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European Union Committee

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Civilian Use of Drones in the EU

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Sub-Committee staff

The current staff of the Sub-Committee are Alicia Cunningham (Clerk), Paul Dowling (Policy Analyst) and Deborah Bonfante (Committee Assistant).

Contact details

Contact details for individual Sub-Committees are given on the website. General correspondence should be addressed to the Clerk of the European Union Committee, Committee Office, House of Lords, London, SW1A 0PW. Telephone 020 7219 5791. Email euclords@parliament.uk

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CONTENTS

	<i>Page</i>
Summary	5
Chapter 1: Introduction	7
Chapter 2: Aviation and RPAS	9
What are RPAS?	9
Terminology	9
RPAS (small and large), drones, and UAVs	9
Commercial, hobbyist and leisure use	10
Civilian Applications for RPAS	10
Table 1: Breakdown of RPAS use in the UK	12
Growth in the civilian RPAS industry	12
Current RPAS Regulations	14
Principles of aviation regulation	14
RPAS Regulation at the International level	15
Table 2: Aviation Regulators	15
RPAS Regulation at the EU level	16
RPAS Regulation at the UK level	16
Box 1: RPAS and the Air Navigation Order 2009	16
The Commission's Communication	17
Chapter 3: Reviewing the Regulatory Framework	19
Extending EASA's competence	19
Figure 1: RPAS Regulators	19
Coherent Safety Regulations	19
Internal Market for RPAS	20
The role of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS)	23
Other non-EU regulatory frameworks	25
Chapter 4: Proportionate Safety Regulations for RPAS	27
Safety equivalence between manned aircraft and RPAS	27
Reconciling regulations for large and small RPAS	29
Pilot training and licensing for small RPAS operators	30
Airworthiness	32
Chapter 5: Enabling technologies	35
Role of SESAR JU	35
Box 2: Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU)	35
Developing new technologies and regulatory uncertainty	36
The technologies needed	36
Detect and avoid	37
Box 3: ASTRAEA	38
Air traffic management	39
Command and control (C2) link	41
Issues with SESAR JU	43
Access to R&D funding for RPAS	44

Chapter 6: Data protection and privacy	45
Data Protection	45
The Data Protection Directive and commercial RPAS use	45
Privacy Impact Assessments	48
Privacy	50
Personal RPAS use and privacy	50
State and journalistic use of RPAS	50
Chapter 7: Third party liability	53
Exemption for model aircraft users	53
Cost of third party liability insurance	54
Compliance with EU insurance requirements	55
Minimum liability limit under EU Regulation 785/2004	57
Chapter 8: Leisure users and public consultation	58
Concerns regarding leisure use	58
Figure 2: Leisure and commercial small RPAS use in the UK	59
Solutions in the short term	60
Raising awareness	60
Product Information	60
Geo-Fencing	61
Public consultation	62
Solutions in the long term	62
Improving enforcement	63
Registering RPAS owners	64
Regulating for the future	65
Summary of Conclusions and Recommendations	67
Appendix 1: List of Members and Declaration of Interests	72
Appendix 2: List of Witnesses	74
Appendix 3: Call for Evidence	78
Appendix 4: Site Visit	80
Appendix 5: Glossary	82

Evidence is published online at <http://www.parliament.uk/civil-rpas> and available for inspection at the Parliamentary Archives (020 7129 3074). Q in footnotes refers to a question in oral evidence.

SUMMARY

Drones, or remotely piloted aircraft systems (RPAS), as they are described in this report, are no longer used solely by the military. In the UK alone, there are now hundreds of companies, mainly SMEs, using RPAS to provide a range of services, including photography, land surveying, building inspection and crop analysis. RPAS will revolutionise what the aviation industry can achieve and how it is regulated. Europe must act now in order to reap the future benefits of this exciting new technology.

This report evaluates the plans set out by the European Commission in a Communication in April 2014 to make Europe a global leader in the RPAS industry.

We strongly support the Commission's aims to create an internal market in the EU for the commercial use of RPAS. The Commission is well placed to develop a set of RPAS safety rules for an internal market by leveraging the role of the European Aviation Safety Agency (EASA) and, by extension, the Joint Authorities for Rulemaking on Unmanned Systems (JARUS). To avoid stifling the existing RPAS industry, which consists primarily of companies using small RPAS weighing less than 20kg, we recommend that safety rules be developed and applied in proportion to the risk that RPAS flights present. Member States must retain a degree of flexibility in regulating small RPAS to respond to local markets and support growth in the industry.

The RPAS industry faces many technological challenges, such as the need for RPAS to 'detect and avoid' obstacles on the ground and in the air. We welcome the Commission's plans to incorporate RPAS into existing aviation research programmes, such as the Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU) and Horizon 2020. However, greater attention must be given to the technological needs of small RPAS, the fastest growing sector within the industry.

EU data protection legislation must remain technology neutral if it is to be flexible enough to apply to the unique characteristics of RPAS. Each Member State's data protection agency should create and share guidance for RPAS pilots on this issue. Concerns regarding the use of RPAS by journalists and for surveillance by state authorities should form part of a public debate about acceptable uses for RPAS.

Commercial RPAS pilots have a clear obligation to purchase third party liability insurance, but the minimum amount of insurance required would, we conclude, be too low to cover the cost of compensation for a serious accident. We also believe that the way in which this amount is determined, based only on the aircraft's weight, does not distinguish between the risks posed by large and small RPAS. The Commission should review this.

Leisure users of RPAS, that is to say users who are not regulated as commercial RPAS pilots or as members of a model plane flying club, have already purchased large numbers of small RPAS. Misuse of RPAS by leisure users could undermine public acceptance of this technology, potentially jeopardising the development of a commercial RPAS market. In the short term, we support the UK Government's plans to raise awareness of safety hazards associated with RPAS through the media and information leaflets at the point of sale. We endorse plans for a public

consultation to gauge support for the increased civilian use of RPAS. In the long term, the police should have a greater role in enforcing existing legislation. Although our recommendations on this issue are UK-focused, similar challenges are present in other EU Member States. Sharing best practice is key to reinforcing the growth of an internal market for commercial RPAS.

In the absence of a global system which could track all RPAS (including small RPAS flying below 500ft), we were impressed by industry suggestions for the creation of an online database through which commercial operators could log their flight plans and data protection policies.

We urge industry, the Government and the Commission to cooperate with the National Aeronautics and Space Agency (NASA), in the USA, which is currently researching a possible tracking system. We also recommend that they consider developing a system for sophisticated small RPAS which would not only manage flight plans and coordinate airspace, but would enable identification of each RPAS and its pilot. This will be essential to enforce existing and future laws governing RPAS use.

Civilian Use of Drones in the EU

CHAPTER 1: INTRODUCTION

1. 2014 could be described as the year of the drone. Airwaves and newspaper columns were filled with the news that Amazon planned to use drones for parcel delivery, while nationalist football fans used one to disrupt a match between Serbia and Albania. As the year drew on, drones were found ‘buzzing’ close to a nuclear power station in France, and a near miss was reported between a small drone and a passenger aircraft landing at Heathrow airport.
2. Underlying this increased media interest has been a rapid growth in the commercial use of drones, more correctly referred to as Remotely Piloted Aircraft Systems (RPAS) or Unmanned Aerial Vehicles (UAVs). In the UK alone, there are now over 600 permissions for commercial RPAS operations enabling many companies to provide services such as photography and land surveying. RPAS have become increasingly popular as an alternative to the use of manned aircraft for aerial surveillance; in future they could be used to carry out many more tasks, such as search and rescue, deliveries and construction repair work. Alongside the expansion in the commercial use of RPAS, they have become increasingly popular for private, leisure users. The *Daily Mail* described them in December 2014 as “this year’s must-have gadget”.¹
3. In October 2012 the European Commission issued a Staff Working Paper² entitled *Towards a European Strategy for the development of Civil Applications of Remotely Piloted Aircraft Systems (RPAS)*, and established a European RPAS Steering Group. In June 2013, the steering group presented its recommendations to the Commission in its *Roadmap for the Integration of Civil Remotely Piloted Aircraft Systems*.³ The roadmap set out a step-by-step approach and timeline for integrating RPAS into the airspace.
4. Then in April 2014, the Commission published a Communication entitled *A new era for aviation*, setting out its views on the future regulation of civilian Remotely Piloted Aircraft Systems (RPAS) operations in the EU.⁴ The Communication builds on the roadmap produced by the European RPAS Steering Group, and sets out the Commission’s views on how to establish a policy framework that will “enable the growth of the commercial RPAS market while safeguarding the public interest”.

¹ “As cheap as £28, they’re Christmas must-haves. But after a near-miss with a plane at Heathrow...Are Drones the ultimate boys’ toys or a godsend for snoopers and terrorists?”, *Daily Mail* (12 December 2014): <http://www.dailymail.co.uk/sciencetech/article-2870937/As-cheap-28-Christmas-haves-near-miss-plane-Heathrow-Drones-ultimate-boys-toys-godsend-snoopers-terrorists.html> [accessed on 23 January 2015]

² Commission Staff Working Document, *Towards a European strategy for the development of civil applications of Remotely Piloted Aircraft Systems (RPAS)*. [SWD\(2012\) 259](#)

³ European RPAS Steering Group, *Roadmap for the Integration of Civil Remotely Piloted Aircraft Systems into the European Aviation System* (June 2013): http://ec.europa.eu/enterprise/sectors/aerospace/files/rpas-roadmap_en.pdf [accessed on 10 February 2015]

⁴ Communication from the Commission to the European Parliament and the Council: *A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner*, [COM\(2014\) 607](#)

5. At the launch of the Communication, Siim Kallas, the then Vice-President of the European Commission and Commissioner for Mobility and Transport, said:

“If ever there was a right time to do this, and to do this at a European level, it is now. Because remotely piloted aircraft, almost by definition, are going to cross borders and the industry is still in its infancy. We have an opportunity now to make a single set of rules that everyone can work with, just like we do for larger aircraft.”⁵

6. The initial aim of our inquiry was to assess whether we thought that the Commission had prioritised the correct issues to ensure growth in the RPAS market. A further aim was to feed into the development of RPAS regulations at EU level. The Commission, in evidence to the inquiry, said that it was “open to suggestions from stakeholders to address the issues to make the creation of the EU RPAS market possible”.⁶ We have taken up that invitation.
7. We have also investigated the issues which will affect the growth of the RPAS market, including the requirements for safe operations and airworthiness. We have considered societal concerns around the increasing use of RPAS, particularly in respect of data protection and privacy. Our consideration of all these issues has taken account of technological developments, as well as the over-arching question of where competence for rule-making should lie.
8. In the course of our inquiry we visited Cranfield University to see first-hand the rapid deployment and data collection capabilities of RPAS to assist in situations such as accident investigation. The Committee also discussed the potential growth of the RPAS market with the European Commission and officials from European Aviation Safety Agency (EASA) and EUROCONTROL.
9. We would like to thank all those witnesses who appeared before us, or who submitted written evidence, for their significant contribution to the Report. They included both small and large companies working in the RPAS industry, RPAS trade associations, and support services such as pilot training organisations.
10. **We make this report to the House for debate.**

⁵ European Commission ‘European Commission calls for tough standards to regulate civil drones’, (8 April 2014): http://ec.europa.eu/commission_2010-2014/kallas/headlines/news/2014/04/drones_en.htm [accessed on 21 January 2015]

⁶ [Q 77](#)

CHAPTER 2: AVIATION AND RPAS

What are RPAS?

11. Until recently the majority of RPAS were used either for recreational or military purposes. Small radio-controlled model aircraft have been flown by enthusiasts in many countries for decades. Today, the British Model Flying Association represents over 820 affiliated clubs in the UK. As for military use, the first recorded use of a remotely piloted aircraft was in 1935, when the Royal Navy used the DH82 Queen Bee for target practice. Over the last 10–15 years the United States military in particular has developed more sophisticated RPAS for reconnaissance and operational purposes. These military aircraft, such as the Global Hawk and Predator, have commonly been referred to as ‘drones’.
12. This inquiry has been concerned with the more recent substantial growth in the civilian, and in particular the commercial, use of RPAS, for example in aerial photography, surveying and monitoring crops. We have not considered military uses of this technology. We have, however, examined the growing leisure use of RPAS.

Terminology

RPAS (small and large), drones, and UAVs

13. Terms commonly used to describe RPAS include drones, unmanned aerial vehicles (UAV), or unmanned aircraft systems (UAS). The term UAV includes Remotely Piloted Aircraft Systems (RPAS) as well as autonomous aircraft which can operate without the intervention of a pilot. Many view the use of the term ‘drone’ as inaccurate and misleading, as it fails to capture either their purpose or degree of technological sophistication. AM-UAS Ltd said that the use of the term ‘drone’ “unfortunately persists in the civil sector and its military connotations bring a negative association to many parts of the industry.”⁷
14. For the purposes of this report, we have decided to adopt the European Commission’s preferred term, Remotely Piloted Aircraft Systems (RPAS). As the term itself implies, RPAS are controlled by a pilot, normally on the ground, who may directly control or intervene in the management of the flight.
15. The basic components of an RPAS are the aircraft which flies in the air, the pilot station (ground station), and the command and control link (C2) connecting the two. The command and control link is a radio data link between the pilot station and the aircraft, which enables the pilot to give commands to, and download data from, the aircraft along radio waves on a selected frequency.
16. As the RPAS sector has evolved, the degree of variation in each of these components has increased. RPAS include very small, toy-like rotary aircraft weighing as little as a few grams; fixed-wing aircraft which can be launched by hand or by slingshot; and aircraft with a 40 metre wing span. The pilot

⁷ Written evidence from AM-UAS ([RPA0006](#))

could be standing outside on open ground controlling the aircraft with a handheld radio-control unit, or located inside a secure building with a sophisticated control console using satellite connections to communicate with the aircraft. The technology or materials loaded onto the aircraft to enable it to collect data or complete specific tasks, referred to as the payload, also vary depending on the purpose of the operation—examples include cameras and fertilisers.

Commercial, hobbyist and leisure use

17. Our interpretation of civilian use of RPAS includes use by commercial businesses for a profit, as well as leisure use by private individuals. For private individuals, a distinction can be drawn between ‘hobbyists’, who are traditionally members of a flying club and have a good knowledge of aviation, and the ‘leisure user’ who buys an RPAS off the shelf to fly in a back garden or in a local park.
18. One of the issues encountered in our inquiry has been the inconsistency of the regulatory framework, which creates an artificial distinction between commercial and non-commercial use of RPAS. The assumption that all non-commercial RPAS users had a pre-existing knowledge of aviation no longer stands. Technological developments have also resulted in similar aircraft being used by commercial, hobbyist and leisure users, but under differing regulations. The Civil Aviation Authority (CAA) said:

“Additionally, there is now a new ‘leisure use’ emerging which should be noted. Due to the ever decreasing size and cost of some systems as technology develops, small unmanned aircraft are now being used by the general public as their ‘personal camera’, offering new types of ‘holiday snap’. This is a different use from either the traditional model aircraft enthusiast, or the ‘commercial operator’. We have already seen instances of foreign tourists bringing their ‘drone’ on holiday with them and using it to take photos of notable landmarks in London. This type of footage is also shared online via sites such as YouTube.”⁸

19. Although the focus of this inquiry is on the commercial use of RPAS, the implications of their leisure use are considered in Chapter 8.

Civilian Applications for RPAS

20. We heard many examples of innovative applications for the civilian use of RPAS which could enhance existing services and industries. Flirtey, an RPAS delivery company based in New Zealand, said that it planned to use RPAS to “revolutionise three industries—online retail, fast food and logistics.”⁹ Amazon has also publicly announced plans to consider using small RPAS for deliveries.¹⁰ The British Airline Pilots Association (BALPA) said that, in addition to transport, RPAS could be used to suspend lightweight screens to project films or advertising.¹¹ Callen-Lenz Associates Ltd and the Professional Society of Drone Journalists said that RPAS could

⁸ Written evidence from UK CAA ([RPA0029](#))

⁹ Written evidence from Flirtey ([RPA0050](#))

¹⁰ ‘Amazon testing drones for delivery’, *BBC News Technology*, (2 December 2013): <http://www.bbc.co.uk/news/technology-25180906> [accessed on 27 January 2015]

¹¹ Written evidence from BALPA ([RPA0031](#))

be used to provide Internet connectivity in remote locations.¹² In fact Google and Facebook are both interested in harnessing this technology to ensure greater access to their web-based services.¹³

21. Mirko Kovac, Director of the Aerial Robotics Laboratory at Imperial College London said that, if combined with robotic technology, RPAS could be used to “repair structures or construct buildings autonomously.”¹⁴ Network Rail Infrastructure Ltd said it was piloting the use of RPAS for surveillance of railway infrastructure, because it improved “workforce safety by enabling such surveys to be carried out from a position of safety”.¹⁵ Carl Robinson, from the British Antarctic Survey, said that RPAS were being using as “science platforms in order to carry out Polar research”, because of their low cost, availability and unique capabilities.¹⁶
22. It is impossible to provide a definitive categorisation of the different civilian uses for RPAS, since new uses are being developed all the time. Nevertheless, Table 1 combines a description of the most common applications for civilian RPAS with some indication of their size and cost.

¹² Written evidence from Callen-Lenz Associates Ltd ([RPA0004](#)), and the Professional Society of Drone Journalists ([RPA0032](#))

¹³ ‘Facebook drones the size of jumbo jets soar 17 miles up’, *The Telegraph*, (25 September 2014): <http://www.telegraph.co.uk/technology/facebook/11120639/Facebook-drones-the-size-of-jumbo-jets-to-soar-17-miles-up.html> [accessed on 27 January 2015]

¹⁴ Written evidence from Imperial College London ([RPA0048](#))

¹⁵ Written evidence from Network Rail Infrastructure Ltd ([RPA0026](#))

¹⁶ Written evidence from Carl Robinson ([RPA0003](#))

Table 1: Breakdown of RPAS use in the UK

	Category (approximate weight)	Current and potential applications	Price and quantity
SMALL (0–20KG)	Micro/Nano/miniature/ 'toy' RPAS (few hundred grams)	<ul style="list-style-type: none"> Leisure use Commercial use (surveillance and inspection of hard to reach areas) Limited flight capability due to poor battery life 	<ul style="list-style-type: none"> Available to buy on the high street and online ~£100 for leisure use ~£10,000 for specialised use Estimated to be tens of thousands of toy-like RPAS in the UK
	Small RPAS (< 2kg)	<ul style="list-style-type: none"> Leisure use Commercial use (photography) 	<ul style="list-style-type: none"> £100–£900 Estimated to be thousands in the UK
	Small RPAS (2–7kg)	<ul style="list-style-type: none"> Mainly commercial use (photography, aerial surveying and inspection) Large recreational models also available 	<ul style="list-style-type: none"> £500–£4,000 ~360 units used commercially
	Small RPAS (7–20kg)	<ul style="list-style-type: none"> Mainly commercial use (photography, aerial surveying and inspection) Some specialist recreational models produced 	<ul style="list-style-type: none"> £4,000–£20,000 ~150 units used commercially
LIGHT (20–150KG)	Light RPAS (20–50kg)	<ul style="list-style-type: none"> Potential to inspect pipelines/power cables, spray crops, search and rescue 	<ul style="list-style-type: none"> £40,000–£100,000 depending on endurance and technology 2 units used commercially
	Light RPAS (50–150kg)	<ul style="list-style-type: none"> Potential for border surveillance; forest fire monitoring 	<ul style="list-style-type: none"> Few for commercial use < £300,000 depending on airworthiness certification requirements
LARGE (>150KG)	Large RPAS (> 150kg)	<ul style="list-style-type: none"> Potential for cargo transport Potential to remain airborne for days, if not months, and travel thousands of miles 	<ul style="list-style-type: none"> > £500,000 None used commercially at present

Growth in the civilian RPAS industry

23. The evidence we received confirmed as credible the estimate by the Aerospace and Defence Industries' Association of Europe that 150,000 jobs

could be created in Europe in the RPAS sector by 2050.¹⁷ The Commission said that these new jobs would be spread across manufacturers, operators and the broader supply chain of enabling technologies.¹⁸ A market study conducted in 2014 by Teal Group, an aerospace and defence consultancy company, suggested that the share of global spending on RPAS for civilian (as opposed to military) applications could increase, as a proportion of total RPAS spending, from 11 to 14 per cent in the next decade.¹⁹ The Commission believes that the RPAS market has the potential to make companies in all sectors more competitive.²⁰ BALPA, EuroUSC and Accenture said that RPAS would put aviation capability in the hands of “every business on the planet”, enabling them to complete tasks efficiently.²¹

24. The most rapid commercial market growth has come from the small RPAS sector.²² In the UK, this has mainly involved the sale of services, for example the collection and sale of surveillance data products and photographs. The Royal Aeronautical Society said that this trend was set to continue because “the amount of investment is less, the technology is more versatile, more readily available, accessible, and easier to use” than existing methods.²³ Robert Goodwill MP, Parliamentary Under-Secretary of State for Transport (hereafter referred to as the Minister), said: “The CAA has experienced a big jump in applications for commercial use of small unmanned aircraft, and it has issued approximately 670 permissions so far in 2014”.²⁴
25. There has also been large growth in ancillary services to the RPAS industry. Resource Group Ltd, a UK based company training RPAS pilots, said that it had trained more than 300 pilots for small RPAS and planned to train more than 500 pilots in 2015.²⁵ André Clot, Director of EuroUSC, another RPAS pilot training company, said:
- “My company has doubled in nine months. I was not expecting that. I have a business plan. Twelve months is too long for a business plan in this business. You have to revise it every three months.”²⁶
26. On the other hand, growth in the market for large RPAS has been slow. The Government said that this was directly related to “solving the additional

¹⁷ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 4

¹⁸ *Ibid* p 3

¹⁹ Overall spending is expected to increase from of \$6.4 billion to \$11.5 billion, largely driven by the military, Teal Group Corporation ‘Teal Group predicts worldwide UAV market will total \$91 billion in its 2014 UAV market profile and forecast’; (17 July 2014): <http://www.tealgroup.com/index.php/about-teal-group-corporation/press-releases/118-2014-uav-press-release> [accessed on 27 January 2015]

²⁰ [Q 81](#)

²¹ Written evidence from BALPA ([RPA0031](#)) and EuroUSC ([RPA0037](#)). Accenture Technology Labs, *It’s Time for Flying Robots: Key recommendations for making unmanned aerial vehicles operational* (2014): <http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Its-Time-for-Flying-Robots.pdf> [accessed on 27 January 2015]

²² In terms of individual small RPAS units sold, it is believed that a large proportion have been purchased for leisure use.

²³ Written evidence from Royal Aeronautical Society ([RPA0018](#))

²⁴ [Q 178](#)

²⁵ Written evidence from Resource Group Ltd ([RPA0009](#))

²⁶ [Q 19](#)

technical challenges associated with flight at greater distances and altitudes, in particular, the airworthiness requirements and the capability to avoid collisions.”²⁷ With regard to large passenger-carrying RPAS, BALPA said that there would be “inevitable resistance” from the public to flying on a machine where “the person who holds their life in their hands does not actually sit alongside them”.²⁸ There would also be little financial incentive to produce a remotely piloted passenger-carrying aircraft because it would still require life support infrastructure for passengers and cabin crew, in addition to the extra expense of building a secure ground base station for the pilots.

27. However, BALPA did identify some potential in the cargo sector. It noted that a cargo RPAS would not require life support equipment, such as pressurisation and air conditioning, catering, seating, windows or even toilets, as are found in manned cargo aircraft. Such an unmanned aircraft would thus be “lighter, cheaper to run, more efficient and easier to build ... than its manned equivalent”.²⁹
28. Hybrid Air Vehicles Ltd, a manufacturer of large, long endurance, gas-filled RPAS, forecasted that its Airlander programme would create 1,800 new jobs within five years and have employees in the tens of thousands by 2050.³⁰

Current RPAS Regulations

Principles of aviation regulation

29. As aviation developed in the early twentieth century to become an international activity, so too did the principles and regulations governing it. The first key principle of aviation regulation is the categorisation of the airspace which determines where different types of aircraft can fly. By international agreement, airspace is designated into classes A-G according to different types of aircraft operations. The designation indicates the level of air traffic management service that is provided and the minimum equipment and pilot competence required to fly. Class A airspace has a full air traffic management ‘separation’ service and is reserved for professional pilots flying sophisticated commercial aircraft. In contrast Class G airspace is used by pilots of small aircraft, gliders and micro lights, and there may be no air traffic management service whatsoever.³¹
30. In addition, sections of the airspace can be restricted for special purposes, most often for military training operations or special RPAS operations. Such airspace is generally called segregated airspace, as it is segregated from other

²⁷ Written evidence from the Department for Transport ([RPA0011](#))

²⁸ Written evidence from BALPA ([RPA0031](#))

²⁹ *Ibid*

³⁰ Written evidence from Hybrid Air Vehicles ([RPA0019](#))

³¹ Commercial manned aircraft operations are largely concentrated in airspace classes A, B and C where a full ‘separation’ is provided by air traffic management. Small general aviation aircraft, gliders and parachutists mostly operate in Class G, but also in E and where the air traffic management service is limited or non-existent. In such airspace the pilot of each aircraft is responsible for keeping well clear of other traffic. Today, most small RPAS operations take place at a height of less than 400 feet above ground level. Airspace at this height is mostly designated as Class G airspace but near to airfields it may be one of the air traffic management controlled classes, for example, B or D.

aircraft, and access is limited to authorised aircraft only. Air traffic management services may or may not be provided.

31. Today most small RPAS operations are restricted to Class G airspace below 500ft above ground. While this is not formally segregated, it is largely free of normal aircraft traffic. Radar tracking of aircraft is not usually provided in this airspace.
32. A second key principle within aviation regulation is the separation between regulation of the physical systems (airframe, engines, flight control software) and of the operation of the aircraft. Airworthiness regulations refer to the certification of the systems and includes design, manufacture and ongoing maintenance to ensure that the aircraft is safe to use. Operational regulations refer to rules regarding what makes an aircraft safe to operate, including pilot training and licensing and the use of air traffic management services.

RPAS Regulation at the International level

33. The International Civil Aviation Organization (ICAO) was created in 1944 upon the signing of the Convention on International Civil Aviation (commonly referred to as the Chicago Convention), as a UN specialised agency.³² ICAO publishes Standards and Recommended Practices (SARPs) which are intended to assist States in developing national aviation regulations. Each ICAO member country has a national aviation agency, or agencies, to oversee the different aspects of civil aviation, such as pilot licensing or air traffic management services.
34. Under Article 8 of the Chicago Convention, all RPAS regardless of size are prohibited from flying over another state's territory without its permission.³³
35. ICAO set up an Unmanned Aircraft Systems Study Group (UASSG) in 2007, which brought together experts from its Member States, stakeholder groups and industry, to discuss the impact of RPAS on aviation regulation. In November 2014, in response to the rapid developments in RPAS technology, the UASSG was elevated to the status of a Panel, and it aims to publish Standards and Recommended Practices (SARPs) on unmanned aircraft by 2018.³⁴ These SARPs will include guidance on airworthiness, operations and pilot licensing.

Table 2: Aviation Regulators

International	International Civil Aviation Organisation (ICAO)
Regional (Europe)	European Aviation Safety Agency (EASA)
National (UK)	Civil Aviation Authority (CAA)

³² ICAO has 191 Member States which work collectively to harmonise and standardise the use of airspace for safety, efficiency and regularity of air transport.

³³ The Civil Aviation Authority, *CAP 722: Unmanned Aircraft Systems Operations in UK Airspace: Guidance* (10 August 2012) Section 1, Chapter 2, p 1: <https://www.caa.co.uk/docs/33/CAP722.pdf> [accessed on 27 January 2015]

³⁴ An ICAO Panel can generate Standards and Recommendations while this is not possible under an ICAO Study Group.

RPAS Regulation at the EU level

36. In 2003, the European Aviation Safety Agency (EASA) was established in Cologne. It is responsible for the airworthiness and operations of aircraft within the EU. EU Regulation 216/2008 provides that EASA is responsible for civil RPAS over 150kg, leaving RPAS below 150kg and Member State use of RPAS (military and non-military) as the responsibility of Member State authorities.³⁵
37. EASA is supported by two other agencies, EUROCONTROL and the European Organisation for Civil Aviation Equipment (EUROCAE).³⁶ EUROCONTROL coordinates the air traffic management services across Europe and conducts research, while EUROCAE drafts the airworthiness and operational standards for aircraft.

RPAS Regulation at the UK level

38. The Civil Aviation Authority (CAA) is responsible for regulating RPAS below 150kg. The CAA bases its regulations on the size of the RPAS, with small RPAS categorised as weighing up to 20kg and light RPAS weighing 20–150kg.
39. The CAA’s main legislative tool is the Air Navigation Order (ANO) 2009, which draws together legislation covering all aircraft, air traffic management, crew, passengers and cargo.
40. The application of articles of the ANO to military, commercial and leisure RPAS operations is explained in ‘CAP 722’, a guidance document generated by the CAA.³⁷ It describes the safety requirements that have to be met in terms of airworthiness and operational standards before an RPAS is allowed to operate in the UK. The document is widely referred to by other states when developing their own regulations. Box 1 outlines the provisions of the ANO relating to RPAS.

Box 1: RPAS and the Air Navigation Order 2009

Article 138, which applies to all aircraft, including RPAS, irrespective of weight, stipulates that “a person shall not recklessly or negligently cause or permit an aircraft to endanger any person or property”.³⁸

Other provisions which apply to all RPAS are:

- A person must not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small unmanned aircraft so as to endanger persons or property (light RPAS under Article 129; small RPAS under Article 166).

³⁵ [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.

³⁶ EUROCAE, the European Organisation for Civil Aviation Equipment, is a non-profit making organisation which was established in Lucerne, Switzerland in 1963 to provide a European forum for resolving technical problems with electronic equipment for air transport. EUROCAE organises Working Groups (WG) where members provide experts working on voluntary basis. EUROCAE WG-73 was created to analyse and develop standards which will facilitate the insertion of RPAS in all classes of airspace. More recently, a separate Working Group, WG-93 was created to address small RPAS.

³⁷ The Civil Aviation Authority, *CAP 722: Unmanned Aircraft Systems Operations in UK Airspace: Guidance* (10 August 2012): <https://www.caa.co.uk/docs/33/CAP722.pdf> [accessed on 27 January 2015]

³⁸ The Civil Aviation Authority, ‘Basic Principles’: <http://www.caa.co.uk/default.aspx?pageid=11185> [accessed on 25 February 2015]

- The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can be made safely (light RPAS under Article 87; small RPAS under Article 166).

Articles 166 and 167 state that for small RPAS (<20kg) the following rules apply:

- The person in charge of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions. RPAS should be flown within the visual range of the remote pilot or observer, or a maximum range of 500m, whichever is less.³⁹
- Small RPAS are limited to fly to a maximum height of 400ft.
- Small RPAS are prohibited from flying in air traffic controlled airspace (Class A–E) and aerodrome traffic zones without authorisation of an Air Traffic Control (ATC) unit.
- The pilot is required to seek permission from the CAA for aerial surveillance or data gathering work.
- Small RPAS used for surveillance should not be flown:
 - over or within 150m in any direction of any densely populated areas;
 - within 50m of any person (other than the remote pilot; or persons under control of the remote pilot), vessel, vehicle or structure (30m during take-off and landing).
- Small RPAS are exempt from the normal Air Navigation Order requirements for airworthiness certification, flight crew licensing and the ‘rules of the air’ although they must be operated safely.

All Articles of the ANO apply to RPAS between 20–150kg. Operators are required to certificate airworthiness, have a permit to fly or a licensed flight crew and to follow the Rules of the Air. If this is not possible, the CAA may be prepared to issue an Exemption under Article 242 of the ANO.

The Commission’s Communication

41. The Communication states that greater access to the airspace over time is essential to achieving growth in the RPAS industry. For large RPAS this means integrating operations into the non-segregated airspace shared with other users and, where appropriate, controlled by air traffic management services. For small RPAS this means increased access to airspace over congested areas, which Commission officials described as “civilian habitat” or “cities”.⁴⁰ The future success of the RPAS industry as a whole depends on flight operations which can take place over greater distances beyond visual line of sight of the pilot. The *Roadmap for the Integration of RPAS into the European Aviation System* said: “all experts agree that the insertion of RPA in airspace will be gradual and evolutionary”, and outlines a timeframe for

³⁹ This principle is commonly abbreviated to “Visual Line of Sight” (VLOS).

⁴⁰ **Q 84**; this is similar to the UK definition which defines congested areas. CAP 722 states an RPAS cannot be flown “within 150 metres of any congested area of a city, town or settlement” The Civil Aviation Authority, *CAP 722: Unmanned Aircraft Systems Operations in UK Airspace: Guidance* (10 August 2012) Section 2, Chapter 1, p 3: <https://www.caa.co.uk/docs/33/CAP722.pdf> [accessed on 27 January 2015]

action between 2013 and 2028 to accomplish full integration of RPAS into the European airspace.⁴¹

42. The Communication sets out plans to create a single market for RPAS by harmonising the regulations for the airworthiness and operations of RPAS. This particularly affects the small RPAS industry which is developing in different ways across Member States. The Commission aims to do this by extending the competence of EASA to include RPAS with a mass below 150kg.
43. In order to meet the technology needs for RPAS, the Communication recommends streamlining Research and Development projects to prioritise the most pressing technological challenges, such as ‘detect and avoid’ technology, critical to both large and small RPAS.⁴² The Commission plans to achieve this by including RPAS-specific projects within the EU’s existing Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU).
44. Alongside the progressive integration of RPAS into European airspace from 2016 onwards, the Communication suggests plans to encourage public debate about measures to address societal concerns. These include perceptions of safety, data protection, security and liability in case of an accident.

⁴¹ European RPAS Steering Group, *Roadmap for the integration of civil Remotely Piloted Aircraft Systems into the European Aviation System* (June 2013) p 5: http://ec.europa.eu/enterprise/sectors/aerospace/files/rpas-roadmap_en.pdf [accessed on 28 January 2015]

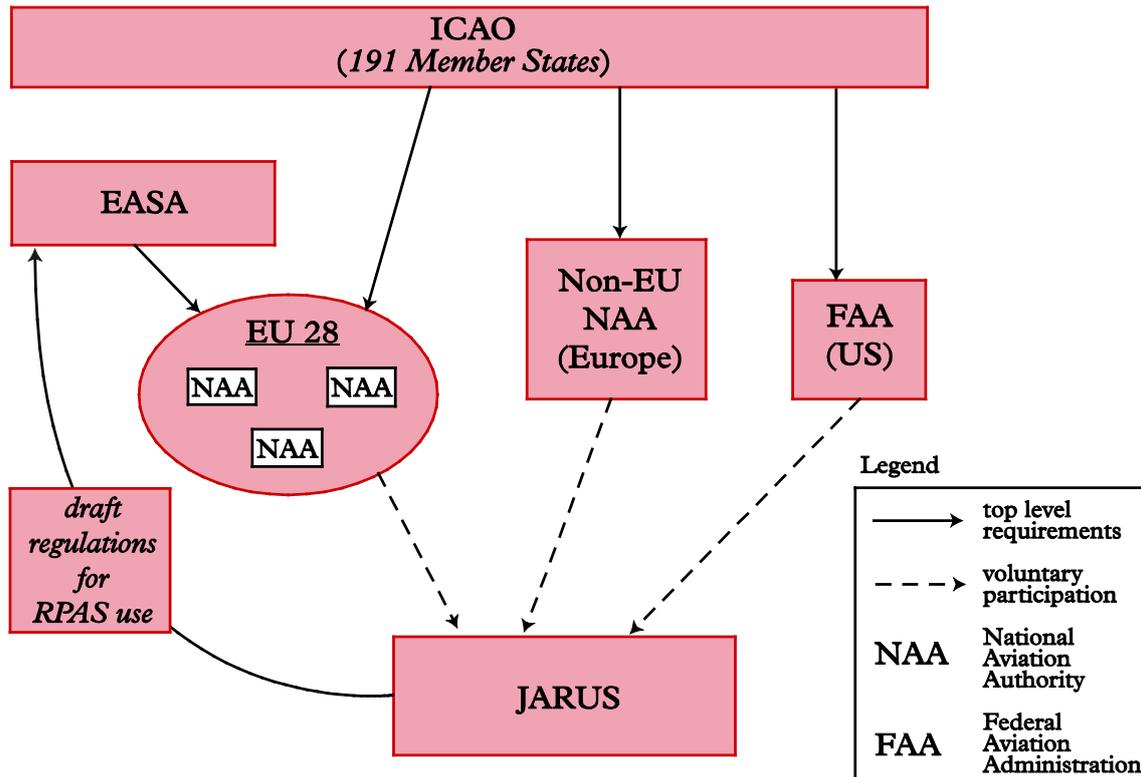
⁴² ‘Detect and avoid’ technology would enable an RPAS to sense objects in the air and automatically avoid a collision. The development of this technology is seen as the prerequisite to increasing access for RPAS to the airspace.

CHAPTER 3: REVIEWING THE REGULATORY FRAMEWORK

Extending EASA’s competence

45. One of the key proposals outlined in the Communication is that the European Aviation Safety Authority (EASA) should develop common rules for all RPAS operations, thereby expanding its regulatory powers to include RPAS weighing less than 150kg. This would limit the rule-making powers of national aviation authorities, which currently have competence in this area.

Figure 1: RPAS Regulators



Coherent Safety Regulations

46. The Communication states that the current divide between national and European regulations for RPAS (whereby those weighing 150kg or more are regulated by EASA and those less than 150kg are regulated by national aviation authorities), is “arbitrary” and “questionable in view of a coherent RPAS safety policy.”⁴³
47. The CAA agreed with the Commission: “it is most unlikely that an RPAS of 160kg (EASA) would be assessed in a way that is dramatically different from an RPAS of 140kg (NAA) when performing a similar mission/type of flight”.⁴⁴ Mr Sivel, of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS), a body of civil aviation regulators, said that although there was disagreement about what should replace this limit “everybody agrees

⁴³ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner; [COM\(2014\) 607](#), p 5

⁴⁴ Written evidence from the UK CAA ([RPA0029](#))

that 150 kilograms was put there during the initial debates 10 years ago and it does not make sense any more.”⁴⁵

Internal Market for RPAS

48. The Communication argues that EASA should develop common rules for all RPAS operations, in order to create a single RPAS market across the EU. It states that the current regulatory system for RPAS “is based on fragmented rules for ad hoc operational authorisations” in individual Member States, such that “National authorizations do not benefit from mutual recognition and do not allow for European wide activities, either to produce or to operate RPAS.” The result, it argues, is that “a true European Market will not emerge, hampering the development of this sector.”⁴⁶
49. The Communication says that part of the challenge lies in the fact that adequate regulatory frameworks permitting RPAS operations are missing in most Member States.⁴⁷ By expanding EASA’s competence to include RPAS weighing less than 150kg, the Commission could facilitate small RPAS operations in all Member States by creating common rules. To illustrate this, we learnt that in Belgium there is no regulatory framework which permits commercial RPAS operations, only exemptions for operations conducted by research institutions. Koen Meuleman, President of the Belgian Unmanned Aircraft Systems Association (BeUAS), told us that, as a result, commercial operators fly illegally with no regulatory oversight to ensure safe operations.⁴⁸
50. The Commission goes on to argue that as a result of the cross-border nature of the aviation industry, EASA is well placed to harmonise rules for RPAS. Margus Rahouja, DG MOVE, said: “We are not looking at it from the local or national markets perspective. Whenever the Commission makes an assessment or a proposal, it has to have a cross-border effect because, otherwise, the internal market is not affected.”⁴⁹ This view was echoed by Airbus Defence Ltd, which said: “RPAS regulation needs to be globally harmonized in order to permit international cross border operations.”⁵⁰
51. Enabling safe RPAS operations in all Member States will enlarge the RPAS market and remove barriers to entry. EuroUSC said: “Manufacturers need to sell and operators need to operate worldwide, so they want a harmonised approach from day one”, a view shared by the National Air Traffic Service (NATS).⁵¹ The Professional Society of Drone Journalists also supported harmonised regulations:

“Presently each country has its own regulation for RPAS use, this is a large disincentive to opening a successful RPAS operation in Europe”.⁵²

⁴⁵ [Q 51](#)

⁴⁶ Communication from the Commission to the European Parliament and the Council entitled: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 5

⁴⁷ *Ibid* p 4

⁴⁸ [Q 115](#)

⁴⁹ [Q 82](#)

⁵⁰ Written evidence from Airbus Defence Ltd ([RPA0012](#))

⁵¹ Written evidence from EuroUSC ([RPA0037](#)) and NATS ([RPA0036](#))

⁵² Written evidence from the Professional Society of Drone Journalists ([RPA0032](#))

52. English Heritage, which uses RPAS to monitor over 400 historic sites and monuments in England, noted that increasing the market for RPAS would “almost certainly stimulate massive technological development and innovation relating to RPAS applications”.⁵³
53. Creating a European internal market for RPAS would also assist Europe in negotiating safety regulations for RPAS at an international level. The Communication states that any rules used by EASA should be compatible with ICAO standards and based on international consensus.⁵⁴ Aerospace Defence Security Space told us:
- “it is, therefore, vital that there is one set of internationally recognised regulations ... [the] region that takes the initiative to progress with a regulatory framework will both drive international regulatory development policy, and simultaneously gain the commercial advantage required to grow its market share.”⁵⁵
54. The Honourable Company of Airline Pilots said that although ICAO provided an “overarching framework” for manned aviation regulations, in practice the “FAA and EASA predominate and most states adopt or copy the processes and practices of one or the other agency.”⁵⁶
55. On the other hand, some witnesses argued that there should be clear limits to EASA’s role in regulating small RPAS (those weighing less than 20kg). NATS said: “if an operator intends to only fly in a single country, local laws/standards should be established, primarily to address societal and privacy concerns.”⁵⁷ The Royal Aeronautical Society said that small RPAS should be managed “under identical regulatory rules as the rest of the [European Union] but with local ‘geographic’ differences to enable day-to-day operations.”⁵⁸
56. We also heard that national regulations would be more responsive to local need. Ursula Agriculture and the National Centre for Precision Farming recommended a national approach for small RPAS, which would “respond more quickly to developing technologies [and] would better assist the development of industry.”⁵⁹ BALPA said: “The advantage of regulating at a national level is that it should be much quicker to implement changes, and this is fine whilst the majority of RPAS are small and do not travel far.”⁶⁰
57. While small RPAS flights are currently restricted to remain in view of the pilot and within national boundaries, technological improvements, such as longer battery life, and market demand will require the development of a regulatory framework that permits cross-border flights in the internal market.

⁵³ Written evidence from English Heritage ([RPA0007](#))

⁵⁴ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 5

⁵⁵ Written evidence from Aerospace Defence Security Space ([RPA0021](#))

⁵⁶ Written evidence from the Honourable Company of Airline Pilots ([RPA0022](#))

⁵⁷ Written evidence from NATS ([RPA0036](#))

⁵⁸ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

⁵⁹ Written evidence from Ursula Agriculture ([RPA0014](#)), the National Centre for Precision Farming ([RPA0016](#)); Callen-Lenz Associates Ltd ([RPA0004](#)), ARPAS-UK and UAV SIG of RSPSoC ([RPA0005](#))

⁶⁰ Written evidence from BALPA ([RPA0031](#)) and Thales UK ([RPA0030](#))

Mr Rahouja, DG MOVE, agreed: “we [the European Commission] probably need to define exactly what should be done and where”, in anticipation of this issue arising in the future.⁶¹

58. Substantive concerns were raised about the impact harmonised rules for commercial RPAS operations would have on the existing small-RPAS industry in the UK. English Heritage cautioned that “a framework may be developed and enforced upon member countries that undermines the progress, development and implementation of RPAS already made in that country.”⁶² Callen-Lenz Associates Ltd was concerned that “any significant changes to regulation governing its existing activities could impact its business base significantly ... a similar concern is shared by other RPAS businesses in the UK.”⁶³
59. In oral evidence Dr Wolfe, of Callen-Lenz, went on to question the impact a change in the levels of regulations might have on the relationship between regulators and industry. She said that the small-RPAS community in the UK had built up “great rapport” with the CAA, and that as a result “at the moment the UK has some advantage compared with other countries”.⁶⁴
60. Maintaining the UK’s lead in the RPAS market will require the Government to continue to play a proactive role in the creation of EU-wide RPAS rules. Mike Lissone, Air Traffic Management Integration Programme Manager at EUROCONTROL, suggested that the UK was already at an advantage in that European regulators sought “the experience you have with flying in the UK because you are quite ahead with developing CAP 722”.⁶⁵ The Government told us: “we will seek to ensure that any proposals for further regulation or new Implementing Rules are proportionate to the risk and [do] not cause additional barriers to growth in this sector.”⁶⁶
61. Some witnesses questioned EASA’s capacity to take on an extra area of competence. The Royal Aeronautical Society said that “centralised control will mean additional administrative and resource pressures on an already stretched EASA”, and recommended that “there should be a lighter touch of control from EASA, with authority delegated to a local level, with administrative oversight at a centralised (EASA) level.”⁶⁷ Jaqueline Foster, MEP, said that EASA had run into difficulties with overregulating rather than harmonising regulations in the past: “That has been a great challenge for them [EASA].”⁶⁸
62. On the other hand, Thales UK said it was reasonable that EASA had been taking on greater role in harmonising regulations over the past eight years: “This is based on the desire for regulatory harmony in areas such as

⁶¹ [Q 82](#)

⁶² Written evidence from English Heritage ([RPA0007](#))

⁶³ Written evidence from Callen-Lenz Associates Ltd ([RPA0004](#))

⁶⁴ [Q 25](#)

⁶⁵ [Q 74](#)

⁶⁶ Written evidence from the Department for Transport ([RPA0011](#))

⁶⁷ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

⁶⁸ [Q 103](#)

Airworthiness, Licencing, Aerodrome operations, Personnel and Aircraft operations.”⁶⁹

63. The CAA suggested that concerns about EASA’s increased competence somewhat missed the point: “JARUS has already been nominated as the ‘rulemaking group’ for the current EASA rulemaking programme, and hence the work towards harmonisation is already underway.”⁷⁰ The role of JARUS is discussed below.
64. **We support the Commission’s aim to create an internal market for Remotely Piloted Aircraft Systems (RPAS) in the EU. EU rules on safety rules will be needed to achieve this, but we recognise the concerns expressed by small RPAS businesses that such rules risk stifling the existing industry. We recommend that EU rules for small RPAS should be flexible enough for Member States to respond to, and support local industry.**

The role of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS)

65. JARUS is a voluntary membership body comprising national civil aviation authorities from EU and non-EU countries and regional organisations. Its purpose is to develop technical, safety and operational requirements for the certification and safe integration of large and small RPAS into the airspace and at aerodromes.⁷¹ The Communication recommends that EASA takes a leading role in JARUS and helps it to produce “implementing rules or guidance” for safe commercial RPAS operations.⁷² Gerry Corbett, UAS Programme Lead, Intelligence, Strategy and Policy, Safety and Airspace Regulation Group, CAA, summed up this as follows: “Essentially, JARUS is becoming the rule-making team for EASA.”⁷³
66. An important advantage of using JARUS to develop safety regulations for commercial RPAS is its international membership. Mr Cremin, Department for Transport, said that JARUS “has in it a number of leading experts in regulatory authorities across the world”.⁷⁴ Adam Simmons, also Department for Transport, said that JARUS “enables us to share experience” with other countries about how to regulate RPAS.⁷⁵
67. The international make-up of JARUS also increases the number of countries and international organisations likely to adopt its recommendations. Mr Lissone, of EUROCONTROL, told us that China, Taiwan and South Korea were seeking to join JARUS.⁷⁶ Eric Sivel, Chairman of JARUS, said: “Once we have China, all the main actors in the world will be in JARUS, and we all have the objective of [agreeing safety rules for RPAS] quickly.”⁷⁷ Gary

⁶⁹ Written evidence from Thales UK ([RPA0030](#))

⁷⁰ Written evidence from the UK CAA ([RPA0029](#))

⁷¹ JARUS website, homepage: <http://jarus-rpas.org/> [accessed on 27 January 2015]

⁷² Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 6

⁷³ [Q 14](#)

⁷⁴ [Q 4](#) (Paul Cremin)

⁷⁵ [Q 4](#) (Adam Simmons)

⁷⁶ [Q 66](#)

⁷⁷ [Q 52](#)

Clayton, Chairman of the Unmanned Aerial Vehicle Systems Association, confirmed that JARUS could be “a very valuable tool for the aviation authorities jointly to create strong regulation and obviously advise EASA and ultimately ICAO.”⁷⁸

68. However, we also heard that JARUS had not recognised the distinction between large and small RPAS in the past. Mr Meuleman said that the early work of JARUS was very poor in relation to small RPAS, because “if you would literally apply what they write, you will never be able to fly.” He continued: “They were technical people or people from the administration that had never seen a drone, in my opinion.”⁷⁹
69. Such an approach reflected concerns about how JARUS, a body consisting of aviation regulators, engaged with the RPAS industry. Aerosynergy Certification Ltd said: “at present, industry is denied access to contribute to JARUS.”⁸⁰ Thales UK called for greater transparency between JARUS and industry, because “industry will constrain civil RPAS development until standards and regulatory requirements are clear and institutionalised on a transparent and mutually inclusive basis.”⁸¹ The Minister said:
- “In the absence of any other international body, I am content that this is the most appropriate form to undertake this role. However, JARUS will work out its relationships with industry, and in particular how industry can make an effective contribution to the work. I will keep that under review.”⁸²
70. Mr Simmons said that improved communication between JARUS and industry could be the solution: “ensuring that there is more sharing when it comes to how the manufacturers are developing their products and how they are used, and in feeding into some of their considerations from JARUS.”⁸³ Mr Sivel, of JARUS, said that JARUS had listened to these concerns, and was establishing a mechanism to reach out and improve its relationship with industry.⁸⁴
71. The Government also noted that JARUS’s task was made more difficult because it was a voluntary body without its own resources. Mr Cremin said JARUS “could probably be more effective”, and that “managing times and priorities is a key issue for JARUS. Getting the right people in the room at the same time also remains incredibly difficult.”⁸⁵
72. Mr Sivel responded: “One of the questions we are asking ourselves is: should we formalise the existence of JARUS and create an association similar to what existed in the past when the Joint Aviation Authorities existed in Europe or something like that, which will allow JARUS to have a minimum staff to develop?”⁸⁶ Over the course of the inquiry, Mr Sivel himself, the EASA representative on JARUS, was elected Chairman, and Christopher Swider, of

⁷⁸ [Q 39](#)

⁷⁹ [Q 120](#)

⁸⁰ Written evidence from AeroSynergy Certification Ltd ([RPA0001](#))

⁸¹ Written evidence from Thales UK ([RPA 0042](#))

⁸² [Q 183](#) (Robert Goodwill MP)

⁸³ [Q 4](#) (Adam Simmons)

⁸⁴ [Q 51](#)

⁸⁵ [Q 4](#) (Paul Cremin)

⁸⁶ [Q 53](#)

the Federal Aviation Administration in the USA, was elected Vice Chair to JARUS. A press release, dated 23 September 2014, also stated that a secretariat for JARUS had been created in EASA to support the group's work.⁸⁷

73. Mr Lissone cautioned against the risk that different entities operating at the European level would each put in place “the perfect plan, perfect roadmaps, perfect deliverables done in splendid isolation.”⁸⁸ He was seeking to put in place an implementation steering group comprising people from JARUS, EUROCAE, EASA, and other bodies, to synchronise the different work streams. Koen De Vos, of DG MOVE, said that the Commission would also ensure that proposals would incorporate the work being done by its different Directorates-General.⁸⁹
74. **The Joint Authorities for Rulemaking on Unmanned Systems (JARUS), through its flexible structure, has the potential quickly to draft safety regulations for the use of RPAS. Working through JARUS should ensure that any future EU rules will be compatible with international arrangements in other countries.**
75. **However, stakeholders had legitimate concerns about the transparency and capability of JARUS. We welcome JARUS' intention to involve industry more in its work. To increase the organisation's transparency and improve its reputation, we recommend that JARUS be organised on a more formal basis, and that it receive more resources from national aviation authorities.**
76. **We further recommend that the UK Civil Aviation Authority maintain and strengthen its involvement with JARUS.**

Other non-EU regulatory frameworks

77. We have concentrated in this report on the civilian use of RPAS, but we are aware of international agreements governing the military and state use of RPAS, which could potentially hinder the development of the internal market in the EU for the civilian use of RPAS.
78. The growing use of RPAS for military purposes worldwide led to the development of a number of national treaties governing their export and trade, which lie outside the EU's areas of competence. The Missile Technology Control Regime (MTCR) governs the export of any RPAS with a range of 300km or more and a payload of at least 500kg (referred to as a Category 1 system).⁹⁰ The UK, along with the 33 other states party to the

⁸⁷ JARUS, Press Release, *New appointments and Announcement of Secretariat* (23 September 2014): http://jarus-rpas.org/phocadownloadpap/2_Agenda/140923_JARUS_Press-Release.pdf [accessed on 27 January 2015]

⁸⁸ [Q 65](#)

⁸⁹ [Q 84](#)

⁹⁰ The MTCR regime is supported by a voluntary group of 34 countries, including 19 EU Member States, such as France, Germany and the UK, and other countries such as the US, Canada, and Russia. In 1992, the MTCR extended its scope with the inclusion of Unmanned Aerial Vehicles, of which RPAS are a subset, within its definition of ‘missiles’. This regime contains a list of goods, software and technology which face export restrictions. This list is divided into two parts. Category I refers to long range missiles, and this includes UAVs (including target drones and reconnaissance drones) capable of delivering and carrying a weight of least 500kg to range of at least 300km. Category II includes UAVS not covered in Category I, capable of a maximum range equal to or greater than 300km. The MTCR has also agreed to a set of guidelines on this list of items which refers to “a strong presumption to deny transfers of Category I systems”.

MTCR, has agreed not to export Category 1 RPAS, reflecting the aim of the agreement to prevent the export of or trade in systems which could be potentially used for the delivery of Weapons of Mass Destruction.

79. Thales UK said that the “efficacy” of this treaty should be considered to ensure the right balance between “preventing the proliferation of technologies necessary to produce long range missiles, whilst allowing the legitimate globalisation of RPAS for both military and civil applications.”⁹¹ Mr Rahouja, DG MOVE, did not think that the MTCR would necessarily limit trade of RPAS in the internal market, because “19 out of 28 member states” had signed up to the agreement.⁹²
80. Andrew Horton, of the Department for Business, Innovation and Skills, argued that while the MTCR appeared limiting on paper, its impact on trade in practice could be mitigated. He said that “it must be borne in mind that Category 1 of the MTCR applies to around 5% of all RPAS systems. We are talking about only a small number of potential systems”—though this situation would change as the technology enabling larger RPAS to fly was developed. He also noted that countries that had military links predating the MTCR would still be able to trade in RPAS, including the UK and the US as members of NATO. Where such earlier agreements did not exist, “that is where we run into difficulties.”⁹³ Moreover, Mr Horton said that when it came to “dual use items”⁹⁴, an EU-wide agreement existed which allowed the export of RPAS with a range of less than 300km between Member States without an export licence.
81. **Some EU Member States have existing obligations under international treaties, such as the Missile Technology Control Regime, which govern how large RPAS are sold. The Commission will need to consider carefully these obligations as it seeks to create an internal market for RPAS in the EU.**

⁹¹ Written evidence from Thales UK ([RPA0030](#))

⁹² [Q 85](#)

⁹³ [Q 6](#)

⁹⁴ RPAS which could be used for military or civilian purposes.

CHAPTER 4: PROPORTIONATE SAFETY REGULATIONS FOR RPAS

Safety equivalence between manned aircraft and RPAS

82. As we noted in Chapter 2, there are two broad categories of safety regulations in the aviation industry: regulations regarding airworthiness, which relate to the safety of the hardware of the aircraft; and operations regulations, which relate to the competence of the operator and compliance with rules of the air. The Communication states that the integration of RPAS into the European aviation system should be based on the principle that safety must not be compromised. RPAS operations should exhibit an “equivalent level of safety in comparison to manned aviation”.⁹⁵ But the Communication also states that “The regulatory framework should reflect the wide variety of aircraft and operations, keep rules proportionate to the potential risk and contain the administrative burden for industry and for the supervisory authorities.”⁹⁶ A key theme for the inquiry was to establish how these two requirements could be reconciled.
83. What determines an “equivalent level of safety” between manned and unmanned aircraft is, in itself, open to interpretation. AeroSynergy Certification Ltd said one form of airworthiness equivalence between manned aircraft and RPAS would be, “the minimum required to maintain the tolerable accident rate equivalent to that of a manned aircraft of similar size or type.” Even this was subject to qualification, since for “RPAS of a size and weight below that of known manned aircraft, such comparisons become more difficult.”⁹⁷
84. NATS suggested an alternative view of operational equivalence, whereby RPAS could “comply with the appropriate airspace rules”, and thus become “managed in such a way that they do not negatively impact other airspace users”.⁹⁸ While this form of operational equivalence is applicable to large RPAS, which would fly in non-segregated airspace and use air traffic management services, it could not apply to small RPAS, which tend to fly without the support of air traffic management.
85. The differences in interpretation of equivalence make it difficult to draft regulations which require equivalent levels of safety between small RPAS (those weighing less than 20kg) and manned aircraft. Mr Sivel, of JARUS, said that the aviation system was not prepared for such small aircraft: “On the larger end it is an aircraft and you have to adapt. On the lower end it is brand new.”⁹⁹
86. With respect to small RPAS, the adoption of a proportionate approach with regards to airworthiness and operational regulations may be more appropriate than simple equivalence to manned aircraft. Trevor Woods, of

⁹⁵ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 5

⁹⁶ *Ibid* p 5

⁹⁷ Written evidence from Aerosynergy Certification Ltd ([RPA0001](#))

⁹⁸ Written evidence from NATS ([RPA0036](#))

⁹⁹ [Q 50](#)

EASA, suggested that such an approach would consider “the operation to look at the risks that the operation produces”.¹⁰⁰ NATS suggested that “regulators should assess the particular risk to manned aviation”, and ask themselves whether a small RPAS was “safe enough to undertake that particular task in that particular airspace”.¹⁰¹

87. A proportionate approach which considered risks on a case-by-case basis would differ from the classic approach adopted for manned aircraft. Mr Sivel described the classic process as: “You certify the aircraft, you certify the airman, you certify the operator, and then it can fly in airspace”, considering each risk factor in isolation.¹⁰² In contrast Mr Rahouja, of DG MOVE, said that a proportionate approach to risk for small RPAS would adopt the principle that “the first purpose is safety not only of the machines but of the operations ... we need to find a way of defining the risk and then regulating accordingly to address that risk.”¹⁰³ He referred to this as a “risk-based” approach, that is to say an approach where the airworthiness and pilot competency requirements are proportionate to the risk that an RPAS flight presents to third parties.¹⁰⁴
88. One strength of a risk-based approach is that it could take into account the variability of small RPAS models, types and applications, a significant challenge to developing regulations for commercial small-RPAS operations. The Royal Aeronautical Society said that without adopting a risk-based approach, it would “be difficult to develop a blanket regulation for such a wide variety of air vehicles and sub-systems”, a point echoed by the Honourable Company of Airline Pilots: “Regulation must reflect and address the potential range of RPAS sizes and activities.”¹⁰⁵
89. A benefit of a risk-based approach to safety regulations for small RPAS is that businesses would only be required to conform to safety standards where appropriate. This is already the case in the UK under CAP 722. Gerry Corbett, of the CAA, said:

“Clearly, if you are operating somewhere where there is very little risk to people on the ground or in the air, you can be a little less fixed with some of the requirements for the aircraft, as opposed to an unmanned aircraft flying over London for example where you need to tighten up the requirements a lot more.”¹⁰⁶

90. Mr Sivel told us that countries which adopted a proportionate or risk-based approach to regulations “almost all now have rules in place, and they almost all certify operators.” He continued:

“To give you an example, in the UK a month ago there were 300 certified operators. The country per inhabitant that has the most certified operators in Europe is Sweden, and then France, and then

¹⁰⁰ [Q 51](#)

¹⁰¹ Written evidence from NATS ([RPA0036](#))

¹⁰² [Q 51](#)

¹⁰³ [Q 83](#)

¹⁰⁴ *Ibid*

¹⁰⁵ Written evidence from the Royal Aeronautical Society ([RPA0018](#)) and the Honourable Company of Airline Pilots ([RPA0022](#))

¹⁰⁶ [Q 16](#)

Norway. All these countries have taken a risk-based approach. If you take another very large country, the United States, that did not take the risk-based approach. Today they do not have a single certified operator.”¹⁰⁷

91. The impact on regulators of taking a risk-based approach to regulations for small RPAS in commercial operations was also discussed. Mr Woods, of EASA, said such an approach would be an efficient use of resources for regulators:

“According to the way that the risk is managed, perhaps there may be a category that does not need very much oversight but the label on the box and this kind of thing is sufficient for the very small machines. I think this emphasises the need for a proportionate approach, otherwise we will need so many resources to regulate it that it will not be possible”.¹⁰⁸

In contrast, BALPA said that “light touch regulation (which is being adopted more and more in other aviation areas) or self-regulation will struggle”, highlighting the difficulty in enforcing such an approach.¹⁰⁹

Reconciling regulations for large and small RPAS

92. A fundamental issue throughout the inquiry was how the two approaches to regulating large and small RPAS, one of which seeks equivalence with manned aircraft, and while the other adopts a risk-based approach to risk in all forms, could be reconciled within one regulatory framework. Mr Woods, of EASA, said that the two approaches would reflect two sides of the spectrum on regulations: “we need to look at it as a complete approach from very small to very large aircraft, with a continuum where the safety assessment of the operation is more important at one end and the certification at the other”.¹¹⁰ Mr Corbett, of the CAA, said that between the extremes of very small and very large RPAS “there ... is a bit of flexibility on a moving scale so that some [regulation] can be done on the basis of a safety case in some areas, depending on where the operation is taking place.”¹¹¹
93. On the other hand, we heard that regulations for large RPAS could also benefit from the flexibility of a risk-based approach. Mr Sivel told us that unmanned RPAS, of whatever size, differed significantly from manned aircraft, as there was no longer a need to protect people on board.¹¹² In this respect, as Thales UK noted, RPAS are “disruptive and [challenge] many aspects of aviation law which has evolved over the past hundred years or so.”¹¹³
94. The Honourable Company of Airline Pilots said that “draconian rules applied to a larger RPAS that was only operated over the sea/sparsely populated areas would close off potential RPAS development areas to EU

¹⁰⁷ [Q 51](#)

¹⁰⁸ [Q 57](#) (Trevor Woods)

¹⁰⁹ Written evidence from BALPA ([RPA0031](#))

¹¹⁰ [Q 51](#)

¹¹¹ [Q 16](#)

¹¹² [Q 49](#)

¹¹³ Written evidence from Thales UK ([RPA 0042](#))

industry and operators.”¹¹⁴ Mr Rahouja noted that Airbus had recently submitted a large RPAS for airworthiness certification by EASA, adding: “Our discussion so far has been about the limited-weight RPAS, but this will be a first step towards a general concept of how and when and why or where ... we can operate a large RPAS in an international or European environment.”¹¹⁵

95. It was also unclear how weight, a significant factor in manned aviation regulations, would be applied to risk-based regulations for small RPAS. Mr Sivel said the idea was “to take the weight out. There will be a weight factor, of course, but it is only one component of the risk assessment.”¹¹⁶ Mr Meuleman, of BeUAS, who helped to design legislation for small RPAS use in Belgium, agreed: “Weight is only one factor. It is an important one, but not the only one”.¹¹⁷ The Minister referred to an extreme example of a very small RPAS being flown around inside a shop: “we need to think about the point at which we say, ‘These are toys. They cannot be hazardous to the general public and they should be outside of the regulation’. I think the weight of the vehicle would probably determine that.”¹¹⁸
96. **We support the Commission’s move towards adopting a risk-based approach to safety regulations for RPAS. Not only would this approach, which considers the characteristics of the RPAS flight, accommodate the variation in size of RPAS, but it would also avoid burdensome regulations for businesses.**

Pilot training and licensing for small RPAS operators

97. Pilot training and licensing demonstrate still more clearly the value of a proportionate, risk-based approach. In manned aviation, an international system for recognising pilot qualifications has been in existence for decades. The same cannot be said for RPAS. While many EU Member States require commercial RPAS pilots to demonstrate competence for specific devices or activities, and to obtain permission from the national aviation authority to carry out aerial work, in the absence of EU-wide rules there is a degree of variation. Peter Lee, of Taylor Vinters LLP, said: “it is not at all straightforward for an experienced UK qualified-RPAS pilot to travel and offer his or her services in another Member State. The complexity of different national regimes therefore risks stifling the development of the small RPAS services industry.”¹¹⁹
98. BALPA and Alan McKenna recommended that all small RPAS commercial pilots should be required to undertake training to obtain a licence.¹²⁰ However, the standard of training proportionate to the operation of a small RPAS was disputed. Captain Andy Brown, of BALPA, said a more comprehensive pilot’s licence for operators of RPAS weighing 7–20kg should be a requirement: “It might not be as comprehensive as an airline transport

¹¹⁴ Written evidence from the Honourable Company of Airline Pilots ([RPA0022](#))

¹¹⁵ [Q 88](#)

¹¹⁶ [Q 49](#)

¹¹⁷ [Q 117](#)

¹¹⁸ [Q 178](#) (Robert Goodwill MP)

¹¹⁹ Written evidence from Peter Lee ([RPA0040](#))

¹²⁰ Written evidence from BALPA ([RPA0031](#)) and Alan McKenna ([RPA0025](#))

pilot's licence, and it would certainly be slightly different, but it would be towards that sort of level.”¹²¹ Gareth Roberts, a trainer and consultant on RPAS use by public service agencies, said that a set of “legal minimum standards” and career education up to and including a level 7 qualification (equivalent to a Master's degree) should be developed.¹²² This could be done along similar lines to the Private Pilot's Licence (PPL) or commercial pilots licence.¹²³

99. On the other hand, Professor Keith Hayward, of The Royal Aeronautical Society, was conscious that “if you overqualify your pilot, your controller, and require him or her to invest a considerable amount of money in that process, it will considerably inhibit the development of the kind of downstream activities that we want to see developed for a future economy.”¹²⁴
100. Yet the risks of pilot error are clear. Philip Heath, of John Heath Insurance Brokers LLP, said: “In general terms, 5% of our operators have had an incident that we can attribute to pilot error. Generally, incidents occur within the first 12 months [of operating], which, to us, indicates that inexperience is, perhaps, a key factor.” He suggested that, as long as costs were kept proportionate, it should be mandatory to include “some form of flight training as an obligation”.¹²⁵
101. Witnesses also reflected on who should deliver this training and how they should be regulated. In the UK, the CAA demands that pilots of any aircraft have at least a basic understanding of the applicable regulations, in particular the Air Navigation Order and Rules of the Air Regulations. The CAA requires potential commercial RPAS pilots to demonstrate that they are sufficiently competent before any operating permission is issued. It recognises qualifications issued by two Qualified Entities (EuroUSC and Resource Group Ltd) as proof of pilot competence.
102. Mr Roberts, though, expressed concern about the private sector provision and certification of RPAS pilot training: “These training initiatives are uncoordinated and often purely ‘commercial’ endeavours and do little to enhance the new trade.”¹²⁶ Mr McKenna said that there should not only be a “requisite standard recognised across Europe, but that there should be adequate competition amongst such certification providers.”¹²⁷
103. Mr Meuleman said that there had been complaints about a company in the Netherlands carrying out this work, which was “quite expensive.” Private companies might work, but “it should be within limits, yes, because they are private companies, and their own goal is to earn money”.¹²⁸

¹²¹ [Q 41](#)

¹²² H M Government, ‘National Framework of Qualifications in the UK’: <https://www.gov.uk/what-different-qualification-levels-mean/compare-different-qualification-levels> [accessed on 27 January 2015]

¹²³ Written evidence from Gareth Roberts ([RPA0002](#))

¹²⁴ [Q 41](#)

¹²⁵ [Q 143](#)

¹²⁶ Written evidence from Gareth Roberts ([RPA0002](#))

¹²⁷ Written evidence from Alan Mckenna ([RPA0025](#))

¹²⁸ [Q 133](#)

104. In contrast, EuroUSC argued strongly in favour of using private organisations, similar to the UK’s Qualified Entities (of which EuroUSC itself is one), to alleviate the pressure on national authorities and to satisfy growing demand for pilot training. It also said that such certified entities could “dynamically harmonise” approaches—for example, a Qualified Entity could operate simultaneously in two or more countries if it satisfied all relevant national criteria.¹²⁹
105. **We recommend that commercial RPAS pilots operating in the EU should be assessed for their competence to fly safely to a level which reflects the risk of the operation to be undertaken. EU-wide guidance on grades of pilot competence should be produced to support the development of the internal market and improve the quality of training received across the EU.**

Airworthiness

106. At present, RPAS with an operating mass of more than 150kg are subject to European Regulation (EC) No. 216/2008, which enforces airworthiness standards. But RPAS below 20kg, the sector where most commercial RPAS operations are currently taking place, are subject to few existing standards or assessments. While an airworthiness standard refers to the quality of the product when manufactured, an airworthiness assessment considers the maintenance of a system which has been in operation.
107. The Royal Aeronautical Society said: “The EC has not included improved airworthiness as a priority for the development of the civil [RPAS] market. We believe this needs to be added as a matter of urgency.” It said that airworthiness requirements were essential in order to ensure the safety of the different types of RPAS available in this expanding market.¹³⁰
108. Resource Group Ltd agreed that the lack of airworthiness standards for small RPAS was a “weakness of the industry”.¹³¹ The Government confirmed that there were no specific airworthiness standards in the UK for RPAS with a mass of 20kg or less:
- “Specific standards for such small aircraft would be disproportionate to the size and relative risk to third parties. It is the responsibility of the ‘person in charge’ of the [RPAS] to satisfy him/herself that the flight can be safely manned and, while flying the [RPAS], he/she is required to operate it in a way that will not endanger any person or property.”¹³²
109. Mr Sivel suggested that there was a risk that a lack of European airworthiness standards for small RPAS would result in manufacturers adopting standards produced by Europe’s competitors, such as the USA. He said that EUROCAE, through Working Group 93, was hoping to develop standards by 2016, but that the quality of these standards would not be sacrificed in order to meet this deadline.¹³³

¹²⁹ Written evidence from EuroUSC ([RPA0037](#))

¹³⁰ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

¹³¹ Written evidence from Resource Group Ltd ([RPA0009](#))

¹³² Written evidence from the Department for Transport ([RPA0011](#))

¹³³ [Q 54](#)

110. We asked the Commission whether it had considered using the CE marking scheme, as a short-term alternative to conventional aviation airworthiness standards, to introduce some basic standards into the small RPAS sector. A CE marking is the manufacturers' declaration that a product meets the requirements of applicable European Directives.¹³⁴
111. Mr Rahuoja confirmed that the Commission was examining this option. He said that the advantage of such a scheme was that it would "avoid a certification process, which may be burdensome for both the administration and industry".¹³⁵ Mr De Vos, also of DG MOVE, added that this approach would also help to reduce compliance costs, because products could be tested by regulators but also by competitive businesses in an industry: "some companies, which see that their market is taken away by products that do not satisfy that CE marking but which are brought on the market, go to some supermarket and perform their own tests."¹³⁶
112. However, Mr Heath, of John Heath Insurance Brokers LLP, said that the CE marking would be relevant only to a device that had been manufactured as an entire unit, and that it would be difficult to apply to a self-build RPAS.¹³⁷
113. Airworthiness standards would need to be complemented by ongoing assessments of the RPAS after use, to ensure that a level of safety is maintained. Mr Heath said that "Approximately 10% of our operators have been involved in an incident that could be related to airworthiness and, in our view, anything that can reduce the risk of an incident has to be welcomed." On the other hand, he cast doubt on the feasibility of asking pilots of RPAS weighing under 20kg to be responsible for the ongoing airworthiness of their aircraft: "Most of the operators that we are seeing are photographers. They are not engineers and they do not possess scientific or engineering knowledge." He also highlighted other issues to consider, such as how often airworthiness assessments were carried out, who would carry them out and the cost to the operator.¹³⁸
114. The Government noted that in certain circumstances the CAA might require additional airworthiness assessments for RPAS, for example for flights over people, or flights beyond the visual line of sight of the pilot.¹³⁹
115. EuroUSC also highlighted the current differences in approach between Member States on this issue. Germany and France simply required RPAS pilots to declare themselves to the relevant regulator, without having to submit their aircraft to any checks, while the Netherlands and Malta

¹³⁴ By affixing the CE marking to a product, a manufacturer declares, on his sole responsibility, that the product has been assessed before being placed on the market and thus satisfies the applicable legislative requirements (for example, a harmonised level of safety) enabling it to be sold in the EU. The scheme only applies to product categories mentioned in EU directives on the CE marking. Distributors must check that the product bears the CE marking and that the requisite supporting documentation is in order. If the product is being imported from outside the EU, the importer has to verify that the manufacturer has undertaken the necessary steps and that the supporting documentation is available upon request.

¹³⁵ [Q 90](#)

¹³⁶ [QQ 90–91](#)

¹³⁷ [Q 143](#)

¹³⁸ [Q 143](#)

¹³⁹ Written evidence from the Department for Transport ([RPA0011](#))

subjected all RPAS to an airworthiness assessment (a requirement formalised in September 2014).¹⁴⁰

116. **We support the ongoing development of EU airworthiness standards for small RPAS. These standards should be, as far as possible, consistent with emerging international approaches, particularly that of the USA. The requirement for airworthiness standards should depend on the type of RPAS operation.**
117. **We recommend that the Commission quickly considers requiring CE marking for small toy-like RPAS (below 2kg). While this is not an airworthiness standard, and would not compensate for pilot error, it would introduce basic quality standards for these products.**
118. **In addition, we believe airworthiness assessments can improve the safety of RPAS operations, and we encourage the Commission to consider creating guidance on this for national aviation authorities.**

¹⁴⁰ Written evidence from EuroUSC ([RPA0037](#))

CHAPTER 5: ENABLING TECHNOLOGIES

Role of SESAR JU

119. The Communication proposes that the Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU) should co-ordinate research and development (R&D) to develop the key technologies required to integrate RPAS into non-segregated airspace. It states that SESAR JU is “uniquely placed” to co-ordinate the different research programmes carried out by various EU agencies, such as the European Commission, EUROCONTROL, the European Defence Agency, and the European Space Agency, and to pave the way towards a gradual and smooth integration of RPAS.¹⁴¹
120. In addition, the Communication promises to define specific actions under Horizon 2020 and COSME¹⁴² to support the development of the RPAS market, involving in particular SMEs. The Commission would co-ordinate these activities with SESAR JU, “to avoid overlapping and leverage on the available resources”.¹⁴³

Box 2: Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU)

SESAR JU is a public-private partnership, created in 2004 in order to develop the technological capacity to deliver the goals of the EU’s Single European Sky programme. The Single European Sky aims to increase the capacity of the airspace and reduce the cost of air traffic management across Europe while increasing safety. In doing so, it will start to modify responsibilities between technology, air traffic managers and flight crew. The Federal Aviation Administration (FAA) is currently carrying out a similar project in the USA, called ‘NextGen’.

The total estimated cost of the development phase of SESAR JU was €2.1 billion, with funding provided equally by the European Commission, EUROCONTROL and the aviation industry. SESAR JU entered the last of its three phases in 2014, and is scheduled to continue until 2020. Its remit has recently been widened to include research into RPAS.

121. **We welcome the Commission’s support for the development and incorporation of key technologies, which will encourage the growth of the RPAS industry.**

¹⁴¹ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 6

¹⁴² Horizon 2020 is the EU’s largest Research and Innovation programme to date with a budget, with €80 billion to be distributed between 2014 and 2020. COSME is the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises running from 2014 to 2020 with a planned budget of €2.3bn. It plans to support SMEs through better access to finance and markets, supporting entrepreneurs and creating more favourable conditions for business creation and growth.

¹⁴³ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 9

Developing new technologies and regulatory uncertainty

122. The Communication states that some of the key technologies required to allow for the safe integration of RPAS into non-segregated airspace are not available. It therefore proposes that research at the EU level should focus on the validation of these technologies, and be efficiently coordinated in order to keep the lead times for their development as short as possible. Without this, the Communication suggests that the EU will continue to be overshadowed in the global RPAS manufacturing market by the current leaders, the USA and Israel, as well as newer competitors such as Brazil, Russia, India and China.¹⁴⁴
123. The Government, the Commission, the CAA, Gary Clayton, UAVS, and Ray Mann, CEO of West Wales Airport, all highlighted a ‘chicken and egg’ problem. On the one hand, regulators were unable to define precise regulations without understanding the new RPAS technologies and procedures that would be employed to account for the removal of the pilot from the cockpit. On the other hand industry was reluctant to invest in developing the required enabling technologies because of the uncertainty over how the technology would be regulated.¹⁴⁵ The requirements to test new technologies rigorously, to ensure that they are safe to use, meant that there was a long lead time between identifying a technology need, its development and the point where it could make a commercial return. Ray Mann said that this regulatory uncertainty was undermining investment in RPAS development:

“This waiting game has been going on for 10 years in the industry, and it has prevented a lot of companies from investing in research and development and taking a capability to demonstration and to market to enable systems to be produced”.¹⁴⁶

The technologies needed

124. In addition to the regulatory challenges outlined in Chapters 3 and 4, potential applications for RPAS are currently not possible without the development of certain technologies. For example, the delivery of a light parcel by a small RPAS in a town or city would require technology enabling the RPAS to fly beyond the visual line of sight of the pilot. The RPAS would need to detect and avoid objects such as trees, lamp posts and people without pilot assistance. Moreover, if a number of RPAS deliveries were scheduled for a similar time in one area, a system to co-ordinate the traffic of small RPAS in the airspace would be needed. To guarantee the safety of the operation, the control link between the RPAS carrying the parcel and the pilot would have to be secure. A loss in connection could result in an accident. When scaled up, these challenges are similar to those facing the use of large RPAS to transport cargo, and this helps to explain why commercial operations for large RPAS are not yet available in the UK or Europe.

¹⁴⁴ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), pp 3-7

¹⁴⁵ Written evidence from the Government ([RPA0011](#)); and AM-UAS ([RPA0006](#)); [Q 2](#) (Paul Cremin), [Q 17](#) (Gerry Corbett), [Q 95](#), [Q 44](#) (Gary Clayton)

¹⁴⁶ [Q 29](#)

Detect and avoid

125. ‘Detect and avoid’ (DAA, also referred to as ‘sense and avoid’) refers to the ability of an aircraft to avoid mid-air collisions. The Government said: “The development of an effective DAA system is key to the safe integration of RPAS” into the airspace.¹⁴⁷ AM-UAS Ltd said: “Based on our knowledge of the sector, we feel that [Detect] and Avoid technology will be a turning point in what is possible with RPAS. It will be this that allows the large scale integration of unmanned aircraft into controlled airspace, and over much longer distances”.¹⁴⁸
126. Currently manned commercial aircraft weighing five tonnes or more are required to have a Traffic Collision Avoidance System (TCAS). This system is intended to support the aircraft’s pilot, who is still legally responsible for ‘seeing and avoiding’ other aircraft. TCAS relies on the use of a transponder and only works with other “co-operative” aircraft that also have transponders.¹⁴⁹ If two large aircraft with TCAS detect each other, the respective TCAS systems communicate to co-ordinate actions to avoid collision. However, the system will not detect a smaller general aviation aircraft without a transponder.
127. Large RPAS will have to operate in a similar way to current manned aircraft and have technology which can be detected by manned aircraft. Thales UK said that RPAS would have to “carry a requisite level of equipment appropriate to the class of airspace they intend to operate. This will include special equipment such as a Secondary Surveillance Radar (SSR) Transponder as well as an approved method of aerial collision avoidance.”¹⁵⁰
128. Witnesses emphasised that detect and avoid system for large RPAS would have to go beyond the existing technology used in TCAS, because it would also have to detect objects which did not carry transponders. By way of example, Denis Koehl, Senior Adviser for Military Affairs, SESAR JU, said that paragliders, who fly below 500ft, do not carry technology to assist in their detection by aircraft.¹⁵¹ AeroSynergy Certification Ltd confirmed that “a Detect and Avoid system must be able to automatically take evasive action with or without the RPAS pilot in the loop.” It also said that, given the potentially catastrophic consequences of a detect and avoid system failing on an RPAS, such systems should “be assigned the highest levels of software development assurance and systems availability and integrity.”¹⁵²
129. A number of UK aerospace companies have responded to the need to develop and certify detect and avoid technology by collaborating with Government on a research project to demonstrate and test this technology on a large RPAS. This project, ASTRAEA, is described in Box 3.

¹⁴⁷ Written evidence from the Department for Transport ([RPA0011](#))

¹⁴⁸ Written evidence from AM-UAS Ltd ([RPA0006](#)) and Resource Group Ltd ([RPA0009](#)). Controlled airspace refers to airspace under air traffic management.

¹⁴⁹ An aircraft transponder is an electronic device used to broadcast an aircraft’s position and identity through wireless electrical signals. Its primary function is to provide air traffic management with a ‘radar’ picture of traffic in the airspace.

¹⁵⁰ Supplementary written evidence from Thales UK ([RPA0042](#))

¹⁵¹ [Q 70](#)

¹⁵² Written evidence from AeroSynergy Certification Ltd ([RPA0001](#))

Box 3: ASTRAEA

ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation & Assessment) is a UK industry-led consortium focusing on the technologies, systems, facilities, procedures and regulations that will allow highly automated vehicles to operate safely and routinely in civil airspace over the UK. The programme, which began in 2006 and concluded its second stage in March 2013, had a budget of £62 million, comprising government and private sector funding. The project consortium included Agent Orientated Software Limited (AOS), BAE Systems, Airbus Defence & Space, Cobham, QinetiQ, Rolls Royce and Thales.

Part of the programme, Separation Assurance and Control, focused on detect and avoid technology. It also tested the technologies required to control the aircraft from a ground control station and the integrity and security of the data link. The other element of the programme, Autonomy and Decision Making, tested sharing the system's in flight decision-making with a human operator.

In April 2013, as part of the ASTRAEA research programme, a Jetstream research aircraft completed a 500-mile flight through UK airspace from Preston to Inverness while under the command of a ground-based pilot and the guidance of NATS air traffic controllers.¹⁵³

130. Members of the ASTRAEA consortium said that the project helped to address uncertainty between industry and regulators. Agent Oriented Software Limited, an SME in the consortium, said that it invested in the project because it wished to be part of the “development of regulations that are both safe and efficient to comply with, and to build the company’s profile in the supply chains of the primes.”¹⁵⁴ Thales UK said that its experience on the programme provided it with the understanding necessary to “access this breakthrough market sector”.¹⁵⁵
131. The Government said that the ASTRAEA programme had “seen numerous demonstrations of improved capability of some of the key systems required and moved forward the formation of draft regulations for their use.”¹⁵⁶ However, Mr Cremin said that there remained much work to do: even after testing the technology, it was necessary “to go through the full system-live demonstrations, as you would do in testing any other product.” He added that it could be compared to the development of the Traffic Collision Avoidance System for manned aircraft, which took over 10 years, and that a potentially certified detect and avoid system might be available “in and around the 2023 timetable.”¹⁵⁷
132. The second stage of ASTRAEA concluded in April 2013. Aerospace Defence Security Space said that it was important “that national initiatives in the UK and across Europe are encouraged to support the body of evidence that has been ... collected by ongoing initiatives such as ASTRAEA.” It continued: “This is necessary to underpin system certification of RPAS for the wide range of civilian uses which could be made available.”¹⁵⁸ Thales UK

¹⁵³ Written evidence from NATS ([RPA0036](#))

¹⁵⁴ Written evidence from Agent Oriented Software Limited (AOS) ([RPA0046](#))

¹⁵⁵ Written evidence from Thales UK ([RPA0030](#))

¹⁵⁶ Written evidence from the Department for Transport ([RPA0011](#))

¹⁵⁷ [Q 9](#)

¹⁵⁸ Written evidence from Aerospace Defence Security Space ([RPA0021](#))

also recommended continued support for the ASTRAEA programmes: “Less than full engagement on current RPAS initiatives will leave UK industry at a significant disadvantage and may lead to an unrecoverable loss in market position.”¹⁵⁹

133. **RPAS development is currently hampered by a ‘chicken and egg’ problem: industry is reluctant to invest in developing the necessary technologies without certainty about how they will be regulated, while regulators are reluctant to develop standards until industry comes forward with technologies for validation. ASTRAEA is a good example of how industry and regulators can work together to overcome this challenge through shared funding and early joint working. We recommend that the Commission adopts a similar collaborative approach to forthcoming research projects in the RPAS sector.**
134. **As the second phase of the ASTRAEA programme is now complete, we recommend that the UK Government publish a plan setting out how it proposes to build on the programmes outputs.**

Air traffic management

135. Air traffic management refers to the separation of aircraft in non-segregated airspace, namely airspace that is used by other aircraft. This separation is provided by ground control staff who use the link between radar and on-board transponders to detect airborne traffic in their area. The primary purpose of air traffic management is to prevent collisions, and to organise and improve the flow of traffic.
136. Large RPAS, weighing over 150kg, will have to comply with existing regulations for air traffic management if they are to be integrated into airspace shared with commercial manned aircraft. The Professional Society of Drone Journalists said: “Larger RPAS will be able to fly higher and have sense and avoid systems and be able to be integrated into the current air traffic system”.¹⁶⁰ Gerry Corbett, CAA, said that large RPAS in the airspace would have to comply with existing requirements under the air traffic management framework: “the way as a controller you deal with a manned aircraft should be as close as possible to the way you deal with an unmanned aircraft. We do not want air traffic management systems to have to start dealing with different things at different times.”¹⁶¹
137. Indeed, this expectation underlies the decision to make the SESAR JU the co-ordinating body for all RPAS research and development projects. Neil Watson, of Thales UK, told us that SESAR JU was currently undertaking research into understanding “how an air traffic controller deals with an RPAS and the fundamental differences in its operating characteristics.”¹⁶²
138. In contrast, we learned that it would not be possible to use the existing air traffic management framework to detect small RPAS. In response to suggestions that RPAS be fitted with transponders, Mr Sivel said: “real

¹⁵⁹ Written evidence from Thales UK ([RPA0030](#))

¹⁶⁰ Written evidence from the Professional Society of Drone Journalists ([RPA0032](#))

¹⁶¹ [Q18](#)

¹⁶² [Q 27](#)

transponders would eliminate any small RPAS because they are quite large.”¹⁶³ Mr Lissone stressed that even if it were possible, fitting all RPAS with conventional transponders would “have a completely negative impact” on the management of large aircraft: “We simply cannot cope with such an amount of transponders.”¹⁶⁴

139. A number of small RPAS stakeholders noted that the creation of a system to manage the traffic of low level flights was needed in order to ensure the safety of increased small RPAS operations. Mr Meuleman said: “What we are after ... is that a kind of notification system, as we call it, should be in place, because we know especially for traffic control and so on, the major concern is that we do not see these things flying.”¹⁶⁵
140. Flirtey, a UAV delivery company, urged us to recommend that regulators “Provide a free Internet service for all unmanned aerial vehicle operators to log their flight paths, plan flights in advance, and to submit requests to Air Traffic Control for higher risk operations” at short notice.¹⁶⁶ Mr Lissone told us that a website was in fact in the process of being developed in Ireland to track RPAS flights: “They had huge issues of RPAS flying in Dublin City Airport and they said that, if we could ask [RPAS pilots] to file authorisation to fly in Ireland and then tell them where they are operating, what altitudes and what times, this would generate automatic aeronautical information to all the airspace users.”¹⁶⁷
141. It was unclear whether such a database system should be developed by regulators or industry. Mr Lissone told us that while SESAR JU was considering a system for small RPAS, it would not be ready “for a very long time, when I am already on my pension.”¹⁶⁸ Mr Koehl, of SESAR JU, said that industry should try to develop solutions which could be used across the EU. The Commission could support this by harmonising rules regarding operations, but that from that point on “the game has to start from the industry side”. He continued: “We have to align local regulation so that everyone can make business across Europe as a minimum. That, for me, is the blocking point—it is the business, it is the market, it is the industry ... That is the main issue. For me it is not [air traffic management].”¹⁶⁹
142. Jay Bregman, the entrepreneur behind eCourier and Hailo, said that he was working on a global identity registry for robots (including RPAS). He agreed that industry should take the lead, and opposed the creation of an RPAS database as a public utility. This was because “the underlying technology and the regulatory principles are evolving faster than the systems we currently have in place to regulate them.”¹⁷⁰
143. There is persuasive evidence that such a RPAS flight notification system could be Internet-based, or app-based, and would not be resource intensive;

¹⁶³ [Q 58](#)

¹⁶⁴ [Q 72](#)

¹⁶⁵ [Q 125](#)

¹⁶⁶ Written evidence from Flirtey ([RPA0050](#))

¹⁶⁷ [Q 69](#)

¹⁶⁸ *Ibid.*

¹⁶⁹ [Q 71](#) (Denis Koehl)

¹⁷⁰ Written evidence from Jay Bregman ([RPA0049](#))

it could achieve a high degree of penetration given the prevalence of smartphone use. NASA in the USA is already working on developing a website which will allow RPAS pilots to reserve blocks of airspace for flights. There is nothing yet in place at the EU level.¹⁷¹ In the longer term, as more small RPAS are flown commercially at low altitude beyond the sight of the pilot, or even flown completely autonomously, some sort of air traffic management infrastructure to separate RPAS flights will be required in order to ensure the safety of complex operations, for example, package delivery in cities.¹⁷²

144. **In light of the evidence we have received, and the example set by ASTRAEA, we recommend that the Commission, the Government and the RPAS industry should work together to explore the creation of an online database through which commercial small RPAS pilots can provide details of their flights (below 500ft) to inform other airspace users. In order to keep the UK and Europe at the forefront of RPAS developments, we recommend that all parties seek to engage with NASA in the USA, which is currently researching the development of such a system.**

Command and control (C2) link

145. A command and control (C2) link is a data link between the pilot and the aircraft, which enables the pilot to give commands to the aircraft and to download data along radio waves. Mr Mann highlighted the importance of this technology:

“The command and control link is the difference between a pilot on the ground and a pilot in the cockpit ... With unmanned systems we need a technology that ensures that that command and control is always linked to the aircraft, so that no matter what happens in any circumstance the control can be taken from the ground.”¹⁷³

146. Despite the fundamental importance of the C2 link to safe RPAS operations, a number of technological challenges still need to be addressed. First is the availability of radio spectrum, upon which the command and control over the aircraft is secured. Thales UK and the Royal Aeronautical Society said that the lack of sufficiently available spectrum was particularly concerning for RPAS operations because of the requirement to send commands from the pilot to the aircraft along one set frequency and to download data along another.¹⁷⁴
147. Historically, the aviation sector has been allocated a large amount of spectrum, which, in order to protect human life, is safeguarded against interference. Mr Lissone, though, said “the way aviation manages the aviation frequency bands is on the outside seen as very poor.” There was increasing pressure from small RPAS users, the communications industry and from some countries, such as the US and Germany, to allow the use of

¹⁷¹ ‘Unmanned aircraft: The robot overhead’, *The Economist* (6 December 2014): <http://www.economist.com/news/technology-quarterly/21635326-after-starting-their-career-armed-forces-drones-are-now-entering-civilian> [accessed on 4 February 2015]; Q 69 (Lissone)

¹⁷² *The Economist*, *op cit* [accessed on 4 February 2015]

¹⁷³ Q 26

¹⁷⁴ Written evidence from Thales UK (RPA0030) and the Royal Aeronautical Society (RPA0018)

non-safety certified aviation frequency bands for RPAS. Mr Lissone warned that if this were to happen, it could undermine the aeronautical industry's justification for maintaining control of a large share of radio spectrum: “[if we] tell everybody that we do not need these special frequency bands and that we can do without ... we have no fight whatsoever.”¹⁷⁵

148. The World Radio Conference in November 2015¹⁷⁶ will be important in deciding the amount and type of frequencies that should be used for RPAS.¹⁷⁷ Mr Rahouja, DG MOVE said: “Shortage of radio frequencies is a serious issue but has not been identified as an acute show-stopper for the RPAS operations.”¹⁷⁸ He said that Member States must co-ordinate their positions in order to defend their interests at the World Radio Conference. On 6 January 2015 the UK telecommunications regulator, OFCOM, stated that the UK would not support the use of non-protected bands for RPAS C2 links.¹⁷⁹
149. In addition to the availability of spectrum, concerns were raised about which frequencies were used for certain applications. The Association of Remotely Piloted Aircraft Systems UK (ARPAS-UK), Unmanned Aerial Vehicle Special Interest Group (UAV SIG) of the Remote Sensing and Photogrammetry Society (RSPSoc) said: “whilst the majority of control and command [links for small RPAS] operate on 2.4GHz and video downlinks are on 5.8GHz, recent RPAS have been sold by Maplins with this combination reversed. It is critical that for the industry to develop there needs to be co-ordinated EC agreement on this issue.”¹⁸⁰
150. Evidence also highlighted the challenge the RPAS industry faces in securing the C2 links from outside interference. Aerospace Defence Security Space said: “The use of such advanced networked systems introduces significant information assurance issues, whose impact on safety is potentially severe, although not fully quantified at present”.¹⁸¹ BALPA referred to an incident in Australia which “was blamed (albeit by the operator) on the link to the small quadcopter being ‘hijacked’.”¹⁸² English Heritage noted that the potential for the command and control link to be hacked posed a security threat for data collected by an RPAS.¹⁸³ Denis Koehl, of SESAR JU, told us that his organisation had undertaken a study into cybersecurity issues to determine

¹⁷⁵ [Q 73](#)

¹⁷⁶ The International Telecommunication Union (ITU) holds a Radio Communication Conference every three to four years at which it allocates spectrum for different uses. The conference will discuss the allocation of radio spectrum bands for command and control links (C2) for RPAS. The conference is scheduled to take place on 2-27 November 2015 in Geneva, Switzerland.

¹⁷⁷ Supplementary written evidence from Thales UK ([RPA0042](#)) and written evidence from the Royal Aeronautical Society ([RPA0018](#))

¹⁷⁸ [Q 97](#)

¹⁷⁹ Ofcom, ‘Update on the UK preparations for the World Radio communication Conference 2015 (WRC 15)’: <http://stakeholders.ofcom.org.uk/consultations/wrc15/update-jan-15> [accessed on 12 February 2015]

¹⁸⁰ Written evidence from ARPAS-UK, UAV SIG of RSPSoc ([RPA0005](#)) and Callen-Lenz Associates Ltd ([RPA0004](#))

¹⁸¹ Written evidence from Aerospace Defence Security Space ([RPA0021](#))

¹⁸² Written evidence BALPA ([RPA0031](#)). A quadcopter is a multirotor RPAS.

¹⁸³ Written evidence from English Heritage ([RPA0007](#))

the size of the challenge, potential technical solutions and the resources required to address them.¹⁸⁴

151. **We recognise that the allocation of spectrum is a Member State competence. The Commission will have to respect this while promoting the use of RPAS in the internal market. We recommend that Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU) focus its research on improving the security and integrity of the RPAS command and control link.**

Issues with SESAR JU

152. The Committee learned that RPAS have only recently been added to the final stage of the SESAR JU project. André Clot, of EuroUSC, said: “SESAR has only just begun in the past year to look at RPAS and [their] integration. It has a long way to go, from my perspective.”¹⁸⁵ Ewan Kelbie, NATS, said: “There is potentially a bit of catch up being played here. There is probably a view that in America, for example, they might be slightly ahead in their thinking in developing the potential infrastructure for RPAS in future.”¹⁸⁶ Denis Koehl, SESAR JU, acknowledged that RPAS were a recent addition, but added: “We can say the way is clearly pathed to have RPAS on board”.¹⁸⁷
153. In 2013 SESAR JU selected nine research projects from various Member States focusing on how to integrate RPAS into non-segregated airspace. €4 million is being spent on these projects, which look at the integration of RPAS for coastguard and civilian operations, and demonstrate technologies using air traffic management services.¹⁸⁸
154. The late adoption of RPAS into the scope of SESAR JU is particularly concerning given the tight deadlines for RPAS integration into non-segregated airspace. The Communication states that progressive integration will begin from 2016 onwards. However, the Government said: “the Commission’s plan for integration of RPAS into European Airspace from 2016 onwards is highly ambitious and unlikely to be achieved owing to the vast number of technological hurdles still to be overcome”.¹⁸⁹ Mr Sivel said that only parts of the target for 2016 would be hit. At a Council of Ministers meeting in October 2014, “Ministers lifted the ‘until 2016’, making it more of a political ambition than the original, ‘It must be adopted by then’ because they realised that sometimes haste is not always the best way to go about things.”¹⁹⁰
155. **The late inclusion of RPAS in the scope of SESAR JU increases the likelihood that the Commission will not meet its timetable for the progressive integration of RPAS into non-segregated airspace. We**

¹⁸⁴ [Q 75](#)

¹⁸⁵ [Q 18](#) (André Clot)

¹⁸⁶ [Q 18](#) (Ewan Kelbie)

¹⁸⁷ [Q 62](#)

¹⁸⁸ SESAR, ‘Demonstrating SESAR: Civil Remotely Piloted Aircraft Systems (RPAS) Integration’: <http://www.sesarju.eu/innovation-solution/demonstrating-sesar/rpas> [accessed on 4 February 2015]

¹⁸⁹ Written evidence from the Department for Transport ([RPA0011](#))

¹⁹⁰ [Q 49](#)

recommend that a realistic timetable for RPAS integration must be decided as soon as possible.

Access to R&D funding for RPAS

156. Within the nine RPAS research projects supported by SESAR JU, one project, CLAIRE, is based in the UK. Thales UK said that it had been selected as the UK leader in this project, and was supported by the UK air traffic management provider, NATS. This project is assessing how the new harmonised European air traffic management systems will accommodate RPAS as airspace users. It is based on an incremental series of RPAS simulations, using scenarios to exercise air traffic management interoperability and communications concepts.¹⁹¹
157. The Communication stresses the importance of including SMEs in research projects through COSME and Horizon2020. However, we learned that SMEs, in contrast to Thales UK, were finding it difficult to access EU level funding. Dr Sue Wolfe, of Callen-Lenz Associates Ltd said that this was partly because projects did not prioritise small RPAS applications.¹⁹² Mr Meuleman suggested that so far as SESAR JU was concerned, an RPAS was “a military UAV that could hardly fit into this room.”¹⁹³ Mr Cremin, of the Department for Transport, said that while the Government was seeing an increasing number of applications from SMEs for EU funding, the requirement for applicants to match the funding being sought with their own capital was a problem. He added: “the trouble is that a lot of the companies at the smaller end are often one or two individuals working in a very small company who do not necessarily understand the route to obtain European money.”¹⁹⁴
158. **We recommend that SESAR JU, together with Horizon 2020 and COSME, should focus more on the technological priorities of the small RPAS sector. It should also consider the financial barriers to SMEs’ participation in research programmes, and actively seek to increase their involvement.**

¹⁹¹ Written evidence from Thales UK ([RPA0030](#))

¹⁹² [Q 32](#)

¹⁹³ [Q 129](#)

¹⁹⁴ [Q 186](#)

CHAPTER 6: DATA PROTECTION AND PRIVACY

159. The progressive integration of RPAS into the airspace raises particular concerns in respect of data protection and privacy. Indeed, the Communication states: “RPAS operations must not lead to fundamental rights being infringed, including the respect for the right to private and family life, and the protection of personal data”.¹⁹⁵ The protection of personal data is regulated by the Data Protection Directive at EU level and in the UK by the Data Protection Act 1998. Privacy, though, is a less well defined concept related to the right to respect for private and family life. It is enshrined in Article 8 of the European Convention on Human Rights. This chapter addresses these two areas in turn.

Data Protection

The Data Protection Directive and commercial RPAS use

160. The EU has a well-established competence with regard to data protection by virtue of the EU Data Protection Directive 95/46/EC, the provisions of which have been implemented in the UK by the Data Protection Act 1998 (as amended).¹⁹⁶ The Directive requires that personal data be collected only for specified, explicit and legitimate purpose.¹⁹⁷
161. The EU Data Protection Directive provides that Members States may restrict the scope of the obligations contained in the Directive for reasons of national or public security, defence, or the investigation of criminal offences. Moreover, the Directive does not apply to the processing of data by individuals in the course of purely personal or household activities. However, the latter exemption no longer applies if data collected in a personal capacity are published and publicly accessible online. As a result, the Directive applies only to commercial RPAS operators and not to hobbyist or leisure users.
162. The Professional Society of Drone Journalists noted the significant implications of data protection legislation for the commercial use of RPAS, since RPAS are “essentially sensor carrying aerial devices ... used to collect data”¹⁹⁸. Accordingly, Trilateral Research and Consultancy Ltd said that RPAS pilots considered their aircraft as “machines through which they can collect massive amounts of data”.¹⁹⁹
163. This does not mean, though, that RPAS present a new or increased threat to data protection, compared with existing technology. The National Centre for Precision Farming told us: “The use of RPAS for aerial work is likely to be far less intrusive than CCTV coverage and the use of mobile phone

¹⁹⁵ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 7

¹⁹⁶ [Q 151](#)

¹⁹⁷ Rachel Finn, David Wright, Laura Jacques and Paul De Hert, *Privacy, Data Protection and ethical risks in civil RPAS operations, D3.3 Final Report for the European Commission* (7.November.2014) pp 67–68. Data Protection Directive, Article 6(b): <http://ec.europa.eu/DocsRoom/documents/8550> [accessed on 26 February 2015]

¹⁹⁸ Written evidence from the Professional Society of Drone Journalists ([RPA0032](#))

¹⁹⁹ Written evidence from Trilateral Research and Consultancy Ltd ([RPA0035](#))

cameras”.²⁰⁰ Mr Lissone, of EUROCONTROL, said that RPAS brought “the same controversies as Google streetview when they were driving around with a camera on top of a car filming every house.”²⁰¹

164. Nonetheless, a number of submissions highlighted the fact that RPAS alter the way in which data is collected. The Centre for Democracy and Technology said that RPAS “have unique vantage points allowing for levels of surveillance that ground based individuals may not expect.”²⁰² David Smith, of the Information Commissioner’s Office, said: “There is more scope with these systems (RPAS) for what we could call collateral intrusion”, whereby data not relevant to specific purpose of the operation are collected, such as images of people in their gardens collected in the course of an inspection on a chimney.²⁰³
165. On the other hand, David Goldberg said: “No operator among the operators that I am familiar with has the slightest interest—the slightest interest—in surveillance or in close scrutiny of independent human beings.”²⁰⁴ He said that data protection concerns about RPAS were “not credible in relation to the use of RPAS in the market that we are talking about” where operators carry out aerial surveillance of crops or infrastructure.²⁰⁵ Mr Lissone said that, in his experience, RPAS pilots who were aware of current legislation handled data protection “with the greatest and utmost care according to the European Standards”.²⁰⁶
166. Moreover, we were assured that the EU Data Protection Directive, and its implementing legislation in the UK, are flexible enough to accommodate commercial RPAS use, and that such flexibility would be lost if specific RPAS data protection legislation were to be created. The Information Commissioner’s Office noted that existing legislation had adapted to other emerging technologies in the past: “Since the [Data Protection Act] came into force, traditional CCTV systems have become an established part of society while other technologies such as automatic number plate recognition have emerged.”²⁰⁷
167. The advantage of the flexibility inherent in the Directive is that it accommodates the varied cultural perspectives on data protection across the EU, which, as Thales UK noted, are reflected in the varying degree of public concern regarding RPAS.²⁰⁸ Moreover, flexible data protection legislation is able to respond to the variation in types of RPAS operations. Mr Smith said: “We may need to apply that [law] in slightly novel ways, but I am not saying there should be a change in the law.”²⁰⁹ Mr Lee also said there was no need

²⁰⁰ Written evidence from the National Centre for Precision Farming UAS Special Interest Group ([RPA0016](#))

²⁰¹ [Q 64](#)

²⁰² Written evidence from the Center for Democracy and Technology ([RPA0034](#))

²⁰³ [Q 150](#)

²⁰⁴ *Ibid.*

²⁰⁵ *Ibid.*

²⁰⁶ [Q 64](#)

²⁰⁷ Written evidence from the Information Commissioner’s Office ([RPA0017](#))

²⁰⁸ Written evidence from Thales UK ([RPA0030](#))

²⁰⁹ [Q 152](#)

for “new knee-jerk laws ... It is the job of lawyers, regulators and judges to interpret the law as it is in the light of new technologies.”²¹⁰

168. The Information Commissioner’s Office also said that EU data protection legislation was currently being updated, “to take account of any new technological developments in a technologically neutral way”.²¹¹ The Council of Ministers and the European Parliament are currently negotiating a proposal for a General Data Protection Regulation. The Minister said that, depending on when it is approved, the Regulation would come into force in Member States at the earliest in 2017.²¹²
169. The General Data Protection Regulation, as proposed, also considers how technology could be used to prevent collateral intrusion by commercial RPAS pilots. Professor Paul De Hert and Laura Jaques recommended that commercial pilots make use of “privacy by design”, whereby the RPAS collecting photographic imagery or video images, from which individuals could be identified, “consider the use of anonymous video analytics or blurring technology.”²¹³ The Information Commissioner’s Office said that, in the updating of EU data protection legislation, “The focus on data controller accountability and privacy by design/privacy by default will be important concepts that RPAS developers and regulators should consider carefully.”²¹⁴
170. Despite these forthcoming measures, concerns were raised about the levels of awareness among commercial RPAS pilots regarding their data protection responsibilities. Trilateral Research and Consultancy Ltd said that its EU-wide research found “a significant gap in RPAS industry representatives understanding of their privacy and data protection obligations.” It also suggested that specific guidance for RPAS pilots on the impact of data protection legislation would help raise awareness.²¹⁵ As well as explaining the law regarding the collection and retention of data, the Centre for Democracy and Technology said these guidelines should clarify where pilots and data subjects could reasonably expect data not to be captured.²¹⁶ Mr Lee said that guidance would also help to ensure that “the law can be applied fairly and consistently to the use of RPAS.”²¹⁷
171. The Information Commissioner’s Office noted that it had revised its CCTV Code of Practice to include specific information on the use of RPAS.²¹⁸

²¹⁰ [Q 152](#) and written evidence from Peter Lee ([RPA0040](#))

²¹¹ Written evidence from the Information Commissioner’s Office ([RPA0017](#))

²¹² Proposal for a Regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Directive), [COM \(2012\) 11](#), [Q 188](#)

²¹³ Written evidence from Professor Paul de Hert and Laura Jaques ([RPA0039](#))

²¹⁴ Written evidence from the Information Commissioner’s Office ([RPA0017](#))

²¹⁵ Written evidence from Trilateral Research and Consultancy Ltd ([RPA0035](#))

²¹⁶ Written evidence from the Center for Democracy and Technology ([RPA0034](#))

²¹⁷ Written evidence from Peter Lee ([RPA0040](#))

²¹⁸ Written evidence from the Information Commissioner’s Office ([RPA0017](#)), Information Commissioner’s Office, *In the picture: A data protection code of practice for surveillance cameras and personal information* (15 October 2014): <https://ico.org.uk/media/for-organisations/documents/1542/cctv-code-of-practice.pdf> [accessed on 16 February 2015]

Trilateral Research and Consultancy Ltd said that similar guidance was being produced by data protection authorities in France and Belgium.²¹⁹

172. **We do not believe that there should be technology-specific data protection legislation for RPAS. The proposed General Data Protection Regulation is the appropriate vehicle to meet the challenges of increased commercial use of RPAS. At the same time, pilots should be made aware of their obligations under existing data protection legislation as well as the draft Regulation. We recommend that the Commission, through Member States' data protection agencies, create and share specific data protection guidance for commercial RPAS pilots.**
173. Concerns were also raised about how members of the public would be able to exercise their rights under the data protection legislation. Rights Watch UK said it would be “hard for a normal individual to identify which organisation is flying an RPAS, for what purpose, and whether that RPAS is being used for a purpose that will collect data about that individual.”²²⁰ Trilateral Research and Consultancy Ltd suggested that research funding should be allocated to constructing a “recognition system for RPAS” which would rely on “unique identifiers”, such as chips, to be “tracked via GPS using a centralised system”. It continued: “Such a system would be a robust transparency tool that would enable citizens to immediately identify the RPAS, the operator and the avenue through which they could find out additional information.”²²¹ The Centre for Democracy and Technology made a similar recommendation.²²² Professor De Hert and Ms Jaques said that such a system would also help RPAS operators to “identify themselves and inform individuals about the aim and location of their operations”, and thereby improve the transparency of their operations.²²³
174. **We have recommended the creation of an online database through which commercial RPAS pilots could share details of their flights with other airspace users. One of the benefits of such a database would be that RPAS pilots could use it to inform members of the public of their data protection policies to make it easier for individuals to rely on their data protection rights.**

Privacy Impact Assessments

175. The proposed General Data Protection Regulation, mentioned earlier, would require any commercial operation involving the collection and processing of personal data to undertake a Privacy Impact Assessment (PIA). PIAs assess the risk of a project interfering with an individual's informational or physical

²¹⁹ Rachel Finn, David Wright, Laura Jacques and Paul De Hert, *Privacy, Data Protection and ethical risks in civil RPAS operations, D3.3 Final Report for the European Commission* (7.November.2014) pp 361: <http://ec.europa.eu/DocsRoom/documents/8550> [accessed on 26 February 2015]

²²⁰ Written evidence from Rights Watch UK ([RPA0010](#))

²²¹ Written evidence from Trilateral Research ([RPA0035](#))

²²² Written evidence from the Center for Democracy and Technology ([RPA0034](#))

²²³ Written evidence from Professor Paul De Hert and Laura Jaques ([RPA0039](#))

privacy. PIAs are intended to help to identify risks in the early stages of a project and provide an opportunity to develop mitigating strategies.²²⁴

176. A number of witnesses recommended that commercial RPAS pilots should carry out PIAs even in advance of adoption of the Regulation, although there was uncertainty regarding when they should be carried out. Mr Lee, of Taylor Vinters LLP, and the Centre for Democracy and Technology both said that PIAs should be required as part of any submission requesting permission to operate an RPAS to national aviation authorities.²²⁵ Mr Lee also recommended that PIAs be mandatory for any operation in congested areas, owing to the higher likelihood of collateral intrusion.²²⁶ Trilateral Research and Consultancy Ltd recommended that a PIA should be carried out “before conducting each type of operation”. This would allow companies to take data protection issues into account at an early stage rather than “applying costly retrofixes”.²²⁷ It continued: “The strength of such impact assessments is that they enable the regulatory framework to take account of the heterogeneity of RPAS technologies and missions.”²²⁸
177. Requirements for commercial RPAS pilots to complete PIAs would demonstrate that public concern regarding privacy was being addressed. The Information Commissioner’s Office said that PIAs were “often the most effective way to demonstrate to the [Information Commissioner’s Office] how personal data processing complies with the Data Protection Act”.²²⁹ Thales UK said: “A basis for wider acceptance will be for users to demonstrate a rigorous approach to personal data security, recognising the duties and responsibilities of Data Controllers.”²³⁰
178. A requirement to complete PIAs would have resource implications for RPAS businesses as well as for data protection agencies. Mr Goldberg said he feared regulation requiring PIAs would become box ticking exercises,²³¹ while Mr Smith suggested that PIAs, by preventing intrusions, could reduce the resources devoted by the Information Commissioner’s Office to dealing with breaches of the law.²³²
179. **While we agree with the principle of encouraging RPAS pilots to carry out Privacy Impact Assessments, care must be taken not to overburden regulators and emerging RPAS businesses. Once the EU General Data Protection Regulation is agreed, we recommend that**

²²⁴ Information Commissioner’s Office, *Privacy Impact Assessments: Code of Practice* (February 2014) pp 4–10: <https://ico.org.uk/media/for-organisations/documents/1595/pia-code-of-practice.pdf> [accessed on 24 February 2015]. Informational privacy refers to the use of personal information and physical privacy refers to whether a person is able to have their own physical space and solitude.

²²⁵ Written evidence from Center for Democracy and Technology ([RPA0034](#)) and Peter Lee ([RPA0040](#))

²²⁶ [Q 161](#). The Air Navigation Order defines a congested area in the UK as being “any area of a city, town or settlement which is substantially used for residential, industrial, commercial or recreational purposes”.

²²⁷ Written evidence from Trilateral Research and Consultancy Ltd ([RPA0035](#))

²²⁸ *Ibid*

²²⁹ Information Commissioner’s Office, *Privacy Impact Assessments: Code of Practice* (February 2014) pp 4–10: <https://ico.org.uk/media/for-organisations/documents/1595/pia-code-of-practice.pdf> [accessed on 24 February 2015]

²³⁰ Written evidence from Thales UK ([RPA0030](#))

²³¹ [Q 161](#)

²³² [Q 160](#)

the Government explain the extent to which it specifically addresses the use of RPAS.

Privacy

Personal RPAS use and privacy

180. The Royal Aeronautical Society suggested that much of the public’s concern regarding privacy and the use of RPAS was directed towards private rather than commercial users.²³³ While commercial users are required to comply with the EU Data Protection Directive, hobbyist and leisure users are exempt. Mr Smith, of the Information Commissioner’s Office, said that while “there is a gap [in the law] in relation to the hobbyist-the private user”, this problem also existed with other forms of technology.²³⁴ The latter point was borne out by the Royal Aeronautical Society: “UA [unmanned aircraft] should be included within the overall discussions relating to the impact of technology on privacy but not be singled out for special attention”.²³⁵
181. Mr Smith added that the role of the Information Commissioner’s Office was to deal with data protection as opposed to privacy: “I am not sure that the legislation and the powers we have are particularly well suited to this one individual invading another individual’s privacy.”²³⁶
182. While the EU Data Protection Directive does not cover the “purely personal” use of RPAS, all relevant criminal offences, such as stalking and harassment, apply equally to commercial, hobbyist and leisure RPAS pilots. The criminal law of course falls within national competence. Dr Kevin MacNish, a former GCHQ employee, said the best way to address these concerns was by “ensuring that existing laws regarding stalking, peeping Toms and telephone interception extend to cover cases involving RPAS and do not allow for loopholes.”²³⁷ The British Model Flying Association drew attention to existing provisions, under the Air Navigation Order 2009, limiting the use of RPAS in circumstances which would entail invasion of another individual’s privacy. For instance, Article 167 prohibits an RPAS used for surveillance being flown less than 50 metres from any person or vessel not under the control of the pilot, and 150 metres from any congested area or open air assembly.²³⁸
183. Concerns regarding the enforcement of existing laws in relation to the misuse of RPAS are discussed in Chapter 8 on leisure users and public consultation.

State and journalistic use of RPAS

184. The evidence submitted to us highlighted the potential for Member State authorities to use RPAS to collect data for surveillance or in the course of investigating crimes. Mr Cremin said: “The police have experimented and are experimenting with RPAS, it is fair to say, and I am sure that as we go

²³³ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

²³⁴ [Q152](#)

²³⁵ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

²³⁶ [Q 160](#)

²³⁷ Written evidence from Kevin McNish ([RPA0020](#))

²³⁸ Written evidence from the British Model Flying Association ([RPA0043](#))

further forward in time that will be increasingly likely.”²³⁹ The Minister said that police could replace helicopters with RPAS or that the coastguard might consider using RPAS in search and rescue situations.²⁴⁰

185. The Royal Aeronautical Society said that state surveillance which made use of thermal imaging cameras and facial recognition technology should require additional oversight mechanisms, such as search warrants.²⁴¹ Dr McNish agreed that “acceptable use of RPAS by the state should be stipulated in law to prevent function creep leading to the arming of RPAS in extreme situations with non-lethal weapons.”²⁴²
186. Member States may, on the other hand, restrict the scope of the EU Data Protection Directive to exclude certain operations on the grounds of national or public security, defence, or the investigation of criminal offences. The Government was “not persuaded that any extension of EU competency into the regulation of surveillance for public safety, the prevention or detection of crime or for national security purposes is necessary.”²⁴³
187. In the UK, the Information Commissioner’s Office said its strategy was to provide guidance to government agencies considering using RPAS.²⁴⁴ Mr Lee welcomed the provision of guidance, but said that it was important for the “state to justify its use of such exemptions (in the Data Protection Act) regardless”.²⁴⁵ He said that guidance should be developed which described how current regulations, such as the Regulation of Investigatory Powers Act 2000 (RIPA), applied to the use of RPAS.²⁴⁶
188. We also raised concerns about how private security firms might make use of RPAS and how that use would be regulated. The Minister told us that if RPAS were to be used by private security companies, “it is important that we make sure that proper controls are in place so that any information gathered ... could not be used for reasons other than the correct pursuit of better security and safety.”²⁴⁷
189. **It is beyond the scope of this inquiry, which focuses on commercial operations, to draw conclusions regarding state use of RPAS for surveillance but the acceptability of state use of RPAS should be subject to urgent public debate.**
190. The inquiry also drew attention to the use of RPAS by the media in order to capture images and videos. Mr Smith told us that Section 32 of the current Data Protection Act contained an exemption for responsible journalism, so that “If RPAS are being used to investigate matters of serious public concern

²³⁹ [Q 8](#)

²⁴⁰ [Q 178](#)

²⁴¹ Written evidence from the Royal Aeronautical Society ([RPA0018](#))

²⁴² Written evidence from Dr Kevin McNish ([RPA0020](#))

²⁴³ Written evidence from the Department for Transport ([RPA0011](#))

²⁴⁴ Written evidence from the Information Commissioner’s Office ([RPA0017](#))

²⁴⁵ [Q 158](#)

²⁴⁶ [Q 159](#)

²⁴⁷ [Q 179](#)

and to comply with the data protection law would stand in the way of that, there is an exemption.”²⁴⁸

191. Mr Smith added, though, that RPAS gave less responsible journalists “another, more powerful tool” to invade an individual’s privacy: “it is not just about the law and data protection regulation; it is also about media regulation and the new media regulators taking a firm view as well on what is and is not acceptable for publication when it has been obtained through privacy intrusion.”²⁴⁹
192. Mr Lee, Taylor Vinters LLP, said: “authorities should consider recommending a data protection and airspace permission exemption for rapid response RPAS journalism ... If this particular developing area of rapid response journalism by RPAS is ignored then irresponsible, amateur cameramen will, in all likelihood, attempt to take footage anyway.”²⁵⁰
193. The Minister accepted that journalists should be able to reveal a wrongdoing, but added that “journalists often push barriers and go further than that”. There was a risk that ‘paparazzi’ could use RPAS to intrude on individual’s privacy. A consultation with the public should therefore include a discussion about how to get the “balance right between the need to reveal wrongdoing while at the same time ensuring that people have the right to privacy in their own gardens or houses.”²⁵¹
194. **While journalists can use RPAS to enhance the reporting of important events, they can also be used to invade people’s privacy. UK media regulators should initiate a public consultation on the appropriate use of RPAS by the media, with a view to providing clear guidance.**

²⁴⁸ [Q 156](#)

²⁴⁹ [Q 156](#)

²⁵⁰ Written evidence from Peter Lee ([RPA0040](#))

²⁵¹ [Q 181](#)

CHAPTER 7: THIRD PARTY LIABILITY

195. The Commission's Communication recognises that, despite efforts to ensure all RPAS operations are safe, accidents can happen, and victims must have access to adequate compensation.
196. At present, EU Regulation 785/2004 describes the insurance obligations for all aircraft operators. It requires that all commercial RPAS operations purchase third party liability insurance.²⁵² The Regulation defines limits for the minimum amount of third party liability insurance required based on the mass of the aircraft on take-off. For RPAS weighing less than 500kg the minimum cover required is approximately €660,000.²⁵³ Model aircraft, including RPAS for leisure use, weighing less than 20kg are not required to have third party liability insurance.
197. The Communication outlines the Commission's plans to assess whether existing third party liability requirements for manned aviation, under EU Regulation 785/2004, are appropriate for RPAS. In 2014, the Commission contracted transport consultancy Steer Davies Gleave to carry out research into the applicability of the existing Regulation for RPAS. Steer Davies Gleave found that there was no uniformity in Europe or more widely regarding the application of third party liability to aviation. Some Member States followed a strict liability regime (where the aviation company was automatically liable for any damage without there being the need to attribute a fault); others carried out a fault-based analysis on a case-by-case basis. It suggested that there was no appetite in the aviation sector to rectify these discrepancies which tended to be smoothed over in practice, and so they were likely to be carried through into RPAS insurance.²⁵⁴ This view was supported by Bird and Bird LLP, which said that there was little appetite for a formal liability regime: "the incidence of aircraft accidents causing surface casualties is low and there are few if any incidents of surface victims of a material accident going uncompensated."²⁵⁵

Exemption for model aircraft users

198. Concern was expressed about the exemption in EU Regulation 785/2004 for model aircraft weighing less than 20kg. The distinction between commercial, model and leisure users, upon which the rules in EU Regulation 785/2004 on liability are based, is no longer clear-cut: the same equipment, presenting essentially similar risks, may be used equally by all these groups. Mr Heath, of John Heath Insurance Brokers LLP, a company offering third party liability insurance to small RPAS operators, noted that existing insurance legislation relied wholly on "the status of the operator, not the platform they are using."²⁵⁶ Mr Phippard, of Bird and Bird LLP, added: "the risk to the

²⁵² [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.

²⁵³ [Q 138](#). This is approximately equivalent to 750,000 Special Drawing Rights

²⁵⁴ Steer Davies Gleave, *A Study on the Third Party Liability and Insurance of Remotely Piloted Aircraft Systems (RPAS)*, (November 2014) pp 1–2: <http://ec.europa.eu/DocsRoom/documents/7661> [accessed on 26 February 2015]

²⁵⁵ Written evidence from Bird and Bird LLP ([RPA0027](#))

²⁵⁶ [Q 136](#)

public is really no different if this 10kg vehicle is being flown in the park by a child or used for survey purposes.”²⁵⁷

199. BALPA and Alvarez and Marsal, a professional services consultancy, both recommended removing completely the exemption for model aircraft, including RPAS, from the requirement for third party liability insurance.²⁵⁸ Alvarez and Marsal suggested that a mandatory insurance regime for all RPAS could be implemented through “a form of registration, as is required on light aircraft today ... and such registration would only be possible with the correct risk training and insurance cover in place”.²⁵⁹
200. Although the British Model Flying Association shared the concerns described above, it argued that ensuring that all RPAS owners had adequate insurance was “difficult to address at any meaningful level.”²⁶⁰ Mr Corbett, CAA, said:

“it is about proportionality ... It is difficult, but we have to get a handle on where the risk is and where the potential for damage is. If we tie it up to such an extent and require insurance for everybody who has even a small aircraft that fits in your hand, for example, I do not think we would be able to manage that appropriately”.²⁶¹

201. **While similar equipment may be used by both leisure and commercial RPAS pilots, introducing mandatory third party liability insurance for the leisure use of RPAS would be disproportionate to the hazard posed by such users.**

Cost of third party liability insurance

202. A number of commercial RPAS operators and ancillary businesses noted the high cost and difficulty of purchasing insurance for third party liability. Resource Group Limited said that “the cost to insure a small unmanned surveillance aircraft (SUSA) is almost twice that of insuring a standard family car.”²⁶² In a joint submission, ARPAS-UK and the UAV SIG of RSPSoc said: “the insurance market for UK SMEs is currently restricted to a few providers and we would welcome greater competition in this area.”²⁶³
203. On the other hand, the Royal Aeronautical Society and English Heritage suggested that this was already happening and that businesses were responding to the demand for insurance.²⁶⁴ The Royal Aeronautical Society said insurers “have invested time in understanding the risks involved in operating UA and have spent considerable time understanding the mechanics and properties of UA themselves.” It accepted that “this is a

²⁵⁷ [Q140](#)

²⁵⁸ Written evidence from BALPA ([RPA0031](#)) and Alvarez and Marsal ([RPA0044](#))

²⁵⁹ Written evidence from Alvarez and Marsal ([RPA0044](#))

²⁶⁰ Written evidence from British Model Flying Association ([RPA0043](#))

²⁶¹ [Q 23](#)

²⁶² Written evidence from Resource Group Ltd ([RPA0009](#))

²⁶³ Written evidence from ARPAS-UK and UAV Sig of RSPSoc ([RPA0005](#))

²⁶⁴ Written evidence from Royal Aeronautical Society ([RPA0018](#)) and English Heritage ([RPA0007](#))

relatively immature technology, [and]; the premiums can be expensive”, but believed this would change “as confidence grows with use.”²⁶⁵

204. Lack of information regarding the risks associated with RPAS partly explained the high cost of premiums for RPAS businesses. Alvarez and Marsal said companies offering bespoke insurance for commercial RPAS businesses “are the exception rather than the norm and they are expensive in premium terms because it is impossible, in the early days of the product and without any real risk data, to truly rate the risk.”²⁶⁶ The lack of information regarding the risks present in RPAS operations also raised questions about the quality of insurance products already in use. EuroUSC said that its own database on safety, collated from reports from over 1,000 companies, suggested that “regulators and underwriters are underestimating future risk”, and that “the probability data is based on many false assumptions”.²⁶⁷
205. At present information is gradually being collated by insurance companies. Mr Heath said that his company’s premiums were calculated according to whether the pilot had received permission to fly from the CAA, completed pilot training, the value of their equipment, the total flying hours to date, and the level of liability required.²⁶⁸ His business kept a record of accidents, detailing types and models of aircraft, in order to identify trends and compare risks, but he was reluctant to share this information for commercial reasons.²⁶⁹ In order to generate shared knowledge of the risks involved in RPAS operations, Steer Davies Gleave said in its report to the Commission that national aviation authorities should improve the data collected on RPAS operations and accidents and share this information with insurers and operators.²⁷⁰
206. The Commission hoped that the cost of premiums would fall following the introduction of clear safety regulations governing commercial RPAS flights.²⁷¹ Resource Group Ltd said that insurance companies should have “a price scaler where premiums are reduced subject to [a] number of demonstrated safety processes”, similar to a ‘no claims’ bonus.²⁷²
207. **In order to improve the information used to determine third party liability premiums, we recommend that any future EU legislation governing RPAS operations should require national aviation authorities to share statistics regarding RPAS incidents with regulators, insurers and operators in other Member States.**

Compliance with EU insurance requirements

208. The cost of insurance premiums could also fall in response to growing demand from operators. However, increased demand would only lower

²⁶⁵ Written evidence from Royal Aeronautical Society ([RPA0018](#))

²⁶⁶ Written evidence from Alvarez and Marsal ([RPA0044](#))

²⁶⁷ Written evidence from EuroUSC ([RPA0037](#))

²⁶⁸ [Q 141](#)

²⁶⁹ [QQ 144, 146](#)

²⁷⁰ Steer Davies Gleave, *A Study on the Third Party Liability and Insurance of Remotely Piloted Aircraft Systems (RPAS)* (November 2014) p 4: <http://ec.europa.eu/DocsRoom/documents/7661> [accessed on 26 February 2015]

²⁷¹ [Q 94](#)

²⁷² Written evidence from Resource Group Ltd ([RPA0049](#))

premiums if commercial pilots complied with their obligation to purchase third party liability insurance. AM-UAS Ltd said that demand for third party liability insurance was already being affected by its cost because new pilots took the risk of not being insured, “in order to become a part of a fast growing and exciting market.”²⁷³ Blue Bear Systems Research Ltd said that commercial pilots failing to take out adequate insurance meant that “ultimately this will increase overall industry costs rather than the risk being shared throughout”.²⁷⁴ The high cost of premiums had also incentivised the creation of cheaper insurance products which excluded third party liability cover altogether. Alvarez and Marsal suggested that these products were more attractive to start-up companies and hobbyist associations, but that they were unlikely to stand the test of a significant incident or claim.²⁷⁵

209. In order for EU Regulation 785/2004 to be effective, and for the cost of premiums to reflect growing demand from pilots, more needs to be done to ensure that commercial pilots are aware of their legal obligation to purchase third liability insurance. Mr Heath said that although “there is an awareness amongst many that insurance is required, but there are also an equal number who are not aware”.²⁷⁶ While Bird and Bird LLP said that trade and model aircraft associations played an important role in informing members, Mr Lee suggested that the CAA also needed to reach out to prospective users and the public to explain RPAS regulations.²⁷⁷
210. While raising awareness should deliver some benefits, witnesses were clear that commercial pilots without the requisite insurance should not be allowed to operate. Bird and Bird LLP noted that Member States were obliged under EU Regulation 785/2004 to ensure that their pilots complied with the insurance requirement.²⁷⁸ Mr Corbett said that the CAA “expect people to have appropriate cover against third-party risks when we issue permissions.”²⁷⁹
211. Compliance with EU Regulation 785/2004 could be improved if confusion regarding its scope was removed. Bird and Bird LLP said that the applicability of EU Regulation 785/2004 to RPAS could be clarified by providing a revised definition of model aircraft, in line with a suggestion made in an EASA working group. This would define model aircraft as those used “exclusively for air display, recreational, sport or competition activity”. It continued: “Such terminology would have the effect of requiring all commercial operations to be insured, regardless of weight, and reduce significantly any confusion which currently exists as to the scope of the insurance obligation.”²⁸⁰
212. This would also serve to give assurance to operators that their insurance was adequate. Mr Meuleman said that confusion existed as to whether European law required specific third party liability insurance for RPAS: “An issue that

²⁷³ Written evidence from AM-UAS Ltd ([RPA0006](#))

²⁷⁴ Written evidence from Blue Bear Systems Research Ltd ([RPA0023](#))

²⁷⁵ Written evidence from Alvarez and Marsal ([RPA0044](#))

²⁷⁶ [Q 140](#)

²⁷⁷ Written evidence from Bird and Bird LLP ([RPA0027](#)) and Peter Lee ([RPA0040](#))

²⁷⁸ Written evidence from Bird and Bird LLP ([RPA0027](#))

²⁷⁹ [Q 23](#)

²⁸⁰ Written evidence from Bird and Bird LLP ([RPA0027](#))

could be clarified is the extent to which European law ... as the regulation on insurance requirements for air carriers and aircraft operators—applies here.”²⁸¹

213. **The cost of third party liability insurance premiums is likely to decrease with greater demand from RPAS pilots. We therefore recommend that trade associations and national aviation authorities raise awareness of and enforce commercial RPAS pilots’ obligations under EU Regulation 785/2004 to purchase insurance. This will reduce the number of operators running the risk of not taking out insurance and encourage a safer RPAS industry.**
214. **To address confusion regarding the scope and applicability of EU Regulation 785/2004, we recommend that the Commission brings forward amendments that would clarify that the legal requirement to purchase public liability insurance depends on whether the RPAS is being used for hobbyist or commercial use.**

Minimum liability limit under EU Regulation 785/2004

215. Some witnesses considered that the minimum limit for third party liability insurance for commercial RPAS below 500kg of approximately €660,000 was insufficient. Mr Heath said that his business did not offer insurance products totalling less than £2 million.²⁸² The British Model Flying Association said that it “takes a strong stance on insurance hence the provision of £25 million of public liability cover as standard to all members.”²⁸³ Simon Phippard, of Bird and Bird LLP, said that if an RPAS pilot caused a major air accident but was only insured for the minimum amount, then “There is not enough insurance, ultimately, for it all to come back through that operator”. He added: “the airline would handle the issue in the first place, as well as their insurers, and there would be sufficient cover at least for the passenger claims to be resolved.”²⁸⁴
216. Thales UK noted that the current limit stemmed from aviation regulations, which were written by reference to the weight of an aircraft.²⁸⁵ As it stands, the Regulation requires the same minimum amount of third party liability cover for RPAS weighing 500kg or 1kg. As discussed earlier in this report, the Commission is moving towards adopting a proportionate approach to risk for RPAS safety regulations. Such an approach would consider factors in addition to weight, including whether operations will take place in congested or rural areas.
217. **In line with a risk-based approach to RPAS safety regulations, we recommend that the Commission increases the minimum amount of public liability cover required by commercial RPAS operators under EU Regulation 785/2004. The Regulation currently stipulates a minimum amount of €660,000 for all commercial RPAS weighing up to 500kg.**

²⁸¹ [Q 117](#)

²⁸² [QQ 136-138](#)

²⁸³ Written evidence from the British Model Flying Association ([RPA0043](#))

²⁸⁴ [Q 146](#)

²⁸⁵ Written evidence from Thales UK ([RPA0030](#))

CHAPTER 8: LEISURE USERS AND PUBLIC CONSULTATION

Concerns regarding leisure use

218. Several submissions expressed surprise at the Commission’s decision not to discuss leisure users in its Communication. Aviation stakeholders took very seriously the risk that a leisure user could cause a catastrophic accident and stunt the development of an RPAS market. In December 2014, the CAA gave an ‘A’ rating, meaning a serious risk of collision, to an incident on 22 July 2014 involving an RPAS and an Airbus A320 landing at Heathrow airport.²⁸⁶ BALPA said that if there were more such events, “public perception may well turn against these machines which in turn could delay adoption”, a view shared by the Professional Society of Drone Journalists.²⁸⁷ ARPAS-UK, RSPSoc said that the risk posed by leisure users was “sufficiently large that it be addressed through regulation at a European level.”²⁸⁸
219. Mr Meuleman, of BeUAS, said that further consideration of the leisure use of RPAS was required, because “there is hardly any difference any more between toys and professional systems, and certainly in terms of technology, it is just the same.”²⁸⁹ Jaqueline Foster MEP emphasised that it was important to “differentiate how [RPAS] are being used and in what category”.²⁹⁰ The CAA acknowledged that it was important to ensure that “two similar devices being flown in the same location, one used recreationally and one used commercially, are not subject to drastically different regulatory requirements”.²⁹¹
220. Mr McKenna agreed that regulation of leisure users warranted further examination at an EU level: leisure users contributed a large part to the growing RPAS market, so “manufacturers will seek to meet (create) the demand of the personal user”.²⁹² By way of example, EuroUSC said that 150,000 DJI Phantoms, a popular RPAS for leisure use, were sold globally last year.²⁹³
221. The potential benefits from the increased civilian use of RPAS are such that we certainly do not support banning the leisure use of RPAS. However, we believe that the hazard presented by leisure users needs to be addressed. In this chapter, we consider possible short and long term solutions to the risks posed by the leisure use of RPAS.
222. For the most part, the concerns we heard about the leisure use of RPAS were related to areas of national competence, such as the ability of a national aviation authority to prosecute in the case of a criminal offence. Figure 2 compares the rules for leisure and commercial small RPAS use as derived

²⁸⁶ ‘Heathrow plane in near miss with drone’, *BBC News*, (7 December 2014), <http://www.bbc.co.uk/news/uk-30369701> [accessed on 12 February 2015]

²⁸⁷ Written evidence from BALPA ([RPA0031](#)) and the Professional Society of Drone Journalists ([RPA0032](#))

²⁸⁸ Written evidence from ARPAS-UK and UAV Sig, of RSPSoc ([RPA0005](#))

²⁸⁹ [Q 131](#)

²⁹⁰ [Q 106](#)

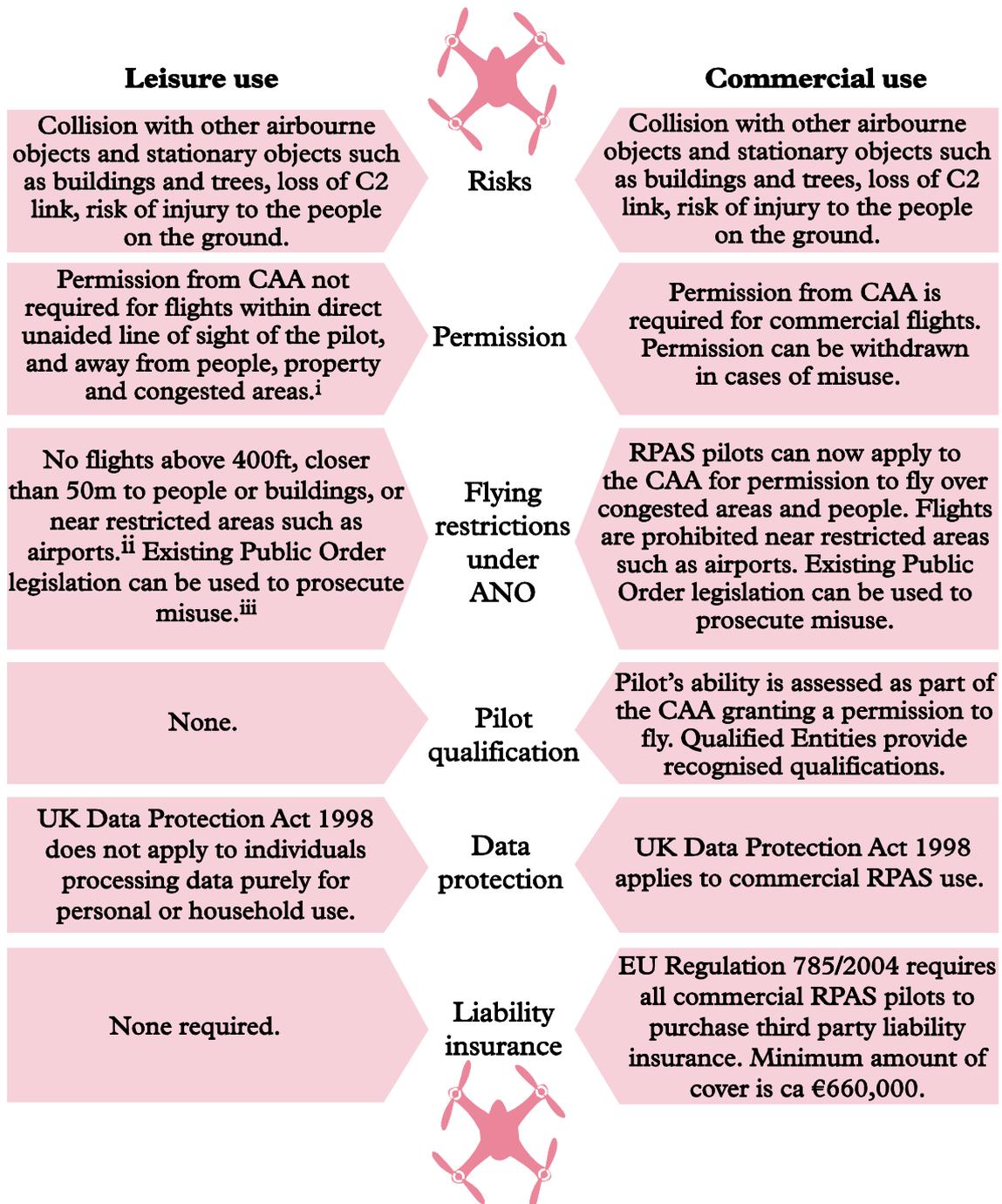
²⁹¹ Written evidence from the UK CAA ([RPA0029](#))

²⁹² Written evidence from Alan McKenna ([RPA0025](#))

²⁹³ Written evidence from EuroUSC ([RPA0037](#))

from the Air Navigation Order 2009, Article 138 of which stipulates that “a person shall not recklessly or negligently cause or permit an aircraft to endanger any person or property.”²⁹⁴

Figure 2: Leisure and commercial small RPAS use in the UK²⁹⁵



²⁹⁴ The Civil Aviation Authority, ‘Basic Principles’: <http://www.caa.co.uk/default.aspx?pageid=11185> [accessed on 25 February 2015]

²⁹⁵ i The Air Navigation Order defines a congested area as being “any area of a city, town or settlement which is substantially used for residential, industrial, commercial or recreational purposes”. Permission must be obtained from the CAA to land or operate within a congested area. Permissions granted may be valid for one flight or for a period of up to 12 months;

ii Articles 166–167 Air Navigation Order. See Box 1;

iii [Q 164](#). Nick Aldworth, Metropolitan Police, said that the Public Order Act 1986 and Sexual Offences Act 2003 could be used to prosecute the misuse of RPAS by leisure users.

Solutions in the short term

Raising awareness

223. An important way to mitigate the risk of a catastrophic accident involving an RPAS in the short term is to raise awareness among leisure users of the risks posed by their aircraft. Mr Cremin said:

“You can go into Maplins today and buy a fairly sophisticated system for about £500. The question, as you quite rightly say, is that when you get the box home, where, first of all, does it tell you that you are buying an aircraft, let alone anything else? These are aircraft. They are viewed in the Air Navigation Order as aircraft, and you have responsibilities under that order, but if I do not know that they are aircraft I do not know how to behave”.²⁹⁶

224. This lack of awareness was described as the distinguishing factor between the model aircraft hobbyist community and the emerging leisure user. The British Model Aircraft Association (BMFA) described its members as “informed, committed and conscientious” operators, while characterising the typical leisure user as “an individual flying on an *ad hoc* or casual basis”.²⁹⁷ It warned that it would be difficult to target leisure users specifically: “The sheer number of multicopter, camera equipped aircraft being sold through a wide variety of outlets” made it “very difficult to target [leisure users] through responsible bodies such as the BMFA or ARPAS.”²⁹⁸
225. Some witnesses recommended a focus on the media. The Minister said that a publicity campaign highlighting the dangers of the misuse of RPAS would be helped by the fact that RPAS use was “viewed by the media as a very sexy area: you do not need to say very much before you get a headline and a piece in a newspaper”.²⁹⁹ Chief Inspector Nick Aldworth, of the Metropolitan Police Service, said that his force was considering reaching out to the public through its website, “one of the most frequently visited in London”, and social media platforms to share information about the safe use of RPAS.³⁰⁰
226. **Given the difficulty of engaging with leisure RPAS users through formal representative bodies, we support the Government and Metropolitan Police Service in seeking to make use of websites and social media platforms to inform the public about how to fly RPAS safely.**

Product Information

227. The CAA said that it was designing an information leaflet to include in RPAS packaging. The British Model Flying Association and ARPAS-UK recommended working directly with manufacturers, rather than just retailers, to ensure that information explaining the responsibilities of an RPAS pilot

²⁹⁶ [Q 10](#)

²⁹⁷ Written evidence from the British Model Flying Association ([RPA0043](#))

²⁹⁸ Written evidence from the British Model Flying Association ([RPA0043](#)) and ARPAS-UK ([RPA0047](#))

²⁹⁹ [Q 179](#)

³⁰⁰ [Q 173](#)

was distributed as widely as possible.³⁰¹ Firstpersonview said that all the recreational RPAS it sold contained information from the CAA, and that it had the agreement of manufacturers to include information about the responsibilities of RPAS pilots in all shipments to the UK in future.³⁰²

228. Mr Meuleman, though, highlighted difficulties implementing a similar strategy in Belgium: “We also had this discussion in Belgium, but I would say the Ministry of Mobility has nothing to say about what is being sold. There is the Ministry of Economy and it is regulated on the European level mostly, so there is a big discrepancy”.³⁰³
229. Chief Inspector Aldworth suggested that the dissemination of safety information could be co-ordinated at an EU level:

“The most likely form of European regulation would most probably be on import-export activity and engagement with the manufacturers and to have a consistent approach towards material that comes in, either the capability of the equipment that is being sold or, going back to our education piece, our ability to get people to take messages on our behalf within the material that they are selling.”³⁰⁴

On the other hand, the Minister cautioned against “prescriptive legislation on this, which we believe might end up being disproportionate and difficult, if not impossible, to oversee.”³⁰⁵

230. **We commend the work of the UK Civil Aviation Authority in creating a safety message to include in the packaging of RPAS. While the Commission is only proposing regulations for the safe operation of commercial RPAS, we believe it could support Member States by co-ordinating the dissemination of guidance for the leisure use of RPAS, including information on safety and data protection.**

Geo-Fencing

231. In addition to raising awareness, existing technology could also be employed to limit where RPAS are able to fly. Geo-fencing uses geographical information stored on a GPS-equipped RPAS to prevent it from flying in areas selected by the manufacturer. This could be used to limit flights near airports, or above certain altitudes. When an RPAS encounters a bounded area, it can be programmed to fly downward to the ground. BALPA said that a commonly sold RPAS now included this technology, and that consideration should be given to making it mandatory on all but the very lightest of small RPAS.³⁰⁶ Firstpersonview said that it only sold imported RPAS which were fitted with geo-fencing.³⁰⁷

³⁰¹ Supplementary written evidence from the British Model Flying Association ([RPA0051](#)) and written evidence from ARPAS-UK ([RPA0047](#))

³⁰² Written evidence from Firstpersonview ([RPA0045](#))

³⁰³ [Q 131](#)

³⁰⁴ [Q 174](#)

³⁰⁵ [Q 180](#)

³⁰⁶ Supplementary written evidence from BALPA ([RPA0041](#))

³⁰⁷ Written evidence from Firstpersonview ([RPA0045](#))

232. **Geo-fencing could be a useful tool for preventing hazardous RPAS flights in sensitive areas, but it is not yet universally available. Over the next year, we recommend that the Government, along with the Commission, should approach industry to assess how this technology could be more widely applied.**

Public consultation

233. As we have already discussed in the context of journalistic and state use of RPAS for surveillance, it will be important for the Government to consult the general public on the implications of the increased civilian use of RPAS. The Communication also states that “progressive integration of RPAS into the airspace from 2016 onwards must be accompanied by adequate public debate on the development of measures which address societal concerns.”³⁰⁸
234. The evidence we received highlighted additional reasons why a public consultation on the civilian use of RPAS in the UK might be required. Mr McKenna compared public perceptions of RPAS flying overhead to the controversy surrounding wind turbines.³⁰⁹ English Heritage noted that the term ‘drone’ was often used in the media, and that “its military connotations bring a negative association to many parts of the industry.”³¹⁰ Mr Cremin, of the Department for Transport, said: “The time is drawing near when we look to have some sort of public dialogue with the general public on the use of RPAS and what they think”³¹¹. The Government said this was important because this industry “will only be feasible if the general public can be convinced that it is safe to exploit this technology”.³¹²
235. The Minister confirmed that a cross-Government working group on RPAS was planning a series of public engagement events to take place during the summer of 2015. These events would aim to “better understand the public’s perception and their concerns about the use of unmanned aircraft in the UK.” The Government was at an early stage in planning these events, but they would take place in several locations around the UK, “drawing on a wide range of people from all walks of life to discuss the prominent issues with operating these systems in the UK. This work will help to shape and inform future government policy in this area.”³¹³
236. **We endorse the Government’s plans to consult the general public on acceptable future uses for RPAS.**

Solutions in the long term

237. Awareness of existing regulations would be reinforced by effective prosecution of those who break the rules. ARPAS-UK and the British Model Flying Association both said that while work was underway to educate leisure

³⁰⁸ Communication from the Commission to the European Parliament and the Council: A new era for aviation: Opening the aviation market for the civil use of remotely piloted aircraft systems in a safe and sustainable manner, [COM\(2014\) 607](#), p 5

³⁰⁹ Written evidence from Alan McKenna ([RPA0025](#))

³¹⁰ Written evidence from AM-UAS ([RPA0006](#))

³¹¹ [Q10](#)

³¹² Written evidence from the Department for Transport ([RPA0011](#))

³¹³ [Q 178](#)

users, “little is being done with regard to enforcement”.³¹⁴ Dr Wolfe, of Callen-Lenz Associates Ltd, said that improving enforcement was essential in creating a deterrent to operators who might well otherwise act outside the legislative framework in the belief that there would be no prosecution.³¹⁵

Improving enforcement

238. Concerns were raised in the evidence regarding the CAA’s capacity to regulate the increasing numbers of RPAS. Mr McKenna, ARPAS-UK and the British Model Flying Association, all said that they did not think the CAA had the human resources necessary to enforce the regulations for RPAS use.³¹⁶ On the other hand, the Minister told us: “There will certainly need to be more resource committed by regulatory bodies in the short to medium term, but this does not necessarily translate to an increase in headcount in regulatory bodies themselves.”³¹⁷
239. A number of stakeholders also questioned whether the CAA was the appropriate body in the UK to carry out enforcement of existing legislation for leisure users.³¹⁸ Chief Inspector Aldworth said that the CAA had very little statutory authority over the leisure use of RPAS unless that use breached the Air Navigation Order. He said that there were real limitations as to what the CAA could achieve, considering the volume and type of complaints that might be “coming around the corner”.³¹⁹
240. ARPAS-UK and the British Model Flying Association recommended that the police, rather than the CAA, be empowered to enforce rules and laws relating to RPAS.³²⁰ Chief Inspector Aldworth said that the Metropolitan Police was increasingly dealing with RPAS-related offences itself, instead of referring them on to the CAA, a move the CAA had welcomed.³²¹
241. Mr Sivel, of JARUS, said that in order for the police in the EU to take on this role effectively, “very simple rules that any non-aviation person can understand” would be needed.³²² Mr Phippard, of Bird and Bird LLP, recommended that every policeman in the UK should know the relevant provisions under the Air Navigation Order, so that quick action could be taken in the event of an offence.³²³ However, Chief Inspector Aldworth noted that the distance restrictions in the Air Navigation Order were “not easy legislation for a street police officer to enforce”, because they relied on witnesses and officers being able accurately to judge distances in the air. He added that the Air Navigation Order provided no power of seizure: “the

³¹⁴ Written evidence from ARPAS-UK ([RPA0047](#)) and supplementary written evidence from the British Model Flying Association ([RPA0051](#))

³¹⁵ [Q 30](#)

³¹⁶ Written evidence from Alan McKenna ([RPA0025](#)), ARPAS-UK ([RPA0047](#)) and supplementary written evidence from the British Model Flying Association ([RPA0051](#))

³¹⁷ [Q 184](#)

³¹⁸ Written evidence from Alan McKenna ([RPA0025](#)), ARPAS-UK ([RPA0047](#)) and supplementary written evidence from the British Model Flying Association ([RPA0051](#))

³¹⁹ [Q 166](#)

³²⁰ Written evidence from ARPAS-UK ([RPA0047](#)) and supplementary written evidence from the British Model Flying Association ([RPA0051](#))

³²¹ [Q 166](#)

³²² [Q 57](#)

³²³ [Q 145](#)

ability to retain evidence and perhaps interrogate it further would be challenging.”³²⁴

242. Chief Inspector Aldworth also said that a police working group was considering how existing legislation for public order or harassment offences could be applied when the offence had been committed using an RPAS.³²⁵ He said that this group consisted of half a dozen police officers from around the country tasked with creating clear national guidance on how to enforce the law with regards to RPAS.³²⁶ One way to create clear guidance was to record incidents in which officers intervened where an RPAS was breaching the law, when these interventions led to prosecution, and why.³²⁷
243. **We are convinced by the evidence we have received that the workload of regulators at EU and at Member State level, be they for aviation safety or public order, will increase in the near future, as the use of RPAS grows. We urge that regulators be sufficiently resourced to deal with this.**
244. **Due to the increasing scope for RPAS-related offences and the limited resources of the UK Civil Aviation Authority, we support greater police involvement in enforcing existing laws with regard to the misuse of RPAS. We welcome plans to produce guidance for police officers on how to apply RPAS safety legislation in the UK. We encourage other Member States to consider a similar approach.**

Registering RPAS owners

245. Chief Inspector Aldworth said enforcement of existing laws was made difficult by the fact that it was not always possible to identify the owner of any given RPAS: “Unless there is a sound and unarguable way of finding and identifying the pilot, there is nowhere to start quite frankly.”³²⁸ Mr David Smith, of the Information Commissioner’s Office, said:

“With most CCTV cameras, even if it is not immediately obvious, you should fairly easily be able to track down the operator. With a camera phone, someone is holding it. If you see a RPAS buzzing around, who is controlling it? Where are they? Who is responsible?”³²⁹

246. Some witnesses therefore recommended the introduction of a licensing regime.³³⁰ Captain Andy Brown, of BALPA, compared this to a TV licence, which would provide contact details of the owner and a means to trace them.³³¹ Gary Clayton, of UAVS, agreed in principle with the idea of licensing, but added, “you have to be careful not to stifle the entrepreneurs at the same time”.³³² Chief Inspector Aldworth said that this was something under consideration in the police working group, although: “there would be

³²⁴ [Q 172](#)

³²⁵ [Q 162](#)

³²⁶ [Q 165](#)

³²⁷ [Q 170](#)

³²⁸ [Q 169](#)

³²⁹ [Q 150](#)

³³⁰ [Q 30](#) (Dr Sue Wolfe), and [Q 45](#) (Andy Brown)

³³¹ [Q 45](#)

³³² [Q 45](#)

many challenges such as who administers the process.” He added that licensing might not provide a complete solution to the problem—even if ownership of an RPAS could be confirmed, the owner might not be the same person as the pilot at the time the offence was committed.³³³

247. It would also be helpful to enforcement agencies to be able to track RPAS while in flight. ARPAS-UK and the British Model Flying Association suggested that “some form of digital identity chip”, including the details of the owner, could be installed in leisure RPAS. They went on to say that each owner could be required to “register their details with the manufacturer who shares these details on an online database.”³³⁴ Mr Sivel said: “when my children are going somewhere and I do not know where they are, with my iPhone I can see where they are. So a type of chip, why not?” He added that this would assist police officers in identifying RPAS owners and prosecuting them if they were breaking the law.³³⁵
248. **We have already recommended the creation of an online database through which commercial RPAS pilots can provide details of their flights to inform other airspace users. We heard compelling arguments as to why the leisure use of RPAS presents risks to the general public and other airspace users. Therefore, in the long term, we foresee the need for a system which can track and trace all RPAS, especially those flying below 500ft, irrespective of whether they are flown by commercial or leisure pilots. This will be essential not only to manage the increased traffic in the sky, but also to enforce existing and future laws governing RPAS use.**

Regulating for the future

249. Throughout the inquiry, we were told that RPAS have the potential to revolutionise the aviation industry, with far-reaching consequences for other industries. Mr Cremin and Mr Bregman compared the use of RPAS to the development of the Internet.³³⁶ Mr Bregman noted that in the early days of the Internet “trust was scarce”:

“It would have been tempting in the early 1990s to attempt to address the Internet problems of the day through traditional legislation. This might have led to ever-increasing prohibitions against identity theft, credit card fraud, and misrepresentation. But it would not have led to Verisign and Thawte. Likewise, I do not believe that traditional legislation should attempt to solve the problem entirely. It should instead be focused on providing a safe means for the market to develop innovations to regulate itself.”³³⁷

250. The Minister compared thinking about the future of RPAS to predictions made in ‘Tomorrow’s World’:

³³³ [Q 167](#)

³³⁴ Supplementary written evidence from ARPAS-UK ([RPA0047](#)) and supplementary written evidence from the British Model Flying Association ([RPA0051](#))

³³⁵ [Q 58](#)

³³⁶ [Q 8](#) (Paul Cremin), Written evidence from Jay Bregman ([RPA0049](#))

³³⁷ Written evidence from Jay Bregman ([RPA0049](#)). Verisign and Thawte began as companies providing certification for websites created on the Internet.

“In the 1960s or 1970s ... they would discover this wonderful new technology and predict how it would be in 10 or 20 years’ time. They usually did find a technology that was going to have applications, but they correctly predicted neither how it would be developed nor how it would be used. We need to make sure that whatever we do as a Government now we do not tie ourselves into future predictions both of the technology and of the application. It is important that we have that degree of flexibility.”³³⁸

251. **The civilian use of RPAS has the potential to bring aviation into all industries. It is important that rules developed by the Commission and Member States enable growth in the industry and development of technology for the future.**

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Reviewing the regulatory framework

1. We support the Commission's aim to create an internal market for Remotely Piloted Aircraft Systems (RPAS) in the EU. EU rules on safety rules will be needed to achieve this, but we recognise the concerns expressed by small RPAS businesses that such rules risk stifling the existing industry. We recommend that EU rules for small RPAS should be flexible enough for Member States to respond to, and support local industry. (Paragraph 64)
2. The Joint Authorities for Rulemaking on Unmanned Systems (JARUS), through its flexible structure, has the potential quickly to draft safety regulations for the use of RPAS. Working through JARUS should ensure that any future EU rules will be compatible with international arrangements in other countries. (Paragraph 74)
3. However, stakeholders had legitimate concerns about the transparency and capability of JARUS. We welcome JARUS' intention to involve industry more in its work. To increase the organisation's transparency and improve its reputation, we recommend that JARUS be organised on a more formal basis, and that it receive more resources from national aviation authorities. (Paragraph 75)
4. We further recommend that the UK Civil Aviation Authority maintain and strengthen its involvement with JARUS. (Paragraph 76)
5. Some EU Member States have existing obligations under international treaties, such as the Missile Technology Control Regime, which govern how large RPAS are sold. The Commission will need to consider carefully these obligations as it seeks to create an internal market for RPAS in the EU. (Paragraph 81)

Proportionate Safety Regulations for RPAS

6. We support the Commission's move towards adopting a risk-based approach to safety regulations for RPAS. Not only would this approach, which considers the characteristics of the RPAS flight, accommodate the variation in size of RPAS, but it would also avoid burdensome regulations for businesses. (Paragraph 96)
7. We recommend that commercial RPAS pilots operating in the EU should be assessed for their competence to fly safely to a level which reflects the risk of the operation to be undertaken. EU-wide guidance on grades of pilot competence should be produced to support the development of the internal market and improve the quality of training received across the EU. (Paragraph 105)
8. We support the ongoing development of EU airworthiness standards for small RPAS. These standards should be, as far as possible, consistent with emerging international approaches, particularly that of the USA. The requirement for airworthiness standards should depend on the type of RPAS operation. (Paragraph 116)

9. We recommend that the Commission quickly considers requiring CE marking for small toy-like RPAS (below 2kg). While this is not an airworthiness standard, and would not compensate for pilot error, it would introduce basic quality standards for these products. (Paragraph 117)
10. In addition, we believe airworthiness assessments can improve the safety of RPAS operations, and we encourage the Commission to consider creating guidance on this for national aviation authorities. (Paragraph 118)

Enabling technologies

11. We welcome the Commission's support for the development and incorporation of key technologies, which will encourage the growth of the RPAS industry. (Paragraph 121)
12. RPAS development is currently hampered by a 'chicken and egg' problem: industry is reluctant to invest in developing the necessary technologies without certainty about how they will be regulated, while regulators are reluctant to develop standards until industry comes forward with technologies for validation. ASTRAEA is a good example of how industry and regulators can work together to overcome this challenge through shared funding and early joint working. We recommend that the Commission adopts a similar collaborative approach to forthcoming research projects in the RPAS sector. (Paragraph 133)
13. As the second phase of the ASTRAEA programme is now complete, we recommend that the UK Government publish a plan setting out how it proposes to build on the programmes outputs. (Paragraph 134)
14. In light of the evidence we have received, and the example set by ASTRAEA, we recommend that the Commission, the Government and the RPAS industry should work together to explore the creation of an online database through which commercial small RPAS pilots can provide details of their flights (below 500ft) to inform other airspace users. In order to keep the UK and Europe at the forefront of RPAS developments, we recommend that all parties seek to engage with NASA in the USA, which is currently researching the development of such a system. (Paragraph 144)
15. We recognise that the allocation of spectrum is a Member State competence. The Commission will have to respect this while promoting the use of RPAS in the internal market. We recommend that Single European Sky Air Traffic Management Research Joint Undertaking (SESAR JU) focus its research on improving the security and integrity of the RPAS command and control link. (Paragraph 151)
16. The late inclusion of RPAS in the scope of SESAR JU increases the likelihood that the Commission will not meet its timetable for the progressive integration of RPAS into non-segregated airspace. We recommend that a realistic timetable for RPAS integration must be decided as soon as possible. (Paragraph 155)
17. We recommend that SESAR JU, together with Horizon 2020 and COSME, should focus more on the technological priorities of the small RPAS sector. It should also consider the financial barriers to SMEs' participation in research

programmes, and actively seek to increase their involvement. (Paragraph 158)

Data protection and privacy

18. We do not believe that there should be technology-specific data protection legislation for RPAS. The proposed General Data Protection Regulation is the appropriate vehicle to meet the challenges of increased commercial use of RPAS. At the same time, pilots should be made aware of their obligations under existing data protection legislation as well as the draft Regulation. We recommend that the Commission, through Member States' data protection agencies, create and share specific data protection guidance for commercial RPAS pilots. (Paragraph 172)
19. We have recommended the creation of an online database through which commercial RPAS pilots could share details of their flights with other airspace users. One of the benefits of such a database would be that RPAS pilots could use it to inform members of the public of their data protection policies to make it easier for individuals to rely on their data protection rights. (Paragraph 174)
20. While we agree with the principle of encouraging RPAS pilots to carry out Privacy Impact Assessments, care must be taken not to overburden regulators and emerging RPAS businesses. Once the EU General Data Protection Regulation is agreed, we recommend that the Government explain the extent to which it specifically addresses the use of RPAS. (Paragraph 179)
21. It is beyond the scope of this inquiry, which focuses on commercial operations, to draw conclusions regarding state use of RPAS for surveillance but the acceptability of state use of RPAS should be subject to urgent public debate. (Paragraph 189)
22. While journalists can use RPAS to enhance the reporting of important events, they can also be used to invade people's privacy. UK media regulators should initiate a public consultation on the appropriate use of RPAS by the media, with a view to providing clear guidance. (Paragraph 194)

Third party liability

23. While similar equipment may be used by both leisure and commercial RPAS pilots, introducing mandatory third party liability insurance for the leisure use of RPAS would be disproportionate to the hazard posed by such users. (Paragraph 201)
24. In order to improve the information used to determine third party liability premiums, we recommend that any future EU legislation governing RPAS operations should require national aviation authorities to share statistics regarding RPAS incidents with regulators, insurers and operators in other Member States. (Paragraph 207)
25. The cost of third party liability insurance premiums is likely to decrease with greater demand from RPAS pilots. We therefore recommend that trade associations and national aviation authorities raise awareness of and enforce commercial RPAS pilots' obligations under EU Regulation 785/2004 to

purchase insurance. This will reduce the number of operators running the risk of not taking out insurance and encourage a safer RPAS industry. (Paragraph 213)

26. To address confusion regarding the scope and applicability of EU Regulation 785/2004, we recommend that the Commission brings forward amendments that would clarify that the legal requirement to purchase public liability insurance depends on whether the RPAS is being used for hobbyist or commercial use. (Paragraph 214)
27. In line with a risk-based approach to RPAS safety regulations, we recommend that the Commission increases the minimum amount of public liability cover required by commercial RPAS operators under EU Regulation 785/2004. The Regulation currently stipulates a minimum amount of €660,000 for all commercial RPAS weighing up to 500kg. (Paragraph 217)

Leisure users and public consultation

28. Given the difficulty of engaging with leisure RPAS users through formal representative bodies, we support the Government and Metropolitan Police Service in seeking to make use of websites and social media platforms to inform the public about how to fly RPAS safely. (Paragraph 226)
29. We commend the work of the UK Civil Aviation Authority in creating a safety message to include in the packaging of RPAS. While the Commission is only proposing regulations for the safe operation of commercial RPAS, we believe it could support Member States by co-ordinating the dissemination of guidance for the leisure use of RPAS, including information on safety and data protection. (Paragraph 230)
30. Geo-fencing could be a useful tool for preventing hazardous RPAS flights in sensitive areas, but it is not yet universally available. Over the next year, we recommend that the Government, along with the Commission, should approach industry to assess how this technology could be more widely applied. (Paragraph 232)
31. We endorse the Government's plans to consult the general public on acceptable future uses for RPAS. (Paragraph 236)
32. We are convinced by the evidence we have received that the workload of regulators at EU and at Member State level, be they for aviation safety or public order, will increase in the near future, as the use of RPAS grows. We urge that regulators be sufficiently resourced to deal with this. (Paragraph 243)
33. Due to the increasing scope for RPAS-related offences and the limited resources of the UK Civil Aviation Authority, we support greater police involvement in enforcing existing laws with regard to the misuse of RPAS. We welcome plans to produce guidance for police officers on how to apply RPAS safety legislation in the UK. We encourage other Member States to consider a similar approach. (Paragraph 244)
34. We have already recommended the creation of an online database through which commercial RPAS pilots can provide details of their flights to inform other airspace users. We heard compelling arguments as to why the leisure use of RPAS presents risks to the general public and other airspace users.

Therefore, in the long term, we foresee the need for a system which can track and trace all RPAS, especially those flying below 500ft, irrespective of whether they are flown by commercial or leisure pilots. This will be essential not only to manage the increased traffic in the sky, but also to enforce existing and future laws governing RPAS use. (Paragraph 248)

35. The civilian use of RPAS has the potential to bring aviation into all industries. It is important that rules developed by the Commission and Member States enable growth in the industry and development of technology for the future. (Paragraph 251)

APPENDIX 1: LIST OF MEMBERS AND DECLARATION OF INTERESTS

Members

Lord Brooke of Alverthorpe
Lord Clinton-Davis
Lord Cotter
Lord Fearn
Lord Freeman*
Lord Haskel
Baroness Hooper
Lord Kakkar
Earl of Liverpool
Baroness O’Cathain (Chairman)
Baroness Valentine
Lord Wilson of Tillyorn

*Lord Freeman, a Member of the EU Internal Market, Infrastructure and Employment Sub-Committee, recused himself from taking any part in this inquiry.

Declaration of Interests

Lord Brooke of Alverthorpe
No relevant interests declared

Lord Clinton-Davis
Hon Life President, British Airline Pilots’ Association

Lord Cotter
No relevant interests declared

Lord Fearn
No relevant interests declared

Lord Haskel
Board Member Parliamentary Office of Science and Technology (POST.)

Baroness Hooper
No relevant interests declared

Lord Kakkar
No relevant interests declared

Earl of Liverpool
No relevant interests declared

Baroness O’Cathain (Chairman)
No relevant interests declared

Baroness Valentine
CEO, London First (a not-for-profit business membership organisation). Members include businesses involved in transport, infrastructure, telecoms, and other London business sectors, as well as many of London’s universities.

Lord Wilson of Tillyorn
No relevant interests declared

The following Members of the European Union Select Committee attended the meeting at which the report was approved:

Lord Boswell of Aynho
 Earl of Caithness
 Baroness Eccles of Moulton DL
 Lord Foulkes of Cumnock
 Lord Harrison
 Baroness Henig
 Baroness Hooper
 Lord Kerr of Kinlochard
 Lord McLennan of Rogart
 Baroness O’Cathain
 Baroness Parminter
 Baroness Prashar
 The Earl of Sandwich
 Baroness Scott of Needham Market
 Lord Tugendhat

No interests relevant to the subject-matter of the report were declared by Members of the Committee.

A full list of Members’ interests can be found in the Register of Lords Interests: <http://www.parliament.uk/mps-lords-and-offices/standards-and-interests/register-of-lords-interests/>

Specialist Adviser

Mr Anthony Henley acted as Specialist Adviser for this inquiry. Mr Henley declared the following interests.

UAS/RPAS specific Activities

International Civil Aviation Organisation (ICAO), UAS Study Group, now RPAS (2008 to present)
EUROCAE (European Organisation for Civil Aviation Equipment) Wg 73 UAS standards development (2007 to present)
European Space Agency (ESA) project, SURMON Contract number 4000107665/11/NL/CLP (2013 to present)
European Space Agency (ESA) study, CERES (Certification Requirements and performances Standards of satcom links for RPAS G2/ATS/D&A) ESTEC Contract N° 4000109120/13/NL/E (2013 to present)
UK Royal Aeronautical Society, UAS specialist Group (2010 to present)
Cranfield University UK- UAS MSc Course (2010 to present)

Other Activities Not Directly RPAS related

European Commission Framework Program 7 (FP7) Aeronautical Research Project ACROSS (Advanced Cockpit for Reduction of Stress and Workload), a large multinational project led by Thales Avionics France (January 2012 to July 2016)
UK Royal Aeronautical Society, Learned society Board (2010 to present)
EUROCAE (European Organisation for Civil Aviation Equipment) Paris Aviation Standards Dependencies Study contract SCOO4 (June to October 2014)

APPENDIX 2: LIST OF WITNESSES

Evidence is published online at <http://www.parliament.uk/civil-rpas> and available for inspection at the Parliamentary Archives (020 7219 3704)

Evidence received by the Committee is listed below in chronological order of oral evidence session and in alphabetical order. Those witnesses marked with ** gave both oral evidence and written evidence. Those marked with * gave oral evidence and did not submit any written evidence. All other witnesses submitted written evidence only.

Oral evidence in chronological order

**	Paul Cremin, Head of UK Aviation Safety, SAFA & Permits Branch, Department for Transport	QQ 1–12
	Andrew Horton, Senior Technical Policy Adviser, Department for Business, Innovation and Skills	
	Adam Simmons, Deputy Director, International Aviation Safety & Environment, Department for Transport	
	André Clot, Centre Director, European Unmanned Systems Centre (EuroUSC)	QQ 13–23
	Gerry Corbett, UAS Programme Lead, Intelligence, Strategy and Policy, Safety and Airspace Regulation Group, Civil Aviation Authority	
	Ewan Kelbie, RPAS Strategy Lead, National Air Traffic Services (NATS)	
	Ray Mann, National Aeronautical Centre	QQ 24–35
	Neil Watson, Thales UK	
	Dr Sue Wolfe, Project Manager, Callen-Lenz Associates Limited	
	Captain Andy Brown, Chairman of RPAS Working Group, British Airline Pilots Association (BALPA)	QQ 36–46
	Gary Clayton, Chairman, Unmanned Aerial Vehicle Systems Association	
	Keith Hayward, Royal Aeronautical Society	
	Eric Sivel, Chairman, JARUS	QQ 47–61
	Trevor Woods, Flight Standards Director, European Aviation Safety Agency (EASA)	
	Denis Koehl, SESAR JU	QQ 62–75
	Mike Lissone, RPAS ATM Integration Programme Manager, EUROCONTROL	
	Margus Rahuoja, Incoming Director-general, DG MOVE, European Commission	QQ 76–97
	Koen De Vos, Policy Officer, Aviation Safety, DG MOVE, European Commission	

Jacqueline Foster MEP, Member of the European Parliament for North West England and Deputy Leader of the Conservative MEPs	<u>QQ 98–112</u>
Koen Meuleman, President, Belgian Unmanned Aircraft Systems Association (BeUAS)	<u>QQ 113–134</u>
Philip Heath, John Heath Insurance Brokers LLP	<u>QQ 135–148</u>
Simon Phippard, Bird and Bird LLP	
David Goldberg, Academic	<u>QQ 149–161</u>
Peter Lee, Taylor Vinters LLP	
David Smith, Deputy Commissioner, Information Commissioner’s Office (ICO)	
Chief Inspector Nick Aldworth MPA, Dip PR, Metropolitan Police	<u>QQ 162–175</u>
** Paul Cremin, Head of UK Aviation Safety, SAFA & Permits Branch, Department for Transport	<u>QQ 176–190</u>
** Robert Goodwill MP, Parliamentary Under-Secretary of State, Department for Transport	
** Adam Simmons, Deputy Director, International Aviation Safety & Environment, Department for Transport	

Alphabetical list of all witnesses

Agent Oriented Software Limited (AOS)	<u>RPA0046</u>
Aerospace Defence Security Space (ADS)	<u>RPA0021</u>
Airbus Defence and Space	<u>RPA0012</u>
AeroSynergy Certification Ltd	<u>RPA0001</u>
Alvarez & Marsal	<u>RPA0044</u>
AM-UAS Ltd	<u>RPA0006</u>
Association of Remotely Piloted Aircraft Systems UK (ARPAS-UK)	<u>RPA0047</u>
Association of Remotely Piloted Aircraft Systems UK (ARPAS-UK) and the Unmanned Aerial Vehicle Special Interest Group (UAV SIG) of the Remote Sensing and Photogrammetry Society (RSPSoc)	<u>RPA0005</u>
* Belgian Unmanned Aircraft Systems Association (BeUAS) (QQ 113–134)	
** Bird and Bird LLP (QQ 135–148)	<u>RPA0027</u>
Blue Bear Systems Research Ltd	<u>RPA0023</u>
Jay Bregman	<u>RPA0049</u>
** British Airline Pilots Association (BALPA) (QQ 36–46)	<u>RPA0031</u> <u>RPA0041</u>
British Model Flying Association	<u>RPA0043</u> <u>RPA0051</u>

**	Department for Business Innovation and Skills (QQ 1–12)	<u>RPA0038</u>
**	Callen-Lenz Associates Limited (QQ 24–35)	<u>RPA0004</u>
	Center for Democracy and Technology (CDT)	<u>RPA0034</u>
	Andrew Chadwick	<u>RPA0008</u>
	Civil Aviation Authority (QQ 13–23)	
	English Heritage	<u>RPA0007</u>
*	EUROCONTROL (QQ 62–75)	
*	European Aviation Safety Agency (EASA) (QQ 47–61)	
*	European Commission (QQ 76–97)	
**	European Unmanned Systems Centre (EuroUSC) (QQ 13–23)	<u>RPA0037</u>
	First Person View	<u>RPA0045</u>
	Flirtey	<u>RPA0050</u>
*	Jacqueline Foster MEP (QQ 98–112)	
*	David Goldberg (QQ 149–161)	
*	John Heath Insurance Brokers LLP (QQ 135–148)	
	Paul De Hert and Laura Jacques	<u>RPA0039</u>
	The Honourable Company of Air Pilots	<u>RPA0022</u>
	Hybrid Air Vehicles Ltd	<u>RPA0019</u>
	Imperial College London	<u>RPA0048</u>
**	Information Commissioner’s Office (ICO) (QQ 149–161)	<u>RPA0017</u>
*	JARUS (QQ 47–61)	
	Peter Lee	<u>RPA0040</u>
	Dr Alan Mckenna	<u>RPA0025</u>
	Dr Kevin Macnish	<u>RPA0020</u>
*	Metropolitan Police (QQ 162–175)	
*	National Aeronautical Centre (QQ 24–35)	
	National Air Traffic Services (NATS) (QQ 13–23)	<u>RPA0036</u>
	National Centre for Precision Farming UAS Special Interest Group	<u>RPA0016</u>
	Network Rail Infrastructure Ltd	<u>RPA0026</u>
	Tony Porter	<u>RPA0024</u>
	The Professional Society of Drone Journalists	<u>RPA0032</u>
	Resource Group Limited	<u>RPA0009</u>
	Rights Watch UK	<u>RPA0010</u>
	Gareth Roberts	<u>RPA0002</u>

	Carl Robinson	<u>RPA0003</u>
**	Royal Aeronautical Society (QQ 36–46)	<u>RPA0018</u>
*	SESAR JU (QQ 62–75)	
*	Taylor Vintners LLP (QQ 149–161)	
**	Thales UK (QQ 24–35)	<u>RPA0030</u> <u>RPA0042</u>
**	Department for Transport (QQ 1–12; QQ 176–190)	<u>RPA0011</u>
	Trilateral Research	<u>RPA0035</u>
	UK Civil Aviation Authority	<u>RPA0029</u>
	Unmanned Aerial Vehicle Special Interest Group (UAV SIG) of the Remote Sensing and Photogrammetry Society (RSPSoc) and the Association of Remotely Piloted Aircraft Systems UK (ARPAS-UK)	<u>RPA0005</u>
*	Unmanned Aerial Vehicle Systems Association (QQ 36–46)	
	Ursula Agriculture Ltd	<u>RPA0014</u>

APPENDIX 3: CALL FOR EVIDENCE

Civil use of remotely piloted aircraft systems (RPAS) in the EU

The Internal Market, Infrastructure and Employment Sub-Committee of the House of Lords European Union Committee, chaired by Baroness O’Cathain, is conducting an inquiry into the civil use in the EU of remotely piloted aircraft systems (RPAS), commonly referred to as unmanned aerial vehicles (UAVs) or ‘drones’. Public hearings will be held in October and November 2014.

Background

RPAS vary greatly in size, flying capability and methods of control. They are increasingly being used in Europe, in countries such as Sweden, France and the UK, to check for damage to road and rail bridges, monitor natural disasters such as flooding and to spray crops with pinpoint accuracy. Basic national safety rules apply to their use, but these rules differ across the EU and a number of key safeguards are not addressed in a coherent way.

The European Commission has been discussing since 2012 how to regulate the operations of RPAS in the EU. It published a Communication on 8 April 2014 setting out its ideas on how European industry can become a global leader in the market for this emerging technology.³³⁹ At the same time, it acknowledged that the integration of RPAS into the EU’s airspace must be accompanied by adequate public debate on societal concerns, including:

- what is an ‘equivalent’ level of safety to manned aircraft, and how can RPAS be protected against security threats?
- how will data protection rules apply to RPAS and their usage?
- does the current framework for liability and insurance for manned aircraft need to be amended to take into account the specificities of RPAS?

The Committee will accordingly consider whether the Commission has identified the key issues in this debate, and how the EU’s actions can benefit the RPAS industry in Europe in a way that is acceptable to all stakeholders.

Respondents need only reply to those questions which they consider relevant to them, and are welcome to address matters which are relevant to the inquiry but are not covered by these questions.

Questions

1. Do you agree with the priorities identified in the European Commission’s Communication for opening the aviation market to the civil use of RPAS? Are there other priorities which should have been included?
2. What are the advantages and disadvantages of regulating RPAS at the national, EU or international levels, for example in the International Civil Aviation Organization (ICAO)? Are the EU’s actions, proposed or otherwise, consistent with developments in non-EU countries, for example in the United States?

³³⁹ COM(2014) 207 ‘A new era for aviation: Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner’.

3. In which new or innovative ways do you think RPAS will be used in the future?
4. What is your view of the estimate by the AeroSpace and Defence Industries Association of Europe that RPAS activities will create about 150,000 jobs in the EU by 2050? What are the factors that might restrict the growth of the RPAS market?
5. Will the existing competences of Member States for the safety of military and civil aircraft, as well as for more general issues such as the allocation and use of radio spectrum, be impacted by the proposed changes in the remit of the European Aviation Safety Agency (EASA)?
6. Are the existing data protection, liability and insurance regimes at EU and Member State levels sufficient to address the concerns raised by the potential greater use of RPAS, or are changes required?
7. Is EU research and development funding for RPAS sufficiently targeted towards the most important issues, for example, getting the airspace regulatory framework right, as against improving the limited airworthiness of today's small and lightweight RPAS?

APPENDIX 4: SITE VISIT

Civil use of Drones in the EU: visit to Cranfield University, 22 October 2014

As part of the Committee's inquiry into the Civil use of Drones in the EU, a Committee delegation visited Cranfield University to discuss issues of relevance to its inquiry, in particular the technologies being developed to facilitate the integration of RPAS into unsegregated airspace, and to view first hand an RPAS in operation. This delegation included Baroness O'Cathain (Chairman), Lord Brooke of Alverthorpe, Lord Fearn; the Earl of Liverpool and Lord Wilson of Tillyorn. The delegation was accompanied by Alicia Cunningham (Clerk) and Paul Dowling (Policy Analyst)

Professor Philip John, Pro-Vice-Chancellor, Aerospace, Transport and Manufacturing, started the day by giving an overview of Cranfield University's history of involvement in developing and testing unmanned aircraft. He made particular reference to the university's work on the "Demon uninhabited air vehicle" when highlighting some of the difficult issues faced by developers of RPAS. For example, he referred to a scale of nine 'technology readiness levels' and how moving from levels 4-6 to level 9 was the most difficult and expensive part of any RPAS development. He also explained how the university complied with UK regulatory requirements and safety protocols when testing the Demon UAV at a military site in Scotland.

Professor Antonis Tsourdos, Head of the Centre of Cyber-Physical Systems, gave a presentation about his Centre's research in developing 'detect and avoid' technology for RPAS. He explained how regulatory drivers, such as the need for safety and transparency, and business needs, such as affordability and public acceptance, were setting the technology targets for his team. He explained how existing traffic collision avoidance systems (TCAS) work on manned aircraft, and what modifications would be required for it to be used on an RPAS system. Going one step further, he said that developing fully autonomous RPAS presents further challenges in that such systems would have to mimic human pilot behaviour when responding to emergency situations.

Pete McCarthy, a former RAF pilot working at the Safety & Accident Investigation Centre at Cranfield University, told the Committee of the potential uses of RPAS as a tool for investigating crash sites. He said that the Malaysian Airlines aircraft which was shot down over the Ukraine was a good, if terribly unfortunate, example of where an RPAS could have been used to determine whether the crash site was safe for human investigators to enter, thereby possibly preventing unnecessary physical and psychological trauma. An RPAS could also have taken photos soon after the crash, thereby providing some record in case there was any tampering with the evidence on site.

David Gardner and Gordon Dickman, Cranfield Aerospace, spoke about their company's experience as an SME in aviation. They explained the work they had done as part of the Project Ultra consortium (an EU funded project as part of the Seventh Framework Programme for Research and Development) and how this work was subsequently subsumed into the European RPAS Roadmap.

Professor Sir Peter Gregson, Vice-Chancellor, joined the Committee in watching an outdoor demonstration of an RPAS flying over a mock aircraft crash site. A pilot controlled an RPAS (a unit weighing approximately eight kilos, equipped

with a camera sitting on a rotating arm, and with eight rotors) using a handheld control as it flew in blustery conditions over and around the crash site, while a separate operator controlled the camera. Committee Members were able to see live, high definition footage of the crash site on a handheld screen as the RPAS was flown over it.

APPENDIX 5: GLOSSARY

ACAS	airborne collision avoidance system
ATC	air traffic control
ATM	air traffic management
BVLOS	beyond visual line-of-sight
C2	command and control Link
DAA/D&A	detect and avoid
EASA	European Aviation Safety Agency
EUROCAE	European Organisation for Civil Aviation Equipment
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAA	Federal Aviation Administration
ICAO	International Civil Aviation Organization
HALE	High Altitude Long Endurance
IFR	instrument flight rules
ITU/WRC	International Telecommunications Union/World Radio Conference
JAA	Joint Aviation Authority
JARUS	Joint Authorities for Rule Making Unmanned Aircraft Systems
MIDCAS	Mid-air Collision Avoidance System
MTOM	maximum take-off mass
NextGen	Next Generation Air Transportation (USA Equivalent to SESAR)
RPA	remotely piloted aircraft
RPAS	remotely piloted aircraft system
RPASP	Remotely Piloted Aircraft Systems Panel (ICAO)
RPS	remote pilot station
SESAR	Single European Sky ATM Research
UAS	unmanned aircraft system
UAV	unmanned aerial vehicle (obsolete term)
VLOS	visual line-of-sight