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Societal and Ethics Aspects of Remotely Piloted Aircraft Systems

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Abstract
Remotely piloted aviation systems (RPAS) or 'drones' are well known for their military uses, but they could also be used for a range of civil applications for state, industrial, commercial and recreational purposes. Regulatory changes are underway which will allow their use in domestic airspace, with substantial functional and economic benefits predicted. The potential benefits of the civil drone sector for its military counterpart have also been recognised and nurtured, although concerns have been raised about European citizens rejecting civil drones because of their association with military drones, as well as some potentially controversial 'crossover' applications such as policing and border control. In this report, we consider this issue in detail, as well as other societal and ethics aspects the introduction of civil drones to European airspace. Exploring policy developments, consultations and research projects in Europe and third countries, we offer a critique of certain aspects of the development strategy, grounded in the concept of Responsible Research and Innovation. In doing so, we do not rely upon critique of drone technologies per se, in their neither their civil nor military guises. Rather, we seek to inform the evolution of responsible and socially beneficial civil drone development strategies. First, we introduce civil drone technology and the main applications areas anticipated. Following this, in Section 2, we describe consultation and development in Europe, the USA and Canada, with particular reference to the management of any identified societal or ethics concerns. In Section 3, we consider three such aspects in more detail in a European context: privacy and data protection, law enforcement, and representations of the relationship between civil and military drones. In Section 4 we present a discussion of what we understand about civil drones in European society, and in Section 5 we offer some recommendations along with and a brief description of further work.

Contents

This report documents progress in a study of societal and ethics aspects of civil drones, which is part of the E-CIT project. E-CIT is concerned with the empowerment of citizens' rights with reference to emerging information and communication technologies (ICTs). Of its four deliverables, the third is to develop recommendations for frameworks of assessment of public engagement in technology development, and best practices for public engagement in *ethics dialogues* about technology assessment and policy. These are developed through the present case study on civil drones as well as two others on wearable sensors and internet of things. The civil drones study will be documented in three reports, of which this is the second. The first report (see Boucher, 2014) described a scoping study that provided an early outline of developments in the civil drone sectors of the USA and Europe, highlighting some emerging concerns, such as potential privacy infringements and the ways in which dual-use aspects of civil drone development are presented to citizens. In this second report, we focus in more detail upon societal and ethics aspects of the introduction of the technology to European skies, and draw upon policy developments and research projects in Europe and third countries to inform a set of recommendations. The report will also stand as a basis for forthcoming empirical work, which will be designed and implemented in response to the gaps identified, and will be documented in the third and final report from the civil drones project, as well as in Deliverable 3 of the E-CIT project, both in late 2014.

The report has five sections. The first introduces civil drone technology and the main applications that they are anticipated to be used for. Following this, in Section 2, consultation and development in Europe, the USA and Canada are described, with particular reference to the management of societal or ethics concerns that are identified. In Section 3, we consider three such aspects in greater detail in a European context; privacy and data protection, law enforcement, and representations of the relationship between civil and military drones. Finally, in Sections 4 and 5, we conclude with a discussion of what we understand about civil drones in European society before offering some recommendations and a brief description of further work.

1. Civil Applications of Remotely Piloted Aircraft Systems

Unmanned or remotely piloted aviation systems (UAS, RPAS or simply 'drones')[1] are technological systems designed for aerial operations without an on-board pilot. They exist in many formats developed for many different purposes and their development

[1] Throughout this report, we follow the terminology that is applied in the domain under discussion. We follow a recent EC Communication (European Commission, 2014a) in using the term 'civil drone' by default.

is gathering pace around the world with hundreds of applications identified, and many more are keenly anticipated. Perhaps the most visibly deployed applications are for US military operations but, here, we will focus upon non-military, civil drones. The technology appears to be at a crucial stage of its development, with substantial interest from policymakers and industrial stakeholders. The key barriers to the development of the sector are mostly regulatory, as technical capabilities and safety procedures are generally seen to have outgrown the tight restrictions on the use of airspace. In response, plans are under development to allow civil drones to be integrated into normal domestic airspace. Rapid innovation, investment and growth are expected in the coming years as restrictions are relaxed. While various societal and ethics aspects of civil drones have been raised by commentators, there has been no substantial public consultation exercise, and debate is largely limited to expert and stakeholder communities.

Within the broad definition of civil drones lie a diverse range of systems and vehicles. RPAS always have an off-board human pilot controlling the vehicle, whether it is done from meters, kilometres or continents away. European development is currently restricted to these systems, although UAS have been developed that can operate autonomously, without any human pilot. In each case, the definition of the system extends beyond individual vehicles to include the ground stations where remote pilots are based, software systems, communications infrastructures, and any other aspects of the system. Some differences between these systems are immediately apparent, such as the size or weight of vehicles, while others are more subtle, such as the medium of communication deployed within the system. Some technical detail, particularly on this diversity in the range of potential systems, is required in order to understand recent developments. In the following subsection, we describe some of the key dimensions of technical diversity, before the some of the major use categories are described in the subsequent subsection.

1.1 Civil Drone Technology

A key dimension of variability is defined by the extent of autonomy and automation delegated from the pilot to the system. Automation levels range from those that are fully piloted from a remote location to those that are fully automated. There are also several points in-between, with some manoeuvres triggered autonomously through automated monitoring of conditions. Depending upon system priorities, autonomous manoeuvres may override remote pilot commands, or be overridden by them. The International Civil Aviation Organisation (ICAO), as well as current European plans, will allow autonomous manoeuvres to override pilot command only

in non-normal circumstances such as communication failure or imminent collision risk (so called 'sense and respond'). The systems that are more heavily automated, including those that can fly without any human pilot, are also quite well developed. While there are no current plans to integrate UAS into normal airspace, a successful period of RPAS integration and further UAS development, could feasibly lead to such a move.

RPAS vehicles are often organised by their weight, with 150kg defining the boundary between heavy and light vehicles. In Europe, those under 150kg are regulated at a national level while those above are regulated at a European level. The 150kg threshold has been described as arbitrary (Finn & Wright, 2014). This could have a fragmenting and distorting effect upon the market and, ultimately, development in the sector.

The complexity of the system is also a critical point of diversity in current regulatory developments. This is captured in two variables, the operating altitude and the line of sight (LOS) from the remote pilot station (RPS). These are not arbitrary, but designed to capture the conditions which define the operational requirements for a flight. The operating altitude is split into two categories. All flights up to 150m, below the level where manned aircraft fly, are defined as low-altitude operations, while all flights above this threshold are defined as high-altitude operations. The line of sight is defined by the communications infrastructures that are required to maintain contact with the vehicle. Three scenarios are defined at low-altitude. In the simplest scenario, the vehicle remains in direct *visual LOS* from the RPS, usually within 500m. Where this is not possible, *extended visual LOS* describes operations where the vehicle is not directly visible to the pilot, but a support crew based in a second location can be used to maintain visual LOS. Where this is not possible, the situation is described as *beyond visual LOS*, and support technology would be required to maintain contact with the vehicle. Two further scenarios are defined at high-altitudes, 150m and above, where the RPAS may share airspace with manned aircraft. In these situations, safe integration and compliance with visual and instrument flight rules is crucial. In the first scenario, *radio LOS,* direct contact is maintained between the vehicle and the RPS via radio communication. In the second, *beyond radio LOS*, more sophisticated indirect communication channels are required, such as satellite. These five scenarios of increasing complexity are presented in Table 1, below.

Visual LOS	Low altitude. Vehicle remains within sight of pilot, usually within 500m of RPS
Extended Visual LOS	Low altitude. Vehicle beyond visual LOS but within visual LOS of a support crew.
Beyond Visual LOS	Low altitude. No visual LOS, vision support technology required.
Radio LOS	High altitude, with direct radio communication between RPS to vehicle
Beyond Radio LOS	High altitude with indirect, e.g. satellite, communication between RPS and vehicle

Table 1: Scenarios of Complexity in RPAS Systems

1.2 Applications of Civil Drones

The distinctions presented in the previous section are based upon the specifications of the technology and its operation. These details are particularly useful for managing logistic, safety and regulatory aspects of civil drone development. However, many of the questions about social, ethical and legal aspects of the technology have been raised by expert commentators and participants in consultation processes in Europe as well as the USA and Canada (as described in Section 2). Understanding and responding to these questions requires an understanding of the variety of applications of the technology, their contexts, purposes and consequences. In this section, we build upon a previous review (Boucher, 2014b) to introduce four commonly used categories of applications – military, non-military governmental, commercial, and personal/recreational – with a few examples.

By far the most visible and debated applications of RPAS fall under the military category, particularly surveillance and combat applications. Military drones can be piloted from an RPS at the other side of the world, distanced from immediate danger, as well as the mechanisms and consequences of their actions. This clearly presents a lower risk to combatants, a key advantage of military drones over manned aircraft. However, some critics have argued that they may contravene the just war principle by reducing risk to their own soldiers by means that increase risk to the civilians that live within enemy territory (Billitteri, 2010). Others have suggested that their efficiency makes military operations more attractive, effectively promoting more aggressive foreign policy, including military action in foreign territories that are not officially defined as warzones, such as Pakistan and Yemen (Sparrow, 2009). Counterarguments hold that military drone strikes comply with international law, are

justified by the principle of self-defence, and are an appropriate response to the characteristics of modern warfare whereby enemy combatants are not readily distinguishable from civilians (Billitteri, 2010). These, and several other ethical and legal arguments for and against military drones are often debated in policy, academia and the mainstream media (for a European summary, see Dworkin, 2013).

The state may also deploy drones in non-military, civil operations. These are most often associated with security and surveillance applications, such as policing and border patrol. Other areas in which governments have used the technology include forest management, fire services, air sampling, search and rescue, and infrastructural maintenance. The motive is often financial economy, with civil drones achieving the same (or higher) performance standards as manned aircraft more efficiently and economically. Furthermore, they present options for performing operations in dangerous or uncertain contexts, such as emergency response, with a lower risk to personnel.

Commercial and industrial applications include internet provision, agricultural monitoring, entertainment, advertisement, security and surveillance, infrastructural maintenance, and delivery services. Some applications offer new capabilities, while others allow safer or more efficient performance of existing tasks, including the 'dull dirty and dangerous' where unmanned solutions are preferred. Some have achieved media interest, such as the headline-grabbing reports about drone delivery services for pizzerias and bookshops. These and other stories have attracted occasional mainstream news coverage and debate about privacy, safety and liability.

Several civil drone applications are outside commercial and state activities, such as flights for recreation, creativity or some other community or individual purpose. Many enthusiasts are organised into communities with websites, forums and meetings.[2] Participants appear to have the technical skills to build and modify their own RPAS from prefabricated kits or their own original designs, depending upon their level of expertise. These communities are generally supportive to other members new and old, and an 'open source' attitude to innovation is adopted, whereby ideas and solutions are shared across open platforms. Some such applications have community oriented aims, such as education, creativity, empowerment and activism. Despite the legality of personal uses of drones often

[2] DIY Drones (diydrones.com), for example, described as 'the leading community for personal UAVs'.

being unclear, there is a growing market for off-the-shelf products for responsible and rogue users alike.

RPAS are highly customisable, so the same base system can be configured with different payloads to deliver various marketable services for government, commercial, recreational and military purposes. Even quite specific configurations can be used for different purposes by different groups. For example, a drone platform equipped to capture air samples may be used by the military to identify potential chemical threats to ground troops, by the government to ensure compliance with air quality regulations, by industry to provide information and forecasting services, and by community groups to monitor their industrial neighbours, a form of *sousveillance* (Mann, Nolan, & Wellman, 2003; Mann, 1998). Because of these crossovers, technologies developed and sold for one purpose can be used for another. Niche applications that may not otherwise have attracted sufficient investment to fund their own development are made financially viable by the provision of a core technological base that can be used for a wide range of purposes. It is clear that the development of a large civil drone sector would generate substantial investment in research and development, likely leading to greater miniaturisation and lower unit costs, which will benefit a wide range of applications in both civil and military domains. Illustrating this dual use aspect is Microflown AVISA's vector sensors. These devices are designed to be used on drones to detect sounds, locate their sources, and initialise actions. This capability, once developed, can be used in civil and military domains and is currently marketed for landing support and mid-air anti-collision systems as well as for pinpointing the source of gunshots and artillery fire and tracking targets (Microflown AVISA, 2012).

2. Consultation and Development in Europe, USA and Canada

In this section, we describe the process and procedural design of recent strategies for the development of civil drones. The focus remains upon societal and ethics aspects, which are described along with the more technical aspects that define many of the milestones in civil drone development. European insights are described first, in the following subsection, followed by descriptions of similar processes in third countries.

2.1 Consultations and Developments in Europe

In Europe, RPAS above 150kg are controlled at a European level by the European Aviation Safety Agency (EASA) while those under 150kg remain regulated at Member State level. While some Member States authorise flights in normal airspace, there have been calls to develop harmonised European rules to support routine RPAS

operations in a way that avoids fragmentation, facilitating the development of a pan-European market. Here, we describe recent European initiatives that have responded to these calls. Given the focus on societal and ethics aspects, we pay particular attention to the procedures through which decisions are made, the framing of the technology, and the design of approaches to managing societal and ethics aspects of development.

The EC held a three-part consultation on RPAS from 2009-2012. The first stage was a hearing on light unmanned aircraft led by the erstwhile DG Energy and Transport. The second stage was a high-level conference organised by the EC with the European Defence Agency. Finally, DG Enterprise and Industry (DG ENTR) and DG Mobility and Transport (DG MOVE) organised a set of five workshops between July 2011 and February 2012. Following these consultations, the European RPAS Steering Group (ERSG) was established under DG MOVE and DG ENTR to design a roadmap which describes a series of activities that would lead to the initial integration of civil drones in European airspace by 2016, setting out the challenges alongside potential remedial steps. The roadmap is not a law, but a unified call for action produced by a range of key stakeholders under the guidance of several Commission services. Since its delivery in June 2013, it has remained a key point of reference for ongoing activities. Detailed information about the consultation process has been shared in an open repository, offering a laudable level of transparency (European Commission, 2014c).

The Consultation

The hearing (European Commission, 2009) gathered 49 European experts from a range of sectors, many of which were government authorities. At the time, interest was not limited to remotely piloted applications and the term UAS was applied. They identified significant potential for civil applications and anticipated major growth by 2015, particularly in lighter UAS, <150kg, where costs are lower. Their potential benefits were rehearsed in the context of a wide range of applications including firefighting, search and rescue, police work, air monitoring, first response, road collision monitoring and 'persistent, on-demand observation' allowing sustained surveillance without pausing for crew replacement. They recognised that military applications dominated the UAS sector, and underlined the role of non-military UAS in offsetting the cost of military UAS; "the future military market for unmanned aircraft alone is insufficient to effectively amortise the high costs of development" (European Commission, 2009, p2).

The cited benefits of UAS development extended to a truly massive, albeit unspecified potential for a wide range of spin-off products and services, comparable with that prompted by space exploration. The main barrier to this development was seen as regulatory. "Once a legal framework exists, a totally new aerial work service supply industry should spout rapidly" (European Commission, 2009, p10). The legal framework(s) would need to address safety; airspace integration; cost sharing across civil, security and defence sectors; operator certification; pilot training and licensing; responsibility, liability and insurance; import/export restrictions on military equipment; and the need to support research and development in a sector dominated by sensitive SMEs. While significant, these barriers were considered surmountable and the hearing report recommended regulations to respond to these issues and to expedite the development of the market. Many of the issues identified during this hearing shaped the subsequent consultations and, indeed, the eventual roadmap.

The next part of the consultation period was the high-level conference (European Commission, 2010). This gathered representatives of EU institutions, member states and military, industry and aviation sectors including the US Federal Aviation Authority. Here, the potential value of the civil drone market was again reiterated, and the need to remove constraints upon the market underlined. The lack of a pan-European legal framework and integration into conventional airspace were seen as serious constraints. The group agreed to set up a high-level group to respond to these issues. The group would comprise of representatives of Member States, relevant European and international organisations, user groups, public authorities and military groups, to ensure that dual-use is addressed from the outset.

In the third phase of the consultation, five workshops were held, focusing on industry and markets, airspace integration, safety, societal dimensions and research and development issues. In each, a range of experts and stakeholders were invited to share perspectives, concerns and suggestions for the sector. The fourth, on societal dimensions, is most relevant here. It was held in November 2011 and had four sessions- issues related to the general framework; responsibility, liability and insurance; privacy and data protection; societal impacts, acceptance and ethics. The sessions are fully documented by the European Commission (2013b) with a summary report (Roma, 2012). In privacy session, it was argued that existing European laws apply to civil drones and no specific provisions appear necessary. In response to citizens' concerns about privacy protection, one solution suggested was that privacy by design approaches could help ensure compliant use of the technology. In the

session on societal and ethics aspects, it was highlighted that citizens may be uncomfortable with civil drones because of their surveillance capabilities and their association with military and police applications. In response, it was suggested that a transparent process should be adopted, and that an open debate about acceptable uses should be promoted. One speaker in this session, representing AeroSpace and Defence Industries Association of Europe, highlighted dual-use amongst other functional and economic benefits of civil drone development and recommended action to promote the advantages of the technology and improve its acceptability to European citizens. These points appear to have had a strong influence upon the eventual roadmap, including its strategy for managing public acceptance of the technology.

From the Consultation to the Roadmap

The three stages of this consultation process were brought together in a working document (European Commission, 2012b). The content of the report closely follows the expert opinions gathered during the consultation. It is at this point that European interest was explicitly limited to remotely piloted vehicles and the terminology in reportage changed accordingly from UAS to RPAS. The working document reiterates the potential functional and economic potential of the technology, and the need for coordinated removal of the barriers to market development. The expectations for growth were high and extended well beyond specific applications to the prediction of creating unpredictable markets. Echoing earlier comparisons with space flight, the report establishes an analogy in the innovation potential created by the development of the iPad.[3] The document also referred to the benefits accruing to the military when military RPAS are used for non-military purposes. These 'mutualisation' benefits include financial income generated through the provision of services (operations, training, etc.) and opportunities for military pilots to build experience. Support for the sector was considered urgent because, if delayed, development could shift elsewhere. The USA had announced ambitious plans around the same time and it was felt that Europe should not 'lag behind', potentially missing opportunities.

The working document also considered three societal aspects of RPAS development that were raised during the consultation. The first was the need to highlight the

[3] "The current market for commercial RPAS services is practically non-existent … It is expected that once the barriers limiting RPAS flight will be removed the understanding of the RPAS potential will quickly spread amongst potential users creating new markets of aerial services, in the same way that iPad created an entirely new and unpredicted market for mobile data services." (European Commission, 2012b)

potential benefits of RPAS, particularly their application in crisis management situations, which provide relatively clear and uncomplicated social benefits. The second concerned issues with responsibility and liability. It was considered preferable to have the operator carry these burdens, rather than the pilot or licencing authorities, with a minimum level of insurance coverage required. Third, the report considered privacy and data protection. Here, it was noted that European law already protects citizens from infringements of privacy[4] and data protection[5]. The report suggested that RPAS present no significant exceptions to these laws and, therefore, no regulatory change would be required at a European level. Nonetheless, it recommended that privacy and data protection should be considered from an early stage of product development with a 'by design' approach, integrating protective measures into the design of technologies, rather than applying end-of-pipe solutions as the product reaches the market. Finally, the report also expressed concern that public unease around RPAS, resulting from their association with military applications, could cause problems. It suggested that public confidence and support could be raised through transparency, consultation with bodies such as the European Group on Ethics (EGE), and clearly defining which applications would be permissible and which would be forbidden.

Following these consultations, the ERSG was set up to produce a roadmap for the integration of RPAS into European airspace. It was delivered in June 2013, and built upon the momentum of the consultations described in the previous sections, which clearly influenced both its structure and content (ERSG, 2013b). It identified 104 government non-military (state and public sector) and 98 civil (largely commercial) operations, and stated that 250 RPAS based businesses were working on around 400 products. Most of these were specialist SMEs working on products at a pre-market stage. The roadmap called for regulatory support to overcome the barriers presented by fragmented regulations. In doing so, safety is considered paramount and it is essential that airspace integration would not present any degradation of standards or place new demands upon existing practices in the manned aircraft sector. RPAS must be considered equivalent to manned aircraft in terms of air-traffic control and safety requirements. All operators must be certified, to ensure that appropriate standards are met, and all pilots must obtain valid licences. The roadmap itself is a proposed schedule for the staggered integration of RPAS into normal airspace. The four stages, described in Table 2, below, refer to increasingly complex scenarios, with

[4] In the Charter for Fundamental Rights, which enshrines the right to private life and family life.
[5] In Directive 95/46/EC and its 2009 revision, which differentiated between commercial and state use of data.

increasing altitude, longer lines of sight, operating in more densely populated areas, and with more harmonised trans-European operations.

2013	Some limited, light civil drone flights under strong regulations without harmonisation
2014-2018	Increased harmonisation and daily operations within visual and extended visual LOS, including urban areas; possibly low-altitude operations beyond visual LOS in isolated areas; some operations at higher altitudes in less congested airspace;
2019-2023	Licenced pilots operate in most airspace categories; full integration at low altitudes, regardless of LOS, expanding to more populated areas; public EU flights complying with different sets of national regulations.
2024-2028	Operations in most airspace alongside manned aircraft; common rules envisaged for public EU flights; cross border EU flights without special authorisation of excessive administrative burden.

Table 2 Roadmap for the Integration of Civil Drones into European Airspace

The roadmap also describes several activities to accompany these stages of integration. These are organised into three categories, each with its own dedicated Annex to the roadmap; regulations, strategic research and societal impacts. In the first, regarding regulations, 27 recommendations are suggested across the four stages of the roadmap. From initial common rules in 2013 to accommodation and partial integration by 2018 and 2013 and full integration by 2028. Many of the specific regulatory requirements relate to licencing, insurance, safety procedures, communications, and the harmonisation of these regulations across Member States. The sequence of these recommendations is not always based on critical dependency but prioritisation and planning, so there is some flexibility in the process.

The second Annex identifies 14 strategic research and development activities, which would respond to some gaps in the availability of technologies that are required for full airspace integration. These activities would support the development of systems for communications, air traffic management, and detect and avoid, as well as the establishment of operational procedures. It recommended that strategic research and development in these areas is coordinated and expedited, highlighting that many developments will also benefit other related sectors, such as manned aircraft and military RPAS.

In the third Annex on societal issues, some potential concerns are discussed. First, the possibility of incidents and compensation claims were considered. It was deemed necessary to establish the responsibilities and liabilities of various actors involved in operations, and to ensure that each is capable of providing compensation if necessary, perhaps through a mandatory third party insurance scheme. With regards security, the annex considered the threat of deliberate malicious use of civil drones, either through the introduction of rogue drones or the commandeering of legitimate vehicles through physical or electronic hijack. A section on protection of privacy and personal data followed the insights gathered during the consultation, arguing that existing European regulations are sufficient to manage these aspects of civil drone development, while recommending an assessment of national implementation 'to ensure any possible issue is identified and dealt with'. A privacy by design approach was also promoted as a means of contributing to compliance with protection rules.

The remainder of the annex is dedicated to benefits to society, the acceptability of risk, and ethics aspects. Here, it argued that it "is important to modify the vision of "killing machines" they [citizens] have right now due to the actually military-specific utilisation and to some catastrophic movies." (p30). A solution of offering alternative visions to citizens is proposed, as well as a strategy for managing public communications to reduce the possibility of an adverse reaction (p39-41). It recognised that different operations may be met by different levels of public acceptability, including "between those operations that provide a "greater good" (for example firefighting or search and rescue) and those operations, which have only limited community benefits" (p39). Shifting from a previous focus on technical dimensions of (discussed in Section 1.1) to a focus on dimensions of their use (discussed in Section 1.2), it recommended a strategy for avoiding adverse reactions by focussing public communications upon more benign applications. Specifically, to "make people perceive RPAS technology as a natural part of future society-increasing familiarity", and to "stress the roles RPAS have in conducting humanitarian operations or in testing for airborne toxins, rather than focusing only on the military and security applications" (p39-40). Further recommendations included establishing a transparent process with wide consultation, defining a range of permissible and forbidden uses, and establishing an ad hoc *RPAS Public acceptance facilitator*, tasked with surveying public perspectives and identifying the means of gaining acceptance.

In 2014, the Vice-President of the EC released a statement (European Commission, 2014f), coinciding with a press release (European Commission, 2014b) and FAQ (European Commission, 2014d). In a break from previous EC discourse, which

referred to the technology as RPAS and UAS, these referred to 'civil drones'. The statement implied a recognition of negative military connotations of drones without explicitly referencing them.[6] It also gave examples of benign applications – such as infrastructural maintenance, disaster monitoring, agriculture, and delivery services – and described the economic potential of a strong European sector. The accompanying Communication (European Commission, 2014a) described the aim of European RPAS strategy as reaping societal benefits of the technology and responding to citizens' concerns through protective action and public debate.[7]

Many third countries have also made plans to integrate civil drones into their domestic airspace. The motives are often similar to those in Europe; to support innovation and meet demand from public and private sectors while maintaining safety standards. However, there are also differences in the approaches taken. Here, we describe developments in the USA and Canada, with particular reference to the consultation procedures deployed and the approaches to managing potential societal and ethics issues.

2.2 Consultations and Developments in the USA

Throughout the 1990s, the Federal Aviation Administration (FAA) permitted occasional operations in normal airspace, generally for non-military governmental surveillance activities. There were strong conditions applied to the issuing of flight permits and operations were quite heavily restricted. Private institutions could request permits for non-commercial purposes such as research, development, demonstration and training, while public authorities could request Certificates of Waiver or Authorisation (COAs) for activities such as border patrol, law enforcement and search and rescue. In general, flights were not permitted in 'Class B' airspace (near populated areas). Non-profit hobby activities were not covered by these policies, as long as they were operated below 400 feet (122m) (FAA, 2013c).

Since the first authorised flight in 1990, applications for permits has gradually increased. In 2009, US Congress enacted the FAA Modernization and Reform Act (P.L. 112-95), which demanded that the FAA make the COA issuing process faster, and establish six operational test sites where UAVs are integrated into normal airspace,

[6] "I'm not sure what sort of image comes to your mind when I say that word but…" (European Commission, 2014f)

[7] "The 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 including safety, privacy and data protection, third-party liability and insurance or security." (European Commission, 2014a, p3).

with a target of full integration by 2015. To this aim, the FAA introduced a web-based tool for COA requests and guaranteed a response within 90 days. They doubled the period of authorisation granted from 1 to 2 years and allowed public safety authorities to operate small UAVs weighing less than 2kg, below 400 feet, within V-LOS, during daylight and away from sensitive airspace such as populated areas and airfields (FAA, 2012a).

In March 2012, the FAA announced that applications would be received to host test sites, where UAS would be introduced to normal airspace under experimental conditions with the aim of informing the subsequent national roll out. They announced a consultation with the Defence Department and NASA, and published a call for public input into the selection process (FAA, 2012b). The aim of the consultation was to provide a transparent process through which public groups could input on questions such as public/private ownership of sites, permitted activities, operator requirements and the factors influencing the selection of sites (Ibid). Over 200 comments were received, and the selection of sites was timetabled for December 2012 (FAA, 2012a). In an open communication one month before the December deadline for announcing test sites, the FAA's Acting Administrator announced a delay of unspecified duration:

> "Our target was to have the six test sites named by the end of 2012. However, increasing the use of UAS in our airspace also raises privacy issues, and these issues will need to be addressed as unmanned aircraft are safely integrated … The FAA will complete its statutory obligations to integrate UAS into the NAS as quickly and efficiently as possible. However, we must fulfill those obligations in a thoughtful, prudent manner that ensures safety, addresses privacy issues, and promotes economic growth." (Huerta, 2012)

The specific privacy issues that caused the delays to the FAA schedule for selecting test sites were not disclosed, although the Government Accountability Office (GAO) understood them to refer to concerns "expressed by commenters" (GAO, 2013). While they do not clarify precisely whom they are referring to, many critical commentators at the time cited the impact upon US citizens' rights to privacy under the Fourth Amendment. Several consumer rights, human rights, technology and civil liberties organisations that raised privacy concerns argued that the implications of the proposed RPAS development were significant and fell within the FAA's mandate to define acceptable standards and ensure responsible development of UAS (see EPIC, 2012). While some concerns were raised about commercial invasions of privacy (private detectives, paparazzi and Google are amongst those cited in EPIC, 2012),

complaints are much more frequently framed as the protection of American citizens from expressions of state power, such as police search. This echoed a broader contrast between support for state intervention abroad and opposition for state intervention in domestic affairs. Indeed, a poll early in 2012 showed that 87% of American voters supported US government's use of UAS overseas, while only 30% supported it at home (Rasmussen Reports, 2012).

50 expressions of interest to host test sites were received (FAA, 2013b) and 25 applications were ultimately submitted (FAA, 2013e). The FAA announced that it would consider these applications with reference to selection criteria, including local expertise, finance and interest, and they would be selected as a group rather than as individual submissions. This reflected the need for test sites to cover a range of geographic and operational conditions including diverse climates, landscapes and airspace profiles, and to ensure the FAA would be able to explore training requirements, operational specifications, and technological considerations under different conditions. Finally, reflecting the concerns raised by commentators in 2012, they announced that the selection criteria would include privacy considerations, with minimum requirements set for each site. In advance of the selection, they published the following set of draft requirements as an indicator of how they intended to manage privacy protection at the test sites (FAA, 2013g):

1. Test sites are operated under privacy policies that are informed by Fair Information Practice Principles, open to the public for feedback, and updated when appropriate.
2. Operations comply with all other privacy laws. Where criminal or civil charges are filed for non-compliance, the FAA may suspend, modify or terminate the test site license.
3. Privacy policies and operations are updated to reflect any future changes to privacy law.
4. Operations comply with data transmission rules.

In making these draft requirements public, the FAA aimed to provoke an informed dialogue amongst industry, policymakers and privacy advocates which would then feed in to the process of ensuring adequate privacy protection at the test sites. They also stated an intention to assess privacy issues continually through ongoing engagement and collaboration with public groups (FAA, 2013g). In February-April 2013, the FAA held a second public consultation which received a total of 99 submissions, all of which have been posted to an open repository (see regulations.gov, 2013). Then, in April 2013, they conducted a public listening session, which focused upon their draft privacy policy for the test sites. The two-hour time

slot consisted of a brief introduction to the proposed policy, presented by an FAA representative, before callers were given the opportunity to make statements of up to three minutes in response (FAA, 2013a). The comments were made public in a full transcription (FAA, 2013b) and the FAA later responded to each specific point that was raised.

The 99 submissions received during the FAA's second public consultation from February-April 2013 and the records of the public listening exercise in April 2013 can be used as a gauge of public reactions to the technology (see regulations.gov, 2013; FAA, 2013b). Some of the respondents were representatives of special interest or expert communities such as retired pilots, others fitting the description of 'lay publics', perhaps attracted to the debate through local issues such as a proposed application to host a test site. Many were supportive of the technology, and criticised the FAA's decision to delay development, arguing that they stepped outside their safety remit or that if (or when) privacy threats emerge then some other authority should (or will) handle them. In particular, the role of the judicial system, rather than the FAA, in protecting Fourth Amendment rights to privacy was highlighted. Some respondents raised concerns about privacy, both as a legal right to be protected, but also as a valued personal experience that was eroded, referring to a diminishing experience of privacy or peace and an increasing difficulty to 'get away from it all'. Some were concerned about safety and worried about access rights of owners if a device should fall in their property. One (outlying) perspective called for a shift in focus of discussion from the infringement of the Fourth Amendment right to privacy to the enforcement of the First Amendment right to bear arms, calling for citizens to use armed UAS for personal protection. Another concrete recommendation was to make the details of all operations public, including the owner, the flight, its purpose, the data collected, and its use.

In September 2013, the FAA published its 'comprehensive plan' describing how it will meet the Modernization and Reform Act (FAA, 2013h). It described plans to have routine civil drone flights (within visual LOS) without special authorisation by 2015 and full integration by 2022. Other decisions, for example on the degree of permitted automation, were deferred to later roadmaps. In November 2013, it published the first edition of its integration roadmap (FAA, 2013d). This described the procedure in terms of three overlapping 'perspectives'. The first, accommodation, was the shortest-term perspective, referring to granting UAS limited access to the airspace on a case-by-case basis. The second perspective, integration, addressed medium-term aims such as enabling routine, regulated airspace access without the need for special

permission. The third and most long-term perspective, evolution, was focussed upon adaptation to emerging needs and capabilities. The need to respect citizens' privacy rights was discussed, referring to the use of dialogic approaches to inform regulations.

On the 30th December 2013, they announced the six sites selected from the 25 applications received (FAA, 2013f), with the first of these becoming operational on the 21st April (FAA, 2014c). In May 2014, the FAA announced that it would establish a Centre of Excellence for Unmanned Aircraft Systems in a university consortium (FAA, 2014a). The five year programme would focus on several aspects of the integration of civil drones to American airspace, including the training and certification of pilots. In June, the FAA clarified the use of drones for recreational purposes in a "do's and don'ts" guidance note (FAA, 2014f), issued in response to several instances of reckless uses of model aircraft, close to airports and crowds of people (FAA, 2014e). While publishing this clarification, the FAA called for comments from citizens to help inform its ongoing analysis. Aside from safety aspects, the FAA also clarified that flights conducted for payment, or otherwise commercial purposes, are not permitted. The distinction is further clarified with several examples, including that flights to survey a field to determine whether the plants require water are permitted where the plants are grown for personal enjoyment, but not where they are grown as part of a commercial farming operation (FAA, 2014, p11). These cease to be defined as recreational or hobby flights and, as such, require a permit. The first such permit for an overland commercial drone flight, an aerial surveying operation in Alaska, was issued in the same month (FAA, 2014d).

2.3 Consultations and Developments in Canada

In 2007, Canadian police used a hobby plane to gather aerial photographs for the first time, with the use of drones for law enforcement purposes growing steadily since then (Bracken-Roche et al., 2014). As in European and the USA, the development of a civil drone sector in Canada is motivated by the substantial functional and economic benefits that are predicted. A Special Flight Operation Certificate (SFOC) issued by Transport Canada is required to fly UAVs in domestic airspace. Approvals have risen from 44 in 2007 to 229 in 2012. Initially distributed quite evenly, by 2012 the vast majority of these permits were issued in three regions, for largely private use. (Bracken-Roche et al., 2014).

In 2011, Director General of Civil Aviation at Transport Canada remarked that the approach of issuing individual permits is limited, as it presents problems for

unplanned operations – including emergency response – and may lead to administrative difficulties as the number of requests steadily rises (Eley, 2011). The UAS Program Design Working Group was inaugurated, which included several relevant policy and industry representatives and was tasked with recommending regulatory changes and standards for the integration of civil drones to Canadian airspace. Since many of the emerging applications involve smaller UAVs, the first phase of the programme considers vehicles under 25kg within visual LOS. The working group includes subgroups to consider *people* (including the licencing of pilots.); *products* (including registration, certification, maintenance, and manufacturing); and *operations and airspace access* (including terminology, flight rules, and safety management systems).

Their first report was delivered the following year (Transport Canada, 2012), and refers exclusively to technical, safety and procedural aspects of integration, without reference to privacy, societal/ethics aspects or consultations. The report is not law and has not been implemented in the legal system. Nevertheless, it remains a key reference point for industry and policymakers and is, in this sense, much like the ERSG roadmap in Europe. Subsequent phases will identify regulatory requirements for the integration of larger vehicles and more complex systems, with the fourth and final phase scheduled for 2017 (Transport Canada, 2013).

This process raised questions about the consideration of privacy, freedom, and democracy, with calls for increased involvement and consultation of civil society actors in civil drone development, which had been controlled by a small community of regulators and industrial stakeholders. The close partnership between Transport Canada and the Department of National Defence has also been criticised for blurring the boundaries between civil and military mandates (Gersher, 2013). A report published by the Office of the Privacy Commissioner of Canada (2013) described some potential privacy concerns, and they commissioned further research in the form of an incisive study of Canadian perspectives on civil drones. The research (as reported in Bracken-Roche et al., 2014) included interviews with key stakeholders on the subject of public understanding of civil drones, a study of publically available information, and a survey of public attitudes, which are described in the following paragraphs

Following Bracken-Roche et al. (2014), the interviews with key stakeholders were designed to understand their perspectives on public support for civil drones. They found that many of these experts were concerned about public opposition because

of what they saw as widespread public misinformation and misunderstandings of the use and benefits the technology. Media coverage of drones as a military technology was highlighted as a key contributor to this problem. The proposed solutions generally involved education and information campaigns to correct misunderstandings and, ultimately, promote public acceptance. Dialogue between stakeholders and public groups was suggested, however, the usefulness and validity of public concerns was often downplayed. The next part of the study considered marketing materials. It found that they tend to focus upon the product, usually the specification and capabilities of the unmanned vehicle, rather than the applications it may be used for. The authors suggested that this is because the authors were targeting a broad market of businesses and governmental customers, with the same platform being customised to suit a wide range of applications. The combined effect is that relatively little information is designed specifically for public consumption, and there is relatively little coverage of specific proposed applications.

The study continued with a poll of 3045 members of the Canadian public about different applications of civil drones. This confirmed the interviewees' statements about low levels of public awareness of civil drones. The highest level of awareness was recorded for aerial photography, weather, cartography, and search and rescue applications. Package delivery was the least known application. They also found that support was relatively low, with the same data collection activities meeting lower approval in RPAS than manned aircraft, and lower still for UAS. However, it also found that public perspectives were more sophisticated than the interviewees had thought, with support varying significantly between application areas. High support was found for emergency response, border/coastal services and law enforcement, while low support was found for private investigators, industry and corporations, and journalists and media. Within each of these categories, still further variety was found. For example, law enforcement use was approved for emergency response, but not for issuing fines or for the identification of individuals. Similarly, the respondents' approval of private and corporate use for security, research and marketing purposes was lower than for maintenance and management of private property.

In conclusion, the authors found that public support and opposition for civil drones is nuanced, depending to a large extent upon the specific application areas, its purpose and context. Acceptance was generally higher for applications in private spaces than those in public spaces although in exceptional circumstances, such as emergencies, the technology met widespread approval. The authors argued that, because of the low level of awareness, and varying support for different specific use-

cases, support for civil drones for one purpose, such as search and rescue, may not be taken as a mandate for other uses, even by the same institutions.

2.4 Comparative Notes

There are several similarities and differences between these recent developments in Europe, Canada and the USA. Considering first the similarities, all three are driven by the potential economic and functional benefits offered by civil drone development. While in each case some concerns have been raised about social dissatisfaction, whether due to connections with military drones, potential privacy infringement or the level of consultation in preparing roadmaps which focus, primarily, upon safety aspects of the integration of civil drones into domestic airspace. While a case-by-case approach to authorisation was first adopted in the three regions, with special permission given for specific operations, all are now moving towards more a streamlined process whereby a properly certified operator (and licenced pilot) is authorised to conduct commercial operations, including complex operations with heavy vehicles beyond visual LOS, without making continual requests. Phased roadmaps, culminating in this scenario, have been produced in all three regions, describing the necessary technical and regulatory steps. These are reference documents, not laws, but carry the weight of those that produced them, including policy and industry representatives as well as other technical, airspace and military experts.

Aside from these many similarities, there are also differences between the approaches to civil drone development in Europe, Canada and the USA. First of all, in the timescales considered. While the USA programme appears to have started earlier than those in Canada and Europe, its development is no more advanced. In fact, while Canada and many Member States have already issued several one-off permits for commercial use of drones, the USA has only recently issued its first.

In the scope of the present study, the most important differences are in the approaches to enquiring, understanding and responding to societal and ethics aspects of civil drone development. The FAA consistently open channels of communication with citizens and public interest groups, and have committed to a dialogic approach to managing privacy concerns as the sectors develops. These range from informal calls for input to more formal consultations, as well as phone-in 'listening sessions', issuing a written response to callers' concerns. While there have been no large scale studies of social attitudes to civil drone development in the USA, these consultations are well documented in open repositories maintained by the

official bodies. In Canada, the official process managed by Transport Canada has been criticised for a lack of such public consultation, although another official body, the Office of the Privacy Commissioner of Canada, has commissioned substantive research into public attitudes to different scenarios of civil drone development, specifically in the context of privacy and data protection. In Europe, the extensive expert and stakeholder consultation process has been partially documented in official repositories (the slides are fully available, but only edited reviews of the verbal proceedings), and substantial research into privacy and data protection aspects have been commissioned. However, these have been restricted to expert and stakeholder communities with a notable absence of public input to any of the research or consultation processes. This means that, despite being the only one of these three regions to have a strategy for managing public acceptance of the technology, Europe is the region with the lowest understanding of social responses to its development.

3. Societal and Ethics Aspects of Civil Drones in Europe

Several concerns regarding societal and ethics aspects of civil drone development have been identified. Here, we explore three principle concerns in greater detail. These are privacy and data protection, law enforcement, and representations of the relationship between civil and military drones. Excluding concerns that could be framed in terms of ethics, but are being discussed with reference to legal issues (such as liability) or technical issues (such as safety), and also those that go beyond our scope to consider military drones *per se*, these remain the three most prominent societal or ethics aspects of concern to industry and policy actors in Europe.

3.1 Privacy and Data Protection

Perhaps the most discussed aspects of civil drone development, from a societal and ethics perspective, are privacy and data protection (PDP). As discussed in Section 2, they were recognised early in the European consultation process, and are also considered in the ERSG roadmap. Most attention is focussed upon legal aspects, particularly the extent to which existing regulations are sufficient to protect citizens under the projected scenario of large-scale diffusion of RPAS.

PDP issues are subject to European Directives, although their interpretation and implementation is the responsibility of individual member states. As such, PDP rules for civil drones will remain in the jurisdiction of Member States. One key point of current debate is the development of a harmonised European market, which may be affected by differences in national interpretations of European Directives. A second point is whether the existing regulations are capable of protecting citizens' privacy

and data in 'the drone age'. While many consultation documents, crucially including the ERSG roadmap, argue that they broadly do, other actors have disagreed. For example, the UK's All Party Parliamentary Group on Drones (2013) have raised three concerns in this area. First, they argued that the combination of advanced aviation and vision technologies presented by civil drone development heralds a level of power and complexity that is beyond the capabilities of current regulations. Their second point was that non-commercial, recreational activities are unregulated and that the Data Protection Act does not carry a custodial sentence, and is therefore too weak to protect citizens. Finally, they highlighted that even in areas where privacy rights are adequately protected by law, many citizens may be unaware of their rights, unaware of infringements of their rights, and incapable of protecting and enforcing their rights.

Aside from potential regulatory changes, one prominent suggestion to resolve PDP concerns is to introduce privacy by design methods. This concept, described in early consultation documents and also the ERSG roadmap (2013a), involves the introduction of measures to protect citizens' privacy and data rights during the earliest stages of development. For example, if automatic storage of data collected by the vehicle could enable legal infringement, deliberate or accidental, the device could be designed to automatically delete the data it collects, ensuring that the default settings do not risk unknowing legal infringements. At a recent meeting[8] of several industry stakeholders, the approach was met with scepticism, particularly regarding the potential burdens of responsibility placed upon manufacturers. In particular, there was concern that a privacy by design policy could disproportionately affect the smaller companies that dominate the fledgling European industry, raising the cost of design and production and handing an advantage to non-European manufacturers.

DG ENTR commissioned a detailed study of PDP aspects of civil drone development in Europe. Most of the work was completed in 2014, including consultation of a wide range of stakeholders and extensive consideration of PDP and related aspects of drone development at both European and Member State level, as well as in third countries. The report (Finn, Wright, Jacques, & De Hert, 2014) is probably the most comprehensive body of knowledge on the subject to date. It concluded that the number of possible systems, devices, applications and contexts, in all their combinations, create a huge range of specific instances where PDP, as well as other

[8] Conference: *Remotely Piloted Aircraft Systems and Integration into EU Airspace*. Royal Military Academy, Brussels, Belgium, 23rd -26th June 2014.

ethical issues, may need to be taken into account. In many cases, operators risk failure to comply with existing European laws. To adequately respond to these needs, they argue, close coordination between different domains of expertise (including technology, safety, and privacy) is required.

Privacy and data protection have also been considered in third countries. As discussed in the scoping report (Boucher, 2014b), the US model of legal privacy protection rests to a large extent upon a concept of reasonable expectations of privacy. This means that citizens' privacy is legally protected from state intrusion when they could reasonably expect (from the perspective of a jury) to be in a state of privacy. So, as surveillance techniques and technologies have developed, and public knowledge thereof has grown, the contexts in which privacy from state surveillance can be *reasonably expected* has gradually shrunk. As McGill and Kerr noted, "whether privacy-invasive or not, once an investigatory technique is standard practice, it soon becomes *unreasonable* for people to expect the police to act in any other way" (2012, p210). This could mean that the surveillance capabilities of civil drones could effectively diminish citizens' domain of legal privacy protection.

As discussed in Section 2, the US integration procedure was delayed to allow the FAA to consider privacy issues. This caused some frustration amongst several civil drone advocates, both industrial and governmental, but illustrates a commitment to considering problems and their potential resolution during the earliest stages of development and making bold decisions. The eventual response to these problems was to initiate and maintain dialogues, undertaking listening exercises and public consultations on the topic before devising a set of draft preliminary privacy requirements for the test sites, which were used to help structure further debate. The FAA has committed to ongoing informed dialogue between industry, policymakers and privacy advocates, promising to explore privacy issues continually through public engagement and collaboration.

As discussed in Section 2, there were calls in Canada to address PDP issues in civil drone development through consultation of citizens and civil society actors (Gersher, 2013). The Office of the Privacy Commissioner of Canada published a report on the privacy implications of civil drones (Office of the Privacy Commissioner of Canada, 2013) before commissioning research into expert and public responses to PDP aspects of civil drone development (Bracken-Roche et al., 2014). The research found that the concerns raised by experts and stakeholders about public opposition were based upon the assumption of widespread public misunderstandings of the

technology, caused by misinformation and sensationalist media coverage. Most information about civil drones published in Canada is, as it is in Europe, not written specifically for public consumption, and often refer to the technical specification of products rather than the applications for which they may be used. There have been widespread calls for public information campaigns about specific applications of civil drones to improve their acceptability. The study of public responses to PDP concerns found that, overall, both public awareness and support are relatively low. However, it also found significant differences in awareness of, and support for, civil drones in different contexts. Operations in private spaces were more acceptable than those in public spaces, and exceptional situations such as emergencies were supported while routine use met greater opposition. The research concluded that, because of the low level of awareness and varying support for different specific use-cases, public support and opposition needs to be considered at a high resolution, with support for the use of civil drones in some scenarios not presenting a mandate for their roll out in others.

The pertinence of these experiences from third countries is to an extent countered by legal and cultural differences. As discussed in the previous scoping study (Boucher, 2014b), the concepts of privacy may differ significantly in different regions. For example, the personal experience of privacy in the US is more often conceptualised in terms of liberty and protection from the state, whereas in Europe it is generally conceptualised in terms of dignity, as a right to be protected regardless of whether the intruder is a state, commercial or personal actor (Newell, 2011). This difference is also reflected in the respective legal systems, with US privacy laws primarily designed to protect citizens from state search and seizure and European privacy laws primarily designed to protect personal dignity (Whitman, 2004). These cultural and legal differences could have implications for the extent to which these insights from the US and Canada can directly inform European developments. Indeed, differences in the concept of privacy may be further differentiated between different age groups and regions within Member States. In any case, it is immediately clear that the US and Canada each have a more advanced level of public consultation, and a greater understanding of the nuances of citizens' responses to PDP aspects of civil drone development. Such an understanding would be useful in designing effective responses to obstacles.

In the USA we have seen a social dialogic approach to responding to PDP issues, and in Canada we have seen substantive research into public attitudes in this area, showing that acceptability is sophisticated and highly context sensitive. Since

activities such as these, engaging public groups directly, have not been undertaken in Europe, we may not yet claim to fully understand PDP aspects of civil drones from a social perspective. Nonetheless, PDP remain one of the more comprehensively addressed of the societal and ethics issues raised in Europe. A key point of the current debate remains the extent to which existing regulations and enforcement regimes are sufficient to ensure citizens' PDP rights are respected in the wide range of applications and contexts of civil drone use. This adequacy may differ in different Member States, depending upon their interpretation and implementation of European Directives. This complexity may be further confounded when privacy is considered as more than a legal status, but also as a valued human experience. Our current understanding of citizens' perspectives on privacy, with reference to specific applications of civil drones in specific contexts, appears insufficient to develop robust regulatory or technical solutions (such as privacy by design). Finally, the sector seems to agree that – while physical safety the primary consideration in integrating civil drones into normal airspace – social aspects such as PDP cannot be ignored. However, it is important to ensure that the examination of and responses to societal and ethics aspects of civil drone development is not limited to PDP. Other societal and ethics aspects also demand attention, as discussed in the following sections.

3.2 Law Enforcement

Related to some aspects of PDP, as well as public acceptability of the technology, concerns have been raised about the use of civil drones for law enforcement purposes. Law enforcement applications remain outside the jurisdiction of the European Institutions, falling instead to Member States. As many police forces have begun using the technology (see Jones, 2014 for a UK summary), the European Council has expressed concern about the possibility of armed drones use by law enforcement agencies (see Finn et al., 2014). Concerns about police use of drones often focus upon privacy and surveillance aspects, but can also stem from concerns about domestic militarism and the integrity of justifications for their use. Here, we discuss each with reference to recent research in Europe and third countries.

The law enforcement aspects of PDP in the context of civil drone development are principally focussed upon the norms of police investigation and citizens' protection from state search, in particular the legal concept of reasonable expectations of privacy. There, it was noted that as surveillance practices become known as standard practice, the reasonable expectation of privacy from such practices is eroded (McGill & Kerr, 2012, p210). This aspect of civil drone use for law enforcement is particularly pertinent in the USA where, as discussed, privacy is primarily framed as protection of

state search and its legal status is defined in terms of reasonable expectations of privacy. This has led to some local controversies. For example, in February 2013, Seattle police abandoned their UAS surveillance project after opponents raised concerns about the adequacy of civil protection from invasive state surveillance. The following accounts show contrasting perspectives on the protest, balancing the need for protection of citizens *by* the police against the need for protection of citizens *from* the police:

> "Angry residents attending the community meeting in October chanted "No drones!" drowning out officers' attempts to explain how the unmanned aerial vehicles would support certain criminal investigations, help out during natural disasters, and assist in search-and-rescue operations." (Sorcher, 2013)
>
> "We're not opposed to the technology, but there needs to be examination of concerns about privacy … We thought something stronger than internal police policies was needed, because those can be changed without the public being aware" (Cheng, Howard, & Meyer, 2013).

A second concern raised about the use of civil drones for law enforcement is the rise of domestic militarism, including the integrity of procedures and justifications for their use. Research by Salter (2014) has exposed inconsistencies in the rhetoric and practical use of law enforcement drones, which he describes as being led by a 'weapons fetish', which obscures practical and ethical considerations with fantasies of control and domination. Through several examples, he raised three key points. First, that drones were likely to affect social groups in different ways, with disproportionate use in disadvantaged communities. Second, he argued that the cost effectiveness justification of police drones was a myth, as they lead to higher life-cycle costs for operations. His third point was that police use of drones has, to date, proved risky with a high incident rate, often involving frivolous use leading to crashes. He concludes that the rhetoric for law enforcement drones is characterised by "unrealised and unrealistic fantasies of total surveillance and swift intervention that are disrupted by an absence of supporting evidence and a tangle of technological legal and practical limitations" (p9).

Other research has highlighted the need to consider police use of drones in more detail. Instead of examining whether drones should or should not be used for law enforcement purposes, this work highlights the need to consider in specific contexts in which police drones could be deployed and what level of force, if any, they could deploy (Straub, 2014). This call for considering application areas at a higher resolution level is supported by research by Bracken-Roche et al. (2014) on Canadian

citizens' level of support for the use of drones for a variety of possible law enforcement uses. They showed substantial differences between specific uses of drones within the broad application area. Specifically, that found that support was higher for finding missing persons (71%), disaster response (71%), and hostage situations (68%) than for speeding tickets (20%), identification at sporting events/political demonstrations (20/22%), and routine patrols (23%). Support for the use of police drones in criminal investigation monitoring was between these levels (42%). The point here is that the use of drones for law enforcement purposes includes a wide range of possible operations for a variety of different purposes. The specifics of operations, including their context and purpose, are crucial in understanding public support and congruence with ethical principles.

Concluding, the use of RPAS for law enforcement is potentially controversial, and must be managed carefully. Since the use of RPAS by police forces is regulated by Member States, not at a European level, consultation and research is required at a national level. However, the success of a European civil drone sector rests upon widespread public acceptance. Public responses will not be discreetly divided between those regulated at national and European level. High profile incidents of police misuse such as those recounted by Salter (2014) could be extremely damaging to the whole sector. To maximise the effectiveness of research and the readiness of the sector, actions should be coordinated and harmonised where possible. At present, we do not have a sophisticated understanding of European citizens' responses to police drones, with much of what we know derived from localised experiences, arising from specific use cases, and informed guesses about how citizens' may react to what remains a little used technology. The limited existing research and consultation on police use of RPAS calls for more knowledge at a higher resolution, considering a wide range of specific applications and in a diverse set of contexts; from search and rescue to crime intervention, and from routine patrols to emergency procedures. While we can learn from the specific police applications of drones that are more acceptable to Canadian citizens, the results are likely to differ in Europe and across member states. However, it would be prudent to expect a similar level of sophistication in European citizens' responses to police drones, with support depending upon the specifics and context of the operation. Finally, since insights on law enforcement to date have principally focussed upon PDP aspects of police drones (e.g. Finn et al., 2014; Bracken-Roche et al., 2014), other societal and ethics issues associated with them– such as the militarisation of domestic spaces, procedural integrity, and justification for police operations – remain underexplored.

3.3 Representations of the Relationship between Civil and Military Drones

Several reports have highlighted the blurring of military and civil drone sectors as joint missions, shared resources and coordinated research programmes become increasingly common (Finn et al., 2014; Gersher, 2013; Hayes, Jones, & Töpfer, 2014). As a dual-use technology, the innovation capacity and economies of scale associated with civil drone development are also anticipated to benefit the military drone sector. Arguments for and against military drones are out of scope here, however Australian ethicist Robert Sparrow built upon his critique of these technologies of war (Sparrow, 2009) to offer warnings about dual-use research, arguing that where researchers and engineers develop civil drones with foreseeable and coordinated benefits for military drone development, they must share some of the responsibility for the consequences of these actions, i.e. for the further development and eventual deployment of military drones (Sparrow, 2012). The critical aspects of this argument rest upon his prior critique of military drones and, therefore, are also out of scope here. However, while excluding these forms of critique, a problematic discrepancy remains in the treatment of the synergies between civil and military drone sectors in the strategy for the integration of civil drones into society, principally the ERSG roadmap. These discrepancies were first highlighted in the scoping report (Boucher, 2014b) and have since been explored in more detail elsewhere (Boucher, 2014a). In the following passages, a brief outline is presented.

The first point is that synergies between military and civil drone sectors were widely recognised as one of the motivations for civil drone development, and were encouraged throughout the EC consultation process described in Section 2. Indeed, they were recognised earlier still, in the EC funded reports that preceded the consultation process (e.g. Frost and Sullivan, 2007). In the 2009 hearing, the need to support broad RPAS development by sharing costs across civil, security and defence sectors was identified: "the future military market for unmanned aircraft alone is insufficient to effectively amortise the high costs of development" (European Commission, 2009, p2). Then, at the high-level conference in 2010, representatives of EU institutions, Member States military, industry and aviation bodies agreed that a "commonly agreed civil-military regulatory framework should favour dual utilisations of the unmanned systems and the development of cost-efficient solutions by the European industry" (European Commission, 2010, p2), and that the "high level group will integrate the military representatives in order to ensure that the dual nature of UAS operations shall be addressed from the outset" (European Commission, 2010, p3). In 2012, the working document that preceded the publication of the ERSG

roadmap recognised the use of military drones for civil purposes as an opportunity to improve performance and reduce costs. This 'mutualisation' would improve performance though the increased scale and range of missions performed and the opportunity for operators to gain experience and expertise. It would also offset the cost of military drones by generating revenue through the provision of training and operational services in the civilian domains, with examples cited in border surveillance (European Commission, 2012b). In summary, throughout the consultation process, it has been recognised that civil drone development would benefit military drone development through its greater innovation capacity, economies of scale, and the outsourcing of civil operations to the military.

The value of civil drone development for the military sector has also been recognised outside the consultation process, for example, the European Council welcomed European civil drone development and highlighted the importance of dual-use research to enhance military capabilities and strengthen the defence industry (European Council, 2013). The UK's Ministry of Defence recognised the strategic importance of civil drone development for the 'future battlespace': "UAS offer an opportunity to capitalise on commercial sector developments and offer rapid technology insertion. Breakthroughs in the civil sector could be rapidly transferred to military use" (Ministry of Defence, 2011, 6-12). They also recognised the value of a strong commercial sector which would not only breed innovations that would be useful to the military sector, but could actually be the main source of technological development for the military, so the future development of military drones rests upon a civil drone sector:

> "The changes in world economies over the last 2 decades mean that the military sector is now dwarfed by the economic size and power of the commercial sector. Except perhaps for space, new developments in military systems are therefore likely to come from specialised development of commercial systems rather than *vice versa*. It is to the commercial sector that we must look for the delivery of future disruptive technology." (Ministry of Defence, 2011, 6-13)

The acceptance of the relationship between military and civil drones is not limited to consultations and position papers, but has also been celebrated quite publicly. To illustrate this point, we refer to two competitions organised for early adopters and enthusiasts. The International Aerial Robotics Competition (IARC) has used a strong military framing, with scenario of the competition presented as a counterterrorism operation (see video; IARC, 2014). The selection of this theme instead of, say, a

search and rescue operation, illustrates the popularity of military narratives amongst some civil drone enthusiasts. A second competition, UAVForge, was organised by the Defense Advanced Research Projects Agency (DARPA), which has been the primary innovation engine of the US military since 1958 with a mission to maintain the technological superiority of the US military and a ring fenced $2.8b budget (Shachtman, 2012). UAVforge was explicitly designed to capitalise upon dual-use aspects of civil drone development amongst enthusiasts, harnessing citizen-led innovation to produce military grade equipment and promote innovation in the military UAV sector. Military narratives were absent in the framing of the operation, but very much present in the details. The UAV had to be contained in a 'soldier portable' rucksack, it had to find and navigate to an identified observation point and 'perch' there, sending real-time images back to the operator, all while avoiding detection by surveillance systems (DARPA, 2012). The organisers provided a virtual environment for collaborative, crowdsourced development and a winners' purse of $100k, along with manufacturing subcontract and an 'exclusive operational military demonstration'. The aim of the project was to develop "a capability of military relevance … to lower the threshold to entry for hobbyists and citizen scientists, hoping to yield greater innovation, shorter timelines, better performance and more affordable solutions." (Federal News Service, 2011). This is strongly aligned with the Ministry of Defence (2011) position described above, where a key source of military innovation is foreseen in the civil sectors.

Now, once it is established that the synergies between military and civil drone sectors were both recognised and nurtured by several actors, we consider the discrepancy between this position and the rejection of the relationship which is articulated in strategies for managing public acceptance of the technology, principally the ERSG roadmap. Here, the relationship between civil and military drones is assumed to be recognized by citizens, but this is seen as a threat to public acceptance of the technology. In response, a strategy was devised for managing public acceptance, described in its third appendix (ERSG, 2013a). The strategy targets broad public visions of the technology, understood to include how civil drones are framed (perhaps as a solution to a problem, or as a threat) and the central metaphors that are used to explain their role (e.g. the drone as a robotic assistant or as a killing machine). These 'vision modification' strategies are principally devised to counteract the prevalence of a military framing of civil drones. Indeed, as discussed earlier, the roadmap states that it "is important to modify the vision of "killing machines" they have right now due to the actually military-specific utilisation and to some catastrophic movies" (ERSG, 2013a, p30). This suggests that military framings

dominate public spaces because of media depictions of the technology, and that these framings should be changed. In elucidating their strategy for promoting alternative visions, they highlight the role of applications which are widely recognised as having social benefits. First, they would identify the aspects of RPAS development that are most widely recognised as beneficial and familiar to citizens before using this information in 'coordinated actions' (ERSG, 2013a). This is distilled into a specific recommendation that captures the simplicity of the approach:

> "Description of the issue: The RPAS are actually not known or just known as "killing machines"
> Proposed solution: Give to the citizens a different vision" (ERSG, 2013a, p36)

Setting aside debates about the ethics of military drones and of dual-use research, two problems remain with this strategy. The first is that it is unlikely to work effectively, because the association is difficult to hide with most mainstream news articles introducing civil drones with some reference to military drones. Several attempts have been made to avoid the connection being reinforced publicly, including interviewees asking reporters to use acronyms such as RPAS or UAS instead of 'drone'. These requests have been used as opportunities to highlight the civil drone sector's sensitivity about the subject of military drones. For example, one article opened with the line "whatever you write, please don't call it a drone" (Terris, 2013), another chose the headline "Don't Use the 'D' Word: They're 'UAVs' or 'RPAs' But Definitely Not 'Drones'" (Gosztola, 2013). Such headlines bring more attention to the relationship between military and civil drones and may raise suspicions about the sector's attempts to hide it. The second problem with the strategy is more substantive, that it is designed to limit public knowledge of some of the key motivations for, and expected outcomes of, civil drone development. In this sense, it accepts that citizens' perspectives on technologies are important but, rather than opening a full debate, focusses upon the application areas that are less likely to be of critical importance to citizens.[9] While the functional and economic benefits of civil drones may be stronger incentives for development than any potential benefits for military drones, the principle of transparency requires that the full range of motivations and expected outcomes should be explored openly, including mutualisation and other synergies.

This second problem is captured in responsible research and innovation (RRI). RRI is currently a guiding concept for the technology development and management in

[9] "stress the roles RPAS have in conducting humanitarian operations or in testing for airborne toxins, rather than focusing only on the military and security applications" (ERSG, 2013a, p39-40)

Europe, permeating the EC's €80b 2014-2020 research funding framework, Horizon 2020. Building upon insights from a range of literatures, particularly science and technology studies, it is described as "an inclusive approach to research and innovation (R&I)" which aims to "better align both the process and outcomes of R&I, with the values, needs and expectations of European society." (European Commission, 2014e). A recent report on RRI considered knowledge as a condition for responsibility, arguing that developments should provide the relevant people with relevant knowledge (European Commission, 2013a). Applying RRI to specific research and innovation practices is not straightforward, although framework approaches are emerging in academic and policy circles. In developing their approach for applying RRI to specific projects, Stilgoe, Owen and Macnaghten (2013) described moving beyond questions about the products and even the processes of innovation to interrogate the purposes. This means that, in addition to the direct outputs of an innovation process (the product) and the procedures associated with its management (the process), the motivations for an innovation process (the purpose) and their transparency must also be considered. Proper application of their 'stage-gate' method of assessing projects would require coordination of the stakeholders managing civil drone development and an independent assessment panel. Nonetheless, we can consider two of their criteria as particularly relevant here; *clear communication of the nature and purpose of the project*, and *mechanisms identified to understand public and stakeholder views* (Stilgoe et al., 2013, p8). These require the assumptions, commitments and framings of the project to be reflected upon and communicated in dialogic engagement with a wide range of stakeholders and publics.

In identifying types of irresponsible research and innovation, von Schomberg (2013) described *technology push* with the example of genetically modified (GM) food in the 1990s. Here, the irresponsible dimension he identified was not the GM technology itself, but insufficient dialogue amongst actors at an early stage and a regulatory focus upon safety aspects without considering the broader contexts, including social aspects. This implies that regardless of the social benefits of civil drones, an inappropriate strategy to introduce the technology to society could be irresponsible, could foster public opposition and could lead to rejection of the technology. RRI requires greater stakeholder involvement at earlier stages of development, with stakeholders responding to societal needs as defined by societal actors. Such an approach requires a more collaborative structure for public involvement in civil drone development than has been seen so far in Europe.

To summarise, it is clear that the relationship between civil and military drones is recognised by stakeholders across the board, with the benefits for the military sector consistently identified as *one of* the motives for and predicted consequences of civil drone development. As discussed, the strategy for managing public acceptance presented in the ERSG roadmap focusses upon those consequences of the development of the technology that are considered more palatable to citizens. However, designed in the absence of substantive knowledge about civil drones in society, the strategy relies upon three assumptions. First, that citizens associate civil drones with 'killing machines' because of actual military use and their representation in cinema and news media (ERSG, 2013a, p30). Second, that these visions and/or public recognition of synergies between civil and military drone sectors negatively affect public acceptability of the technology (ERSG, 2013a, p34). Third, that this can be counteracted by managing visions of the technology through public information campaigns that highlight those outcomes of development that are seen as benign (ERSG, 2013a, p39). These assumptions may or may not hold, and should be examined.[10] If they do hold, and the approach succeeds, it may still contravene the principles of RRI by 'pushing' the technology rather than promoting, inasmuch as possible, an informed, balanced, and transparent consideration of the technology and how its development can be shaped to maximise social value. To be clear, this does not mean that civil drones should not be developed because of their synergies with military drones, rather that these synergies should be explored with citizens along with other motivations and potential consequences of civil drone development. Similarly, it does not mean that strategies for ensuring public acceptance should not be pursued, rather that such strategies should focus upon the technology's acceptability to citizens instead of the citizens' acceptance of the technology. In shifting the burden of acceptability from the citizens to the technology, reflections upon the appropriate uses of the technology would be performed to explore which developments of the technology should be supported and which should not, rather than to identify which applications have greatest potential to gain trust in the full spectrum of applications.

4. Concluding Remarks: Understanding Civil Drones in European Society

In the previous section, three issues were described, each identified as potential causes of public concern about civil drones which could develop into opposition to their development. The three concerns differ in many ways, but have in common the confounding impact of insufficient understanding of the nuances of citizens'

[10] Such an examination is planned for the subsequent report in this series.

perspectives on the technology in different contexts. The first issue, privacy and data protection (PDP), was considered the most comprehensively understood of the three issues, yet there has been no substantial research into European citizens' perspectives of the PDP implications of civil drones. The latest studies in Europe (Finn et al., 2014) and Canada (Bracken-Roche et al., 2014) have each shown the importance of considering privacy and data protection issues with reference to specific applications, rather than civil drones more generally, highlighting the importance of the purpose, context, and objectives of an application in the level of public support and acceptability. The second issue, the use of drones for law enforcement, is often considered to have substantial potential for controversy, but we know very little about European citizens' attitudes to these applications. North American studies (e.g. Bracken-Roche et al., 2014; Straub, 2014) have highlighted that law enforcement is too broad a category to capture the nuances of public opinion and acceptability, which echo PDP in their dependence upon specific use cases, purposes, contexts and objectives. The third issue, representations of the relationship between military and civil drones, called for a deeper understanding of public visions and framings of civil drones, including examinations of the assumptions that underpin strategies to manage public acceptance, and warned of the need for a transparent, responsible approach to public communications. The design of appropriate solutions to all three of these societal and ethics issues must include social research or public consultation. In the following passages, we consider the current state of knowledge about European attitudes to civil drone development.

In the absence of substantive studies of European citizens, we rely upon studies of related technology areas, the informed opinions of experts, and studies of citizens conducted outside Europe. The Commission has conducted a large-scale survey of European citizens' attitudes towards robots (European Commission, 2012a). While the technologies and applications for robotics and civil drones differ, they may be sufficiently close for some of the insights to remain valuable. It is also relatively recent and representative, performed in March 2012 with coverage of all EU27 member states as part of the EC Eurobarometer programme. The study revealed that, generally speaking, Europeans have little experience with robots, yet hold a generally positive view of them. 70% of respondents were concerned about robots' impact on employment, but 88% were positive about their potential role in difficult or dangerous tasks. Generally, the more positive results were recorded from those who that were more accustomed to robots in their everyday lives, those that were more interested in science and technology, and those that were based in Scandinavia and Eastern Europe.

These results may bode well for civil drones, as many of the anticipated applications offer support for humans in difficult or dangerous situations. Furthermore, some of the most critical attitudes to robotics in the Eurobarometer survey were directed towards their impact on employment opportunities, with respondents expressing dissatisfaction with technologies that replace humans, e.g. in factory work. Civil drones have less potential to replace humans in these activities and, further – given the need for a human pilot in RPAS systems – may create a new sector of skilled employment. The aspects of civil drone development that have been described as potential sources of public opposition (PDP, law enforcement, and synergies with military technology) were not considered in the robotics survey. However, its finding that support for robot technology depends largely upon the specifics of the applications that the technology is used for further reinforces the call for research into social responses to a variety of specific applications of civil drones in a range of specific contexts.

Surveys such as these with reference specifically to civil drones are less common. In one example from the USA (Eyerman et al., 2013), a nationally representative sample of 2,119 citizens reported moderate support for the use of drones in domestic airspace (57%). A key point, however, was that public support varied significantly depending upon the application (search and rescue (88%), homeland security (67%), fighting crime (63%), commercial applications (61%), and routine use (43%)). Concerns were raised about surveillance outside homes and in public spaces (67%), safety issues (65%), and the effectiveness of government regulations (75%) (Eyerman et al., 2013). This echoes the research by Bracken-Roche et al. (2014) described earlier. This considered Canadian citizens' level of support for the use of drones for a variety of possible law enforcement uses in the context of PDP. They also found substantial variation between applications (missing persons (71%), disaster response (71%), hostage situations (68%), criminal investigation monitoring (42%), routine patrols (23%), identification at sporting events/political demonstrations (20/22%), and speeding tickets (20%)). The transferability of the results of these studies from the USA and Canada to a European context is unknown, although we may expect similarly nuanced and context dependent levels of public support for civil drones in European airspace. However, it seems clear that civil drones is too broad a category for public support figures to be meaningful. Furthermore, within application areas such as law enforcement, there are also a wide range of specific operations and contexts that are important factors in public acceptability. As such, meaningful public consultations should consider civil drone applications at a high resolution. The

need to capture the nuances of what may be a sophisticated position on the technology also suggests that in-depth qualitative work, such as focus groups, could help use to explain and understand the reasons for the results found in quantitative survey work. It can also ensure that the priority areas and key issues are defined by the citizens, overcoming a substantial disadvantage of large-scale questionnaires, where these are defined in advance by stakeholders.

As described in Section 2, the consultation process to date has been limited to a relatively small group of experts and stakeholders and not extended to citizens. The ERSG strategy for managing public acceptance of civil drones calls for information and education actions which are characterised by a flow of information from stakeholders and experts to citizens, with the desired result of public acceptance of the vision of civil drone development as articulated by industry and policy experts. This leaves the process open to critique from civil society organisations such as Statewatch, which has argued that the process "appears to have been designed precisely to avoid any substantive discussion or debate" (Hayes et al., 2014, p77).

Since the forecasted economic and functional benefits of civil drone development are so positive, it is important to support their development and manage areas of uncertainty, controversy or concern. Drawing on the insights of RRI described in Section 3, forms of technology push – including the provision of imbalanced information about the motivations for and predicted consequences of development – could be irresponsible and could increase the likelihood of public rejection of the technology. Public engagement and consultation should be an opportunity for citizens to be empowered to inform civil drone development in a way that reflects their values and, in doing so, become co-producers of, and co-responsible for, the technology. Information and education actions remain important, but they must maximise transparency about all the motives and predicted consequences of development to provide the knowledge that is, according to RRI, a prerequisite for responsibility. This implies a shift from *uni*directional information actions to *bi*directional consultation and dialogic engagement. This, in turn, implies a shift in the positioning of citizens, from passive actors, whose acceptance of the technology is determined by information received, to active agents, making an informed input to development and deployment. Such dialogue is particularly important in potentially controversial topics such as law enforcement, synergies with military drones, and PDP. It also, importantly, would allow publics to define key issues and priority areas in a bottom-up process.

5. Recommendations and Next Steps

Several recommendations can be drawn from the discussion presented in the previous sections, and they can be captured together into a single key point:

> **The process of civil drone development should be aligned with responsible research and innovation**.

The specific recommendations are primarily directed towards the strategies for managing societal aspects of civil drone development, referred to in the recent Communication (European Commission, 2014a) as the provision of "adequate public debate on the development of measures which address societal concerns including safety, privacy and data protection, third-party liability and insurance or security" (p3). We recommend a dialogic approach to public engagement. In the context of responding to the points of discussion raised in the previous section, this would include ensuring that public communications – such as information actions, social dialogues, or public consultations – are designed to maximise the opportunities for citizens' to gain a full understanding of all the motivations for, and predicted consequences of, civil drone development. This includes the full range of outcomes, ranging from those with substantial and little contested social benefits (say, search and rescue) to those that are expected to court controversy and potential opposition to the envisaged technology development path (including, perhaps, routine police surveillance or synergies for the military drone sector). Strategies to maximise the social potential of civil drones, including their acceptability, should be based upon understanding of their relationship with citizens' values. Furthermore, such strategies should not be designed to transform citizens' from passive opponents to passive supporters, but to transform their role into active agents, (co-)responsible for ensuring development is aligned with their values.

In practice, this means that social research and public consultation should be undertaken to develop understanding of how civil drones can be most appropriately aligned with values held by European citizens. This means we must take public concerns seriously, regardless of the extent to which expert communities consider such concerns to be valid. To be clear, the aim is not to counter the widely recognised functional and economic benefits of civil drones but – following the insights of RRI, including the cautionary tale of GM technology – to maximise their social value, not least by minimising the risk of their rejection.

The current early stage of development, before regulatory directions become fixed and strategies are implemented, is the ideal time for social research and public consultation. While cultural and legal differences may mean that specific insights

from consultations and studies in Canada and the USA may not necessary apply in Europe, it seems clear that public opinion is sophisticated, and varies substantially between applications and contexts. Public support and opposition for different use cases is unlikely to be neatly divided between those managed at a European level and those managed in Member States. As such, initiatives to promote a European market cannot ignore the potentially controversial applications such as law enforcement or the implementation of privacy rules that are controlled at a national level.

The current project does not have the resources to conduct a large enough programme to develop a suitably nuanced understanding of how civil drones can be best aligned with the values held by European citizens. However, some immediate steps can be taken to explore some central questions in a preliminary way. As part of the E-CIT project – which is developing 'ethics dialogues' as an method of public engagement with emerging technologies – focus groups are being organised to explore European citizens' visions and values with regards civil drone development. This will include an analysis of which narratives and framings of the technology (for example as a source of economic benefit or as a dystopian military tool) are adopted in different contexts. It will also explore some of the assumptions adopted in the ERSG roadmap, including the idea that the association of civil and military drone sectors will lead to opposition of civil drones. The results will be used to inform further concrete recommendations for the design of a robust strategy for the introduction of drones into civilian airspace.

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