Parrot

To: Senate Standing Committees on Rural and Regional Affairs and Transport References Committee

Subject: Inquiry into Remotely Piloted Aircraft Systems (RPAS), Unmanned Aerial Systems (UAS) and associated systems

About Parrot

Founded in 1994 by Henri Seydoux, Parrot (the "Company") is a French technology firm that has a strong international focus and has successfully adapted its business model over the years.

Headquartered in Paris, the Company employs more than 1,000 people worldwide, with nearly half focused on research and development, and it generates the vast majority of its sales in international markets. The Company has been listed on Euronext Paris (FR0004038263 – PARRO) since 2006.

Pioneering the identification of tomorrow's technologies, the Company initially developed its -business around hands-free communication systems and infotainment solutions for the automotive industry, a market on which it has a leading position today.

After the Company floated on the stock market in 2006, the Company has gradually diversified its activities, developing and selling retail products in the connected devices sector, focusing in particular on audio and gardening products with a view to exploring a range of innovative technologies.

Since 2009, the Company has also started to design and sell drones, benefiting from the research work carried out by its Innovation Lab.

Building on its success in the consumer drone market, the Company is developing its drone offering for commercial markets, combining a range of advanced solutions around hardware, software and services.

As a result of these gradual changes, Consumer Drones and Commercial Drones represented 56% of the Company's revenues in 2015, compared with 34% of the Company's revenues at December 31, 2014 and 18% at December 31, 2013.

Australia represents about 15% of our global sales.

Safety first

Parrot is firmly committed to the safety of its products. We continue to invest in technology features which enhance safety, and in educating both consumer & commercial operators about the rules of safe flight. Parrot is already cooperating with EASA, JARUS and national aviation authorities globally, and stands ready to collaborate with Australian policy-makers on these issues, including through working groups.

We strongly believe that the safe operation of drones requires a culture of compliance amongst drone operators. This is best achieved through operating rules which are clear, enforceable, and harmonized at a national level. A plethora of diverging requirements across locations undermines safety, and makes it more difficult for manufacturers to communicate the operational rules to their operators, or to implement safety features. In this context, we hope that Australian law will be as aligned as possible with international concepts and rules developed by JARUS, whenever possible. We also hope that no major change will be adopted to the recently adopted regulation, as it could only confuse users, especially hobbyists.

Risk-based approach, clear and enforceable safety rules

Drones come in a variety of sizes, weights and performance capabilities, which present challenges in regulating with a one-size-fits-all approach. We therefore support the approach

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taken by CASA to differentiate applicable rules in categories, in line with the risk associated with operations, especially for low-risk operations (E.g. below 2 kg category, and private landowner rules).

How to improve safety?

Operator liability, registration and education

It is a basic principle of aviation that the operator (pilot in command) is responsible for the operation. While there are significant differences between civil drones and manned aircraft, especially in the light and ultra-lightweight categories, we agree with the view that this principle must be maintained in unmanned operations, in line with the recent Riga Declaration.

We believe that the introduction of the compulsory registration of drone operators would help increase compliance and accountability. A **registration system could be created as it would**:

- encourage compliance through a user-friendly process, suitable for mass market products
- be online, free of charge, and fast (without waiting time post registration)
- register the drone operator and assigns a unique number to the person, not the drone
- clearly state the applicable rules (safety and other) and asks the registrant to acknowledge them
- allow the immediate printing of the unique operator registration number for the drone marking, or an equivalent digital marking (e.g. serial numbers)

This online registration system could evolve in a multi-purpose platform supporting continuous improvement with training modules or information campaigns. Our company is committed to help educate drone operators to ensure safe operations at all times. We do this by including leaflets in all boxes ("Know Before You Fly") and through our corporate online presence. We have worked closely with regulators to develop user-friendly and effective manuals, as well as an awareness campaign.

A technology-neutral approach

Drone technology and drone safety features are developing at an incredible pace.
Parrot is in favour of a technology-neutral approach. It proposes requirements focusing on objectives to be achieved or performance-based standards while allowing different means of compliance. It offers CASA the flexibility to swiftly adjust targets as technology evolves. It's key to be able to adjust of rules based on fast paced technological advances and emerging evidence.

Australia has chosen a simple and flexible approach, which could inspire other countries

With its 12 years of experience in drone regulation, CASA has taken a real lead compared to other developed countries. Its foundational drone laws in 2002 represented a world first, and gave Australia a clear competitive lead on a global scale. This foresight formed a significant part of Parrot's motivation to invest in the Australian market, where its hardware has formed the backbone for important local research programs, commercial endeavours, and consumer enjoyment. The global commercial drone market size was estimated to be USD 552 million in 2014 and is expected to grow at a CAGR of 16.9% by 2022. Increased applications in agriculture and law enforcement sectors are expected to favorably impact the market over the forecast period. UAVs have useful applications in various industrial verticals including military, homeland security, natural resources, construction, agriculture, and retail.

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With the recent regulatory changes, CASA has shown similar forethought. By creating a 2 kg category for commercial flights, CASA incentivises the use of the lowest-risk tools for a wide array of applications. However, in saying this, the Company believes that more flexibility could be considered for FPV[1] flights, as it is now a wide-spread technology well accepted in many countries as long as an observer is present to observe the environment (USA, New Zealand, France, United Kingdom). The current Australian system, which requires pilots to register to a model aero association (MAAA), is very restrictive and prevents the use of FPV, and subsequently reduces the applications available (E.g. in oil and gas refinery safety inspections).

Drones are a game changer

Drones are useful in many situations as a "remote eye" or as a replacement to a scale. It is well documented that it is in the dull, dirty or dangerous activities that drones have best been put to use, improving effectiveness and reducing the levels of risk exposure. In some cases, they have been a game changer. Here are some examples:

1. Firefighters fight floods with drones

This highlights a perfect application example that would be supported by the newly created sub-2kg regulation.

Situation: In December 2015, the Seine-et-Marne Fire and Emergency Department (France, next to Paris) made initial contact with Parrot, seeking assistance in the identification of potential uses for drones in the emergency services industry. The Bebop 2 drone met the needs identified in conventional theatres of operation: light and maneuverable, the device quickly obtains air imagery which is useful for making decisions in the field.
Through the SDIS77 (Fire and Emergency Department 77), Commander Olivier Compta, in charge of the drone project, decided to use drones more systematically in order to optimise the different field initiatives.

Mission: The heavy rain at the end of March 2016 in the Paris region caused high levels of flooding in many towns. On Thursday 2 June 2016, the flood peak was announced.
In anticipation of the flood peak, the fire brigade foresaw an extra need for local air shots. Parrot joined the firemen at the flood locations with three pilots and spare drones.

The ability to remotely and safely monitor the impacted areas was a precious resource during the management of this crisis. Aerial imagery captured by the drones enabled emergency services to monitor the gradual rise in water levels, and made it possible to decide whether or not to launch operations, to adjust the flood recession forecasts, and to deploy resources in the most relevant areas.\

The most useful function was the live video feedback enabled by the FPV function. The fire brigade operational centre (CODIS) used these videos in real time to anticipate the situations and direct necessary resources.

Impact: For firefighters, during major missions such as fire suppression or responses to natural disasters, it is essential to prioritize the operations in order to manage the human and material resources available. Aerial imagery provided by drones offer an ideal solution for

[1] First-person view (FPV), also known as remote-person view (RPV), or simply video piloting, is a method used to control a radio-controlled vehicle from the driver or pilot's view point.

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mapping locations. Today, two complementary solutions may be adopted in the field: Helicopters and drones.

While helicopters are essential on rescue missions for transporting people and for general mapping over long distances, it is preferable to use the drone for pure identification missions in order to optimize deployment times and costs, whilst significantly reducing the need to place helicopter crews in dangerous low altitude situations. Maneuverable and responsive, drones proved the imagery necessary to assist many minor missions. The distribution of several devices over several strategic areas offers precise air coverage, which is all the more effective as it provides a life video stream back to centralized command centres, ensuring real-time situational awareness. Such situational awareness is vital, and drones could have played a significant role in the 2011 floods in Queensland where helicopter resources were needed to make a high number of aerial rescues.

Drones used in Emergency Response have to be easy to operate, harmless, robust and ultimately… consumable. Parrot's approach to Emergency Response is therefore to promote the use of affordable light drones for operations, that can support operation monitoring, tactical recognition, live streaming and also 2D and 3D mapping.

Video (floods) : https://www.youtube.com/watch?v=sDQnJWKJrCY&feature=youtu.be

2. Drones increase safety and efficiency in disaster zones

This example highlights the useful application of safe, low-weight, frangible aircraft in beyond line-of-sight applications. The same operational uses are suitable for large scale agricultural and natural resource surveying, and the inspection and security of infrastructure such as rail.

Situation: No humanitarian aid operation is possible without accurate data of the affected areas and communities. To this day, the humanitarian community has mostly relied on data provided by plane or helicopter flight observations over impacted areas. Such operations are very costly, take time, are heavily dependent on weather conditions, and often don't allow easy access to remote or isolated areas. At times, they might even interfere with rescue operations, which can lead to dangerous situations. What is more, smaller humanitarian aid actors are entirely dependent on governments or bigger players for the production of such data. These constraints hamper the necessary agility of humanitarian relief effort where time is limited. The use of UAVs by humanitarian aid operations is about to change that.

Mission: Haiti, one of the poorest countries in the Western hemisphere, has a recent history of dramatic natural disasters. Over a million Haitians have been displaced, and infrastructures severely hit. In 2010, Haiti sustained a massive earthquake, immediately followed by Hurricane Sandy (2012) which left substantial parts of the country destroyed and its people homeless and vulnerable. Parrot and its subsidiary Sensefly teamed up with the International Organisation for Migration (IOM) to help the IOM perform two of its core missions in Haiti: data collection about the displaced population and disaster risk reduction.

Impact: eBee drones (a Parrot/Sensefly product) were used by IOM teams in 2013 to map out some 45 km2 of Haitian territory in just 6 days. The precise 2D maps and 3D terrain models produced by the drone's camera provided up to the minute imagery to the IOM. The maps created were crucial in delivering aid to these communities and in developing infrastructure

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for displaced people. 3D mapping was also instrumental in risk reduction activities. For example, by mapping out a riverbed, the IOM was able to map the flow of water in order to plan infrastructure and protect dense urban encampments from flooding. Several shantytowns were also mapped in the process, recording census information, distributing aid and developing infrastructure. Collected data were made publically available in the hope they would help efforts carried out by small and medium-sized humanitarian relief bodies.

Finally, the IOM and the professional services team of Drone Adventures, which helped the IOM to operate the drones, have now successfully trained local communities in using and understanding drone technology.

A European Commission report found that compared to satellite imaging sources, UAV's offer "significant benefits due to their higher flexibility in deployment, potentially better timeliness and more advanced technical capabilities".

3. The role of drones in precision agriculture

This example demonstrates the suitable applicability of the new "private landowner" regulation. Such a regulation enables farmers and similar landowners to safely take advantage of the benefits of drones at a much faster adoption rate.

Situation: In the past, fertilisers were applied based on the average of crop samples taken from a field. This meant too much fertilizer application to one half of the crop, and too little to the other half. The emergence of GPS technologies and variable-rate machinery have allowed for the development of precision agriculture. Drones offer aerial imagery and data that give farmers access to fast, precise and cost-efficient advice on fertilisation and plant protection strategies for their fields.

Mission: Parrot and its subsidiary Sensefly have developed specialised agriculture solutions that cover aerial crop scouting, combined with data processing and analysis. One example is the Signpost Survey project in Ireland, that uses multispectral imagery to identify which areas within a crop are underperforming and why. Sometimes this triggers additional measures, such as the analysis of targeted soil samples. This helps farmers to concentrate efforts on specific areas and to take measures that are appropriate to solve the local issue, rather than bringing out fertilisers indiscriminately across their fields. In short, Signpost Survey's mission is to get the right amount of nitrogen into the right place at the right time.

Impact: Drone-supported precision agriculture offers a number of tangible benefits. It improves the quality of the crop and boost yields. This is important at times when it becomes more challenging to secure global food supply for ever larger populations. Importantly, it also reduces the waste of fertilizers and crop protection products. This is not only good for the environment by making agriculture more sustainable. It also reduces costs for farmers and optimises their return on inputs. Thanks to the cost-efficient nature of drone technologies, their benefits become available to a larger number of farmers and offer opportunities for "dronepreneurs" – small companies that offer agricultural drone services.

Drone use by season: The following table shows the different ways in which a drone can be used to provide accurate, on demand data throughout the year.

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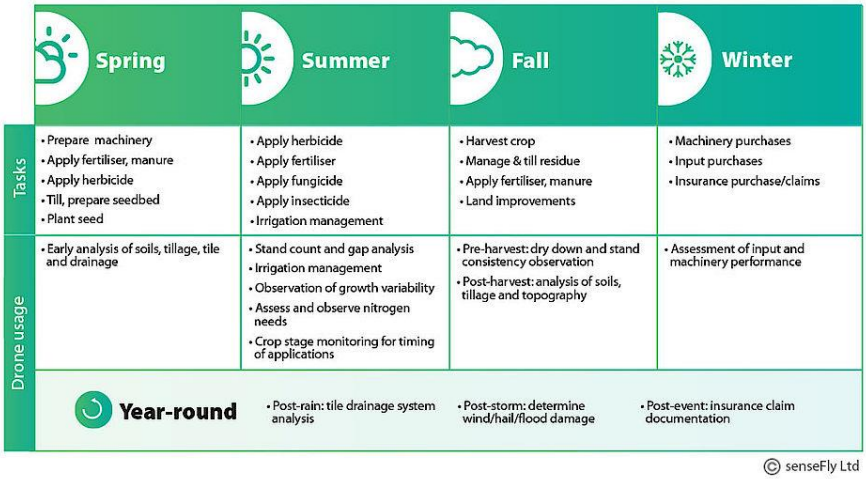

4. Use of drones in natural resources

This example highlights the significant benefits of drones in productivity, and more importantly in health and safety risk reduction.

Situation: Modern life would grind to a halt without mining: its products are in our houses, our cars, our phones and computers. Geological surveys are at the heart of all mining activities. Until recently, these surveys were often carried out by specialists that operated on the ground. This did not only expose workers to the risks inherent in all mining activity, but was often cumbersome, expensive and time-consuming where areas were large or difficult to access.

Mission: Aerial imagery from drones does not only support mineral exploration, but can feed into the entire lifecycle of a mine, from early exploration and design phases, to constructing and running and monitoring a mine and its environment, to managing the legacy of closed sites. Parrot's daughter company Sensefly has worked with numerous mining companies across the world to leverage the benefits of drone technologies. Examples include the survey of a new graphite mine site in Madagascar, a project to measure copper extraction in one of the world's largest mines in Chile, or to precisely map the topography of rugged landscapes in Oman to plan for future operations in a Chromite mine.

Impact: In mining, worker safety is of paramount importance. Drone technology minimises the time staff spend on site to conduct geological surveys. This increases safety and reduces costs. Drone-based data collection also boosts productivity. Surveying projects that once took days or weeks using traditional techniques are now possible in just a few hours. What is more, thanks to drones there is no downtime required while surveyors move around a pit, as can be the case when using terrestrial surveying instruments. This makes drone technology a valuable application in mining.

Video: https://youtu.be/GGW28UnPLAQ