, thus putting UK drone operators at a disadvantage when competing for international business.

If the UK relinquishes membership of EASA, UK UAS operators would be required to apply for separate approvals for a Light UAS Operator Certificate [LUC] in each Member State in which it wishes to do business [as well as having to establish its ability to do business in that state]. The LUC entitles that entity to authorise its own operations within its terms of approval. Subject to co-ordination with local regulators, an LUC approval would ordinarily be applicable anywhere across Europe and potentially global. Such privileges, even if nominally granted by the UK CAA, would only be accepted in Europe in the presence of specific bilateral agreements.

For UAS, as matters stand, under the Chicago Convention, individual states still have the right to refuse overflight or operation of UAS from another state, so whatever the UK were to do would be limited to domestic operations or subject to bespoke arrangements with another state. How cross-border remain part of EASA, it would be able to do so on the basis of holding an approval that is issued to a locally-recognised standard.

A UK UNIQUE APPROVAL PROCESS, EVEN IF SIMILAR TO THAT OF EASA, WOULD NOT AUTOMATICALLY BE RECOGNISED ACROSS EUROPE NOR THE REST OF THE WORLD, THUS PUTTING UK DRONE OPERATORS AT A DISADVANTAGE WHEN COMPETING FOR INTERNATIONAL BUSINESS.