UAS TRENDS: UP AND TO THE RIGHT, ...OR CAN YOU KEEP UP?

Recent conflicts have accelerated trends that were already underway in the Unmanned Aerial System(UAS) market. ***Figure 1*** shows a variety of different attributes that illustrate changes in the military market. The first three relate to differences over time worldwide, with an increasing number of **countries** able to deploy drones, a predicted 40% increase in **spending**, and a rapidly growing number of **patents** being issued as interest in this sector is reflected in innovation (graphs ***a*** through ***c***).

The remaining graphs show trends relative to the different sizes of drone platform which vary from big Class 5 platforms capable of flying at over 18,000 feet and weighing more than 1,320 lb., all the way down to Class 1 models that will fit in the palm of a hand and weigh next to nothing.

The most dramatic changes are occurring on the smaller platforms where **costs** are dropping the most (***d***). Factors at play include increasing digitization, integration, better technology availability for reducing size weight and power (SWaP), scaling to higher volumes, and for larger systems increasing deployment of modular architectures.

One mega-trend across many countries is disaggregation, or the strategy to supplement or replace large high value assets with tens to thousands of smaller low value assets. With such widespread stocking by countries,

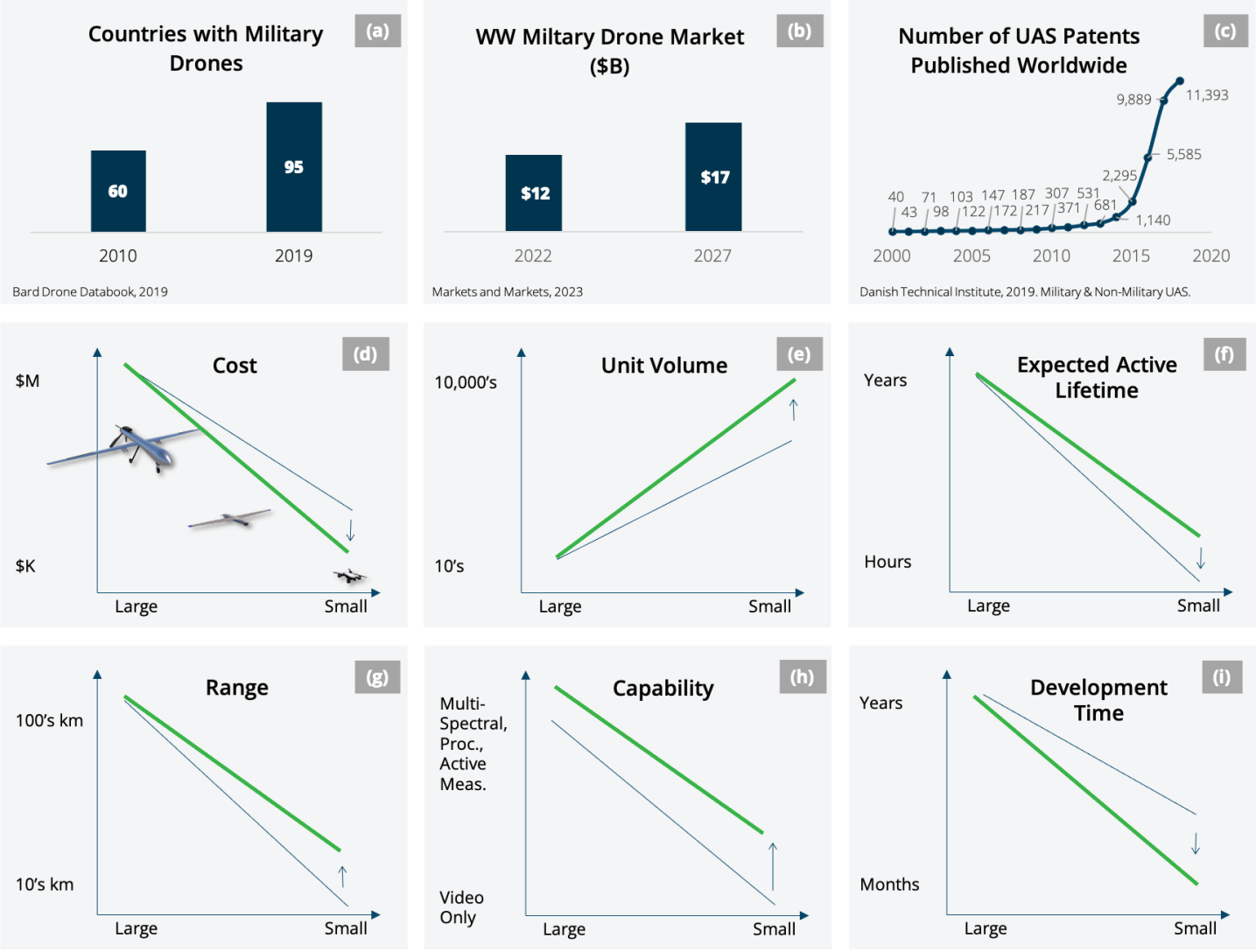

Figure 1: Changes to selected attributes over the past few years

mass deployments in ongoing conflicts, increased use of loitering munitions and one-way attritable models, this impacts the **unit volumes** being produced (***e***) and the **expected lifetime** (***f***).

Achievable **range** (***g***) and increasing **capabilities** (***h***) are intertwined, as weight and power consumption can be traded to increase either. Improving technologies to reduce size and weight are increasing usable range of even small drones, and attritable use can double the range available if units are not expected to make a return journey. Epiq's focus is on the radio capabilities, and software defined radios find application in UAS platforms for sensing such as signal intelligence (SIGINT), RF record and playback, spectrum analysis, direction finding, communications including satellite communications (SATCOM), data links, ad-hoc mesh networks, as well as active functions such as electronic warfare (EW), electronic attack (EA), jamming, radar, counter-UAS. As lower SWaP technologies become available they allow more channels, higher conversion bandwidths, wider frequency coverage and even small form factor processing of AI/ML (artificial intelligence/machine learning) algorithms to be included in the same payload. Similarly, where a given platform might only have been deployable with a visible spectrum camera initially, it is often possible to upgrade payloads with multi-spectral coverage and extensive radio services.

The last point about upgrading of platforms hints at the remaining trend to be discussed, which are the expectations around reduced **development times** (***i***). Particularly for the smaller models, there is a convergence of availability of commercial platforms and technologies with enablers such as 3D printing, rapid prototyping, common development environments and adaptation. Programs are therefore no longer set in stone with one set of production specifications for their duration. Instead many are constantly being updated on the fly as needs change, improvements are implemented, parts availabilities come and go, and firmware is updated based on lessons learned during deployment. This a very different environment than has traditionally applied in the defense industry. Timelines for development are measured in months rather than years, and non-traditional players are competing successfully against established incumbent companies using development methodologies and manufacturing techniques borrowed from consumer electronics. Such approaches don't result in the same ruggedness and reliability levels usually expected for military applications but meet the needs of the moment achieving cost and time-to-deployment expectations more easily.

WHERE DOES EPIQ FIT INTO ALL OF THIS?

The company has focused on bringing the latest semiconductor technologies that underpin software defined radios and making them easy for engineers to rapidly incorporate into traditional and non-traditional platforms. Starting from the tiniest form factors[1] with the most frugal power consumption as our foundation, it has proven much easier to scale up to the power and space available for a platform than to start large and scale down. COTS technology, a flexible and consistent design environment and inclusion of the latest processing technologies has allowed us to help customers improve costs, range, development times, capabilities and scale up production volumes quickly.

In the UAS market it is hard to keep up - **contact us** to chat about how we can help you do it, or **visit our website**.

[1] *(Our smallest radio is a 6 GHz bandwidth model which is only slightly bigger than a large postage stamp and uses about 2W)*

ABOUT EPIQ

Epiq Solutions develops cutting edge tools for engineering teams and government-focused organizations requiring situational awareness and detailed insight into their RF environments in order to identify and act against wireless threats.

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