The Future of Flight: Public attitudes towards the increasing use of drone technology in the UK

Whitepaper

About this report

As drone usage continues to grow among businesses in the UK, this report explores public acceptance of this new generation of aviation. It argues that although the public have some key concerns that will need to be addressed, ultimately there is a broad public acknowledgement that drones stand to offer many advantages.

Findings are based on a two-stage research programme with the UK public which explores current thinking around the increasing use of drones, and what more can be done to improve public acceptance going forward.

This programme of research was commissioned by a BT-led consortium called Project XCelerate (more details on p.23), as part of their wider work on the UK Government's Future Flight Programme[1]. All research work was undertaken by independent research consultancy, Strive Insight.

About the authors

Project XCelerate consortium

BT, together with Altitude Angel and a number of UK tech start-ups, have been selected by UK Research and Innovation to deliver a Future Flight Challenge project called Project XCelerate[2]. The consortium plans to establish a commercial drone zone in open and unrestricted airspace, located south of Reading, Berkshire.

Joining BT, the consortium includes drone technology experts from Altitude Angel, Dronecloud, HEROTECH8 and Skyports, cyber-security provider Angoka, and end user experts SkyBound Rescuer and DroneStream.

For more information, visit: **www.bt.com/business/drone-solutions**

Strive Insight

Strive Insight is a research and insight agency built to help businesses find and release commercial opportunities.

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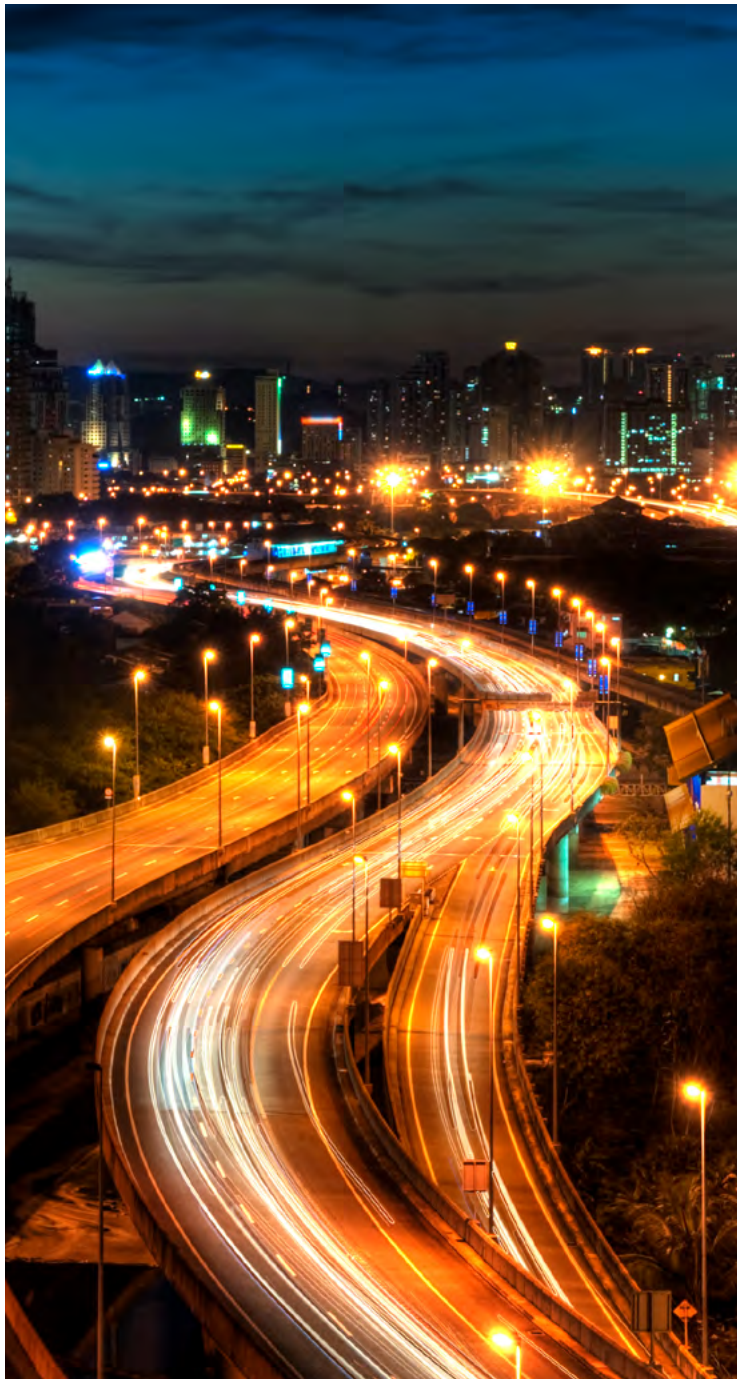

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1. Executive summary

Drone usage within businesses and public services is growing exponentially within the UK, and according to PwC[3], 76,000 drones will be flying across UK skies by 2030. If this growth is to continue, public acceptance of drone technology will be critical.

As part of their wider work on the UK Government's Future Flight Programme, the Project XCelerate consortium has partnered with independent research consultancy, Strive Insight, to investigate current public acceptance of drone technology and identify how we can best support it in the future.

Based on thorough research conducted during 2021, the Project XCelerate consortium and Strive Insight have found that:

We are at a tipping point in the public perception of drones

- There is high and growing public awareness of drones, but limited knowledge of their capabilities at present
- Public attitude towards drones is split. Around half of the population are optimistic about the possibilities of future drone usage, but there is also a sizable group who are more nervous, and will need reassurance about how drone technology will be used in the future
- Positive opinion about drones is driven by knowledge; the more the public is educated about drones, the more positive and accepting they are likely to be

There are concerns that will need to be addressed before the public are fully accepting of drone technology

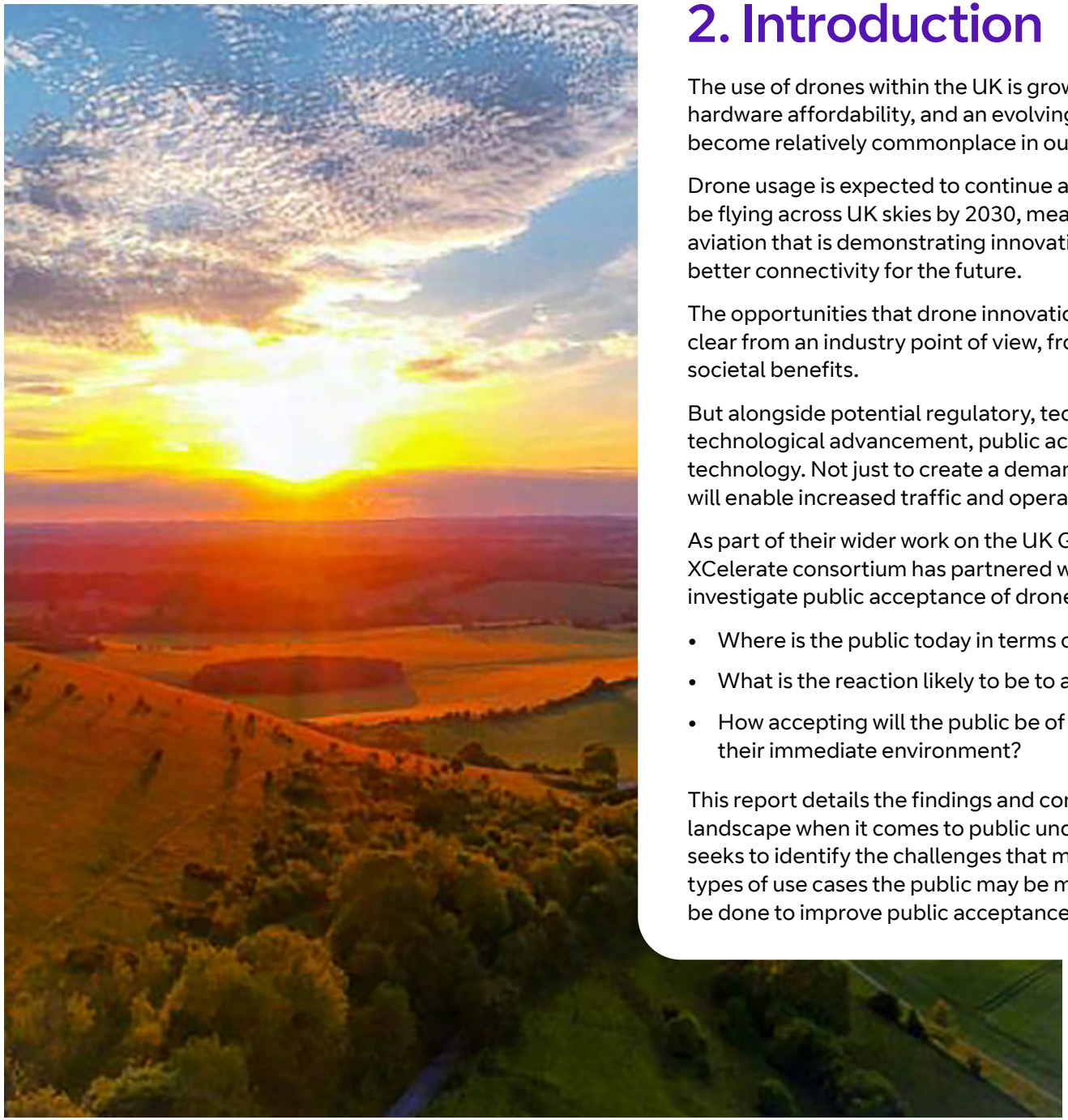
- Regardless of general outlook on drones – whether optimistic or pessimistic – invasion of privacy is a real worry for the public when they consider the increasing use of drones
- There are also concerns around potential drone misuse (in particular, concern around "peeping toms"), and the threat this may pose to public safety
- Concerns around privacy and misuse are underpinned by the widespread perception that drone usage remains largely unregulated. The public will need reassurance that drone regulation exists and is enforced

The public are generally accepting of drone usage for wider societal benefit, but are more wary of usage for purely commercial purposes

- Despite some concerns, the public can see the potential advantages of using drones more widely within society and are open to a range of potential drone use cases, once they hear about them
- Use cases with wide societal benefit – and where the user organisation is highly trusted – are most acceptable to the public, for example drones used in missing person searches, firefighting, and crime scene investigation
- The public are more wary of use cases that seem purely commercial, for example air taxis, grocery delivery, and private security measures

Engagement and information will be key to increasing public acceptance

- The public will need to be educated and inspired if they are to be more accepting of drone technology; the opportunities for drones to deliver positive benefits for wider society will need to be brought to life
- The public will also require further information around the existence and enforcement of drone regulation, to help provide reassurance



2. Introduction

The use of drones within the UK is growing exponentially. Advances in technology, growing hardware affordability, and an evolving regulatory landscape has meant that drones have become relatively commonplace in our skies over the last decade.

Drone usage is expected to continue along this trajectory. According to PwC, 76,000 drones will be flying across UK skies by 2030, meaning the UK will be at the forefront of a new generation of aviation that is demonstrating innovative ways to deliver new services, increased mobility, and better connectivity for the future.

The opportunities that drone innovation presents to the commercial and public sectors are clear from an industry point of view, from boosting the economy through to delivering wide societal benefits.

But alongside potential regulatory, technical and commercial obstacles typical of any new technological advancement, public acceptance will be essential for the effective rollout of drone technology. Not just to create a demand for drone services, but also to create reassurance that will enable increased traffic and operation.

As part of their wider work on the UK Government's Future Flight Programme, the Project XCelerate consortium has partnered with independent research consultancy, Strive Insight, to investigate public acceptance of drone technology and look at a number of key questions:

- Where is the public today in terms of engagement with drone technology?
- What is the reaction likely to be to an increased presence of drones in everyday life?
- How accepting will the public be of the changing aviation landscape and what this means for their immediate environment?

This report details the findings and conclusions of this research. It looks to outline the current landscape when it comes to public understanding of, and attitudes towards drone technology. It seeks to identify the challenges that may be faced in gaining public trust in drones, looks at what types of use cases the public may be most accepting of, and aims to help understand what can be done to improve public acceptance of drones in the future.

3. The current landscape: What do the public think about drones?

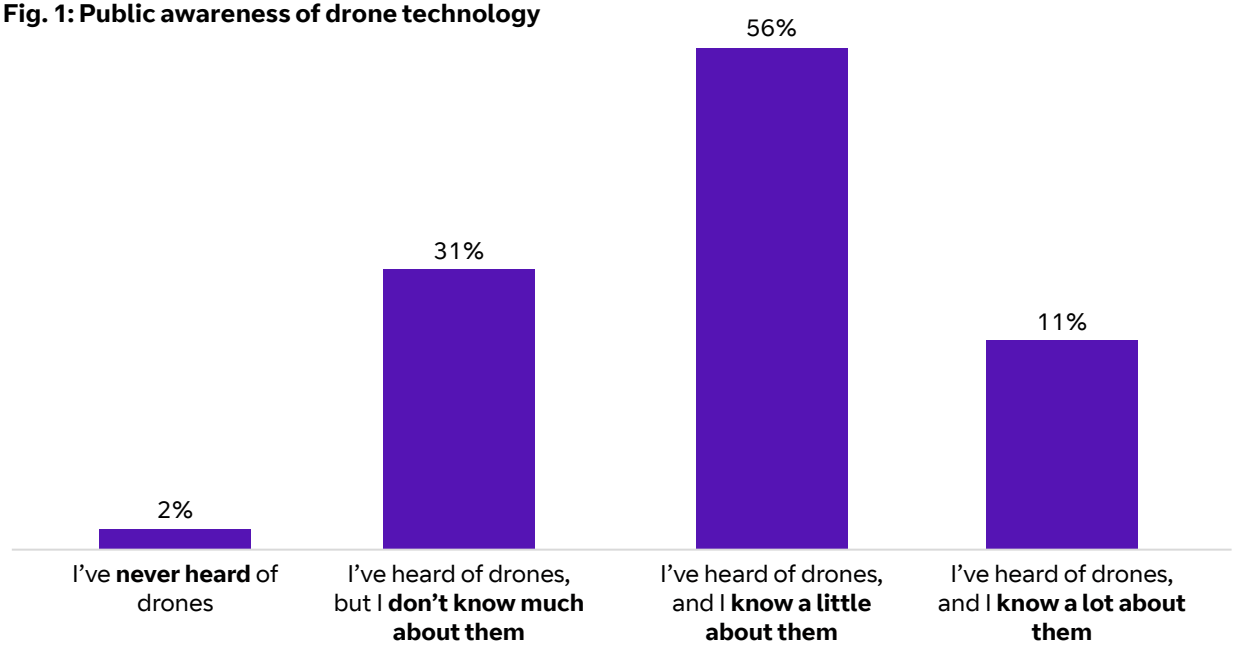
There is high and growing public awareness of drones, but limited knowledge of their capabilities at present

Drone technology is no longer a 'niche' subject area. Public awareness of drones is high, with a majority able to identify the basics; i.e. that drones are:

- machines that fly
- powered by propellers
- unmanned, and remotely piloted.

However there is a lack of knowledge about their full capabilities; a majority say they 'don't know much', or only 'know a little' about what drones can actually do (see fig. 1).

Fig. 1: Public awareness of drone technology

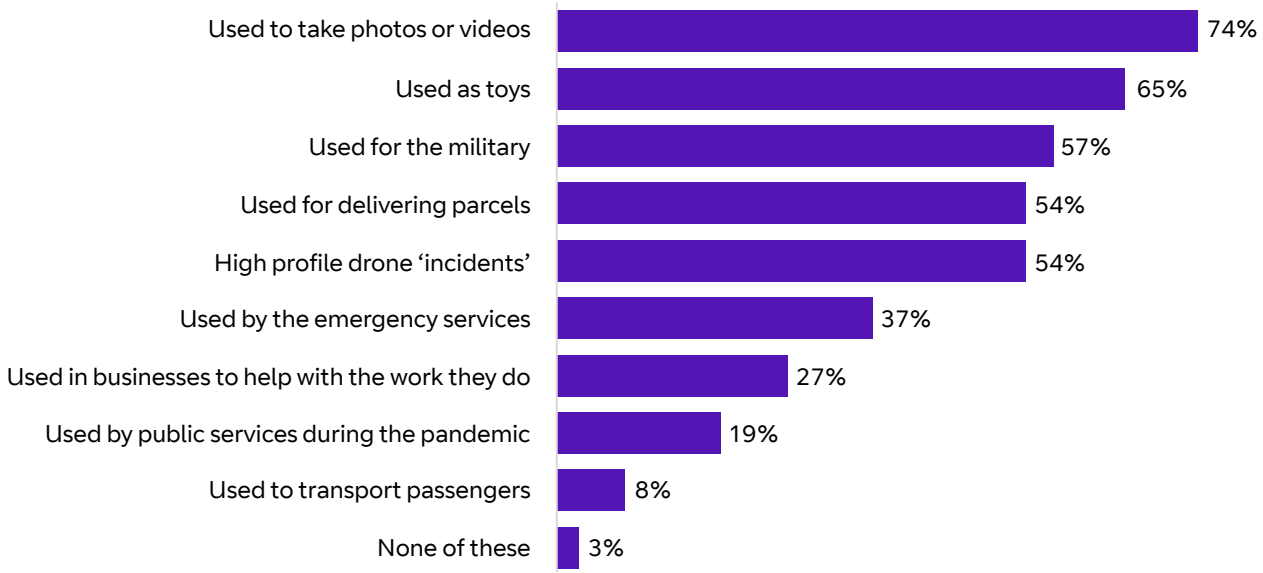


Source: Which of the following best describes your knowledge about 'drones'? By 'drones', we mean unmanned aircraft without a human pilot on board, examples of which can be seen in the below image.
Base: All respondents (n=2,000)

This low level of knowledge is driven by the limited ways in which the public have previously encountered the technology.

Most have heard of drones being used by individual hobbyists – flying just 'for fun' or to take photos – with many aware of friends or family who personally own and use a device (see fig. 2).

Fig. 2: Public awareness of types of drone usage



Source: What kinds of things have you heard or read about drones in the past?
Base: All respondents aware of drones (n=1,968)

Many are also aware of drones being used by the military, having seen news reports on drone strikes in recent conflicts.

However, knowledge about drone usage and capabilities is limited to these ends of the spectrum, and beyond usage in the hobbyist and military spaces, the public is largely unaware of potential civic and commercial applications of drone technology.

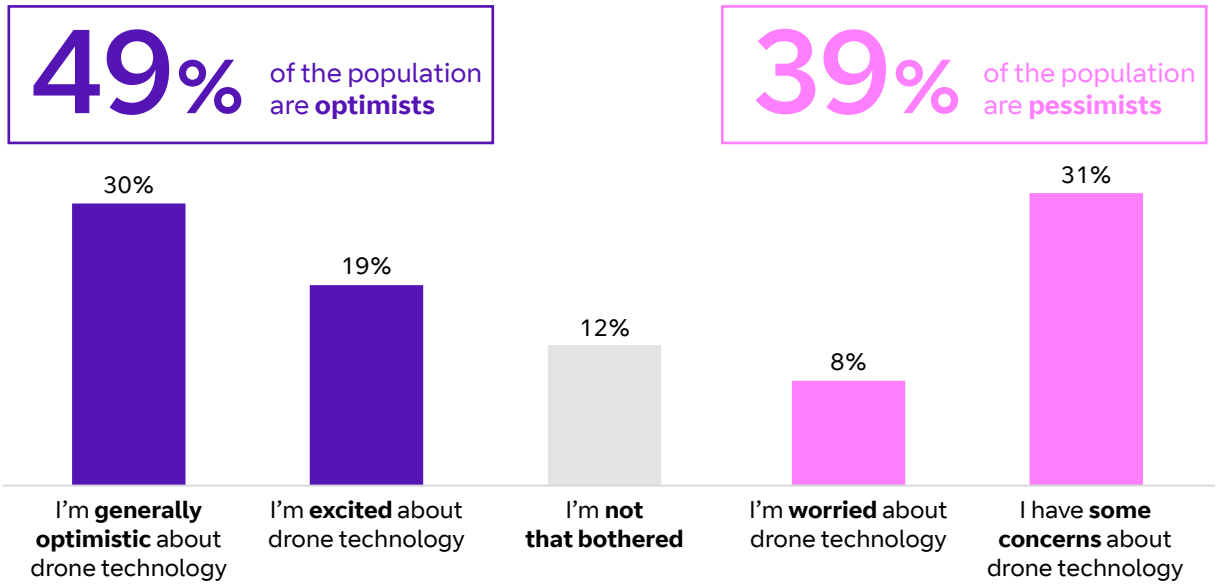
Public attitude towards drones is split

Public opinion is split over whether drones stand to have a positive or a negative impact on society in the future (see fig. 3).

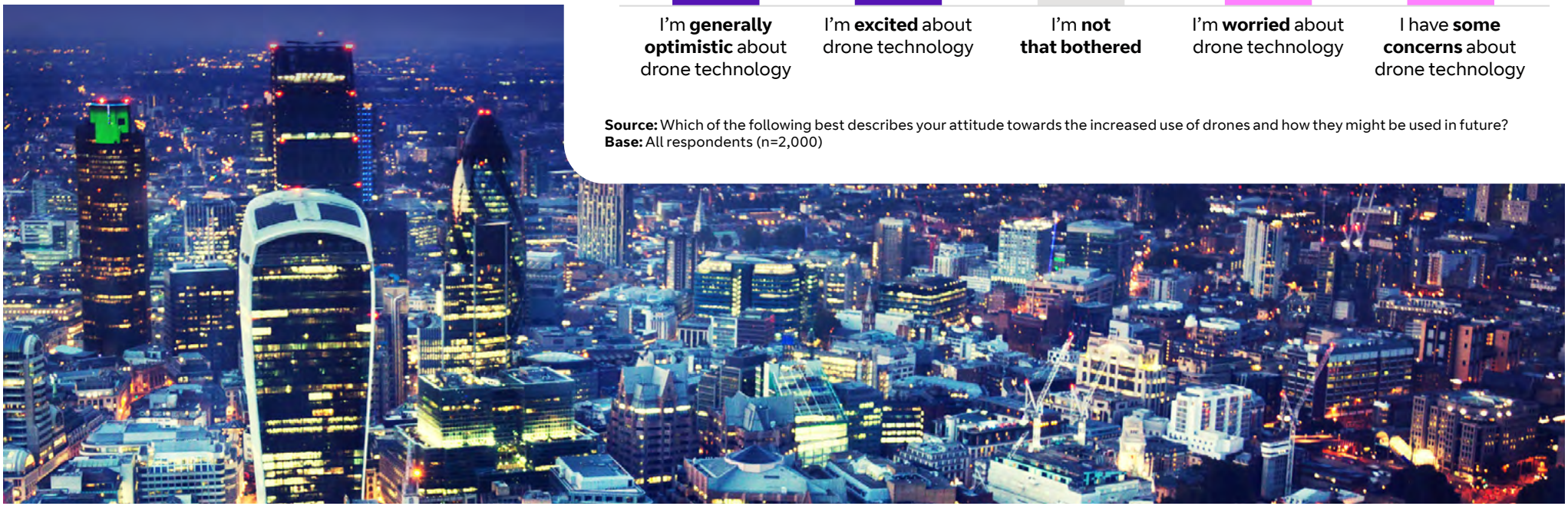
Around half of the UK population can be classified as ‘Optimists’: those who are generally excited about the possibilities of future drone usage and hopeful about the benefits they could bring.

However, there is also a sizable group who can be classified as ‘Pessimists’; those who are more nervous about the prospect of an increase in drone technology, and who will need considerable reassurance before they are fully accepting of drone innovation in our everyday lives.

Fig. 3: Public attitudes towards the increasing use of drone technology in the UK



Source: Which of the following best describes your attitude towards the increased use of drones and how they might be used in future?
Base: All respondents (n=2,000)



Positive opinion about drones is driven by knowledge

The key factor driving differentiation between Optimists and Pessimists is their level of engagement with drones; knowing more about drone capabilities seems to drive positive perception.

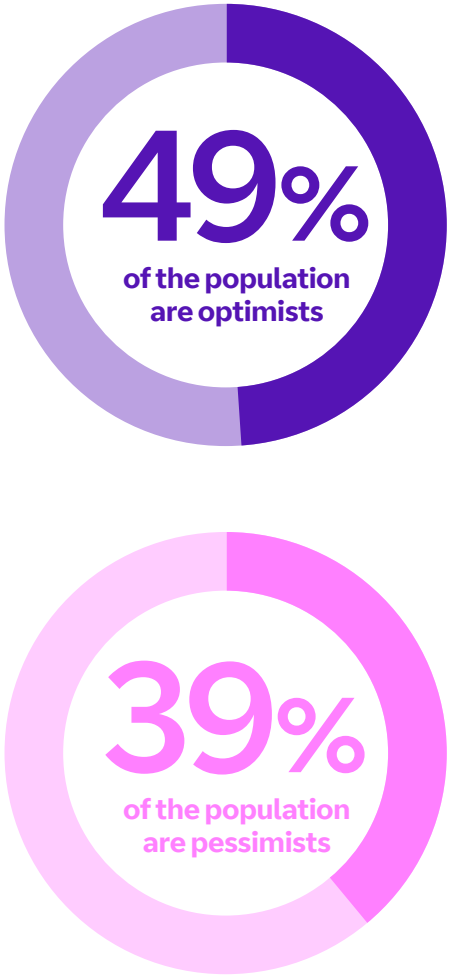
Pessimists have considerably lower levels of engagement with drone technology, their knowledge stemming primarily from the news, where stories may have a more negative slant.

Optimists display much higher levels of engagement with drones; they are likely to be encountering the technology in more informal settings – conversations with friends, and on social media – and are more likely to be aware of drones being used in innovative ways for commercial and civic purposes.

This link between engagement and attitude seems to suggest that the more we can educate the public around drones, the more positive and accepting they are likely to be.

Given the low level of current knowledge around drones, we are at a tipping point in public perception, and now is a good time to engage with the public to help shape the debate.

Fig. 4: Drivers of drone outlook



- **Younger** age groups (under 50)
- Living in **metropolitan/urban** areas
- **More knowledgeable** about drones:
  - **Likely to be engaging with drones outside of the news** – conversations with friends and family, social media, technology publications
  - Higher **awareness of drones being used for commercial** purposes

- **Older** age groups (50+)
- Living in **suburban** Britain
- **Less knowledgable** about drones:
  - Mainly hear about drone in the **news**
  - Largely negative knowledge about drone: **high profile incidents**, **military** use, and future **Amazon deliveries**

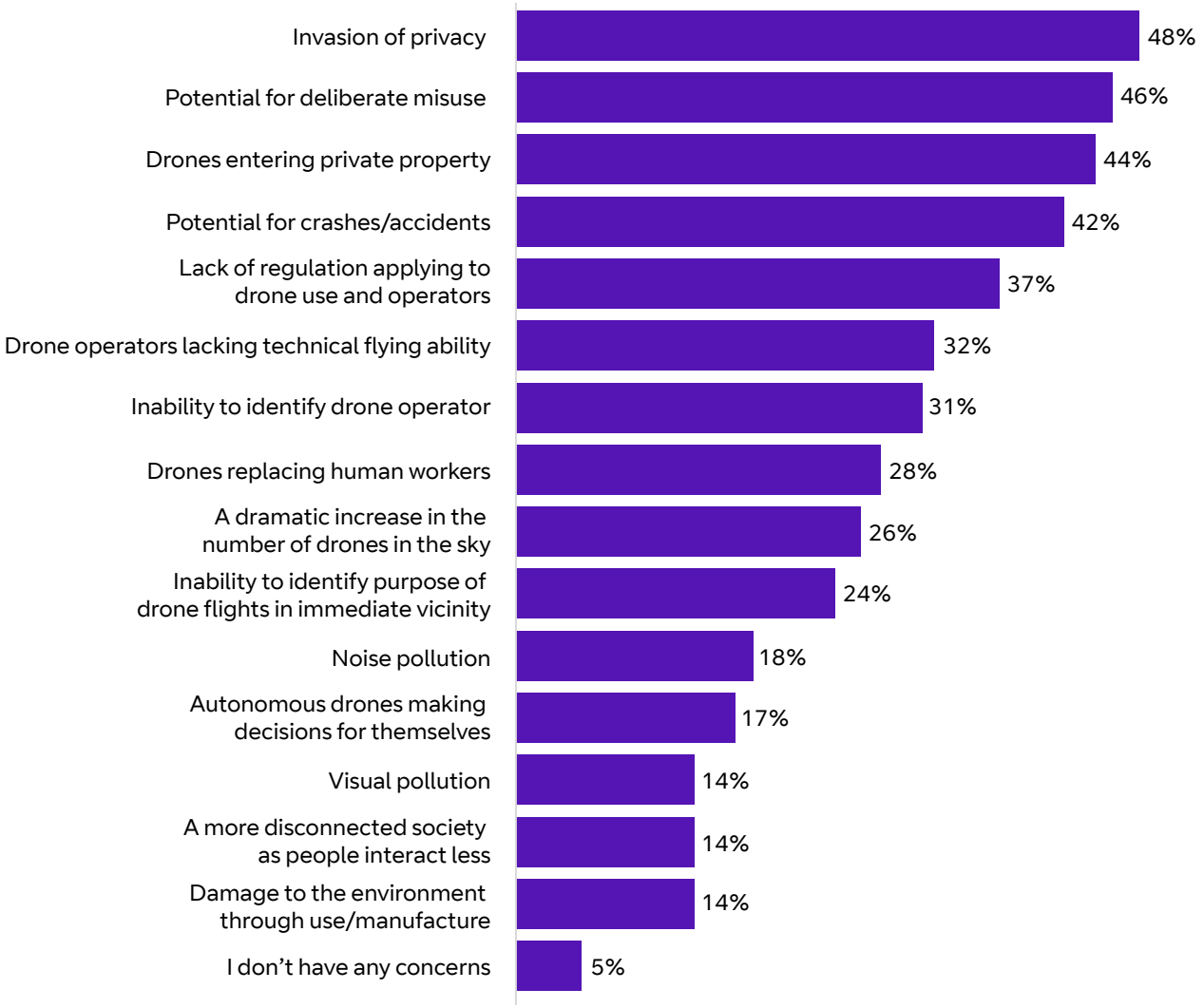
4. The challenge we face: Barriers to the public acceptance of drones

There are concerns that will need to be addressed before the public are fully accepting of drone technology

Regardless of general outlook on drones – whether broadly optimistic or pessimistic – the public have some concerns about how the technology operates, and the impact it will likely have on their lives as usage continues to grow (see fig. 5).

These are key issues that will need to be addressed head-on, with sufficient mitigation measures put in place and reassurance provided, if the public are to be accepting of an increase of drones in UK skies.

Fig. 5: Concerns about drone usage



Source: Here are some things that other people have said they might be concerned about when it comes to drones. Which of these, if any, would be personal concerns for you?
Base: All respondents (n=2,000)

Invasion of privacy is a real worry for the public

Invasion of privacy is the biggest worry the UK public have about drone technology.

There is notable concern over security of personal data: the public have questions over who would own any personal data collected, where it is going to be used and what for, and ultimately what recourse they would have if their trust is abused.

As well as concern over data privacy, the public similarly worry about drones breaching the privacy of their physical property. Many take issue with the prospect of drones entering or surveying on – or close to – their own homes and gardens.

"I think drones can be quite invasive."

"It's a matter of privacy. I might be in my back garden, and suddenly a drone might fly overhead and film me in my personal space."

"It's a question of the data that drones are collecting, and how I'm able to actually give consent for that. I don't think you'll be able to control that."

Source: Quotes from members of the public in qualitative focus groups.

There are concerns around potential drone misuse, and the threat this may pose to public safety

A second key worry for the public is around the potential for deliberate drone misuse.

Interestingly, research interviews with the public demonstrate that while they do have concerns over drones being used for potentially larger-scale harm (e.g. for terrorism, or hacking purposes), the focus of their anxiety is actually more localised in nature; drones being used by "peeping toms" for unsolicited surveillance.

Although smaller-scale, the threat of being 'watched' by someone operating a drone in a deliberately malicious manner was felt to be very real, posing a serious threat to public safety.

"I've seen it on local Facebook pages where people have reported that they've seen drones over people's gardens. And then over the next couple of nights bikes have been nicked from the sheds."

"What if drones went near somebody's window and took some indecent footage? They could capture absolutely anything. And before you know it, social media footage has been posted, and everyone's passing it around."

Source: Quotes from members of the public in qualitative focus groups.

The public will need reassurance around drone regulation – that it exists and is enforced

These concerns around privacy and misuse are underpinned by the perception that drone usage remains largely unregulated.

The public see a gap between drone (mis)use and accountability, and raise important questions around liability. If something goes wrong on a drone flight, who is accountable? If users are operating irresponsibly, how can they be identified and traced? And how, ultimately, can penalties be enforced?

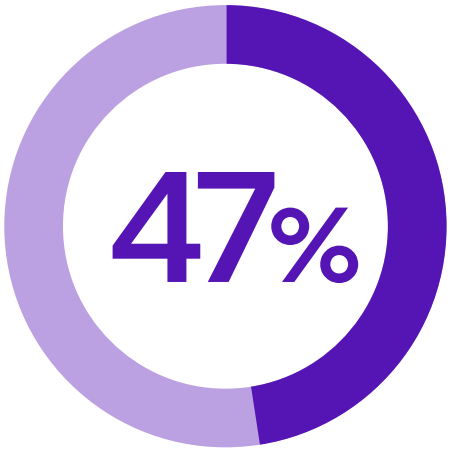
These concerns stem from a lack of awareness around the regulatory framework in which drones currently operate within the UK. Only half of the public are aware that drones are subject to some form of regulation set by the Government and the Civil Aviation Authority (see fig. 6).

"There's no way to trace who is flying the drone if they do something wrong. So you could call the police, but there's nothing that they can do about it, because they don't know where it's coming from."

"I don't know if there are any laws at the moment. It's very ambiguous now I think."

Source: Quotes from members of the public in qualitative focus groups.

Fig. 6: Awareness of drone regulation



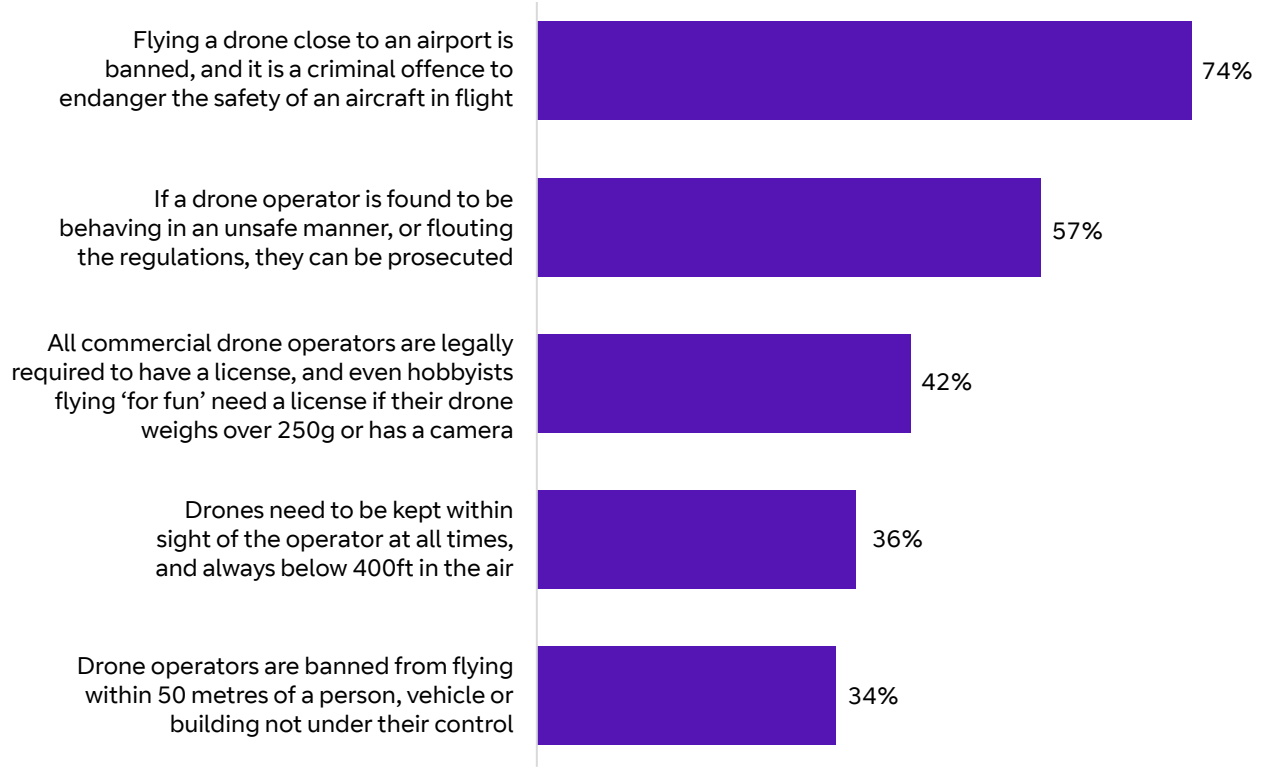
Unaware that drones in the UK are subject to regulations set by the Government and the Civil Aviation Authority

Source:
Drones in the UK are subject to a number of regulations set by the Government and the Civil Aviation Authority. Before today, were you aware of this?
Base: All respondents (n=2,000)

When questioned around the specifics of drone regulation, awareness declines further. Whilst there is reasonable awareness of regulation surrounding drones flying close to airports (likely due to recent high-profile incidents in the UK), knowledge is generally lacking when it comes to some of the most basic rules of drone operation (see fig. 7).

Raising awareness of regulation around drone licensing, prosecution for unsafe flying, and sanctioned distances from people, vehicles and buildings, could help in providing public reassurance.

Fig. 7: Awareness of specific drone regulations (% aware)



Source: Below are some of the current regulations in place governing the use of drones in the UK. Before today, did you know that...?
Base: All respondents (n=2,000)

5. Drone usage and applications: What is acceptable to the public?

The public see the benefits of drone usage, with human safety, human capability extension and environmental benefits the most resonant

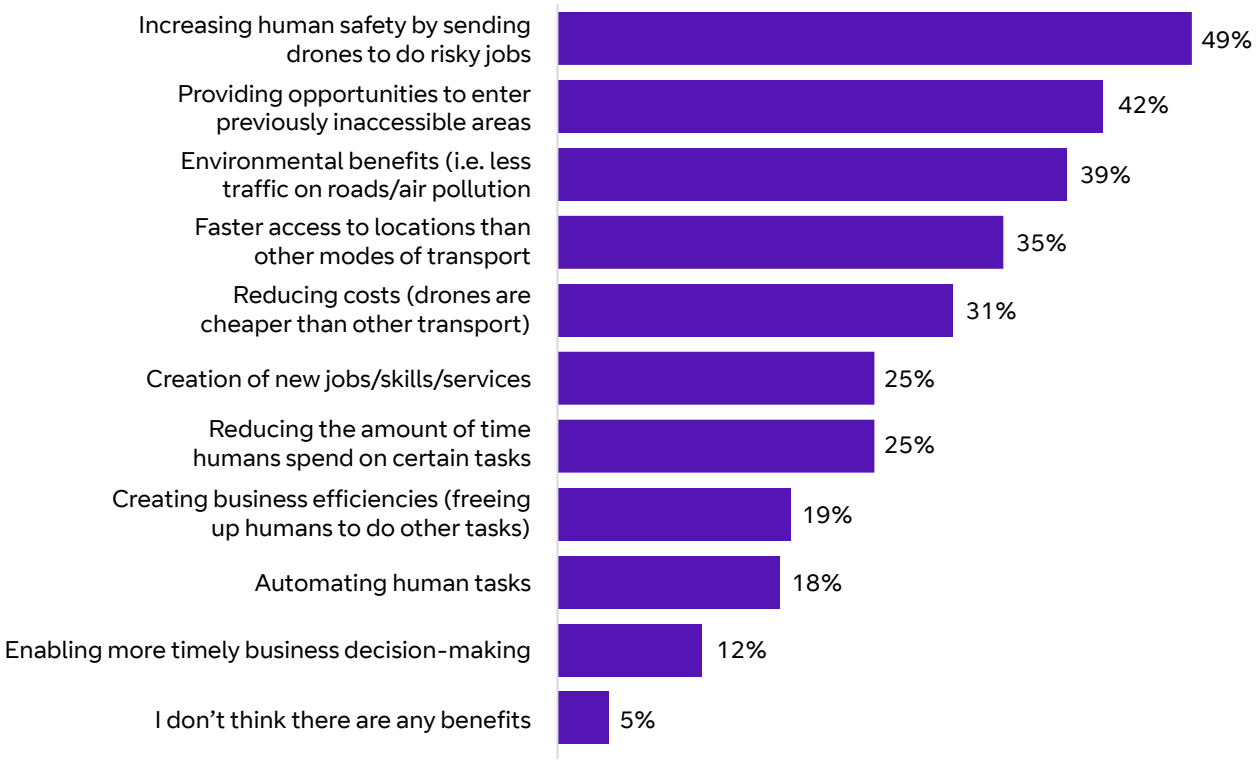
Despite some concerns around drone technology, the public can see beyond these, to the potential advantages of using drones more widely within society (see fig. 8).

When thinking about the advantages of drone usage in general (i.e. not attached to a specific usage), it is human safety that is most resonant for the public. Many are able to see the benefits of sending a drone in to complete tasks in dangerous or hazardous situations, instead of sending a person.

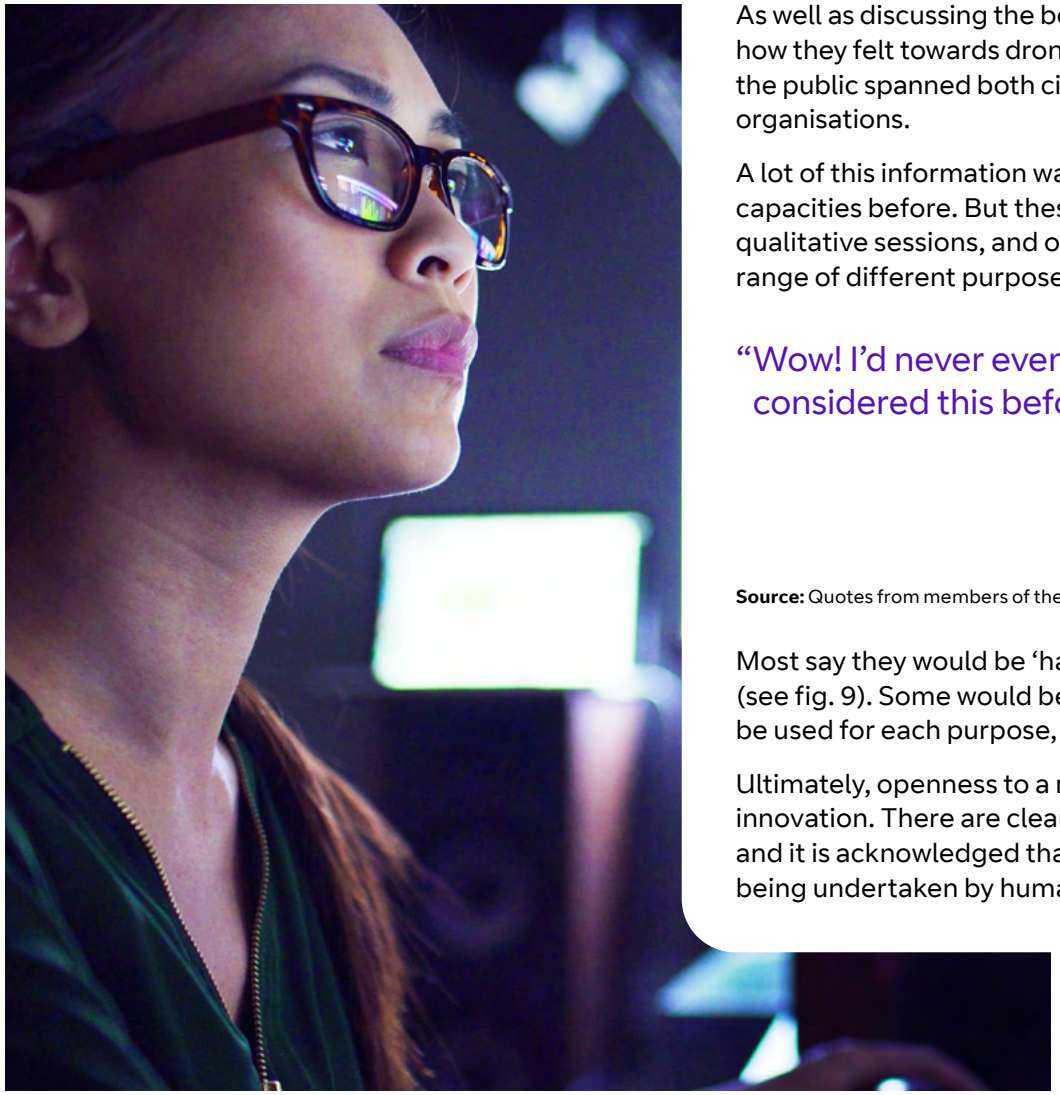
The ability of drones to add significant value to 'human approaches' was also noted, by extending human capabilities and providing opportunities to enter otherwise inaccessible areas.

The environmental benefits of drones are also compelling for the public, with the prospect of less traffic on UK roads – and the associated reduction in air pollution – another key advantage of drone usage.

Fig. 8: Perceived benefits of drone usage



Source: Here are some things that other people have said might be benefits of drones being used by individual hobbyists and organisations. Which of these, if any, would you agree with?
Base: All respondents (n=2,000)



The public are open to a range of potential drone use cases, once they are introduced to them

As well as discussing the benefits of drones at a general level, the public were also asked to think about how they felt towards drones being used for a series of specific use cases. The examples presented to the public spanned both civic and commercial uses, with drones being operated by a range of different organisations.

A lot of this information was 'new' to the public: most had not heard of drones being used in these capacities before. But these use cases proved engaging; the public were keen to hear more during the qualitative sessions, and our quantitative research confirms an openness towards drones being used for a range of different purposes.

"Wow! I'd never even considered this before"

"I had no idea drones could be used for these kinds for things – it's really opened my eyes."

"I am sort of taken aback by the potential. It's pretty mind boggling, really. And it's quite exciting."

Source: Quotes from members of the public in qualitative focus groups.

Most say they would be 'happy' for drones to be used for the large majority of the 20 use cases tested (see fig. 9). Some would benefit from knowing a little more about the practicalities of how drones would be used for each purpose, but none of the use cases were rejected outright.

Ultimately, openness to a range of use cases is based on the fact the public can see real opportunities for innovation. There are clear examples in which using a drone has a genuine benefit over not using a drone, and it is acknowledged that drone usage in many cases would add considerable value to the work already being undertaken by humans, as well as conceivably extending those human capabilities.

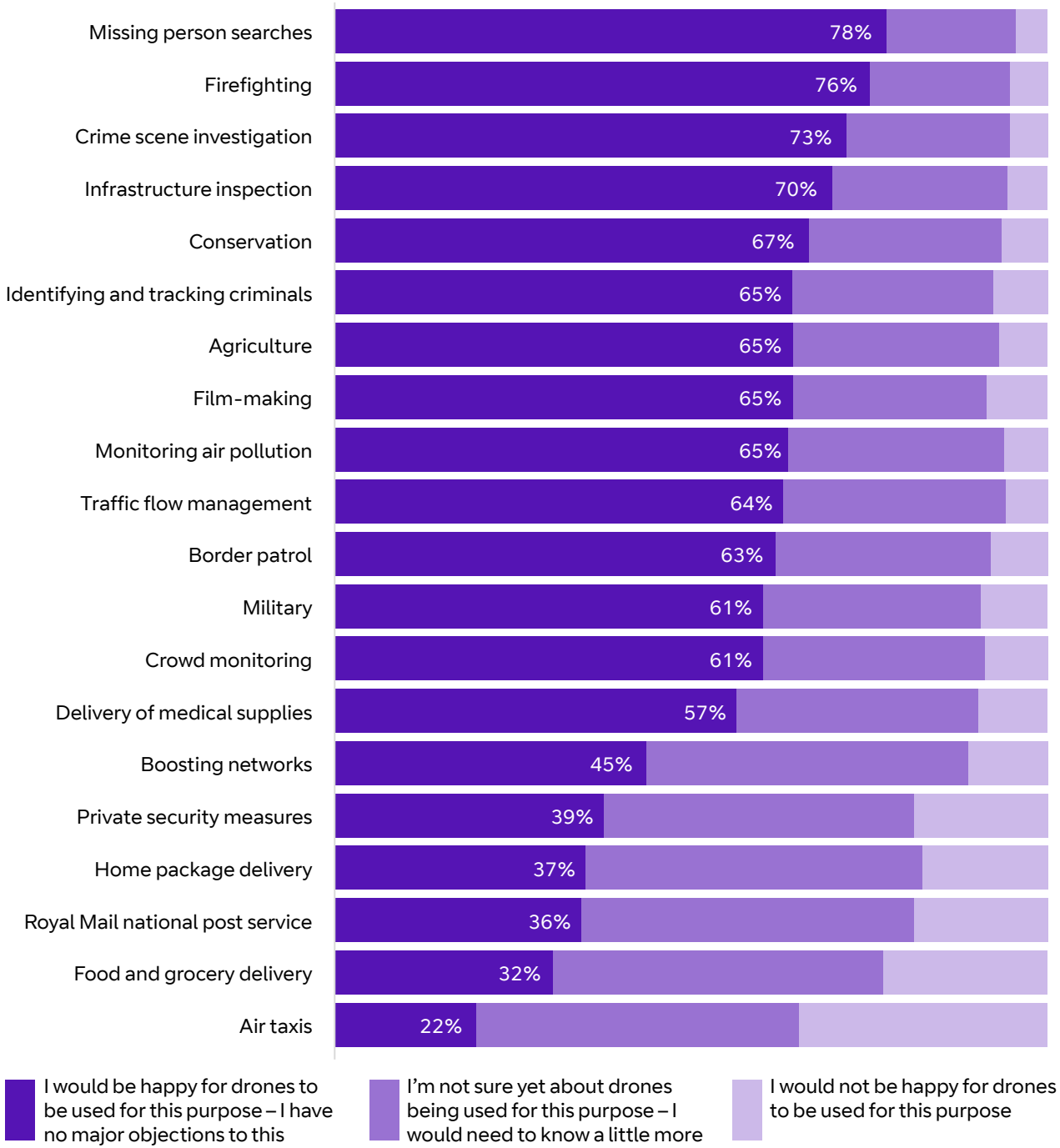


Fig. 9: Public acceptability of drone use cases

Source: Below are a number of examples of how drones might be used by businesses and organisations in future. For each example, please tell us how you feel about drones being used for this purpose.
Base: All respondents (n=2,000)

There are two primary drivers of public acceptance

Our research has found that there are two key drivers of public acceptance when it comes to drone usage:

- firstly, a high degree of trust placed in the drone operator – key to establishing a base level of confidence among the public
- secondly, the scale of the benefit – where wide-reaching benefits can outweigh the perceived risk of drone usage.

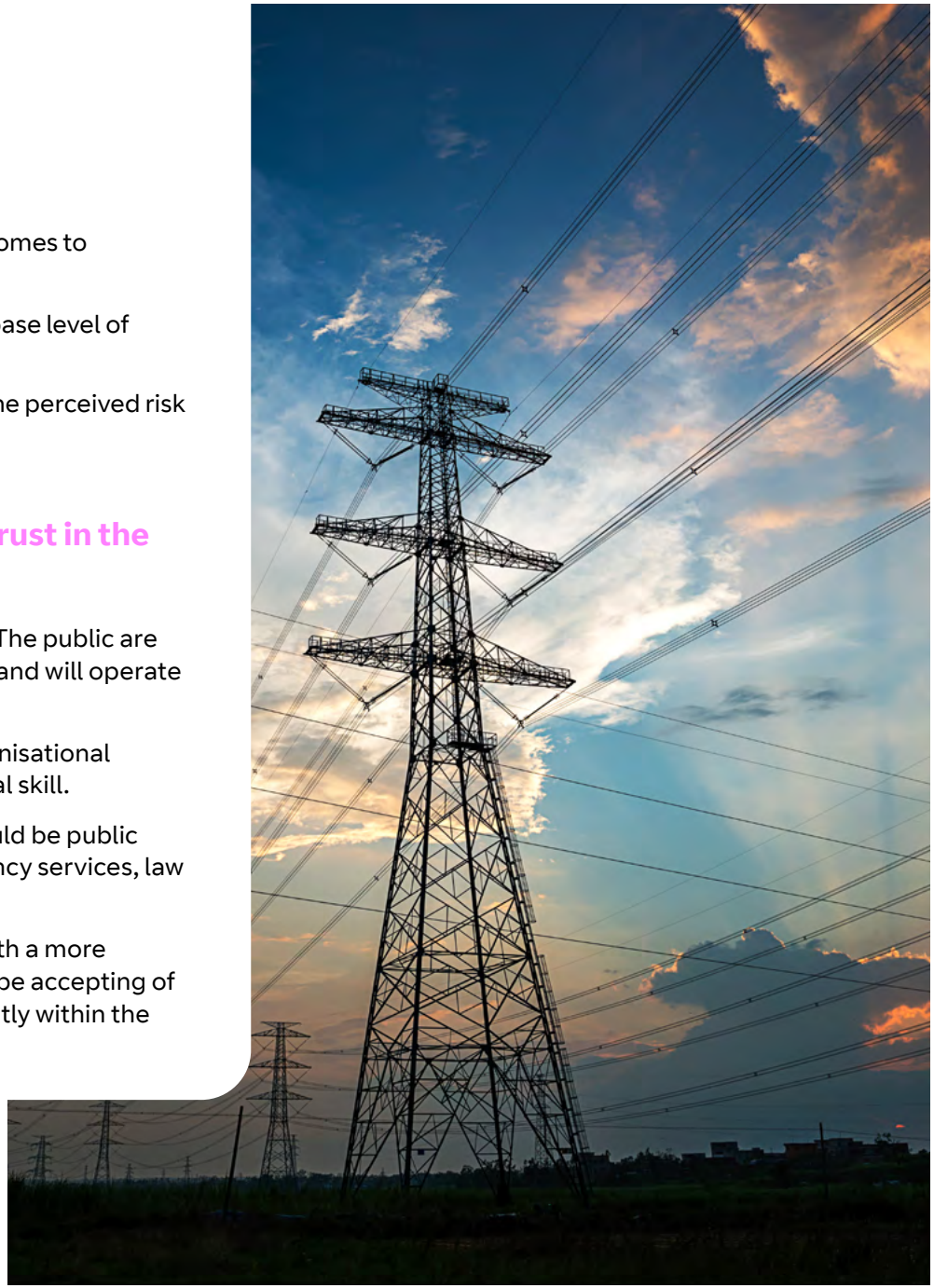
Most acceptable drone applications will require a high level of trust in the operator organisation

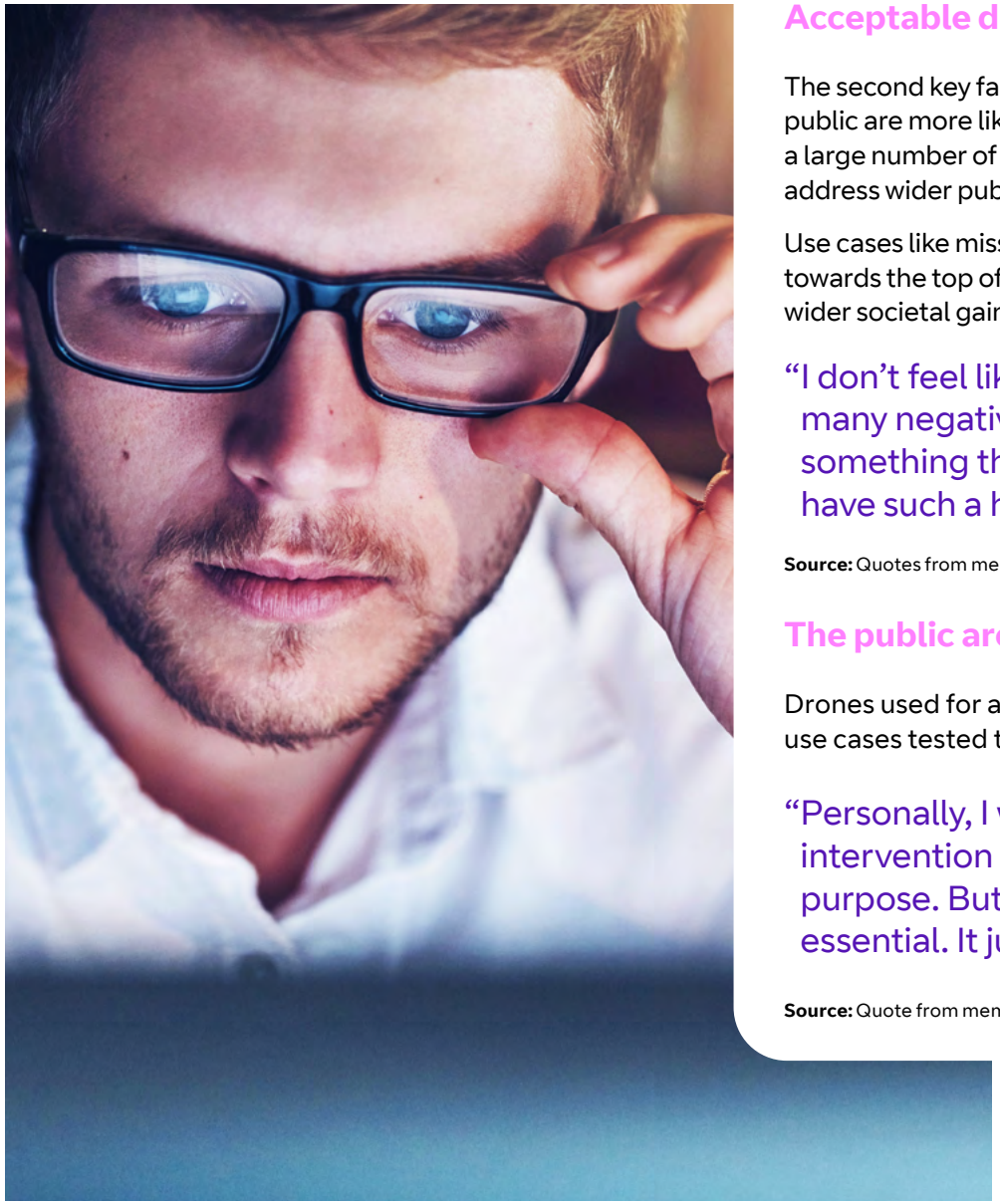
The level of trust placed in the drone operator is key in driving public acceptability. The public are more likely to be accepting of a use case when they believe that the drone user can and will operate the technology safely and in good faith.

Use case acceptability is highest where the operator is deemed to have strong organisational integrity and judged likely to be operating legally and with a high degree of technical skill.

Organisations that tend to command a high level of public trust in this instance, would be public bodies offering critical public services and civic organisations, for example emergency services, law enforcement, and national infrastructure.

A high level of trust in the operator organisation is especially important for those with a more pessimistic outlook on drone technology. Pessimists in particular are more likely to be accepting of drone use cases when they trust that a user would be operating safely and compliantly within the regulations.





Acceptable drone applications will also provide wide-reaching benefits

The second key factor influencing public acceptance is who stands to benefit from the drone usage. The public are more likely to be accepting of drone use cases when the benefits have the potential to impact a large number of people; where benefits accrue to others beyond just the operator, and potentially address wider public concerns.

Use cases like missing person searches, firefighting, conservation, and monitoring air pollution – towards the top of the acceptability hierarchy – are good examples of where drones can be used for wider societal gain.

"I don't feel like you can really have many negative thoughts about something that's obviously going to have such a huge benefit to society."

"I think anything that's going to have a positive impact for so many people is a good thing."

Source: Quotes from members of the public in qualitative focus groups.

The public are more wary of use cases that are purely commercial

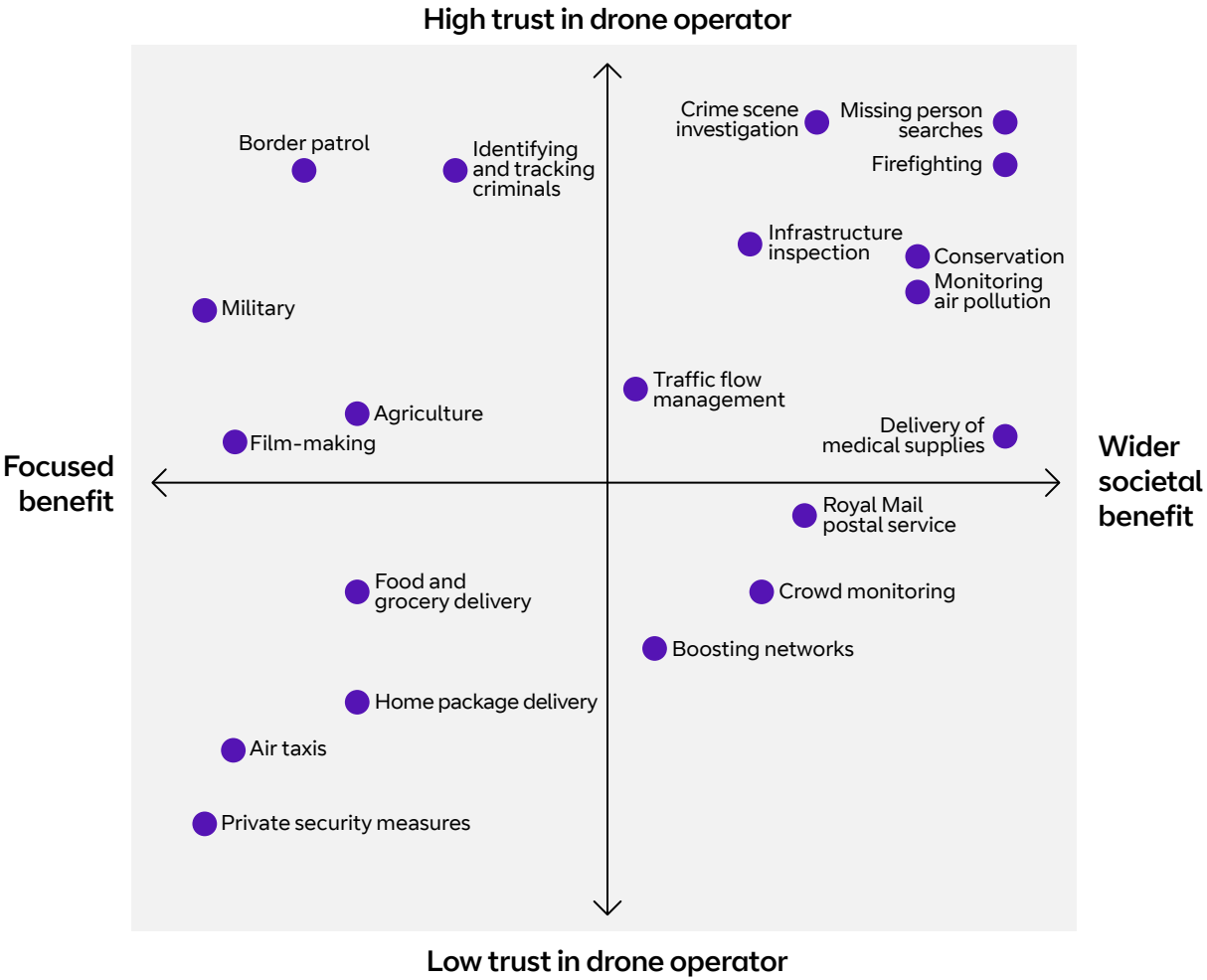
Drones used for applications such as air taxis, grocery delivery, and private security are among the use cases tested that were least acceptable to the public.

"Personally, I would say using drones for things like firefighting, emergency intervention etc is great, because they are clearly being used for a good purpose. But using a drone to deliver a takeaway, for example, is not really essential. It just seems like overkill."

Source: Quote from member of the public in qualitative focus group.

The public are hesitant about drones being used for applications that have a more commercial focus. These can be viewed as 'frivolous', with benefits not widespread enough to warrant the perceived 'risk' of drone operation.

Fig. 10: The key drivers of drone public acceptance



Source: Qualitative mapping of the acceptability of drone use cases

6. Moving forward: How can we unleash drone benefits while improving public acceptance?

Although the public are broadly aware of drones, their knowledge is limited, and the conversation has yet to properly begin about the benefits they could bring to everyday life.

Whatever the general outlook on drones – whether holding a more positive or negative view – the public have some key questions about how they might operate. To help speed up the public acceptance of drones, efforts should be focused in two key areas:

Engagement and inspiration

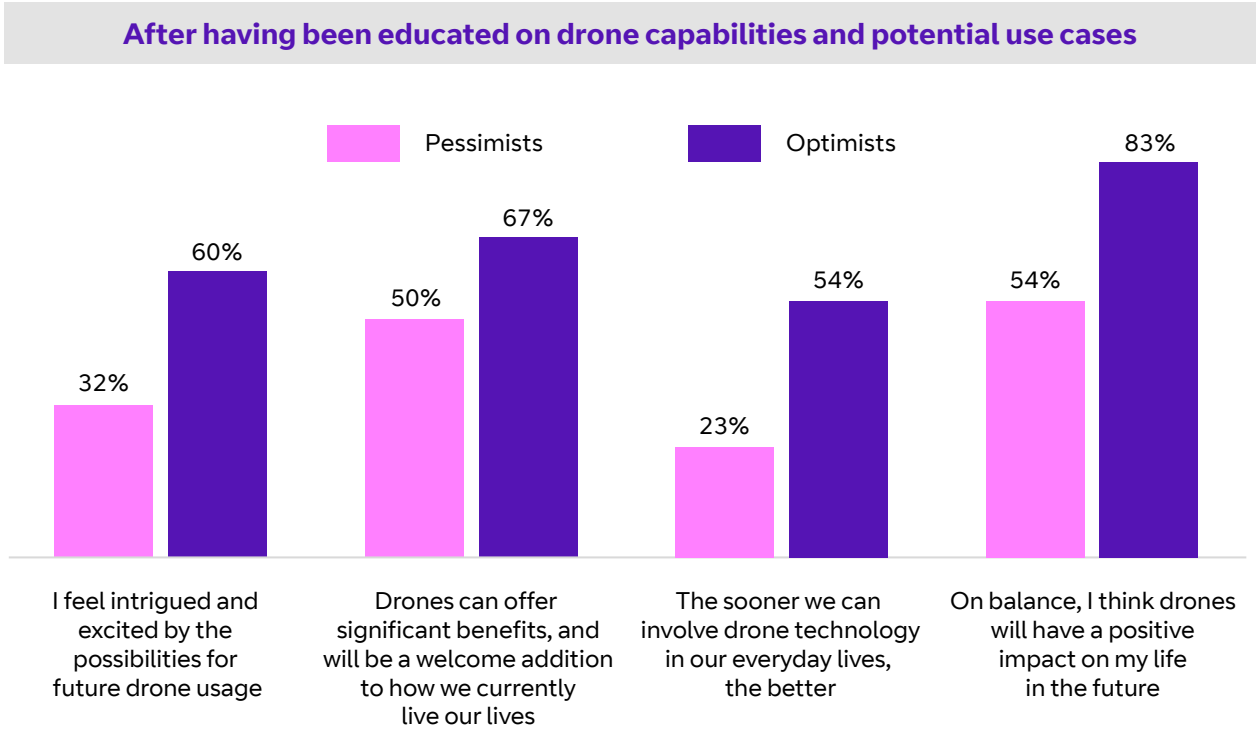
Our research has demonstrated a genuine public appetite for information around drone capabilities, and the potential real-world applications.

The public have shown to be both engaged and excited by the future possibilities of the technology, and the data confirms that education around the capabilities of drones and potential use cases are persuasive tools in driving acceptance, even amongst those who initially had a more pessimistic outlook (see fig. 11).

How do we drive public acceptance of drones?

The public will need to be educated and inspired, and the opportunities for drones brought to life with compelling use cases.

Fig. 11: Perception of drones post-education (total % agree with each statement)



Source: For each of the pairs of statements below, please indicate which best represents your point of view...
Base: All Pessimists (n=773) and Optimists (n=985)

68%

of the British public believe that drones will have a positive impact on their life in the future

Information and reassurance

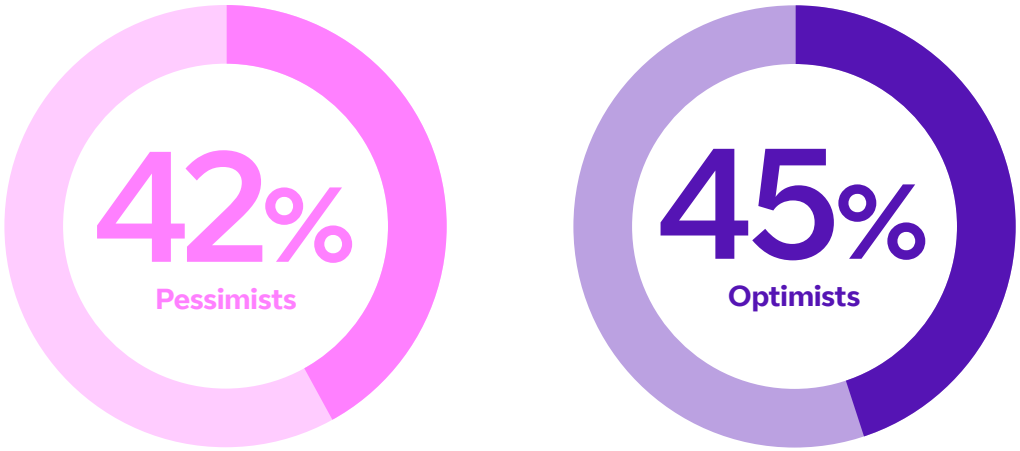
Drone technology is still new to a vast majority, and the public understandably have some concerns about what this new future of aviation may look like in reality. Many concerns stem from a lack of understanding around how drone misuse would be dealt with though, as knowledge of the regulatory landscape is unknown to most.

Information around the basics of drone regulation, however, is shown to have a positive impact on reassuring the public about the increased use of drones in the future (see fig. 12).

How do we increase public acceptance of drones?

The public will need further information around the existence and enforcement of drone regulation, to help provide reassurance.

Fig. 12: Percentage who 'feel more reassured' after being educated on drone regulation



Source: Given what we've told you about how drones are regulated in the UK, how does this impact on your perception of drones?
Base: All Pessimists (n=773) and Optimists (n=985)

7. Project XCelerate and the future of drone flight

Overall, this research highlights the importance of engaging and informing the public on the potential of drone flight to enhance lives, as well as addressing any concerns they might have on the future use of drone technology.

Project XCelerate will conduct flight trials along the 8km-long zone to prove to the public and industry that, with the correct technology and infrastructure in place, safety standards can be met for secure and responsible commercial drone usage in unrestricted airspace, when flown beyond visual line of sight and in the same airspace as manned aircraft.

The project will demonstrate how drones can support ground-breaking use cases such as search and rescue, infrastructure inspection, precision agriculture, and even the delivery of medical supplies to help improve access to healthcare and save lives. By demonstrating the positive impact of drones through real world use cases, Project XCelerate aims to help influence existing airspace restrictions to safely unlock the potential for drone technology.

The Project XCelerate consortium recognises that unlocking the potential of drones requires close collaboration with a number of key stakeholders, from the public, Government, regulators, and the industry. Through partnerships with world leading experts, the project aims to help contribute to safely opening up the skies, creating new opportunities for the future of drone flight.

8. About the research

Strive Insight undertook a two-stage programme of research during 2021.

Stage 1: Qualitative research to understand public engagement with drones and the acceptability of future drone use cases

What did we do?	8 x online focus groups with the public • 90 minute sessions • Conducted online
Who did we speak to?	40 respondents in total • General population sample • UK-wide coverage • Representations across all age groups

Conducted in March 2021

Stage 2: Quantitative research to measure current opinion on drones and the size of the public acceptability challenge

What did we do?	Quantitative online survey
Who did we speak to?	N=2000 respondents • UK nationally representative sample • Quotas set on age, gender and region

Conducted in April 2021

9. About the Project XCelerate consortium

BT, together with Altitude Angel and a number of UK tech start-ups, have been selected by UK Research and Innovation to deliver a Future Flight Challenge project called Project XCelerate. The consortium plans to establish a commercial drone zone in open and unrestricted airspace, located south of Reading, Berkshire.

Joining BT, the consortium includes drone technology experts from Altitude Angel, Dronecloud, HEROTECH8 and Skyports, cyber-security provider Angoka, and end user experts SkyBound Rescuer and DroneStream.

Altitude Angel is the world's leading provider of UTM (Unmanned Traffic Management) software, enabling those planning to operate, or develop UTM/U-Space solutions, to quickly integrate robust data and services with minimum effort. Today, Altitude Angel's market-defining technology is providing a critical, enabling service on which the future of automated navigation in towns, cities and at key infrastructure locations will be built.
https://www.altitudeangel.com/

Angoka provides hardware-based solutions for managing the cyber-security risks inherent in machine-to-machine (M2M) communication networks, such as those used for Connected and Autonomous Vehicles, Critical National Infrastructure and Industry 4.0.
https://angoka.io/

Dronecloud is a cloud-based Software as a Service (SaaS) solution targeted at enterprise level drone operations, built for drone operators by drone operators. Our platform and evolving eco-system integrates complex drone fleets, team based project management, real-time airspace and ground hazard data into a risk assessed and auditable workflow built for mission critical drone ops.
https://dronecloud.io/

DroneStream is a software platform that allows drone operators to collaborate with their clients or teams in real-time.
https://www.dronestream.io/

HEROTECH8 is a robotics start-up developing drone-in-a-box technology for security, public safety and industrial inspection applications. Our technology enables end-users with a means of remotely and automatically deploying, recovering, and recharging drones without the need for an on-site pilot.
https://www.herotech8.com/

SkyBound Rescuer offers industry leading research and consultancy services into best practice for the use of drones in public safety.
https://skyboundrescuerproject.com/

Skyports is an advanced air mobility company developing and operating landing infrastructure for the electric air taxi revolution, as well as operating cargo drone deliveries.
https://skyports.net/

BT is the UK's leading telecommunications and network provider and a leading provider of global communications services and solutions, serving customers in 180 countries. BT's purpose is as simple as it is ambitious: we connect for good. From improved mobility, connectivity, healthcare and manufacturing output, to reduced road congestion and pollution, automated drone technology will transform the quality of our lives. As a leading connectivity and technology partner for UK businesses and the public sector, BT is trusted to deliver fast, reliable cellular connectivity for people, devices and machines across the country. This positions BT well to lead an exciting new chapter for the UK – bringing together the best of mobile communication and aviation industries in the development of commercial drone flights.

Offices Worldwide

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