

Unmanned Aerial Systems: a Challenge to European Industry?

by *Professor Keith Hayward*

Keith Hayward is Head of Research at the Royal Aeronautical Society. In this article he looks at the worldwide defence market for unmanned aerial vehicles and the response from the defence industry; in particular he examines the European approach and asks whether it can make the necessary changes to the structure of supply and demand to keep up.

Unmanned vehicles of all types are set to dominate military thinking over the next decade and spending on robotic warfare is growing rapidly across the world. The US dominates the sector, but UAV technology is spreading globally, with the Middle and Far East set to play a major role in future developments. However, despite clear interest in UAVs, European activity in the field is affected by limited budgets and regional fragmentation.

The Industrial Challenge

The advent of unmanned aerial vehicles poses some fundamental questions about the defence technological and industrial base. Robotics generally challenges the traditional military industrial complex.² The basic technology is also easily copied and hence diffusible. In 2008 the international trade association for unmanned aircraft had 1400 members in 50 states and the AIAA annual UAV census described 538 UAVs in various forms.

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In short, the widespread diffusion of basic UAV technology and the 'immature' nature of the industry base, combined with remarkable growth, has led the French Parliamentary Defence Committee to note that: "The market for drones is not like any other market".³ Although Europe has achieved a strong position in the conventional aerospace market, there is a growing danger that European industry might miss the UAV boat.

The UAV Market

The US is the world leader by far in UAV use and technology acquisition, with American firms having over 66% of the work market. The current US fleet of medium and large UAVs, currently 72, will grow to 223 in 2015 and to over 476 by 2020. Forecasts of potential sales of UAVs suggest a market worth over \$38Bn over the next 10 years. This includes some \$20Bn on research. The US is likely to account for at least 60% of this business.⁴

European companies currently have 2.6% of the market, but in many respects are lagging Israel at 1.70% as a dynamic force in world markets, where several other countries are using its platforms as a basis for indigenous UAV development, including the UK Thales Watchkeeper.

UAV Companies are Different

Defence ministries have frequently referred to the need to attract new entrants into the defence business, especially from innovative small companies. But in practice, the lack of conventional institutional ties and knowledge of procurement practices hampers the connection. The UAV market has been more accessible to new entrants, especially to small, innovative companies. This is still a noticeable characteristic of the UAV industry, but established defence contractors are catching up, often through acquisition and absorption of innovative companies. The downside is the risk of losing the innovative spark in small companies, as the small independent design team becomes part of a larger unit.

The incentives to achieve a balance between innovative spark and flexibility within a large corporate entity go beyond just balance sheets. The UAS revolution implies a return to faster cycles of design, development and production, inspiring young engineers and scientists who might otherwise have been deterred from entering an industry where one project can dominate a career and where individual responsibility and challenge can get buried in a large development team. The UAS industry supply chain demands flexibility and low-cost solutions combined with the highest technical specifications.

In many cases it means adopting best practice from other areas such as autosport, as well as tapping their suppliers and logistic methods.

National procurement agencies are still coming to terms with the unmanned systems supply chain – although old

practices are creeping into UAS procurement, with the US recording cost escalation and delay amongst several major UAS programmes.

The UAS revolution also implies nurturing a wide technology base. Commitment to pure research cannot be stunted; too often this is sacrificed for pressing operational needs, support for employment-heavy platform makers and budget cuts generally. Given the speed of change in this sector, nobody with ambitions of having a 21st Century defence industrial capability can afford to underspend in the upstream technologies, especially as the leverage from initial expenditure is very high indeed. This has already been shown by the trajectory of UAS development and deployment to date.

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European Catch-up

Although strongly placed in conventional aerospace, Europe will have to play catch-up with a vengeance in this sector. It is no great record to be only just ahead of Israel in numbers of UAS programmes and market share. There are a number of active and innovative programmes, and the key manufacturers are fully engaged in acquiring the necessary technologies. Europe has the sub-systems industry capable of sustaining a regional UAS capability.

However, it is already evident that Europe will have to work hard to avoid the perennial trap of duplication and redundancy. There are powerful industrial and political interests in supporting 'sovereign' capabilities.⁵ But progress is still patchy: Europe will need to match the sheer versatility and depth of commitment to UAV development already shown by the US and elsewhere. There is a risk that the European defence and aerospace supply chain could miss out on this important growth area.

European efforts are still beset by domestic competition and manoeuvring to retain 'sovereign' capabilities. The recently published British Green Paper on defence has hinted at encouraging greater cooperation with the French, which might extend to work on unmanned systems – an option given impetus by high-level meetings between Prime Minister Brown and President Sarkozy in 2008.

These have led to conversations between BAE Systems, Dassault and Thales.⁶ Set against this there is a degree of intra-regional competition between British- and French-led advanced UCAV demonstrator programmes. And a BAE-Dassault programme based on the Mantis would compete with the EADS Talarion.

Problems with European UAV Collaboration

Much of the UAV business is about quick response to customer requirements with clever applications of existing technology, plus agility and speedy decision-making – not a hallmark of European armaments collaboration.

Moreover, collaboration may not be the best alternative for UAS development: compared to many advanced weapons platforms, costs are relatively low, at least in the tactical segment of the market. In the final analysis, there may be no alternative but to seek partners. The overriding problem remains the availability of money to support development and the need to sustain production on a market that at best will demand a limited number of platforms at any one time, but with a built-in capability to respond to events and to replace losses. Again, the fundamental structural inadequacies of the European defence market militate against this approach to procurement.

The practice of *le juste retour* is still present in too many European collaborative programmes, even if hidden by pre-contract manoeuvring. More importantly, if Europe is to develop a fully world-class competence in next-generation UAS technology and manufacture, the supporting industrial system must also be open and accessible to a wider range of players, including from outside the region. This will demand a transformation of the European defence industrial base, as well as a substantial modernisation of multinational procurement.

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The newer European defence institutions including the European Defence Agency have identified UAS equipment as a vital component of Europe's future defence and security requirement; the key will be giving sufficient power and competence to ensure adequate coordination of UAS research, development and production. And, above all, to

facilitate the transformation to a new industrial structure that will nurture new ideas and concepts.

Deficits may Trump Defence Budgets

Even though European governments – and the UK is no exception – fully appreciate the importance of unmanned platforms in a modern inventory, there is a reluctance to put real money behind development. There is funding for some technology demonstration and for urgent operational requirements – almost inevitably for US or Israeli platforms. In the specific British environment, the impending Strategic Defence Review should address this lacuna – the Green Paper and the Defence Concepts and Doctrine paper on strategic trends further underline the importance of robotics generally. However, given the tough economic conditions in the UK and throughout Europe, the need to curb deficits could constrain spending on ‘exotic’ technologies.

Futures

So, has the advent of UAS transformed the aerospace supply chain and associated industrial structure? And, equally important, can European industry make the necessary changes to the structure of supply and demand to keep up? The temporising answer is that it is too early to tell. Using a familiar analogy used by the UAS community, in the parallel lifetime of unmanned aircraft, the Wrights flew just over a decade ago, the military have discovered aviation’s value as a weapon, technology is moving very fast, and a cottage industry of inventors and enthusiasts is gearing up for mass production. Unmanned platforms seem to have reached their Western Front moment. But where are we likely to go in industrial terms?

The impact of UAVs on industrial structure has so far reflected general trends. More capability in less space; more power and stealthier; increased value-for-money and a leaner production system have been part of the defence and aerospace mantra for at least two decades. Going to the more exotic end of the technological spectrum, ‘nanobots’ will have more in common with integrated circuit production than conventional aerospace manufacturing. There will also be the custom-built one-offs that will reflect satellite construction, as well as aping their role as very long-endurance, high-altitude platforms.

The real challenge will be to provide an appropriate industrial base for the middle- to high-end UAVs, where low-volume production will work against relatively high-cost development. The potential long-term winners in this segment will be the systems architects or integrators. Whether there is enough meat on this market to support all of the current pretenders is debateable.

A Different Business Model

Fundamentally, the long-term future of the UAV sector will demand a different business model. The adage – price

low for development and make it up on production – will not work for low-volume, relatively high-cost products. Customers will want a new ‘system’ in a foreshortened cycle. Think higher-end ‘plug and play’ hi-fi units, or computers and add-on peripherals; or an even better parallel – ‘super cars’. Profits have to come from the first production model, which might even be the second vehicle. Traditional aerospace suppliers, certainly from the aero-structure side, will have to match these demands. Higher-level sub-systems suppliers may have more scope to adapt, but they too will potentially have to share business with a novel set of sources.

Europe is at a very difficult juncture. Through a mixture of national and collaborative programmes, Europe has held its own in conventional aerospace markets. There is a widespread understanding of the industrial stakes at risk in missing the UAS wave, but there is little central grasp of how to move forward – nor is it evident that all of the leading defence and aerospace companies have fully appreciated the process-driven nature of the new UAV business model. Israel is already dominating one segment of the tactical UAV market, and is a supplier of choice to indigenous programme unmanned air platforms.

The US will confidently supply its own market and others will buy from the US when they can. Others will seek domestic solutions for modestly defined requirements. As the French Parliamentary Defence Committee warns, Europe is at a “crossroads” as far as the choice of suitable collaborative MALE programmes is concerned, with grave danger of becoming totally “dependent on US or Israeli platforms”.⁷ It is evident that unless Europe sorts itself out very soon, it will lose contact with one of the most dynamic defence and aerospace markets of the 21st Century. ■

NOTES

- ¹ This article is based on a Royal Aeronautical Society Discussion Paper, Unmanned Aerial Vehicles: a New Industrial System? Available on the Society website
- ² P.W. Singer, *Wired for War: the robotics revolution and conflict in the 21st century*, New York 2009, page 240
- ³ Assemblée Nationale, 1 December 2009, Report No. 2127
- ⁴ Aviation Week, 19 October 2009
- ⁵ Aviation Week, 5 February 2010
- ⁶ Aviation Week, 12 October 2009
- ⁷ Assemblée Nationale, 1 December 2009, No. 2127; four European NATO forces in Afghanistan are using Israeli platforms to fulfil urgent operational needs, *Defense News*, 16 November 2009