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Game of drones: do civilian applications harbour opportunities for sustainable development?

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EXECUTIVE SUMMARY

Multipurpose, efficient and inexpensive, drones have met with considerable success in the civilian realm, both among the general public (leisure drones) and as an alternative technology or source of innovative solutions in a professional context. The development of this market has been fostered by a large number of actors and an ever widening array of applications which should continue to multiply as regulatory mechanisms are established in countries across the globe. Like the internet, the civilian drone industry is likely to rapidly enter a structuring phase during which growth will become focused on applications with the highest added value, and dispersed start-ups will gradually consolidate to produce industry behemoths. So competition, already fierce, is likely to intensify.

Employee and user safety, fuel efficiency, high-tech agriculture…some drones are already providing tangible social and environmental benefits, while many more applications still in the R&D phase are showing promise. The process of market structuring may amplify opportunities, because, in order to cash in, drone operators will have to become highly specialized in areas with high barriers to entry.

While the earliest drones were robots designed for launching attacks and protecting territory, unmanned vehicles are no longer confined to military uses. In the civilian realm, they are primarily tools for surveillance, intervention or assistance used by the police and firefighters, as well as technical support for researchers. Recently, though, they have increasingly begun finding commercial applications: high-tech toys, flying cameras and data gathering for professionals. Drones are making an entrance in a variety of industries too, something that has by no means gone unnoticed. In fact, experts are all predicting a radiant future for this new market.

I. Drones burst onto the civilian scene

What is a drone?

The term 'drone' covers both cutting edge military machines that entail millions of dollars in R&D, and commercial drones for leisure purposes with a retail price of a few hundred euros (Figure 1).

Figure 1. Example of an AR 2.0 drone (Parrot)

Characteristic :

- Quadricopter using WIFI remote control (maximum distance: 50 meters)
- Carbon fibre structure for lighter body, equipped with 4 electric motors, a Li-ion battery and 2 HD video cameras (frontal and underside).
- Speed: 5m/s.
- Battery life: ± 15 min.
- Dimensions: 51.7 cm x 45.1 cm
- Weight: 420 g (including hull) ; 380 g (exclusive of hull)

Source : Mirova/Parrot

Strictly speaking, drones are remotely dirigible unmanned aerial vehicles (UAVs), however, this term is now being increasingy replaced with the term Unmanned Aerial Systems (UAS) to accommodate the wide variety of applications. Their size and weight varies according to their function: they can be a small as a few centimetres across or as wide as a score of metres. Drones mimicking the natural world (dragonflies, flies) have been designed that are less than 30 cm across and weigh under 20 g (the DelFly Explorer). Meanwhile, civilian and military applications can employ vehicles with wingspans of up to 40 metres (RQ-4 Global Hawk).

What's the hubbub about?

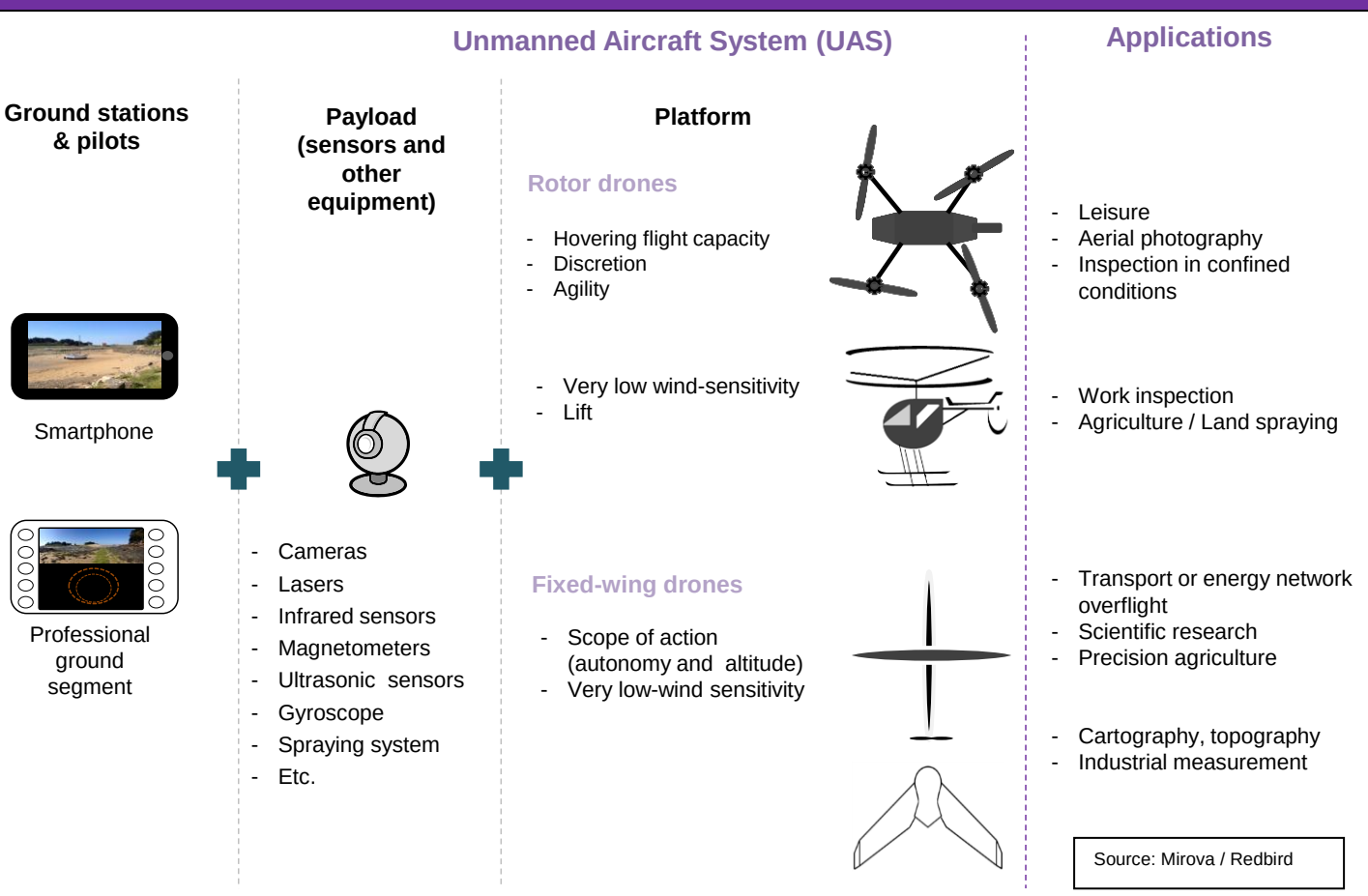
While the military is still the largest market currently, civilian applications for drones are set to offer the greatest potential for growth. Luxury real estate, advertising, agriculture, events, civil engineering, mapping…drones can make themselves at home in a wide range of domains.

UAS draw on technological advances achieved by both military research (massive investments in drones, sensor technology and support vector regression) and the smartphone industry's innovations in the miniaturization of components such as processors, batteries and the like, which these vehicles also rely on. This means the technologies are ready to use, well-tested, and their R&D costs have already been paid down. Very standard drones can be had for less than a thousand euros; a high performance civilian UAS, on the other hand, can cost anywhere from €30,000 to €80,000.

As shown in Figure 2, most UASs consist of three elements:

- a ground station (for piloting the vehicle),
- the payload, including sensor(s), video and still cameras etc.,
- the platform (flying mechanism).

Figure 2. Examples of Unmanned Aircraft Systems adapted to specific uses



These vehicles vary in terms of size and type motor, making them adaptable for particular tasks. Smaller drones with multiple rotors are quick and manoeuvrable; this gives them an advantage in flying in close quarters or over rough terrain. Models with fixed or flapping wings are silent, and autonomous; a preprogramed UAS can complete a mission without instructions from its ground station, giving it a much larger range. While most unmanned vehicles are remotely controlled, preprogramed drones are likely to become more common, especially as SAA (Sense And Avoid) technologies develop. Drones can also be fitted to gliders or dirigible-type balloons. While less manoeuvrable, increasing size goes hand in hand with a much greater carrying capacity, making it possible to transport equipment as well as unwieldy and weighty packages.

Lastly, the variety of sensors that UAS can be fitted with qualifies them to undertake a wide variety of tasks: taking aerial photographs and recording sound, but also creating maps in 3D, of temperature etc. Drones make it possible to quickly and easily collect data of many different kinds in a very short time span. As a result, they offer a solution that for many sectors is less time-consuming and more precise than traditional manual collection, while remaining less costly than earlier technological solutions (satellites, planes, etc.).

In some cases, UAS do more than provide an alternative to other technologies: companies are beginning to offer innovative services in which drones play a role, for instance, flying over fields under cultivation as part of a high tech agriculture design. All in all, about 200 new applications have been identified so far (L'Usine Nouvelle, 2014).

> " Drones are versatile, efficient and competitively-priced, a perfect combination reflected in current enthusiasm

Basically, the wide range of applications for UAS, combined with savings in terms of labour and time, competitive pricing, and in some cases, better performances (i.e. surveying etc.) explains the current fascination with using these vehicles for civilian and commercial purposes. For the last three years, the sector has been in the midst of a very active development phase, and in order to understand this nascent industry, it is important to examine the current market and what underlies it.

Birth of an Industry

Stepping back to appreciate the international situation, it is clear that some countries have yet to adopt regulations that would permit the development and use of civilian drones, including for commercial purposes (see Figure 4). It goes without saying that a regulatory framework is essential to provide guidelines for UAS usage in civil society. Where such a framework does not exist, it is impossible for the industry to really take off. France, the third country to regulate UAS, after Australia and Canada, has been at the vanguard of drone regulation in Europe, and, following a less than stellar performance in military applications, is home to the largest number of civilian drone operators in the EU. The country has a long and rich history of aeronautics, and thus possesses the specialized expertise needed for the UAS market to develop. Going forward, however, the financial means of the big groups in the United States is likely to permit them to catch up quickly as soon as the regulations governing commercial applications are in place. Thus the industry's international topography is likely to change drastically in the next few years.

Not only are regulations spotty and as yet unstandardized, actors in the industry are similarly disparate, with few manufacturers of unmanned vehicles, but increasing numbers of operators (companies specialized in offering services that rely on drones). The FPDC (Fédération Professionnelle du Drone Civil), a French professional body devoted to civilian drones, lists only 40 manufacturers or assemblers on the French market, which is one of the most developed. The European Commission recognizes 400 production sites, primarily in the UK, France, Germany, Italy and Spain (EUC, 2013). Only three companies have emerged as global competitors thus far: Parrot, DJI and 3D Robotics. According to the president of the board for Delta Drone, a publicly held French manufacturer of civilian drones, "the global market for civilian drones should reach 15 billion dollars in the next five to seven years" (Le Monde, 2013).

At the operations end, the progressive firming up of ad hoc regulations has encouraged a proliferation of players. Whereas at the end of 2012 there were hardly any operators, France is today the country with the largest number: 430 companies are licenced by the DGAC (Direction Générale de l'Aviation Civile), France's civilian aviation authority, whereas 240 are comparably licensed in the UK and Sweden (1400 companies total in Europe; as yet there are no commercial players in the United States). The gross revenues of French civilian UAS

manufacturers and operators increased by 50% in 2013, for a total of 93 million euros; this number is expected to be triple by 2015, reaching 288 million euros (Air Cosmos, 2014).

Despite the fact that there are currently no operators in the US, in March of 2013 the AUSSI (Association for Unmanned Vehicle Systems International) put together a forecast of the economic potential of civilian drones. This study suggested the impact on the economy of the United States would be in the range of $13.6 billion over the next three years, and $82.1 billion in total between now and 2025. Despite these rosy figures, however, companies in this industry do face considerable risks, as a substantial portion of the market for civilian drones has matured very quickly.

Near-term structuring of the civilian unmanned vehicle market: fierce competition ahead

As was the case with the internet, also a technology initially developed for the military that rapidly developed in the civilian marketplace, the initial proliferation of players in the sector is likely to be followed by a period of market consolidation driven by reasons specific to each segment of the industry. With increasing competitive pressures, players in the civilian drone sector will be making vital strategic decisions: we can expect to see a failure rate of close to 50% for start-ups in the coming years (Air & Cosmos, 2014).

At the construction end, the industry should experience a large number of mergers, leading eventually to the emergence of a few major specialists, due on the one hand to competition from companies previously specialized in military drones that are beginning to market commercial civilian UAS for surveillance or industrial applications (Diamond, Lockheed Martin, Airbus, Thales, etc.), and on the other to the maturity of the leisure drone market (64% of the market for civilian

UAS). Parrot, the creator of the world's most popular leisure drone (700,000 units sold worldwide), has already embarked on this path with its acquisition of a 57% stake in SenseFly, a Swiss company specializing in drones for 3D mapping, 10% of Delair Tech, a manufacturer founded in 2011, and 21% of Airinov, which is dedicated to agricultural solutions.

However, the market consolidation is expected to be even more dramatic among operators. The overwhelming majority of operators are small to medium sized companies (EUC, 2013), 80% of which are located in Europe. Many are positioned in areas with low value-added. According to the operator Redbird, which specializes in professional services, only 10% of existing operators are actually ready to provide full spectrum solutions from data collection to information management and treatment that can meet a specific demand. 90% of professional UAS operators are specialized in audiovisual (aerial photography, etc.). With equipment that is far from costly and little in the way of image treatment services, the activity presents low barriers to entry. Operators are more or less interchangeable, and large scale clients can easily establish their own in-house image drones. We can thus expect to see considerable attrition among operators devoted to audiovisual, to the advantage of operators with strong expertise in handling collected data.

> " Up to 50% of start-ups in the sector could be affected by market consolidation and specialization in services with the highest value-added

The time for selling drones by the hour is past; instead, the idea is to provide real value for the client in highly targeted areas. This means that the greatest potential for growth is to be found in professional drones for non-audiovisual applications, such as surveillance, inspection and agriculture, among others. Furthermore, this is where unmanned vehicles are potentially advantageous from a social and environmental standpoint. However, before turning to the opportunities that civilian drones can offer, it is important to address the risks involved.

II. A legal framework is needed to contain significant risks

What is so risky about civilian drones?

Certain uses of drones may jeopardise privacy through the collection of information (audio and visual) without people's knowledge. Used for surveillance by cities or during public events, UAS could violate individuals' rights and freedoms. An unmanned vehicle can very discretely take still photographs or video footage, record sounds or geolocalize individuals, intruding into people's private lives without drawing attention.

However, this should not permit us to ignore the more prosaic risks of accident, or the possibility of misuse. In March 2014, a drone was used to deliver drugs to a prison in Australia, while

earlier, in September 2013, Germany's Pirate Party illustrated that it was perfectly possible to use a UAS to approach a political figure—in this case Christian Democrat Angela Merkel—with the intent of conducting an assassination.

Regulation is needed in order for the market to expand without threatening the security or privacy of individuals, while nonetheless ensuring that the risk of piracy or collision with other flying objects is contained and that these devices are not used to transport illegal substances.

A program of awareness and education will also be necessary to sensitize people to whatever framework is finally put in place. In some cases, users could find themselves in breach of the law out of mere ignorance and without ill intent. For instance, leisure drones area sold without any training as to what a user is entitled to do or prohibited from; early in 2014, the first arrest of this kind was made when an unauthorized amateur video of Nantes began to circulate on social media.

A regulatory issue of international scope

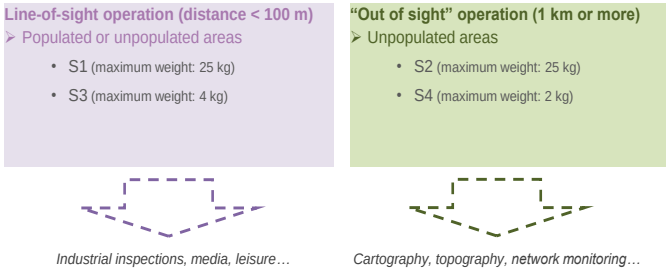
Since 2013, short-term objectives have been established and various regions have put together working groups and roadmaps to help integrate unmanned flying vehicles into civilian airspace. By 2015, 30 to 40 countries are expected to have put in place some kind of regulatory framework (see Figure 4), according to Redbird. As covered in Part I, such a framework is a necessary precondition for any development of professional activities; without it, the risk of subsequent interdiction are simply too high.

In April of 2012, France narrowly beat out Ireland to become the first country in Europe to regulate the civilian use of drones (Legifrance, 2012). The statutes provide for differing usages based on the characteristics of the unmanned system: weight, flying distance, presence of the drone in the operator's field of vision, and the types of sensors on board. Manufacturers need to secure approval from the DGAC for their designs, which must include the specifics of their mission type (classified as S1-S4). Operators must be licensed by the DGAC. The four currently authorized mission types are illustrated in Figure 3.

Also in 2012, but in August, the United Kingdom published recommendations (Civil Aviation Authority, 2012), and in 2013 made public a list of more than 100 companies authorized to fly unmanned vehicles within its airspace (*The Guardian*, 2013). Other countries, such as Sweden, have since established limits. However, there are no international standards at this time, so rules vary from one country to the next, and studies are still underway to identify and devise ways of controlling all the potential risks.

On 8 April, 2014, the European Commission proposed the establishment of new, stricter norms in order to unify the regulatory framework at the level of the European Union and meet the goal set by European Council (EUR-Lex, 2014) of bringing drones into civilian airspace as of 2016 (EUC, 2013).

Figure 3. Regulation of UAS France (2012)



Source: Mirova/Legifrance

Beyond the boundaries of Europe, it will be necessary for the industry to balance rules established by the Canadian government (2010), Australia (2011) and New Zealand.

In December of 2013, the United States, the FAA (Federal Aviation Administration), which had previously limited civilian drone use to surveillance activities, permitted testing of various other uses at six sites scattered around the country.[1] These tests are part of a roadmap drawn up by the FAA (FAA, 2013) in view to establishing an official regulatory framework by 2015. This tardiness explains the lack of operators in the United States.

China, Japan and Mexico use UAS for commercial applications, among other things, but have no regulatory framework to address associated risks. However, there is a general trend towards governments taking steps to contain the risks associated with the development of civilian drones and thus allow enterprise to fully take advantage of the opportunities for growth offered by this dynamic industry.

[1] *These are located in Alaska, Nevada, New York State, North Dakota, Texas and Virginia.*

Figure 4. Regulation of UAS in the world

Existing regulations

- Germany
- Australia
- Canada
- South Korea
- France
- Ireland
- Japan
- The Netherlands
- Czech Republic
- United-Kingdom
- Sweden
- Switzerland

Regulation process underway

- Alaska
- Austria
- Brazil
- Colombia
- Spain
- United-States
- Finland
- Greece
- Italia
- Russia
- Slovenia
- Turkey

No regulation

Source : Mirova, Redbird

III. Can civilian drones contribute to sustainable development?

Indirect advantages: drones offer plenty of social benefits…

The most noticeable social and environmental benefits of UAS occur indirectly. New applications, running a gamut from the prosaic to the madly futuristic, are announced each day; some of these projects could make an undeniable contribution in terms of sustainable development (see Figure 5).

Initially used to improve security measures, civilian drones made their initial appearance in the sky thanks to their adoption by police and firefighting departments. There is no question but that unmanned vehicles are an asset in the context of rescue missions, preventative measures, and missions that would be overly risky for human beings. Some French and Chilean firefighters are already using UAS with optical cameras and infrared sensors. Impervious to smoke, these vehicles can create dynamic real-time maps of a fire front, making attempts to control forest fires more effective and less dangerous. But firefighting is only one example amongst many. Quadricopters were used to examine debris and identify victims of hurricane Katrina. Today, seagoing rescue drones can deliver life-preservers to persons in distress, while on land they distribute first aid kits to individuals who are geolocalized using specialized software applications; in mountainous regions, UAS are able to find and assist hikers. Meanwhile, the same advantages that attract security and rescue uses have made for adoption by environmental researchers and NGOs: drones are particularly well adapted to collecting data over a broad area that is difficult to access. To take one example, the WWF (World Wildlife Fund) has been testing drones as a method of deterring poachers since 2012, and NASA uses unmanned vehicles to map and announce storms, including hurricanes.

Public and parapublic institutions aside, many of the professional uses to which UAS are put can have a positive social impact. A California start-up called Matternet, for instance, is working on how to use unmanned vehicles to deliver medicines and medical tests to the least accessible areas in emerging countries, notably in Africa and Asia. Internet giants Facebook and Google have each bought manufacturers of UAS that can fly at high altitudes (these being respectively, Ascenta, a UK company, and the US Titan Aerospace). Among other things, such vehicles could serve as telecommunications relay points, making internet access a reality for populations in the far periphery.

> “ Health, security of users and workers, access to information… the social benefits of unmanned vehicles are many

A more concrete example, no pun intended, is the use of drones for inspecting constructions (bridges, aqueducts, dams, etc.) and infrastructure such as electrical grids, rail systems and pipelines. This ensures proper functioning and user safety through the prevention of collapse for structures such as bridges and aqueducts, and the prevention of derailing in the case of train tracks, while avoiding the exposure of workers to the risk of personal injury involved in human completion of these long and perilous missions. The SNCF (Société Nationale des Chemins de Fer), which controls France’s interurban rail system, the APG, responsible for Austria’s electrical grid, and ArcelorMittal already employ drones to single out weaknesses in their infrastructure. This reduces the need for night crews, which always entail additional risks, as well as system down-time for maintenance, and avoids the risk of employee falls during viaduct inspections. ArcelorMittal uses its UAS to check the condition of its chimneys and the protection of its equipment without having to send personnel up on ropes to conduct inspections. Similarly, Geneva’s airport has acquired a drone used to verify the safety of its take-off and landing strips.

Finally, drones have the potential to considerably increase safety in the nuclear sector. The IAEA (International Atomic Energy Agency) is planning to use UAS by 2015 to measure radioactivity in the zones of Fukushima that are not accessible.

…and they also contribute to environmental benefits

Even through drones are not likely to prove a substitute for trucks when it comes to home delivery, despite pronouncements by Amazon—given the average load capacity of a drone and the complexity of circulating in an urban environment, a small fleet of drivers will remain more profitable than dispatching dozens of drones—UAS still have an important role to play. Pollution associated with the transport of freight (mass mobilization of merchandise) could be eliminated using unmanned vehicles with high carrying capacities lofted by helium. Lockheed Martin’s P-791 is one such prototype and has a load limit of 20 tonnes. However, it will take several

years and substantial legislation before this solution becomes a reality.

A more immediate application for UAS is to be found in the construction industry. The cost of construction and, for cement-makers, quarrying, is substantially impacted by costs associated with moving heavy equipment (trucks, tractors etc.). In a matter of hours, certain UAS operators can create a 3D map of a construction site, allowing the contractor to optimize movement of the vehicle fleet, reducing valuable fuel by as much as a fifth (L'Usine Nouvelle, 2014). Beyond the cost savings, this obviously reduces considerably the negative environmental impact of a worksite.

> " Whether employed to optimize energy use in Construction or as a tool for high-tech agriculture, UAS offer tangible contributions to sustainable development

Also geared toward environmental benefits, operators like Air Azur have specialized in providing residential thermal analyses. Using an onboard infrared camera, the drone charts zones of heat loss, making it possible to strategically reinforce insulation. GrDF (Gaz réseau Distribution France), which distributes natural gas, has already begun using this tool to raise awareness of energy consumption among subscribers.

Not all of the applications envisioned for UAS in the agricultural sector will have a positive effect on the environment. Some players will use these vehicles as a mechanism for blanket spraying operations, raising questions about the dispersion of chemical substances. When used for precision agriculture, however, drones provide technical support that can help reduce costs. While the maps provided by this method will never completely supplant satellite images, their data will be even more precise, making it possible to better localize and dose the inputs to be delivered. Relatively competitive costs, practicality and versatility set UAS up to play a facilitating role in many systems and in some cases give rise to new ideas about how to intervene. Whether their aim is to monitor, inspect, transport or rescue, the use of drones can clearly contribute to better controlling environmental and social risks, for example, by reducing the carbon footprint of activities or ensuring greater worker safety; they also present valuable opportunities for sustainable development in areas such as access to health and to information, sustainable buildings and the preservation of biodiversity.

Some of these projects are still experimental; nonetheless we may hope that many of the imputed benefits will come to fruition, especially given the fact that, as covered earlier, UAS operators offering services with high value-added, especially in the areas of industry and agriculture are those expected to prove most durable and likely to see the greatest economic opportunities over the next few years.

Direct social benefits: predictions for job creation are hopeful, but circumspection is needed to judge total impact

Civilian drones are a fast growing industry that is expected to generate substantial employment. The AUVSI estimates that over a period of 10 years, 100,000 highly skilled jobs will be created on US soil alone. There are as yet no similar studies freely available for Europe; however, the economic trend of the sector is clearly positive, suggesting a similar impact on employment. Direct job creation should be especially pronounced among operators. For the time being, most operators are very small entities (40% of French operators currently have fewer than two full-time employees): the rapid expansion of this sector will favorably affect the numbers of salaried personnel. The establishment of an entirely new technology also produces indirect employment through the emergence of ancillary services such as training pilots and technicians, or the maintenance and repairs of UAS.

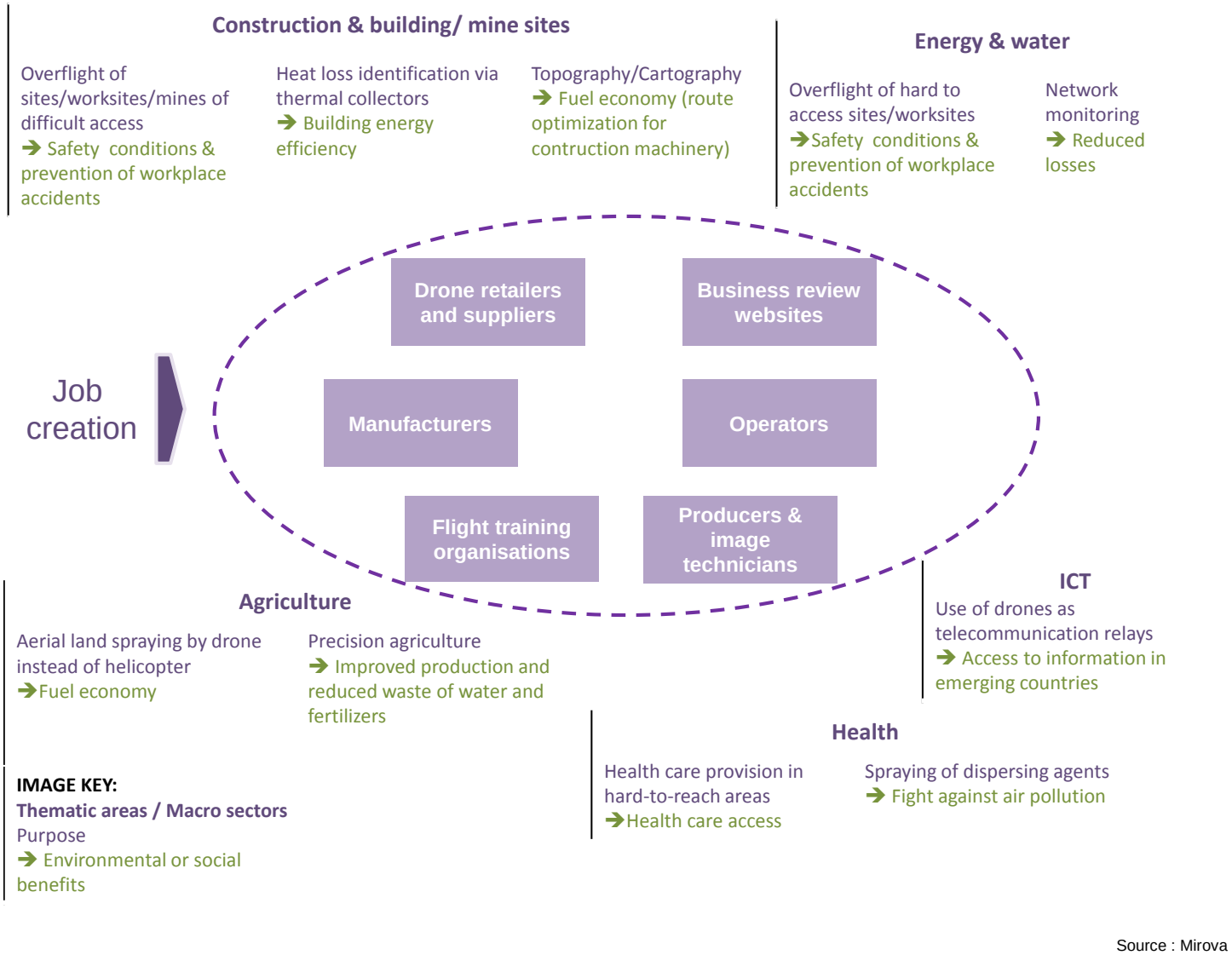
Nonetheless, it seems only appropriate to bring some nuance to these optimistic projections. For one thing, the market will likely continue to structure itself, and intense competition, notably in the area of media-related drones, could lead to the failure of many current start-ups. New hires at some companies will thus be offset by some level of employment destruction.

Furthermore, one of civilian drones' trump cards is the capacity of these vehicles to perform what the industry calls '3D' tasks: those which are Dull, Dangerous and Dirty. While we may applaud the increase in safety, given that workers were formerly obliged to complete these tasks, UAS nonetheless take the place of these workers, potentially eliminating jobs. In a matter of hours, a drone can collect the data that previously required several days of work on the part of an entire team; meanwhile, the jobs that drones create will largely be high-skilled jobs such engineers, UAS pilots, salespersons and media producers. The number of jobs created will thus not

offset the destruction of jobs for less qualified workers, who have more trouble resuming a place in the workforce, on average.

Given the variety of factors and the lack of perspective on an industry that is still in its infancy, it remains impossible to quantify either the gains or losses as far as employment is concerned. What we can count on is the creation of jobs requiring high levels of qualifications, and an improvement of working conditions for a certain number of lower wage jobs.

Figure 5. Direct and indirect social and environmental benefits ensuing from UAS deployment



Source : Mirova

Direct environmental benefits will be limited

As with the social impact of civilian drones, it is difficult to reliably evaluate their environmental effects. Among other things, it is hard to determine how much UAS production contributes to the worldwide panorama of energy consumption, although the low capital intensity of the industry, largely concentrated on the capacity of employees to manipulate the data collected, makes the issue fairly limited in scope. This notwithstanding, most vehicles currently on the market are powered by electric motors that rely on Li-po (Lithium polymer) batteries. When their carrying capacities are comparable to those of conventionally powered vehicles, such as helicopters, there is a direct environmental benefit in terms of energy resources and hazardous emissions.

What do drones reveal on the horizon for the responsible investor?

The use of drones in civilian airspace offers those who pursue responsible investing occasion to direct investment on the one hand toward specialized operators in areas that foster social or environmental benefits, such as internet access in emerging countries, precision agriculture or energy efficiency within the building sector, and, on the other, toward manufacturers whose design of unmanned vehicles creates these opportunities.

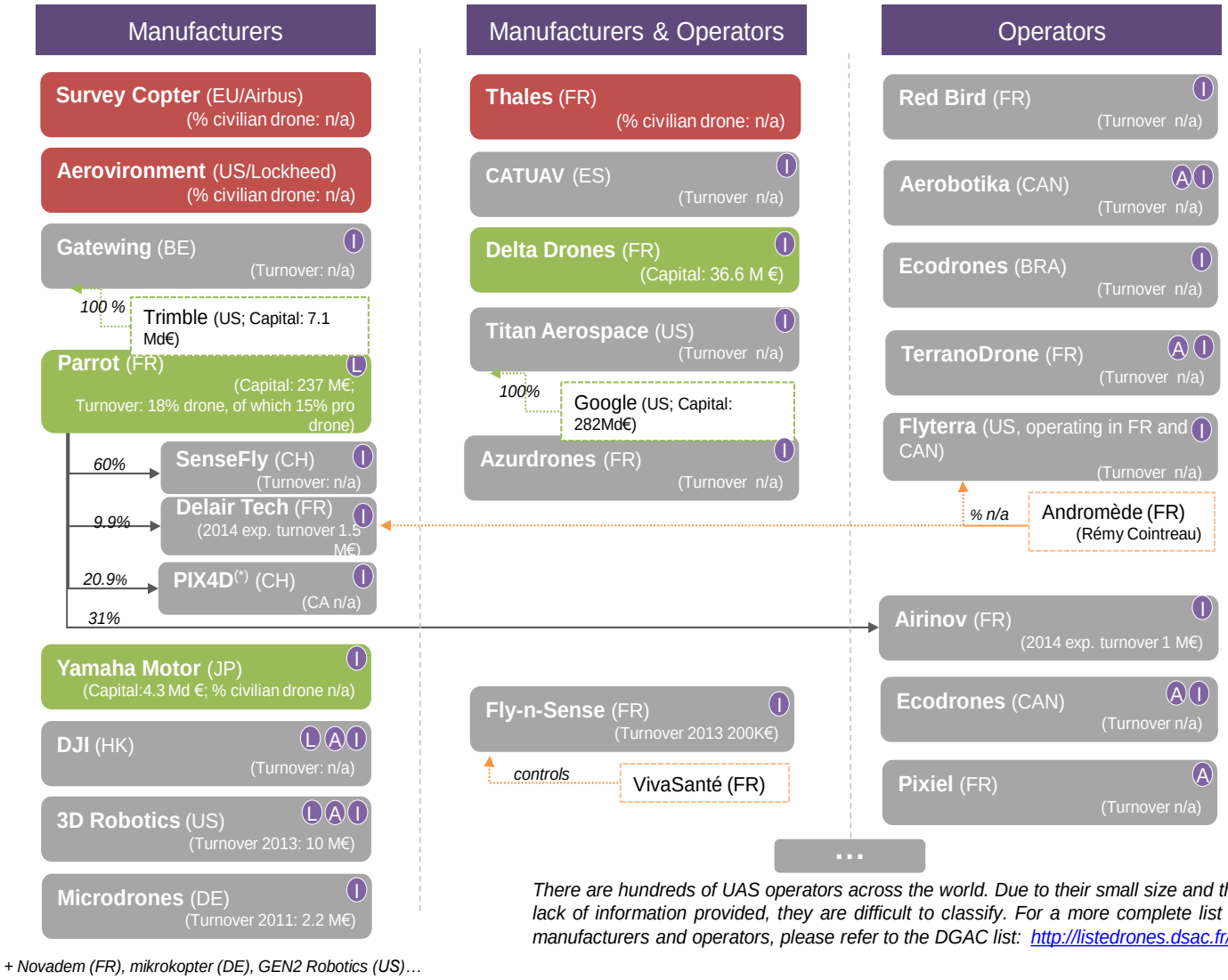
At this point, there only a handful of listed companies in this sector, of which Delta Drone is one. It is important to carefully monitor new offerings as they appear, as the market is only beginning to establish a structure and launch the concentration of players we are likely to see take place.

Additionally, unlisted companies in this industry may decide to issue sustainable bonds as a means of financing projects that have substantial social or environmental benefits (precision agriculture, energy efficiency of buildings etc.). Additionally, their potential contribution in terms of sustainable development can be a significant area for growth and a draw for larger companies.

In terms of product line (i.e. manufacturers), opportunities lie in the area of UAS developed specifically for industrial and agricultural functions (‘eBee Ag from Sensefly, for instance), or providing solutions for the population at large: drones made by Titan Aerospace, for example, help extend networks and contribute to closing the digital divide, and such drones could contribute to solving the problem of deforestation associated with towers. Other players, such as PIX4D, are focusing on the development of software for making extremely precise measurements using data collected by these UAS. On the service end of things, a number of operators are offering custom solutions (UAS flight and data analysis) that allow clients to optimise their environmental impact (RedBird, Ecodrones, etc.). Some companies are both manufacturers and operators, giving them the possibility of offering highly specific services such as helping to fight forest fires (Fly-n-sense).

Finally, in the context of a fund dedicated to overall job creation in France or in Europe, the world of unmanned aircraft systems, from construction sites to regulators, operators and pilot instructors offers real prospects for growth in terms of job creation, and should come to offer opportunities for investment.

Figure 6. Civilian Drone Value Chain



There are hundreds of UAS operators across the world. Due to their small size and the lack of information provided, they are difficult to classify. For a more complete list of manufacturers and operators, please refer to the DGAC list: http://listedrones.dsac.fr/

Legend

- *Military industry*
- *Listed companies*
- *Unlisted companies*
- *Acquisition of holdings within the military industry*
- *Unlisted company's acquisition of holdings outside the military industry*
- *Unlisted company's acquisition of holdings outside the military industry*

- L *Leisure drone*
- A *Audiovisual application*
- I *Industrial application: agriculture, cartography/topography, etc.*

Source: Mirova, Redbird

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