Department for Transport

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Ministry of Defence

Public dialogue on drone use in the UK

Moving Britain Ahead

TNS

TNS BMRB

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Executive summary

1 The Department for Transport, Ministry of Defence and Sciencewise commissioned TNS BMRB to conduct a public dialogue on the use of drones in the UK. It explored **the public's understanding of drones, attitudes towards current usage, and public expectations, aspirations and concerns about future usage**.

2 The dialogue consisted of three waves of reconvened workshops in 5 locations (Aberystwyth, Manchester, Stirling, Salisbury and Newry) held from December-February 2016. Members of the public across a broad demographic spread were recruited to take part, and a total of 118 participated in all three waves. Experts and stakeholders, including drone operators, aviation authorities, and academics also participated in the dialogues, to listen to and support informed debate. An Oversight Group provided steering and support throughout, for example in helping ensure stimulus materials used in workshops were accurate and balanced. Technical detail about the methodology, the topic guides and stimulus are provided in the Appendix.

3 At the start of the dialogue, participants on the whole had **low awareness and knowledge** of drones, with military drones and high street toys being the main (and sometimes only) types participants had heard of. Participants often had little or no knowledge of commercial applications. High level associations with drones tended to be somewhat negative, linked to concerns about privacy and surveillance, safety and mis-use, and fear of the 'unknown'. Many acknowledged that these views were driven by the portrayal of drones in the media, and that they didn't feel they heard or knew that much about the subject. However, by the end of the first workshop, participants were **highly engaged** with the issues and were eager to learn more.

4 As the dialogue progressed and participants learnt more about drones, they tended overall to become more positive. This was prompted by a number of factors. Firstly, **discovering the range of commercial and state uses** for drones. Participants were surprised at what they perceived as the wide-ranging scope and scale of drone technology, and the potential for positive uses that could benefit citizens. Secondly, **seeing drones in person** and **interacting with their operators** reassured participants about the safety features, the quality of materials used, and the nature of the commercial permissions process.

5 The following key themes emerged during the dialogue discussions which underpinned participants' views and priorities for drone use in the UK.

- Different attitudes emerged towards different groups of potential drone users. The general public were seen as the highest risk group and most likely to cause accidents and incidents when operating drones, due to low awareness of regulations, lack of training, and the growing accessibility of drone technology. Participants were particularly concerned about children and teenagers who were expected to be less likely to read instructions and more likely to take risks and use drones unsafely.

- Participants struggled with the **current categorisation system** for drones (which specifies different requirements for different weight drones). Participants perceived larger drones and those with greater capabilities to present higher levels of risk. Therefore, they often wanted smaller 'toy' drones designed for public use to form one category, with a sliding scale of categories according to size and capability.

6 Participants had some concerns about drones, which changed and shifted over the course of the dialogue process. By the end of the dialogue, **four key public priorities emerged with relative consistency across all 5 locations:**

- **Anonymity and traceability:** Participants worried about the current difficulty of identifying the user if they encountered a drone or a negative incident occurred. Participants were also concerned about not knowing the purpose of a flight, or how any data collected would be used. This led to concerns about accountability for accidents and enforcement of regulations.
- **Safe use by operators**: Participants were concerned by injuries caused by drones crashing or falling from height, accentuated by the perceived difficulty of flying them, and the fact that public users were unlikely to have had training.
- **Quality of materials**: Safety concerns were often in part driven by anxieties about the potential for sub-par safety standards. In particular, participants worried about whether quality of materials would be sufficient to avoid preventable injury or accidents e.g. in relation to inexpensive, smaller, imported drones, 'home-made' machines built by hobbyists, and eventually drones that become outdated in terms of safety mechanisms or overall quality (e.g. battery life).
- **Mis-use of drones** (particularly hacking, terrorism, stalking and surveillance) was a concern from the start of the dialogue process. However participants often acknowledged that many forms of technology can be mis-used and that these were not necessarily drone-specific issues. Overall, this concern waned over the course of the dialogue in comparison to the other issues above.

7 **Participants suggested four common strategies** across the areas to address their priorities.

- **Registration** was a key starting point to address numerous concerns, notably anonymity. Participants thought this would enable users to be traced and held accountable and liable when things go wrong. The act of registration itself was also perceived to encourage more responsible behaviour. However participants acknowledged that registration alone may not enable someone to identify a user in the moment, and set experts the challenge of finding solutions to this. The dialogue process also gave space for participants to consider the feasibility of this idea; despite potential barriers, they felt it was an important area for investment.
- **Mandatory training**, particularly of public users, was seen as a potential avenue to reduce the likelihood of accidents if users were more aware of regulations and how to use their equipment safely. Participants suggested minimum requirements for public users such as online training at registration. They expected more significant training would be required for commercial operators – or anyone using heavier, more sophisticated drones.
- **Technological solutions** were also seen as a way to address safety concerns, particularly by the public and near airports. These included enforcing minimum

safety standards which would include safety features built into drones, notably blade covers and geo fencing capabilities.

- **Raising awareness and education** was a strategy commonly suggested across the areas by many participants to address unsafe use by making users more aware of regulations. This could also reassure the wider public by making them aware of drones and their capabilities and when and how to report incidents.

8 Participants tended to end the dialogue feeling **more positive** about drones than when they began, and tended to end with a **more balanced** view of the benefits and risks. However, they also felt strongly that the key concerns outlined above need to be addressed to reassure them about drone use in the UK. Recognising the pace of change in the industry, participants ultimately wanted greater controls on public access to this technology introduced. They felt this would be an important first step in reducing risk and future-proofing drone policy.

1. Introduction

Background

1.1 Background

Unmanned aircraft systems have historically been predominantly the domain of the military. However, in recent years there has been a rapid increase in the recreational and commercial use of remotely piloted aircraft systems (RPAS) and small drones in the UK. This growth is due to a combination of technological advancements and increases in availability, leading to an increasing breadth of size and function of drones.

The maturation of the technology has been so swift that 'drones' are becoming a reliable technology for civil use. Recognising the value of this as an area of growth for the aviation industry and associated suppliers, the Government has supported the development of RPAS technology through the ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation & Assessment) programme and other related projects with industry[1]. RPAS technology has the potential to create an important market of innovative and competitive application within the public and commercial sectors.

Within the UK, the only specific laws relating to drones are aviation safety related and contained within the Air Navigation Order 2009. The commercial use of drones is regulated within the UK by the Civil Aviation Authority (CAA) with specific qualifications and permissions required to operate drones commercially or in certain circumstances, when drones are intended to be flown close to people or properties. These regulations also apply to the recreational use of drones, however this use also presents a different challenge. Increasingly affordable and accessible, it is possible to operate drones without any training or knowledge of the rules governing their use or the responsibilities of those operating them[2].

Given the range of drones that are now available, and the diversity of their potential applications, aspects of the existing regulatory framework may require review to account for the growth in number and type of drone users, and to ensure the safe and sustainable growth of the sector. Safety is understandably the overarching concern in relation to policies and regulations, particularly considering the increase in the number of incidents involving drones (e.g. close proximity to other aircraft). However, the technological advancements in civilian drones and their payloads also present considerations in relation to privacy, data protection, security and liability in case of an accident as well as safety considerations.

1.2 Policy context

In April 2014 the European Commission released a Communication detailing plans to make Europe 'a global leader in the RPAS industry'. Within this Communication was also

[1] The ASTRAEA programme was a UK industry-led consortium focusing on the technologies, systems, facilities, procedures and regulations, aiming to enable the routine use of drones in all classes of airspace.
[2] There is more information about the rules governing drones, including the current classification system, in Appendix 4.1.

the recommendation that “progressive integration of RPAS into the airspace from 2016 onwards must be accompanied by adequate public debate on the development of measures which address societal concerns.” This was reviewed by the House of Lords European Union Committee who made recommendations in March 2015 on the civilian use of drones in the EU[3]. In keeping with the recommendations of the EC and evidence submitted to the EU Committee, the Minister for Aviation at the DfT committed in March 2015 to a series of public dialogue events to consider issues with operating drones in the UK to help inform government policy in this area.

Overview of public dialogue

1.3 Aim of public dialogues

Public dialogue is an approach that involves citizens in decision making about important emerging policy issues. Dialogue brings together a diverse mix of the public with relevant policy makers and experts, to discuss, reflect and come to conclusions on complex, controversial or sensitive issues.[4] Evidence shows that providing people with the right information, enough time, in the right conditions, can broaden perspectives and help people take on new knowledge about complicated topics, such as emerging technologies. Further, discursive interaction can help promote understanding, encourage ‘public-mindedness’, and potentially develop or change opinions.[5]

Dialogue thus aims to open up discussions ‘with’ rather than one way communication ‘to’ the public, allowing citizens to have genuine impact on the policy process. In turn, this makes for policy that is more socially informed, more publically acceptable, and more cost-effective in the long term.

1.4 Scope

There are two key points to note in relation to the scope of this dialogue:

- All forms of unmanned aircraft were included in the scope of this dialogue, with the term 'drones' as the overall descriptor for all types of unmanned aircraft.
- The dialogue was limited to use of drones in the UK (including by the military) but not their military use overseas. This exclusion extended to drones being used by the military overseas but being piloted remotely from the UK.

1.5 Objectives

The Department for Transport, Ministry of Defence and Sciencewise commissioned TNS BMRB to conduct a public dialogue to provide well-grounded, robust data on the public’s views and attitudes towards drone use in the UK. The dialogue will inform the development of UK Government strategy and future public consultations, as well as any other future public engagement and communications on drones in the UK. Specifically, the public dialogue explored:

- The public understanding of drones and current uses
- Expectations, hopes, concerns and fears about future usage – in particular, related to concerns about privacy, data protection and safety

[3] http://www.publications.parliament.uk/pa/ld201415/ldselect/ldeucom/122/122.pdf
[4] http://www.sciencewise-erc.org.uk/cms/assets/Publications/What-is-public-dialogue-FAQ-Report-V2.pdf
[5] ‘Changing hats: how deliberation impacts citizens’. Tim Hughes & Amy Pollard (April 2014)

- Priorities for change: what the public wanted to see done, if anything, to respond to any concerns or key question areas.

1.6 Oversight Group

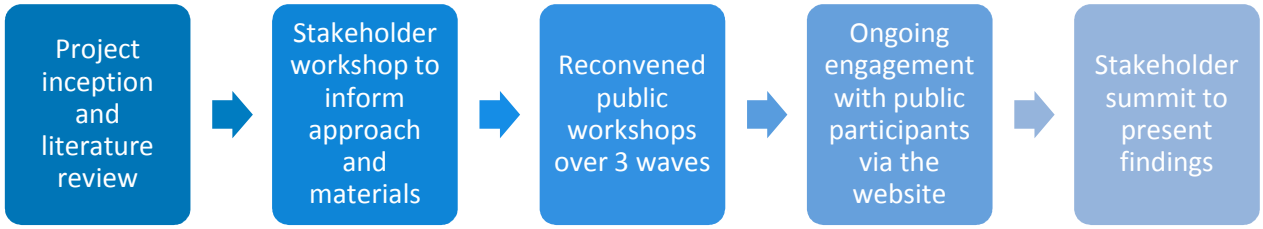
The dialogue was overseen by a dedicated Oversight Group comprised of a group of expert stakeholders. As well as being integral to the early development of this dialogue, the group helped to inform materials development at each stage, providing comment on the structure and content of materials presented to the public to ensure they covered relevant issues, and provided fair, balanced and accurate information to the public.

Methodology

1.7 Overview of methodology

Figure 1.1 below gives an overview of the approach taken, comprising several stages. More information about the method, recruitment process, ethics, stakeholder attendees, stimulus materials, and analysis process are provided in the technical Appendix.

Figure 1.1: Overall approach



1.8 Brief literature review

To ensure the research would be built on existing knowledge, TNS BMRB conducted a brief, targeted review of the literature on drones prior to commencing the public dialogue. This was based on 35 key documents including academic journals, media articles and strategic documents. The sources for the review were compiled by recommendations from the Oversight Group (see Appendix 5 for a list of sources).

This review was not intended to be exhaustive or representative of the literature at large, but to provide an initial grounding for the research team and to inform materials development. Sources covered definitions and the basics of drones/RPAS technology, current and future use of drones, economic value, legislation and regulation, safety, privacy and autonomy. The Oversight Group also helped ensure that the literature review took a balanced approach – including a range of different viewpoints and perspectives, and introducing both more positive and potentially more challenging aspects of drones use and regulation.

1.9 Stakeholder engagement

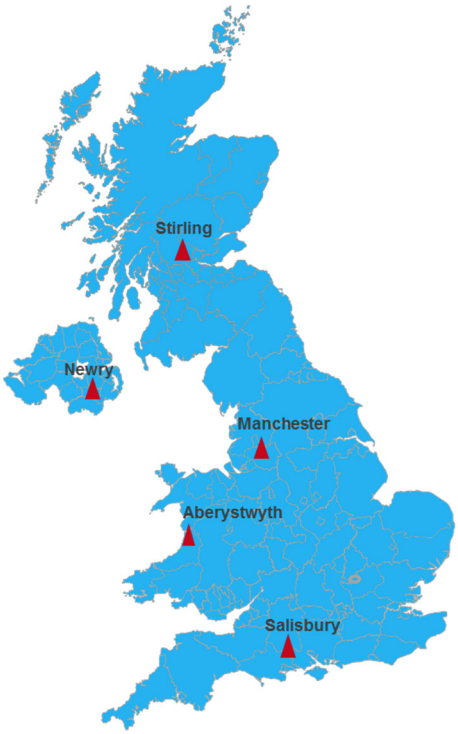
Prior to the public dialogue workshops, 48 stakeholders from a range of backgrounds were brought together to discuss the current state of play in relation to drone use in the UK, including representatives from the project team and sponsoring departments and representatives from government, the film industry, local councils, police, insurance and academics. Workshop discussions were facilitated by TNS BMRB, and included: stakeholders' views about the benefits and challenges surrounding drone usage; their attitudes towards privacy and data security, health and safety, and autonomy; and their

expectations for public attitudes and concerns. This informed the development of the materials for the public workshops.

A wider group of stakeholders were then invited to take part in the public workshops, from a range of fields such as regulatory bodies, commercial operators, government, the police and legal profession. In each wave, stakeholders played a specific and important role. In Wave 1, they observed and listened to participants and answered any initial questions. In Wave 2 they were more active in their involvement, offering expert, technical information to participants in response to questions. Drone operators brought in and showed their drones to participants, helping them to understand how they work. Finally, in Wave 3 stakeholders played a constructive role in challenging participants' priorities and strategies, providing input and feedback as to the associated costs and practicalities of their plans.

After the public workshops, a smaller number of stakeholders were brought together to hear the headline findings at a stakeholder summit event and discuss their responses to these, including how they thought their organisation would respond to the findings of the dialogue. The summit event gave stakeholders who had attended events an opportunity to reflect on and share their experiences of taking part.

1.10 Public dialogue workshops



TNS BMRB conducted three waves of reconvened dialogue workshops with the public. The workshops were held in five areas – Aberystwyth, Stirling, Manchester, Newry and Salisbury. These locations were chosen to include all regions of the UK, rural and urban locations, and areas with different levels of exposure to drones. A total of 118 participants participated in all three waves. They were recruited by TNS BMRB's specialist in-house recruitment team using free-find methods to include a range of demographics (including age, gender, social grade, ethnicity and disabilities). Four extra participants were recruited in Stirling after unexpected low turnout in Wave 1[6]. More information about recruitment and participant profiles can be found in Appendix 2. The workshops took place in December 2015, and January and February 2016. Wave 1 and Wave 2 were six weeks apart due to the Christmas period and Wave 2 and Wave 3 were four weeks apart which is a more standard approach.

The **first wave of workshops** lasted 3 hours, and explored participants' spontaneous knowledge of and associations with drones. After these views were surfaced, participants were presented with some initial information, including introductory videos from DfT, Sciencewise and the MoD. In between workshops, participants conducted activities to stimulate continued engagement, via conversations with friends and family, and discussions on the dialogue website. The **second wave of workshops** lasted 6 hours and involved an interactive carousel approach, where participants explored a number of areas including safety, privacy and regulation. Stakeholders brought a range of drones to the

[6] Although 30 participants were recruited for the first wave in all areas, 19 participants arrived at the Wave 1 Stirling workshop due to traffic in the area on the evening. Four extra participants were recruited to boost demographic groups. In advance of Wave 2, one of the TNS BMRB team conducted a telephone interview with each of the new participants, covering the material from the first workshop.

workshops, allowing participants to see them in person. In the **third wave of workshops**, lasting 5 hours, participants reflected on their experience so far, and discussed their overall priorities for drone use in the UK. With the support of expert stakeholders, participants developed 'strategies' to address their priority concerns.

More detailed discussion of the workshop activities is provided at the start of each chapter of this report, and in Appendix 3. The workshops consisted of plenary debates, break out discussions, paired discussions, group activities and the digestion of a range of forms of stimulus materials providing information about drones and drone use. More information about the format of the workshops and all of the stimulus materials can be found in Appendix 3 and Appendix 4. Feedback was provided via evaluators throughout the process. The discussions were audio recorded, with participants' consent, and these were used for the analysis process alongside pro formas filled in by researchers and insights from analysis brainstorm sessions.

1.11 Public dialogue website

Between each wave of the dialogue workshops, participant engagement was encouraged through a dedicated website. This had three purposes: primarily, to engage participants between the workshops in a private discussion forum; secondly, to provide them with visibility and contact with participants in the other areas; and thirdly, to share materials from each workshop in the public-facing part of the site. Paper copies, including a sample of discussions from the website, were sent to those who were unable to access the website, to ensure that no participants were excluded due to lack of internet access. A summary of the key themes discussed on the forum is provided in the Appendix 1.2.

1.12 Media coverage

A continuous media monitor was conducted during the dialogue process, in order to prepare for participants' responses if they encountered a 'sensationalist' news story, and to help understand what might be influencing shifts in opinion during the dialogue. Key stories included: Amazon proposing to deliver parcels using drones; drones being flown over or near airports; the delivery of illegal drugs by drones into prisons; a toddler's eye injured by a drone propeller; a drone nearly crashed into a skier; and developments to the ways in which drones could be disabled – for example, the use of nets, lasers and even eagles to bring down drones in flight.

Science Museum Event

Alongside the public dialogue, an event was run independently by Sciencewise and the Science Museum to engage further members of the public in discussing use of drones in the UK. TNS BMRB provided some materials from the public dialogue to be used.

Participants who took part in this event varied from the public dialogue, due to it being a self-selected audience (those with an enthusiasm for science and drones). Most of the participants who took part in the event had had contact with drones as opposed to only a small number of participants in the public dialogue, and were particularly engaged in science and technology. This meant that their starting point was rather different, being quite positive or neutral and relatively well informed, compared to the public dialogue participants[7].

[7] A summary of the findings from the event can be found at: . http://www.sciencewise-erc.org.uk/cms/assets/Publications/Science-Museum-event.pdf

2. Unprompted awareness and initial perceptions of drones

The first wave of workshops focussed on understanding the public's 'starting point' in relation to drones: exploring their spontaneous perceptions, emotional associations, and existing awareness around the use of drones. This section reports on participants' unprompted knowledge before seeing any stimulus materials. It explores participants' expectations of what drones are, who might use them and for what purpose.

Most participants had **low awareness and knowledge** of drones at the start of the dialogue process. Spontaneous associations related to **military drones and high street 'toys'** and assumptions tended to be negative, reflecting what they had encountered through media coverage. On the whole, participants were **unaware of other users and applications of drones**, namely commercial or other state uses.

Participants responded positively to information about a wider range of uses and users, and were often **interested and excited** by the potential in the industry. However, participants also retained initial concerns around **safety, privacy and surveillance and mis-use**. Overall, participants ended the first phase of the dialogue excited about possibilities, particularly around potential uses of mid-size drones and current and future commercial applications, but with concerns that they wanted to see addressed in order to reassure them about drone use in the UK. The stimulus materials used in Wave 1 can be found in Appendix 4.1.

Awareness and knowledge

2.1 Spontaneous awareness and knowledge

At the start of the dialogue process, most participants reported that they had **low awareness and knowledge** of drones. Younger people tended to be slightly more familiar with drones, as were the small number of participants who were personally or professionally interested in technology or aviation more widely. These participants for example noted that drones can be used as part of filming at music events, sports photography, journalism and for leisure use. Some had encountered footage on the internet or video games, if not in the media or real life.

> *"I'm very ignorant, actually, so I would say ignorance is part of my attitude to them. I don't feel particularly well informed or concerned with them." (Stirling, Wave 1, Female)*

In general, participants' awareness of drones was largely limited to two types: **small high street toys and military drones**, though some people were aware of stories about Amazon proposing to use drones to deliver packages. Information about drones came mainly from media coverage and seeing drones for sale in high street shops. Some participants had heard about drones from friends, family, via social media and videos, and

a small number via an existing interest or through working in a related industry (e.g. tech, engineering or mechanics).

> *"The way the media portrays them, everywhere I've seen them, it's military or over some sort of war base…So that's how I relate to it". (Stirling, Wave 1, Female)*

> *"Amazon. That's the one that comes to mind, because we always see it advertised that they're going to use them for home deliveries and stuff." (Newry, Wave 1, Male)*

Spontaneous associations and assumptions

2.2 Initial associations

Some individuals with more general knowledge of drones – for example, those with knowledge of commercial use for filming – raised positive associations with drones. Younger participants were also more likely to see drones as 'advanced', 'futuristic' and 'intelligent' and to report a sense of curiosity and excitement.

However, overall, participants' spontaneous views and connections with drones tended to be **negative**. Participants reported top of mind feelings that drones are 'sinister', 'alien', or 'creepy'. These feelings seemed to be driven in part by the appearance of drones, but also that participants felt they knew little about the technology – those with the least knowledge tended to be the most fearful. General negativity was also driven by the perception that drones may be unsafe or dangerous in some way, or the assumption that drones are mainly for military use abroad (this negativity often being driven by media coverage).

Spontaneous concerns commonly emerged about **privacy** and **surveillance**. Participants were apprehensive about journalists and the 'paparazzi' using drones to invade privacy more easily, and were similarly worried about members of the public or the state using drones in this way. As participants commonly assumed all drones to have cameras, privacy concerns were front of mind. Participants were similarly concerned about the safety of the technology, driven by a visceral reaction to the idea of a drone potentially 'falling from the sky', crashing and causing injuries. Other issues participants raised in initial discussions were the potential for mis-use, such as for terrorism, stalking, 'spying', and drug smuggling – again predominantly driven by media coverage.

> *"We were talking about journalists using them and journalists are bad enough with their long length cameras aren't they? Well if they have got the potential for poking their nose in, the drone would take [them] into places that they couldn't physically get, so that's an invasion of privacy on a huge scale." (Newry, Wave 1, Female)*

Less common views related to:

- whether drones were regulated in any way – with participants in several areas raising concerns that they might not be early in the dialogue process;
- the vulnerability of drones to hackers, meaning they could be hijacked for criminal or terrorist activity;
- concerns around economic impact if there is any potential for drones in the future to supplant people in some jobs.

> *"It makes me feel uneasy. Anybody can have these presumably. Who is actually monitoring to say they aren't used inappropriately?" (Salisbury, Wave 1, Female)*

> *"Well computers go wrong, don't they, things get hacked. I mean look at the Talk Talk thing, you know, it's dead easy, you know for these 10 year olds to hack into all these wonderful secure systems." (Manchester, Wave 1, Female)*

"We don't hear much good news about them!" (Stirling, Wave 1, Female)

2.3 Expectations of what drones are and who uses them

Participants had **relatively clear and consistent expectations** of what drones are. Despite perceiving themselves as having little knowledge about drones, participants were able to define the basic operation of a drone: as a machine that flies, has propellers, and is unmanned and remotely piloted. Participants often assumed that **all drones had built-in cameras**, and in general tended to be less aware of other types of payload (capabilities and technologies on-board the drone). There was no spontaneous awareness of the increasing autonomy or automation of drones.

Journalists, logistics (Amazon) and military and leisure users emerged as most top of mind user-groups. Following further discussion, participants suspected the police and the state might also use drones for surveillance. Some were aware of drone use amongst wedding photographers and at music and sports events, but on the whole participants were largely **unaware of other commercial applications**. Exceptionally, individuals more familiar with drones cited examples of drones being used by scientists, archaeologists, rescue services, farmers, surveyors and estate agents.

Despite a somewhat negative starting point, overall participants were highly **engaged** by the topic. They acknowledged that the negative connotations they held were largely driven by media coverage, which they recognised as often one-sided and potentially even sensationalist, and were eager to hear more about drones and the positive applications that could benefit citizens. By the end of the first workshop, participants reported finding drones interesting and exciting and began the dialogue with an open frame of mind.

"I think most are quite negative connotations but I want to know more about what they can do for…good." (Salisbury, Wave 1, Female)

"I know most of the media coverage is negative but… what you don't see is the vast amount of positives that come out of it as well." (Aberystwyth, Wave 1, Male)

The following section of the report outlines how participants responded to learning more about: 1) different users and 2) current and future applications of drones. We explore how learning more shifted participants' views around key benefits and potential concerns – and what this meant for their priority issues for a policy and industry response.

3. How views developed

Between the first and second waves of workshops, participants were asked to interview family members or friends about what they knew about drones, how they felt about drones and any concerns they had. The aim was to keep participants engaged in the issues, and to encourage deliberation and reflection in the interim through discussion and individual research. They were also invited to share their thoughts and any news they had heard about drones in a discussion forum on the dialogue website.

The second workshop explored how participants' views had evolved, and how they might shift further. It provided participants with the opportunity to see and handle a range of drones. This workshop employed a 'carousel' approach, where participants rotated between different 'stations'. The stations were designed around responses to key themes identified in the first wave, and consisted of: safety, privacy, and regulation, as well as the 'hands on' drones station. Participants spent time at each station, considering the theme from the perspective of different user groups. The stimulus materials used can be found in Appendix 4.2.

*This section of the report outlines the **participant journey** through the dialogue process and explores the key moments where views and attitudes shifted during the process. It goes on to explore conversations participants had around attitudes to different **user groups**, and views on how drones are **categorised**. These areas ultimately **informed participant views about drones**.*

As participants were introduced to more information, they became **increasingly aware of a tension between the benefits and risks** around drone use. Participants grew excited about the wider range of users, applications and capabilities as they learnt more, but remained concerned about what they perceived to be some serious risks that required addressing. Views also shifted when participants encountered drones in person and discussed permissions processes and procedures employed by current state and commercial users.

It became clear that some of participants' greatest concerns regarding drone use surrounded **public users** (members of the general public rather than state, military and commercial users), and the range of drones they had access to. Though participants were reassured that regulations exist for drones, they worried that **awareness of regulation** was currently low, again particularly amongst public users.

Shifts in views

3.1 Discovering uses and users

The first moment in the dialogue when views shifted significantly was when participants learnt about **the range of current and potential applications** of drones.[8] Having been

[8] The materials presented to participants covered a very wide range of potential users and uses, including neutral or more negative uses (see Appendix 4.1).

previously unaware of many of the commercial applications of drones, participants were often surprised at the scope, scale and reach of current drone use in the UK.

Participants began to feel markedly more **positive about drones** when they learnt of the potential for this technology to benefit citizens and society, as well as drone users. This was particularly the case for those who had never considered drones in a positive capacity before.

> *"Well I personally am surprised that it is being used in so many ways. I'm staggered that I hadn't thought of this already, that it's already up there. Because I came to this evening having known very little or nothing about drones. My eyes have been opened." (Aberystwyth, Wave 1, Male)*

> *"I learnt a lot last time and thought wow, they are a benefit as well, I thought they were evil bad things that just do wrong and bad in the world but after seeing all the stuff that we saw and discussing I thought they are a big benefit." (Aberystwyth, Wave 2, Female)*

Participants were particularly **positive and enthusiastic about drones being used to save lives,** and were struck with the range of uses in this field, namely:

- in the emergency services and disaster relief e.g. to lessen risk to servicemen (e.g. from fires), enable quick access to sites, to deliver medical supplies;
- to help find people lost in remote areas;
- to help catch criminals more quickly (e.g. car thieves);
- to support conservation activities, such as monitoring wildlife or rainforests.

These uses were highly compelling to participants as they judged their overall views of the technology.

> *"I hadn't thought of them using [drones to apply agricultural] fertilisers. Or taking medicines to certain places…That's amazing … I would never have considered any of those sort of uses before but that is very cool…It's just another way of helping people." (Stirling, Wave 1, Female)*

Participants also appreciated the value of drones in **de-risking human activities** (e.g. instead of scaffolding), **reducing costs** (e.g. in replacing the need for more expensive aircraft), and providing **new opportunities** to enter previously inaccessible areas.

> *"The jobs that they can do…it's time saving and a lot cheaper." (Salisbury, Wave 2, Male)*

Some participants reported that they saw drones as the 'future' and that they would bring benefits and opportunities as yet undiscovered. Others were interested in potential 'fun' uses, such as drone racing – seeing this as an exciting new technology.

Learning about the range of drone uses also led to some **concerns**. For example, some participants felt somewhat alarmed that the drone industry was far more advanced than they had realised, contributing to general wariness about the **pace of change**. Some participants felt their fears were confirmed in discussion of other drone users, including potential mis-use of drones (notably stalking, terrorism and hacking). As they considered different public users of drones, differentiating between hobbyists and 'casual' leisure users, concern grew about the public's lack of awareness of drone regulations and other relevant legislation. Prompted concern also grew about lack of training, particularly for public users.

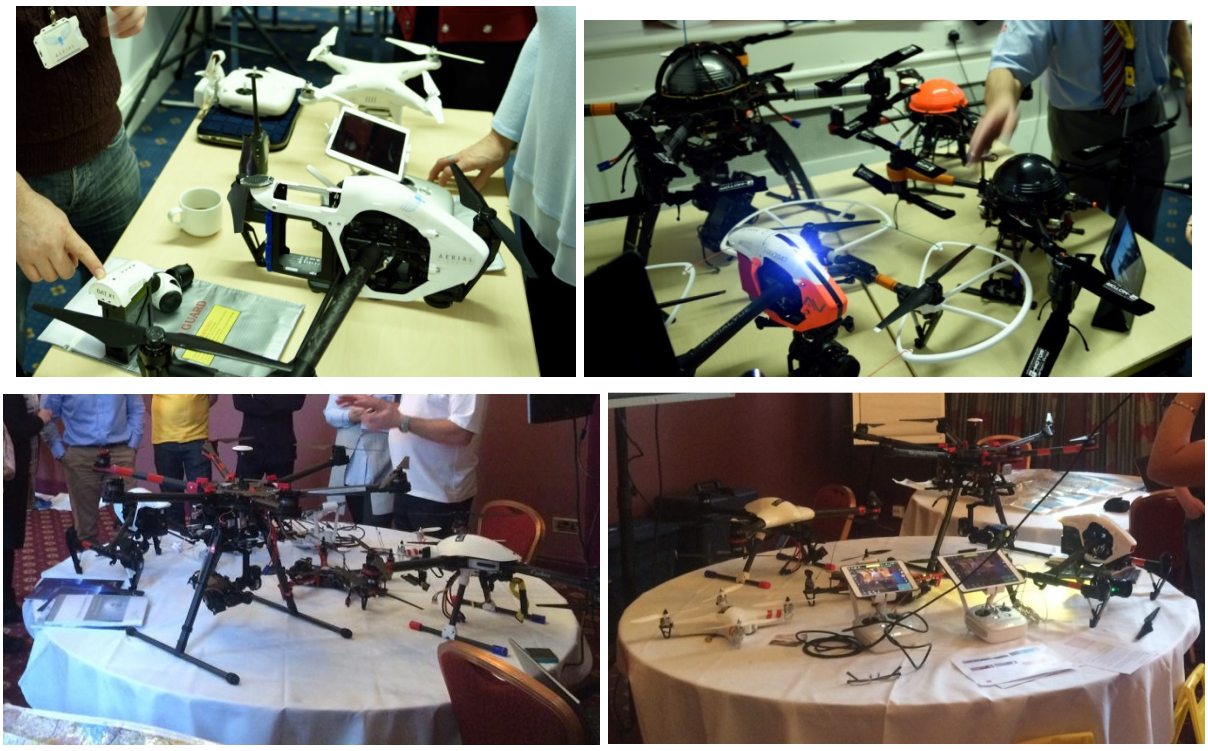
3.2 Seeing drones, meeting operators

Another moment where views shifted significantly was when participants encountered drones in person, rather than just in images and videos. This exposure, particularly to medium-sized drones (over 3kg), tended to reassure participants who found the quality of the materials to be higher than expected. Participants were also reassured about safety as they learnt about different features designed to prevent drones 'dropping out of the sky' when they run out of battery or lose the data link connection with the pilot/operator, such as slow landings or return to home functions.

Participants were reassured by learning about the **permission process** commercial and state users undertake and the processes they abide by. When described by operators present at the events, this process was regarded as rigorous and comprehensive. Participants were particularly reassured by talking to the police about the procedures they follow which include **alerting citizens about use of drones** in their area and **having multiple operators present during the flight**.

> *"I've found myself getting less concerned about the bigger side of things, i.e. military, police … I think both the chaps from the police here this morning, they were taking it very seriously … you're at that level where people are going to have a massive risk assessment. So I'm less concerned about the bigger users, than I am perhaps about medium, once it gets into private hands." (Aberystwyth, Wave 3, Male)*

Figure 3.1: 'Hands on with drones' carousel in Wave 2 (Manchester and Stirling)



However, some participants became concerned when they discussed the cost of these mid-sized drones (i.e. drones above 3kg), which they perceived to be affordable for the general public - in light of their size, weight and capabilities, perceiving them as large enough to represent a not insignificant risk when in the wrong hands. Discussions in these sessions simultaneously heightened concern that public users may not go through the permission process which commercial users do. This led to concerns about members of

the public being able to easily access powerful drones if they had the resources to do so. These ideas are discussed in more detail in the following section.

Drones users and categories of drone

Participants' attitudes towards different users of drones and views on different types of drone underpinned and informed their overall views on drone use in the UK. Their concern about public users, and dissatisfaction with the current categorisation system (which specifies different requirements for drones of different weight), helped shape participants' ultimate priorities and strategies for change outlined in the following chapters.

3.1 Attitudes to different users

Participants' greatest concern tended to be about **public users** rather than state, commercial or military users. Whilst participants tended to assume that military, commercial and state operators were likely to behave responsibly in the UK, public users came to be viewed as the **highest risk group** as they were seen to have the lowest awareness of drone regulations and data protection legislation, be the least likely to have received training, and be more likely to engage in risky behaviour. Some participants were particularly concerned about children and teenagers who were perceived to be less likely to behave responsibly and safely. Consequently, public users were seen to be more likely to: (a) cause accidents and (b) infringe on other people's privacy, either inadvertently or purposefully. Concern was further driven by the growing accessibility of drones to this audience, as the development of the technology would mean drones with greater capabilities became increasingly affordable.

> *"The only ones that still worry me are the hobbyists and leisure users, they frighten me the most… I'm not saying it's malicious, but if you go and buy one in a shop … Does it actually say 'this is what it can do and if you go out of it you're liable." (Salisbury, Wave 1, Female)*

> *"I'd be worried about...public use of them rather than commercial and State. Commercial don't want...their investment to fall out the sky. The State is hopefully regulated." (Aberystwyth, Wave 1, Male)*

> *"As a parent I wouldn't want 14 year old boys videoing my two children in the park." (Newry, Wave 2, Female)*

Participants were less concerned about the safety risks posed by **commercial users** as they were regarded to be more likely to have undertaken a permissions process and training. Commercial operators were also perceived to have a vested interest in protecting what was likely to be expensive equipment, and a desire to avoid reputational damage. However, participants raised some concerns about commercial drone flights when the public was not made aware of the purpose of data collection and usage. For example, they disliked any notion that commercial operators might use data collected with drones for marketing purposes. It was important that operators were transparent about why data was being collected and how it would be used, when flying near members of the public or their property. Some participants had concerns about the pace of current development of the commercial sector and the future trajectory for drones. The image of the sky being filled with delivery and other drones was commonly cited.

> *"In 10 years into the future, do you think we'll see a drone every 5 minutes? I mean what kind of frequency will we see?" (Manchester, Wave 1, Female)*

Participants were generally positive about the potential uses of drones by the **state,**[9] in particular around emergency and medical services applications (particularly in Salisbury after speaking to the police who attended), but more generally in terms of the time and cost saving potential. Like commercial operators, state users were also assumed to be highly regulated and monitored, to follow strict procedures and to have received training to address safety concerns. However, some expressed concern about the state's use of drones for surveillance, with specific greater concern about invasion of privacy by the police in Newry and Manchester. In these areas, some participants had more negative attitudes and expressed awareness of a tension between citizens and state actors, such as the police. Participants had questions about data collection, and were uncomfortable with state users (particularly local authorities) making use of incidental findings, that is, for purposes other than the initially stated intention. Overall, concerns about state surveillance seemed to be driven by an individual's personal relationship to particular state actors, rather than being specifically driven by drones. In Manchester, participants questioned who would have access to data collected by state users. Participants in Aberystwyth questioned whether drones were the best use of public resources in a time of austerity.

There was generally low concern about **military** use of drones in the UK itself, though key differences emerged by areas in relation to this. There was low initial awareness about military use of drones in the UK (although this was higher in Aberystwyth and Salisbury), compared to awareness of use abroad in conflict zones. Again, military users were assumed to have high levels of specialist training, to be highly regulated, controlled and follow safety procedures. When participants learnt more, some regarded military testing and use of drones in the UK as somewhat 'inevitable', saying they would not normally expect – as individuals – to be able to influence military actions or protocol. Some felt that it was important that the public would be informed if the military were using drones in their area, but were unsure whether this would be the case. There was some concern about the safety of 'testing' in Manchester and Aberystwyth but participants agreed it was probably a low risk. Some participants in Aberystwyth and Stirling were concerned about risks around military drones being hacked and data stolen from them.

> *"It's just the testing bit that's scary, isn't it? … The fact they say testing. Not 100%, this will not crash, this will not blow up." (Aberystwyth, Wave 2, Female)*

Views about military use of drones tended to reflect individual attitudes towards the military overall, rather than being driven by drone use specifically. In general, Manchester and Stirling were slightly more negative than Salisbury and Aberystwyth. Concern about surveillance was highest in Newry and again participants acknowledged historical reasons for this, and reported being more suspicious of and cynical about military and police use, with some feeling uneasy about military use of drones and finding some of the terminology and acronyms used sinister and threatening . On the other hand, some participants in Salisbury expressed pride about living in a 'military' area and the UK being at the forefront of this advanced technology. Some in Stirling who lived near military airfields felt that enduring attendant noise disruptions was 'part of their duty' as a UK citizen.

3.2 Drone categorisation

Participants often struggled with the current Civil Aviation Authority (CAA) categorisation system for drones, primarily based on weight. They often found it difficult to conceive of the size of a drone based on weight, even after seeing some drones in person. Mid-size drones were often estimated to weigh more than they actually did, for example, those weighing 7-8kg were often assumed to be in the 20kg+ range (despite weights being frequently quoted in materials). Weight categorisation was also perceived as unhelpful as

[9] State users included ambulance, fire, police, military, local authorities and other public sector bodies. See Appendix 4.1 for more details on the examples provided in stimulus materials.

it did not account for drone capabilities, payloads and safety features. Participants also thought the current categories were too broad, including what they perceived to be very different drones in the same broad weight categories. The current system was therefore seen to be **in need of updating**.

> *"We also felt the…categories are too broad, for example, the Barbie pink glitter drone is grouped in with a large Phantom that can carry a DSLR around." (Aberystwyth, Wave 3, Male)*

Participants often found different ways of re-classifying drones and their risk level based on a combination of: likely user (often defined as whether the public was likely to use it); weight (in terms of the potential damage it could cause should it crash), payload and capabilities (in terms of potential to invade privacy and cause injuries) and safety features. Participants commonly referred to the difference between 'toys' and 'tools' and saw this as an important distinction. 'Toys' were commonly perceived to be smaller drones designed for children and the public, with low capabilities beyond flight. A drone became a 'tool' once it grew in size and capability, in terms of the length of flight, the inclusion of cameras (or higher quality cameras), and was designed with commercial and state users in mind. The boundaries between these categories were seen to be blurred by drones such as the Phantom and Inspire, as they were seen to be 'tools' that could be used by the public, and this was perceived as a key risk area.

> *"We had a bit of a debate around at what point we draw up the threshold for considering…the child's toy drone. And I think it was a little bit about damage the drone can do." (Newry, Wave 3, Male)*

The key message was that the current classification system is inadequate. Regulatory categories need to account for capabilities as well as weight, and 'toys' and 'tools' should be regulated differently with the process being less burdensome for 'toys'.

> *"I'm surprised that 'drones' encompasses such a massive range. I think there needs to be some work on what is a drone and different categorisation. So, that's actually quite scary, that they still haven't split all this out." (Aberystwyth, Wave 3, Male)*

In summary, the following views and concerns about drones emerged during discussions:

- High concern about untrained public users having relatively easy access to a range of drones;
- Some concerns about state or military surveillance and invasion of privacy, particularly for participants with existing reservations towards these groups;
- Marginal concern about the use of data collected by drones amongst commercial or state users;
- A desire for the categorisation of drones to be more precise, differentiating between toys and tools and taking capabilities into account.

These views informed participants' overall priorities by the end of the dialogue, which are explored in the next section.

4. Priorities and concerns about drone use in the UK

In the third workshop, participants reflected on their discussions so far, and prioritised their key issues and concerns in relation to drones. The stimulus materials used in Wave 3 can be found in Appendix 4.3.

This section outlines participants' key priorities for drone use in the UK, in terms of the key concerns and issues they thought were most important to address. The order reported here reflects participants' ranking of their highest priorities by the end of the dialogue process. Participants' highest priority by the end of the dialogue was **anonymity and traceability.** They were concerned about not being able to identify a drone's user in the event of privacy invasion or safety incidents, challenging accountability and the enforceability of regulations. Concerns about **safe use** were also common, driven by the lack of training and awareness of regulations, as well as the **safety of equipment** and materials. Participants also often prioritised tackling **mis-use**, including for terrorism.

These priorities are explored in turn below.

Anonymity and traceability

Anonymity and traceability emerged as key priorities across the locations. The anonymity of the drone user was regarded as a **new and distinct feature** of this form of technology. The difficulty in identifying a drone user was concerning for a number of reasons:

- anonymous flights posed a greater risk to people's **privacy**, e.g. as it was easier to collect information without seeking consent;
- the **purpose** of the flight and/or reason for data collection may be totally unknown, and thus disconcerting;
- it would be challenging to **enforce penalties** should the user breach regulations;
- there would be an **accountability and liability** gap should anything go wrong.

4.1 Anonymity and accountability

Anonymity was a **consistent concern** across the dialogue locations and encompassed other issues, notably privacy. Anonymity led to discussions on the linked issues of traceability, enforceability, accountability and liability.

> *"For example, I'm walking in the street and I magically just see a drone. I don't know who's on the other end of that drone. You don't know who's on the other end of it. It could be someone taking pictures." (Stirling, Wave 1, Male)*

Participants disliked the idea that they could encounter a drone flight whilst being unaware of, and unable to discover, the purpose of flight and data collection. Participants felt that being unable to **trace** a user would mean that regulations, no matter how sensible and thorough, would be effectively unenforceable. Questions were raised around **who was responsible for enforcing** drone regulations and whether this was the police, CAA or another body. The key issue was not knowing who the public should contact about an incident, how, and what response they could expect.

> *"If you phoned up the police and said 'There's somebody flying a drone about my garden, taking pictures.' they'd probably just think 'She's paranoid'." (Stirling, Wave 3, Female)*

Lack of traceability also presented problems for holding drone users **accountable and liable** when things go wrong. It was thought that a lack of traceability may also encourage irresponsible behaviour amongst some users. Some participants' were unsure about whether and what kind of public liability insurance ought to be required, and discussed whether this should be mandatory. They also questioned whether home insurance policies would need to cover drone use. This suggests that better communication with the public about requirements may help to reassure them about drone use.

> *"If someone irresponsibly, deliberately irresponsibly flies a drone and it injures a child or an animal, or even kills somebody, which is highly possible, if they believe that they can't be traced, if they believe that they've got no accountability, then it won't bother them, because they're reckless anyway. And if they believe they can't be traced, that's a massive issue for me." (Manchester, Wave 3, Male)*

4.2 Anonymity and privacy

Invasion of privacy was a key concern early in the process, spontaneously and in response to early information about how drones work, with women tending to be slightly more concerned about this than men. There was some concern raised about the filming and photographing of women and children. These were concerns that were specific to drones, illustrated by participants' contrasting of drones with CCTV where the public is aware of the location of the cameras, the user and their purpose, with signs providing contact details. Concerns about privacy were thus often driven by the anonymity of the user.

> *"With CCTV we know where the cameras are. We know they're there. If we see a drone flying over us…why is that hovering over my head?" (Newry, Wave 3, Female)*

Privacy concerns initially tended to refer to **images and videos** captured via drones, and often about these being uploaded to the internet. Participants were somewhat reassured to discover that in general, drones camera capabilities may not be powerful enough to 'see into windows', though they questioned how long it would be before light, high-resolution cameras were made cheap and accessible. Concern was significantly heightened after participants learnt about other payloads and uses that could infringe on privacy, such as thermal sensors to detect how many people were living at an address (see Appendix 4.2 for the example used). Reaction to this revealed particular concern about invasion of privacy in the home, with some participants saying it would make them feel 'violated' and that it was 'outrageous'.

> *"I would hate to think that someone … could pick one of these things up and spy through my window and I know nothing whatsoever about it … or spy in the back garden or when I'm on holiday with my kids, you're not allowed to stand outside*

somebody's door with a video camera but this thing can do it and you don't know where it is, who he is or whatever." (Newry, Wave 1, Male)

"I think having cameras is what becomes the observation side and the surveillance side, and the thing that most people have problems with are the ones with cameras." (Manchester, Wave 1, Female)

Participants reported specific privacy concerns regarding different users. They were concerned about **public** users invading their property (notably gardens); and uploading invasive videos or images on to the Internet without their permission (particularly teenagers who were seen to be more able and likely to upload data to the internet).

Concerns were raised about **commercial** users using data for marketing purposes without permission; for example collecting data and using this to identify houses to send marketing materials to. Participants were also concerned about their ability to **opt out** of commercial use and whether this was realistic in some scenarios. Whilst some participants accepted use at events such as music concerts, others were concerned about use by smaller, private companies at locations where drone use might be less anticipated and more surprising and whether and how it would be possible to opt out. This view also applied to state use. Participants were less supportive of the idea of drones being used for individual commercial gain in some cases, as opposed to for societal good (for example when used by the emergency services).

Some participants, who held existing concerns about **state surveillance**, also worried about the potential for drones to facilitate invasive practices, making reference to 'Big Brother'. Some people in Manchester expressed concern about how facial recognition capabilities might be used by the police in the UK. There was also greater concern about police use in Newry than other areas. Some were also concerned about use by local authorities to impose fines, for example around parking and planning permission (see Appendix 4.2 for the example used in the stimulus).

"We said like traffic management, is it going to be a bit like Big Brother you know? You're not going to be able to breathe without a blinking drone capturing everything you're doing." (Aberystwyth, Wave 3, Female)

As discussed above, there were relatively low levels of concern about **military** users invading privacy. Participants tended to see the military as a responsible data controller and generally did not tend to expect them to invade the privacy of citizens in the UK. Participants in Newry were more uneasy and cynical about military and police use but acknowledged this may be driven by historical context, particular to Northern Ireland.

Safety – drone users

4.3 Risk of accidents and injuries

Concerns about safe use of drones and their potential to cause **accidents and injuries** were **consistent** across the locations and throughout the dialogue. Concerns about unsafe use were driven by a number of factors:

- That (some) drones may be difficult to operate, and that things can go wrong very quickly
- The rising accessibility of this technology to the public
- Concern that public users have low awareness of regulations, and are unlikely to have received training, and may not read instructions or guidance provided with drones

- Concern that young people are more likely to take risks and be reckless, particularly in groups
- The relatively low cost of drones, as well as current lack of traceability may encourage more reckless behaviour

"9 times out of 10…most people skip the instructions…little kids or teenagers who are going to get them for Christmas; they're not going to read the instructions…that's when they can lose control of it." (Stirling, Wave1, Female)

"If they're all sort of egging each other on, and seeing who can do the best tricks and so on, there's a lot of things that could happen." (Stirling Wave 2, Male)

Whilst many participants were concerned about drones causing physical injuries, some acknowledged that this is not a drone-specific issue, acknowledging the need for proportionality.

"I know you can have an eye out [with a drone] but that can happen with a stick. That wee boy could have had a stick." (Wave 2, Stirling, Male)

However participants were concerned that drones, particularly when they are used recklessly or by poorly skilled users, are capable of causing **physical harm and injuries**, both minor and serious. Some participants acknowledged that accidents can happen involving responsible and experienced users, particularly after watching videos of accidents and realising how rapidly control can be lost and crashes occur once a flight starts to go wrong. When participants imagined drone risks, the ones that seem visceral, likely and of high impact were the fact that drones: (a) are airborne and therefore can fall from height; (b) seem hard to fly and therefore could crash; and (c) have some features which appear dangerous and have caused injuries which have been reported in the media (e.g. sharp blades). Some participants were aware of media stories about injuries, such as celebrity injuries during music concerts, and a serious injury to a child's eye[10].

"If you are walking in the park and one of these things is out of control and it smacks you on the head, the chances are it's going to kill you." (Manchester, Wave 1, Male)

Participants were particularly concerned about **injuries to children**, caused either by other children or adults behaving in a risky way (e.g. flying a drone inside). Some participants were concerned about injuries to **animals**, and in Salisbury some were also concerned about stress which may be induced by hearing and seeing drones or being followed by them. Some participants mentioned concerns about damage to **buildings and property**, but this was less of a priority than injuries to people.

Many participants rated concern about use of drones near **airports** and the potential to cause plane crashes as a high priority. This was due to the potentially '**catastrophic**' nature of the incident which could be caused and the number of people affected. Some participants were aware of reports at the time of fieldwork about incidents recorded at UK airports, which may have contributed to this concern[11]. As such, participants regarded this as a 'live' issue, where an incident could occur imminently and that required rapid, remedial action. Participants were concerned about an incident at an airport either as the result of terrorism or reckless use by the public.

"If somebody is capable of launching a rogue drone which is capable of maybe bringing down a passenger aircraft, then in terms of the seriousness of the incident that would take that to the highest priority for me." (Manchester, Wave 3, Male)

[10] Some participants were aware of these stories but they were both shown to participants at the safety carousel in Wave 2.
[11] Some participants were aware of media stories about these reports but they were also shown articles at the safety carousel in Wave 2 (http://www.bbc.co.uk/news/technology-33612631) .

"I think it was on the news this week again there was another two very close mishaps, I think it was at Heathrow concerning drones, and that would be my priority, basically would be something very catastrophic happens... Whether carrying bombs or interfering with aircraft.' (Newry, Wave 3, Male)

Safety – equipment and materials

4.4 Risks associated with equipment and materials

Participants reported safety concerns regarding some **types of materials and equipment** and questioned whether there are **safety standards** for the industry. Some perceived certain types of drone to be less safe, often because they worried that **lower quality** drones were more likely to falter, break or 'drop out of the sky'. Some types of equipment were seen as less likely to include the types of **safety features** which participants found reassuring in Wave 2 when they saw drones and their operators, such as return to home functions and blade covers.

"If you go in and buy one of these for a kid from Argos at £49.99, does it have the same capabilities and distance as one at £500 or £5,000?" (Newry, Wave 1, Male)

The types of drones considered to be highest risk were:

- **Cheap and/or imported drones** – these were perceived to be made from poorer quality materials, be poorly assembled, less likely to have reassuring safety features or minimum safety standards.
- **Small drones** – these were perceived to be likely to be cheaper and carry the risks associated with cheap drones. Small drones are also seen to be likely to be operated by the public and young people who are perceived to be a higher risk category.
- **Home-made drones** built by hobbyists – these were seen to be unlikely to have faced a rigorous testing process, less likely to meet safety standards, and even less likely to be traceable.
- **Older drones** – these are seen to be less likely to have reassuring safety features and more likely to falter with increasing age.
- **Battery life** – this was a particular concern for some participants who believed that if battery life ran out then a drone would 'drop out of the sky'.

"Our concerns are more based on miniature and small drones…it's the miniature and small versions that…could get out of hand around airports, schools and privacy." (Newry, Wave 1, Male)

"My concern would be how can you regulate something that people may be able to just order in separate parts? Because if we look at kind of what they are, separate parts, put together at home, then who even knows I have it?" (Newry, Wave 1, Female)

Mis-use and terrorism

4.5 Forms of mis-use

Participants were concerned from the start of the dialogue that drone technology could be used maliciously and pose a number of risks to the public. Numerous participants raised the concern that drones could be used by **terrorists**; for example carrying explosives or

chemicals. Participants perceived this as an issue that was specifically exacerbated by drones, and were specifically concerned about the new types of sites drones could access; for example nuclear sites and high security areas. A further dimension to risk lay in the fact that drone attacks could be launched remotely, relying on automated flight paths, and not be easily linked to an individual.

> *"Terrorism can be quite worrying… there's always going to be somebody behind it, somewhere quite close, but in terms of pre-programming, they could just do a runner and send off a drone that could do some serious damage" (Aberystwyth, Wave 1, Female)*

> *"When I heard about crop spraying I thought that's quite a good tool for terrorists isn't it, chemical warfare." (Salisbury, Wave 1, Female)*

Participants were also concerned about possible **hacking** of drones, accentuated by the perceived vulnerability of the data link connecting drones to pilot/operator control stations. Participants were concerned that drones could be made to crash, or be hijacked during flight and redirected for malicious purposes. They were also concerned that the data link could be hacked and data stolen and mis-used.

> *"It would seem to me that the risk in this, is this middle bit, the commander controlling. I was immediately thinking, well how easy is it that, to hack or to disrupt." (Manchester, Wave 1, Male)*

Some participants raised issues around use of drones to enhance other forms of criminal activity, particularly **stalking, illegal surveillance and drug smuggling**. Drones could be used for stalking women or surveillance of properties prior to burglary. Some participants were aware of media stories about drones being used to smuggle drugs into prisons and were concerned drones could be used to aid drug smuggling across borders.

Concern about mis-use of drones was intensified by what was perceived as a **lack of reliable options for intercepting drones** (notably in Salisbury). Participants understood from stakeholders and materials that it is difficult currently to disable drones. Some future enforcement options were presented, including drone nets and lasers. Some participants were aware of eagles being trained to intercept drones. However, these solutions were in themselves perceived as dangerous and were understood to carry their own risks (e.g. in terms of accuracy or where the rogue drone lands).

Though mis-use was a prevalent concern from the start, by the end of the dialogue this was often **not felt to be a drone-specific issue**. By the end of the process, participants generally acknowledged that almost **all forms of technology can be subverted**. Some participants remarked that no matter how thorough your regulations and processes, there will always be people who break them, and commented that policy needs to be designed to **cover the majority** of well-intentioned users.

> *"It is not the drone, I mean a lump of machinery … is not evil on its own. It's how you use it. The very first thing we ever invented was the knife wasn't it … There are people who will subvert any kind of technology." (Salisbury, Wave 1, Male)*

> *"There will be people who will use it for criminal and wrong purposes. They'll do that with anything, so that isn't the fault of the drone or the drone industry. So if we start from the perspective, the British public are generally responsible and reasonable people, if they know that there are regulations that control drones over a certain weight, then the vast majority of people would adhere to those regulations." (Manchester, Wave 3, Male).*

Other priorities

4.6 Areas of lower priority

Participants in a number of locations were also concerned about developments in the area of **autonomy** of drones and artificial intelligence, particularly around the idea of drones 'making decisions for themselves' without human control, which they thought presented currently unknown risks. Whilst participants were vague about their specific concerns, there was general unease about this prospect in some areas (Aberystwyth, Manchester and Salisbury). Participants in Manchester said this raised concerns about humans losing control over technology. Participants in Aberystwyth and Salisbury were frightened by the idea of drones making decisions for themselves, which might cause harm to people.

> *"Yes, it just worries me that a human link is taken out of the decision making process." (Salisbury, Wave 3, Male)*

> *"I think the anonymity of them. That's what prompted me to think about Skynet in Terminator. You know? They could think for themselves." (Manchester, Wave 3, Male)*

Other priorities and issues emerged less frequently in some areas including:

- Use of drones by paedophiles to film and photograph children (Newry)
- Lack of age restrictions for purchase and lack of clarity around parental responsibility (Aberystwyth)
- Drones replacing workers and causing job losses (Aberystwyth)
- Perception that increasing drone use could lead to a more disconnected and remote society as people interact less (Manchester)
- Lack of knowledge about how to dispose of toxic batteries safely and potential environmental impacts (Manchester)
- Potential damage to electricity cables and the impact of this on customers (Manchester)
- Harm to the environment through manufacture and use (Newry).

The following section explores participants' suggestions and **strategies** to tackle some of the concerns outlined in this chapter.

5. Drones ‘strategy’

In the third and final wave of workshops, participants were invited to design ‘strategies’ to address the key issues they had identified. In this exercise, participants produced a strategy and spending plan, and each strategy was interrogated by the other participants and stakeholders in terms of costs, who should take responsibility, challenges, and proportionality. This section explores the key strategies suggested, including how participants responded to some of the challenges or barriers to implementation, and who they thought should be responsible.

*It should be noted that the public are not drones experts or policy makers, and as such these strategies should not be understood as comprehensive, rigid or formal plans. Rather, they represent and reveal the **key principles of the public priorities** and concerns in relation to drones as an emerging technology.*

There was **a high degree of commonality** amongst the strategies produced within and between locations:

- Universally, participants saw **registration** as a critical way to address concerns about anonymity and traceability, underpinned by broader concerns about privacy and safe use. Participants felt that registration would encourage some **self-regulation** and lead to more responsible behaviour.
- **Training** was presented as a crucial strategy to address concerns about unsafe use, particularly by public users.
- **Technological solutions and minimum safety standards** were also seen as an important way to address safety concerns, particularly around airports.
- **Education and raising public awareness** were often suggested across all the areas, both to encourage safer use and to reassure the public by making them more aware of regulations and penalties.

Each of these key strategies is explored in turn below.

Registration

5.1 Principles driving the strategy

Registration emerged clearly as a strategy cornerstone across the dialogue locations. It was seen to address a number of participants’ key priorities, but fundamentally was a critical starting point for **tackling concerns around anonymity**. Participants saw registration as enabling tracking and identification of drone users and this as essential to policing, enforcement of regulations, and **accountability** when things go wrong. When challenged on this point by some expert stakeholders, participants defended this strategy strongly, particularly in Salisbury. Participants argued that they could see few reasons why responsible users would not want to register. When challenged by expert stakeholders about the associated costs and burden on operators, participants (often strongly) rejected

these arguments as inadequate. This was due to their view that registration was critical to addressing their fundamental concerns about the control and oversight of drones.

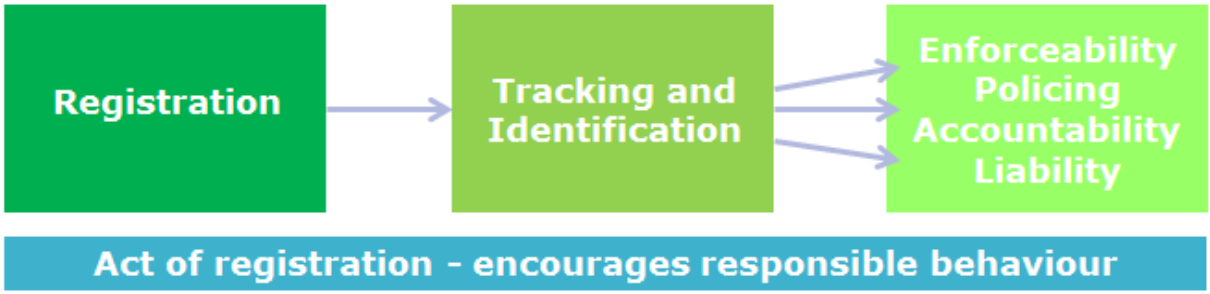
> *"It's the fact that … if something goes wrong, then you can trace it back to who's in charge of it and who's accountable for it." (Aberystwyth, Wave 3, Female)*

> *"In order to address this issue, anonymity and traceability of users, that every drone … should be registered with their name, address, whatever else is required in order to trace that person and the owner of the drone to take it a step further. If a drone is used for a criminal purpose or it's used recklessly, whatever the offence is, the owner is liable for the drone at all times." (Manchester, Wave 3, Male)*

Additionally, participants perceived that the act of registration in itself might **encourage more responsible behaviour** from drone users. It was believed this could deter some reckless behaviour, as users/operators would know they were registered.

> *"If we didn't have registration numbers on our cars we probably would speed past a speed camera… Because we're not traceable or accountable. But if you're buying something that you're then accountable for you're probably going to fly it much more sensibly and within the regulations." (Salisbury, Wave 3, Female)*

Figure 5.1: Principles of registration



5.2 Implementation

A number of ideas emerged across the locations and whilst the details varied, participants were consistent in what they wanted to achieve. Regarding **timing and process**, participants wanted to see drones registered before they could be operated; either at the point of sale or shortly afterwards online, with identification documents required and an activation code then supplied. In Salisbury participants also suggested having to register multiple users (e.g. partners and children), given there may be a difference between the **purchaser, owner and operator** of a drone. Some participants (particularly in Manchester and Salisbury) wanted to put the burden of responsibility for ensuring registration on to **retailers** by requiring them to be licensed at point of purchase. Some participants recognised likely challenges associated with this due to the international market, online and second-hand sales and home-made drones.

> *"... if you had your drone licensed to you, it's going to make you aware, more cautious what to do with it and put a bit of a thing back to the parents that they've got to think about how their kids are using these things " (Newry, Wave 3, Male)*

Some participants wanted the process to reflect the **DVLA experience** and owners to hold a license until they transferred this to a new owner. Participants commonly compared drone registration to car and motorcycle registration, shot gun licenses and licensing for dangerous dogs – as processes they were familiar with – regarding drones as comparable with vehicles in terms of risk.

Some participants wanted a **minimum age** for purchase, broadly ranging from 14 to 18. Parents would be responsible for children operating drones under this limit. In Aberystwyth, participants suggested a **certification system**, drawing this from film and computer game certificates, which would inform parents which age group the product was suitable for. One group in Aberystwyth thought children should be banned from using drones entirely.

Insurance was sometimes discussed in this context, with some participants suggesting that public liability insurance should be mandatory either for all users and categories (like car insurance), and others suggesting just commercial users. Participants felt that clear information about requirements would need to be communicated to the public, prior to or at the point of registration. Participants in Stirling discussed whether manufacturers should be liable for faulty drones which cause accidents.

Registration was proposed as a key starting point to address concerns – but participants acknowledged that it was not a panacea. Anonymity concerns were driven by the idea that members of the public would be unable to identify the owner of a drone when they encountered one – on their property, in a public place or after an accident. Participants acknowledged that registration alone would not necessarily enable someone to **identify an operator and their purpose in the moment**, unless a recognisable marking was available and visible (e.g. for the police, emergency services or military drones) or you could find this information elsewhere.

> *"We were saying earlier about them maybe being licensed. Yeah, that's great. But as you said, you are not always going to be able to trace the person down the street who is using it ... you couldn't actually prove it was him that was using it." (Stirling, Wave 2, Female)*

Some participants suggested that electronic **chipping** of drones (so they can be tracked) and a website or app could be developed to tell you if drones are being flown within a geographic area, perhaps retroactively. Some participants compared this to flight tracking or Wi-Fi detection technology. Expert stakeholders and other participants did test these suggestions with challenges, prompting participants to consider data security issues and high development costs. In response, participants reflected this challenge back to drone experts to develop options for how this could be implemented, and nominate or institute an appropriate data holder. Some participants suggested that this could be overseen by the police, CAA or another dedicated body.

> *"If a drone was in my garden and … it caused me distress I would be calling the police and I would expect them to have a mechanism whereby they could at least find out who on the ground was operating that." (Salisbury, Wave 3, Female)*

> *"At the moment you can put an app into your phone that will identify what planes are flying overhead…so that would only be a very small step to having the identity of a drone flying over.'' (Newry, Wave 3, Male)*

Across the dialogue areas, participants wanted to see **different registration requirements** for drones of different sizes, capabilities and users. Larger drones and drones with more capabilities would require a more rigorous process (for example similar to that which commercial users currently undertake), as they were seen to be potentially more dangerous. It was expected that commercial users should face a more detailed process than public users. Some participants suggested excluding small 'toy' drones from the process, though others wanted to see all drones registered in some way.

> *"If all drones were registered above 1kg, so we're taking out the toy drones, the ones that you pay up to £100 for but actually if they did go wrong then they're not going to*

cause mass destruction. Obviously there is still potential for injury but it's not going to be … catastrophic." (Salisbury, Wave 3, Female)

"It wouldn't be fair if you get somebody licensed and having to have a chip in it because it wouldn't happen, it's a toy. But the question is at what point do you draw the line between it being a toy and something harmless, and something they don't need to license?" (Manchester, Wave 2, Male)

5.3 Cost and responsibility

Overall, participants tended to report that the cost of registration should be shouldered by users and manufacturers. They argued that users in particular should contribute at the point of registration as they, and manufacturers, are often benefitting from drone purchase and use. Participants tended to think registration should be overseen by a public body; e.g. the CAA or DVLA who they saw as appropriate and capable.

"The DVLA have, I presume, the computer capacity, they've obviously got the inbred knowledge of how to administer it and run it, so for me the ideal department, to run the registration of drones, would be the DVLA." (Manchester, Wave 3, Male)

Some participants were also unsure **who to contact** about a concern or incident and whether this should be the CAA, the police or another body. They acknowledged that concern about reckless use of a drone, or discomfort about its use over your property, may not be a high priority for the police depending on the risk level of other incidents occurring simultaneously in the force area and resources. However participants then questioned who they should contact instead and how to report an incident. Participants in Manchester particularly questioned whether resources would be available to be able to enforce drone regulations once users are identifiable and whether extra funding would be required for this.

Training

5.4 Principles driving the strategy

Training was also a key element of many of the strategies across the locations because it responded to central concerns about safe use, particularly by public users. Mandatory training was seen to be a crucial way not only to improve operating skills amongst the public, but also to **raise awareness** of the risks and regulations, in turn reducing the likelihood of **accidents**. Participants proposed varying levels of training, but often wanted this to be introduced at the point of registration.

"…more information makes it safer. So the more information people have, the fewer accidents, because they know more." (Aberystwyth, Wave 3, Female)

5.5 Implementation

Many participants suggested that compulsory training could and should be **linked to the registration process**. Online training modules would need to be completed before registration was completed and an activation code supplied. Some participants noted that they and other members of the public rarely read instructions or terms and conditions when they purchase technology (especially online). Therefore some participants suggested that the compulsory training modules should be short, accessible, include pictures and videos and be presented in stages, each of which must be acknowledged before the next is displayed to encourage engagement. A group in Newry thought it should be compulsory to renew training every few years.

Stakeholders at the dialogue events challenged suggestions about mandatory training, and prompted participants to consider who would produce and update training materials, and the likelihood of use by public users. Participants responded that materials should be short and simple and centrally produced.

> *"If you brought in some sort of activation where a drone couldn't fly…and they have to pass an online test, 5 or 10 questions very simple. And you have to tick these boxes and go through this little questionnaire, on situations before you actually activate the actual drone to fly." (Salisbury, Wave 3, Male)*

Participants also suggested the following ideas for implementation:

- CAA produced leaflets – which summarise key regulations – to be placed in every box or provided by retailers at point of sale[12]
- Lessons on drone operation available at flying clubs and discounts on lessons provided at point of sale
- Renewals and refresher training provided during software updates.

As with registration, participants tended to suggest that there should be **different training requirements** for different drone categories. Participants tended to suggest that larger drones and those with more capabilities should require higher levels of mandatory training, because of the greater associated risks. Some participants suggested that these drones should require face to face training perhaps at flying schools, or a hazard perception simulation, reflecting the potential level of damage they could cause if they were to crash.

> *"We were thinking about proportionality and that maybe the training…is graduated depending on the class of drone…differentiated by both weight and range." (Manchester, Wave 3, Male)*

5.6 Cost and responsibility

Participants were often less clear on who should be responsible for training and who should pay for this, though some felt it should be borne by the user as they would benefit from a new skill. Participants questioned who would be responsible for designing and updating training materials and requirements and who would pay for production and administration. As they perceived there to be an overall societal benefit, some participants were willing for public money to support the development of these programmes. Participants responded positively to the CAA leaflets they were shown and found these accessible and informative, and as a result were comfortable with the idea of the CAA leading this.

Minimum safety standards

5.7 Principles driving the strategy

Participants commonly included technological solutions as part of their strategy, as developments in drone technology tended to **reassure** participants about drone use. The development of **safety features**, particularly for public users, was seen to be able to reduce high risk use of drones and lower the likelihood of accidents and incidents. Raising awareness of these features could help to reassure the public. Including some of the safety features as standard would also help to reassure the public.

Some participants wanted to see **minimum (British or EU) safety standards** set and enforced for drones purchased in the UK. This would address concerns about cheap

[12] This practice already takes place in some stores.

imports and poorer quality materials and equipment being more likely to falter and cause accidents. These features could also help to prevent higher risk usage and lower the likelihood of incidents and accidents. Participants often wanted to see certain features standardised either across all types of drones (for example in Stirling) or just for larger and higher capability drones (often understood as over 1-2kg) which are more able to cause serious incidents.

5.8 Implementation

The following safety features were particularly well received. Participants were particularly reassured by the concept of **geo fencing**[13] as a way to prevent dangerous use around airports and other sensitive sites (e.g. nuclear sites, motorways and schools). Even with limited knowledge of how this technology would work in practice, participants were particularly enthusiastic about the principle of this potential solution to a major safety concern. Standardising geo fencing technology was perceived to be able to address concerns about potentially 'catastrophic' accidents caused by collisions with airplanes. Participants tended to disregard costs of this solution due to the potentially catastrophic nature of accidents.

Participants were reassured by the concept of **blade covers** as a simple and low cost way to help prevent injuries caused by sharp blades. Participants tended to report that this should be standardised for drones of all sizes and some were surprised this was not already the case. Participants were reassured by the concept of **height and distance 'blockers'** (which would limit where a drone can be flown)**,** particularly for public users and young people, as a way to help prevent drones being flown out of the line of sight and therefore less likely to be crashed. They felt this would also help underline to users that there are regulations around height and distance. Participants were enthusiastic about the idea of a **return to home function** for drones which are flown too far from the controller or are due to run out of battery. This was seen to be a way to prevent drones from 'dropping out of the sky' and crashing.

However participants sometimes had concerns about this technology and how it works in practice, for example how the drone is able to navigate obstacles and land safely. There was some surprise in Stirling that detect and avoid technology is not already more advanced, even in military drones. Participants in Manchester suggested strobe **lighting** to raise visibility of drones. Some participants included **anti-hacking technology** as a potential solution to concerns around the hacking of the data link and drones being taken over or data stolen by those who want to mis-use drones. Whilst this was seen to potentially be able to go some way to protect users, their data and equipment, some participants acknowledged that hacking techniques would also be developing alongside anti-hacking technology.

> *"The child that lost their eye as well because I always thought there was supposed to be a guard over those, so that wouldn't happen." (Newry, Wave 2, Male)*

5.9 Cost and responsibility

Some participants recognised that development and standardisation of these kinds of safety features would incur a **cost to manufacturers and/or drone users**. However participants tended to report that manufacturers and users should cover the cost of these developments as they benefit directly from drone purchase and usage. There was little discussion about how minimum safety standards should be developed, enforced and

[13] Geo-fencing is a feature in a software programme which defines geographical boundaries and creates a virtual barrier. This could be part of a drone's software which would prevent it from flying in defined locations, by sending an alert to the operator when a boundary is crossed (e.g. an airport).

overseen, and by whom. Some participants acknowledged the challenges and costs around this solution in practice in an international marketplace and one where goods are likely to often be purchased online and where some drones are home-made.

> *"I really don't think that it would add that much to the cost. I mean look that's the responsibility to everybody. If I'm selling food it's up to me to make sure that the food is fit for use … it's not up to anybody else, if I'm selling something that's unsafe." (Newry, Wave 3, Male)*

> *"We talked a lot about ISO standards … The big discussion [is] about how you could standardise the manufacturer to make sure they were compliant." (Newry, Wave 3, Female)*

Raising awareness and education

5.10 Principles driving the strategy

Education and raising public awareness of drones were often explored by groups across all of the areas, but particularly in Aberystwyth, Stirling and Manchester. Participants reported that the wider public as well as drone users need to be educated about drones, regulations and penalties. Though reassured to discover that regulation pertaining to drones exists, participants raised consistent concerns about the level of public awareness of them. Education would enable the public to **know when they had witnessed or experienced an infraction**; know **how to report incidents appropriately**; and know **what action to expect** as a result. In particular, participants wanted to raise awareness about when and how to report incidents to the police, and what the alternatives are for when an incident might not be a police priority.

> *"... Yes there are already a lot of rules and regulations in place. Which are actually quite good, but who's enforcing them?'' (Newry, Wave 3, Male)*

> *"Low awareness of regulations we considered to be a priority to change because that's not just for the users for the drones that's also for the general population…so they can be aware that they're being used appropriately." (Salisbury, Wave 3, Female)*

Some participants in Aberystwyth were keen that education should also include the benefits of drones and what they can contribute:

> *"If we're going back to educating people in schools, wherever, there's also a lot of good that comes out of these. So we don't want to stall the mind on thinking where we can put these to good use." (Aberystwyth, Wave 3, Male)*

Participants, particularly in Stirling, wanted to see regulations **simplified** so that they are accessible and comprehensible for the public. Participants wanted to be able to easily access all relevant legislation pertaining to drone use in the UK (e.g. data protection legislation) in **one place and in an easily digestible format**.

Participants also suggested that there should be **campaigns** to raise public awareness of drone regulations. This could include:

- Awareness raising campaigns through television, radio and the media
- Information on websites and social media (and social media campaigns being particularly targeted at young people)
- Lessons in schools (e.g. as part of Personal, Social and Health Education) and police visits to schools

- Campaigns targeting parents to raise awareness of children using drones

Participants were less clear where responsibility and cost for this strategy lay than with other strategies.

Other strategies

Though the suggestions above encompass the strategies most commonly suggested across the five dialogue locations, others emerged less frequently and with less strong opinions, in some areas. These included:

- The use of **public notices** to raise awareness of where drone use is occurring. This might be to alert the public when drones are being used in a particular space, temporary notices for one-off use or permanent notices informing the public about regular or periodic use (Manchester and Newry)[14]
- Encouraging the establishment of drone clubs to help people learn to fly safely (Aberystwyth)
- Use of eagles (Aberystwyth) and other drones (Manchester) to intercept drones near airports
- Prioritise enforcement of the current regulations by public bodies through incentives and penalties (Newry)
- Drone MOTs to ensure equipment is 'fit to fly' (Newry)
- The creation of a new, centralised 'drone authority' to oversee registration, enforcement and training (Stirling).

[14] This is already the case for (some) commercial operators.

6. Conclusions

This section outlines participants' views by the end of the dialogue, and includes some of the implications of the findings of this dialogue for policy makers, industry, regulators and other organisations.

6.1 Views at the end of the dialogue

Throughout the dialogue process, participant engagement was high. Participants became highly invested in their opinions, staunchly defending their drones 'strategies' in conversations with expert stakeholders. As they learnt more, participants continued to weigh the benefits against their areas for concern. Concerns grew more specific, focussing on particular issues that were personally pertinent or emerged as priorities for the group.

However, whilst participants retained some concerns, they tended to end the dialogue on the whole in a fairly balanced position, seeing drones as an area that was in need of some targeted actions to bring it into line with their requirements for an acceptable situation (particularly regarding public users and drone categorisation), but not any radical overhaul. By the end of the dialogue, on the whole participants were much more positive than they had been before the process.

> *"Initially [I was] quite negative about them. After reading about … Jihadi John and Amazon … but as I've learnt more about it, I've become a lot more positive about it, … used by the police, used by the military. It's put my mind at ease … clearly a multifaceted tool isn't it? It can be used for good purposes and of course for bad, a bit like everything." (Aberystwyth, Wave 3, Male)*

For example, when one group of participants were asked to sum up how they were feeling about drones by the end of the dialogue process, they tended to use more positive and reflective words such as 'enlightened', 'encouraged', 'interested', 'informed', 'eyes-opened' than negative ones. However, there were clearly some anxieties and concerns remaining, not least because participants acknowledged that some of what they wanted done to tackle key concerns would be difficult to implement. These participants tended to use words such as 'confused', 'sceptical', and cynical when summarising their feelings about drones.[15]

6.2 Implications for the future of drones

Participants understood that the 'drone industry' is developing rapidly and the market growing, particularly for public users. They reported that there are many more drones in the UK already than they were aware of, leading some to feel that policy and regulation is already 'behind the curve'. Participants – associating drones with 'the future' – suggested policy needs to be **future oriented** and future proofed to keep pace with the sector as it continues to evolve.

[15] These words are based on a sample of words given in a final activity, reflective of the overall balance of views by the end of the dialogue.

"It feels a bit like closing the door after the horse has bolted, drones are already everywhere!" (Stirling, Wave 2, Female)

6.3 Participants' priorities

Overall, participants were most concerned about:

- anonymity of drones users and the difficulty tracing misconduct or enforcing accountability;
- the safety of drone flights and equipment;
- the potential mis-use of drones.

In particular, participants felt that the public's current easy access to drones was a risk factor for all these issues, as they were least likely to know how to fly safely (or take the trouble to find out), more likely to infringe on privacy (knowingly or through negligence), and more likely (than state or commercial users) to fly recklessly. As a result, key changes suggested across the dialogue locations ultimately aimed to:

- have greater control over public access to drones, particularly larger ones, to ensure accountability and encourage responsible and safe use
- build in standardised safety features including limits to where drones could be flown;
- raise public awareness of rules and regulations; and
- introduce at least basic training for all operators.

A key part of participants' strategies was **registration** of drones and drone users. Participants felt registration responded to a great many of their concerns, notably safety and privacy. They viewed registration as a proportionate measure to 'weed out' more casual users who were deemed to represent the highest risk as this would present an additional barrier to them. Registration was also a key point where other measures, such as training and increasing awareness of regulation, could be introduced. Participants acknowledged that registration was a **starting point** for countering anonymity concerns – allowing members of the public to identify (or request another body to identify) the user of a drone. Looking forward, participants wanted to see solutions that would allow **identification in the moment**. Though registration may not be the specific route adopted to introduce controls onto drone use in the UK, it will be critical for policymakers to respond to these participant concerns – namely anonymity and traceability – that ultimately drove many of their decisions.

Another component to participants' suggestions for change was the introduction of minimum safety standards, to most drones over a certain size if not all. A key challenge to this will be achieving **international co-ordination** on the introduction of minimum standards, and co-operation from industry.

6.2 Raising public awareness

When participants had heard little about drones, they tended to mainly remember the negative – there seems to be a dearth of stories about the benefits of drones or the range of applications. Once heard, people picked up on the benefits quickly, and were particularly enthusiastic about the **potential for saving lives and de-risking human activity**, and were impressed with **cost-saving** and **futuristic**, cutting-edge applications.

Views also tended to become more positive as people became aware that drones are regulated and when people saw drones and spoke to their operators.

With participants eager for more **balanced** media coverage, and with one of their key strategies being around **increasing public awareness** about drones, there is a clear opportunity for drones operators and others to engage with the public on drones use. Focusing on the **benefits to citizens and society**, the range of applications, as well as showing people drones in person, could all help to build trust in industry and operators, increase awareness of regulation and reassure the public about wider use.

Participants also felt it was important for the public to be **notified of drone use** in their area by state or commercial operators, and mechanisms for this as well as allowing people to opt-out should be considered to reassure the public about privacy concerns.

6.3 Drone users and categorisation

Participants exhibited **high levels of trust** in state and commercial drone users by the end of the dialogue, driven by trust in their awareness of regulations, controls in place and their perceived level of training. This has implications for policy makers, insurers and others in terms of the assumptions the public might make about different state and commercial users, in terms of safety, permissions, expertise, and public liability insurance.

Though participants had clear views about the use of drones amongst the 'untrained public', views about **hobbyists** (more likely to have experience and some expertise) were slightly different. Participants were conscious that any measures introduced should take hobbyist-built or moderated drones into account, ensuring specific provision for this group is built into any new rules on safety standards or traceability.

A clear recommendation from this dialogue is also to consider drawing new lines between types of drones, to distinguish between smaller toy drones, and larger drones with capabilities to cause safety and/or privacy concerns. All suggestions by participants hung around a **new categorisation system**, with registration, training, and other requirements increasing in proportion. This categorisation would also need to factor in the future trajectory of drone technology, or be revisited as this develops.

What will happen next

The project evaluator, White Ox, are evaluating the project and looking at how it has been delivered. The outcomes of the process are being used to inform a public consultation that will be launched later in 2016. Participants in the process will be sent a copy of the consultation and invited to further express their views on the policy proposals that have arisen from this workshops.