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Drones for Europe

by Andrea Gilli

The emergence of unmanned vehicles has dramatically reshaped intelligence and warfare over the past two decades. This is particularly clear in the air domain where the so-called drones have come to prominence as major force multipliers: at relatively affordable costs, they can deliver powerful surveillance capabilities, thus enhancing military planners' and political decision-makers' situation awareness and intelligence, as well as reducing troops' presence on the ground for both combat and non-combat missions. Moreover, over the next few decades, combat drones will reshape – if not completely revolutionise – air warfare thanks to superior aerodynamic, ground-attack and swarming capabilities, whatever one may think about their ethical implications.

The European Union is currently at a critical juncture in this field, as its member states need to launch some unmanned aerial programmes in order to strengthen their industrial capacity and thus preserve their security and strategic autonomy in the decades ahead. Indeed, some voices are calling for a clear decision in this respect at the forthcoming December meeting of the European Council.

The state of play

Remotely piloted aircraft (RPA) are pilotless aircraft remotely flown via radio or satellite communications links. They can be either fixed- or rotary-winged and, primarily, they provide intelligence, reconnaissance and surveillance (IRS) capabilities: through their onboard sensors, they capture various types of information which are later processed at ground installations. Thus, in a way, most RPA are like satellites but operating in both the troposphere and stratosphere. Most drones are unarmed, although progress in technology is increasingly favouring a swift and easy weaponisation of even relatively small platforms. While potentially worrying, this trend does not clearly affect only RPA, as any other vehicle (from ambulances to motorboats) could be subject to similar modifications.

Drones can be classified according to their range, altitude and autonomy: some drones cannot fly higher than 350 m or for longer than two hours, and their range cannot exceed 10 km, while others can fly for up to 48 hours, at an altitude of 20,000 m, with a range exceeding 15,000 km. Three types of drones deserve attention in this context: surveillance drones – in both their medium- and high-altitude/long-endurance configurations (MALE and HALE, respectively) – and unmanned combat aerial vehicles (UCAVs).

During the past decade, European countries have launched – alone or in cooperation – various research projects, technological demonstrators or even procurement programmes in this field. However, also due to limited funding, the final result has often consisted in the acquisition of either Israeli or US unmanned platforms – the two market leaders. Current EU fleets, however, remain insufficient, as the recent military operations in both Libya and Mali have shown.

In the HALE class, Europe's capabilities will depend on NATO assets, the Allied Ground System (AGS) programme, based on the American RQ-4 Global Hawk drone, especially after Germany's recent decision to abandon its Euro Hawk project (also based on the RQ-4).

In both the MALE and UCAV classes, European countries are likely to launch their own programmes in the immediate future. With respect to MALE platforms, past attempts between France and the Netherlands (EuroMALE), France, Germany and Spain (Talarion), and France and the UK (Telemos) have all failed. France, Germany and Italy (and possibly Spain) seem to be willing to try again. Although there is a risk of reinventing the wheel, such a programme could provide these countries with the required industrial know-how to be re-employed both for combat drones and also for smaller and dual-use platforms intended for border control, maritime surveillance or fire-prevention. The alternative lies in stronger partnerships with Israeli or US companies – implying dependency on the latter.

With respect to UCAVs, European countries want to be active in this sector both because of their past research (in the form of technology demonstrators) and the strategic value of this capability area: France led the nEUROn (involving also Greece, Italy, Spain, Sweden, and Switzerland); Germany and Spain worked on the Barracuda, Italy on the Sky-X, Sweden on the Filur and SHARC, and the UK worked for almost a decade on the Taranis.

In 2010, France and Britain agreed to develop a common UCAV programme: whether this will extend also to the other countries is difficult to say. The obvious risk is to repeat the choices that, in the past, created fragmentation and redundancies within Europe, i.e. a plurality of similar and competitive programmes that inefficiently employ already scarce available R&D resources.

Adopting the drones – challenges

Regardless of European countries' procurement decisions in this domain, the adoption of drones is likely to raise several challenges in terms of what management studies label the 'industrial ecosystem', namely the entire set of actors and factors that are necessary for delivering the full potential of certain products. For RPA, we can understand such an industrial ecosystem as made up of human-robot interactions, industry, components and materials, battle-networks and armed forces.

Classification of RPAs

Type	Range/Altitude/ Endurance	Examples of fixed wings (company)	Examples of rotary wings (company)
Medium Range	300km/4,500m/ 20 hours	Sperwer-B (Sagem), Watchkeeper (Elbit/Thales),	Fire Scout (Northrop Grumann)
Medium Altitude Long Endurance (MALE)	1,150km/15,000m/ 14-24 hours	Predator A (General Atomics), Hermes 1500 (Elbit Systems)	Snark (TG Helicorp)
High Altitude Long Endurance (HALE)	14,000km/18,000m/ 28-36 hours	Global Hawk (Northrop Grumman)	
Combat (UCAV)	4,000km/12,000m/ several hours (5-10)	nEUROn (Dassault), X-47B (Northrop Grumman)	

Source: Various online open sources.

- *Robot-Human Interaction: no human on board, fewer humans at work*

Automation and robotics are everywhere: from anti-virus software in laptops to auto-pilots in airplanes, from automatic cars not requiring manual gears to precision-guided munitions. Irrespective of the platform's automation level, human beings still play a central role in the age of robotics, starting from the decision about what to automate (and to what extent) and what instructions to send to the machine.

The human-robot interaction thus has many facets, but what matters here is how it affects public opinion and in particular people's attitudes to defence expenditure. Defence is a public good: it serves the whole community without yielding immediate and tangible benefits and returns: as such, it is difficult to fund. In the past, this puzzle could be solved inter alia thanks to defence spending's employment implications. However, in the age of drones and robotics, this will be more complicated. Drones production is highly capital intensive and more limited than traditional aerospace programmes: for instance, in the 1980s and 1990s, Germany, Italy and the UK produced together 900 Tornado Panavia third generation combat aircrafts. As a whole, however, EU countries will not acquire more than 100 UCAVs. Even assuming that the production of UCAVs requires the same labour contribution as third generation combat aircrafts, this change has dramatic implications for employment. In turn, this makes the case for defence spending more difficult, especially in democratic countries.

- *Industry: platform leadership*

In the past, European cooperation in armaments has been fraught with problems. EU countries have often sought to protect their national industry and domestic jobs, thus leading to inefficiencies, duplications and also to spiralling costs and time delays. In the case of RPA, these mistakes cannot be replicated. Current tight budgets do not leave a lot of room for manoeuvre. Moreover, given the limited number of unmanned platforms that European countries will acquire, there is no space for a plurality of actors.

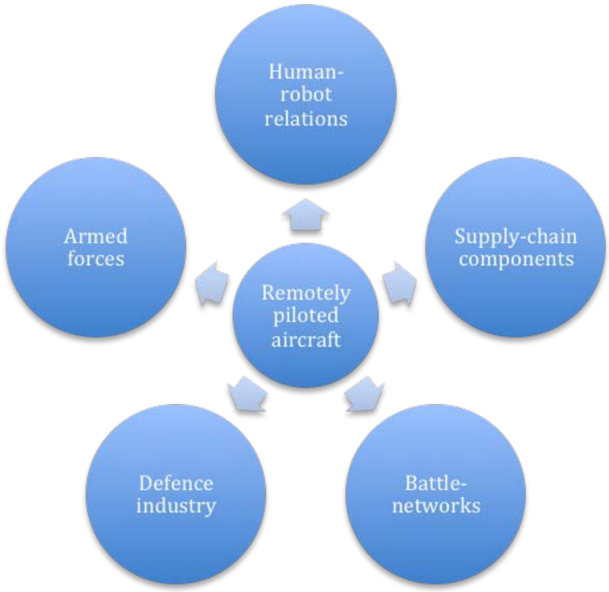
This clearly raises sensitive political questions. Unless a new wave of consolidation of the EU aerospace industry occurs, some countries/companies will have to accept secondary industrial roles. In order to address the likely resistance, European countries could decide jointly to undertake – in parallel to their immediate MALE/UCAV programmes (first generation) – some conceptual work on the following (second) generation to be assigned on a competitive basis and/or to the companies excluded from the first round.

A second challenge concerns technology. RPA specifically require, at the platform level, systems engineering skills, competences in artificial intelligence, and expertise in robotics. RPA might be unable to generate on their own the necessary R&D in all these areas. It is therefore essential that European countries invest in these domains. This will allow them to both develop future military drones and strengthen their robotics industrial base also for civilian and commercial use. Closer partnerships with civilian R&D institutions will be necessary.

- *The supply chain and critical materials*

Drones are the archetype of modular innovation: their added value stems from the possibility of plugging and playing different components and subcomponents independently developed on the market. Moreover, as RPA remove the pilot from the cockpit, it is essential that their artificial eyes (the sensors) excel in accuracy and resolution. Yet some forms of political supervision or intervention are still necessary. First of all, in order to ensure that the components market remains efficient and innovative, EU policy-makers should promote the adoption of open architectures and common standards. In this way, component-makers can autonomously produce their various sensors and systems without being bound to specific platforms and designs.

Second, advanced sensors like radars and infrared electro-optical systems require rare earths materials. Such materials are unequally distributed around the world, with China and Japan possessing the bulk of global reserves. This calls not only for a proper European strategy but also for the



Source: Based on diagram in Andrea Gilli and Mauro Gilli, 'Attack of the Drones: Should we fear the proliferation of unmanned aerial vehicles?', Paper presented at the American Political Science Association Annual Conference, Chicago, 29 August-1 September 2013.

creation of specific security stockpiles: a EU initiative would be the most appropriate way ahead in this respect.

- *Essential complements: battle-networks and armed forces*

Each industrial ecosystem contains some complements, i.e. external actors or factors whose support or presence is pivotal for delivering the full potential of a certain product. Cars require streets, mobile phones need cellular networks, heating systems electricity grids or gas tubes. In the case of RPA, three main complements deserve attention: infrastructures for the battle-networks, skilled armed forces, and suitable military organisations and doctrines.

First, medium-to-high RPA require advanced communication systems and, in particular, satellites to transfer their intelligence to ground installations. As/if the use of drones by European countries grows, more bandwidth will be necessary: currently, a single RQ-4 Global Hawk consumes five times the total satellite bandwidth the entire US military used during the 1991 Gulf War; and even the United States – with the widest military satellite network in the world – cannot employ simultaneously more than a few of these platforms over some particular areas (like the Middle East or Central Asia). Thus, European countries will need either to launch new satellites or to find technically viable and cost-effective alternatives (like relying on commercial satellites, using other RPA to transfer communications, or increasing their autonomous capabilities through artificial intelligence). In any case, additional investments will be necessary: otherwise, critical bottlenecks will prevent the exploitation of European RPA. There is also the need to develop proper regulations and systems to allow drones to move within, and across, countries' national air space: otherwise, the employment of RPA will be extremely difficult.

> '... [EU] member states need to launch some unmanned aerial programmes in order to strengthen their industrial capacity and thus preserve their security and strategic autonomy in the decades ahead.'

Second, with drones, the absence of onboard pilots strengthens the role of ground installations and increases the need for qualified personnel in imagery, signal and communications intelligence. Such professionals are highly skilled but relatively difficult to recruit into the armed forces. As European countries plan to employ more RPA, these recruitment problems – already tangible among many European armed forces – are likely to become more acute. Some European countries have contracted out these functions to private companies. Alternatively, military recruitment must be adapted.

Third, new technology is convenient not only because it is often less expensive and more efficient, but also because it promotes changes in the way of doing business: the internet has not helped us locate white pages vendors, it has replaced them. Similar considerations apply to drones. In military affairs, however, changes in business practices are generally difficult: any change entails risk, and any risk may have catastrophic consequences. Without proper doctrinal and organisational adjustments, the potential of drones is unlikely to be exploited to the full, in terms of both superior efficiency and additional effectiveness (security). Branches or capabilities that could be massively transformed include artillery, amphibious corps, naval aviation, close air support and combat air patrolling. European policy-makers will have to work with their armed forces to promote and facilitate their doctrinal and organisational transformation.

A little to-do list

The Helsinki Headline Goals were drafted in 1999 to identify the critical military shortfalls EU member states had to address in order to face the security challenges of the new millennium: drones were on the top of that list. However, almost 15 years later, European countries still suffer from such shortfalls and the Union, as a whole, still lacks critical capabilities in this domain. In Libya and Mali, European countries had to rely on the US and its RPA for intelligence, surveillance and reconnaissance capabilities. As the age of drones warfare speeds up, and more and more countries around the world start producing various types of unmanned platforms, the EU and its member states are taking the right steps towards launching pivotal RPA programmes. While necessary, however, this is not a sufficient condition: drones present many other challenges that EU countries will somehow have to address.

First, funding drone production will not be easy, as this will not significantly boost employment in the industry.

Second, competition among companies will be particularly acute, given the low number of platforms European countries will produce and the scarcity of other defence and aerospace programmes: however, Europe cannot afford to repeat past inefficiencies. Thus, some difficult political choices will be necessary.

Third, in order to ensure competition and innovation in the production of key components, European countries must actively promote the adoption of common standards and open architectures. The EU should also pay attention to the supply of some pivotal raw materials (rare earths).

Finally, various infrastructural, organisational and recruitment challenges must be addressed: otherwise, EU member states will not able to exploit the full potential of drones.

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