

# Aerospace and Defence

Under attack from innovation

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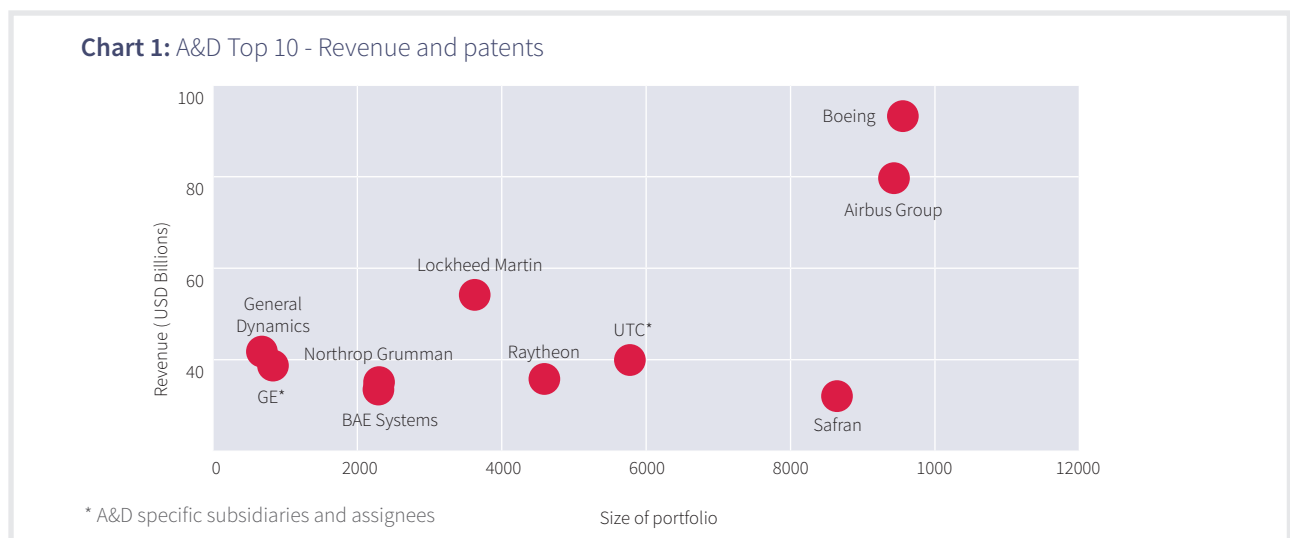
## Aerospace and Defence

### UNDER ATTACK FROM INNOVATION

It must be tempting as the CEO of a major A&D company to believe that your position is unassailable. The industry is large - over \$700bn, and order books are at record levels. You have relationships with MoD and DoD that go back decades, and there are always wars to fight. You have a long history of R&D, and leadership in innovation and technology. Best of all you have cash. The M&A picture, however, tells a story of consolidation and disruption - Harris and L3 have announced a merger, just part of the \$30bn of sector deals this year estimated by PWC. This report considers disruption through a different lens - innovation, and patent rights owned by the companies and countries that look to profit from the sector.

### A&D COMPANIES ARE MAJOR PATENT OWNERS

The starting point is to recognise that patents are not new to the sector. Chart 1 depicts the A&D top 10 by revenue alongside the size of the relevant part of their patent portfolio. While aggregate count is something of a meaningless measure, the sheer scale and differences do beg the question about how patents are integrated with core business strategy: Why does General Dynamics have 5x less patents than Northrop Grumman? Why does UTC invest so heavily in its portfolio?



Until quite recently it was hard to access business intelligence around patents that penetrated this the raw data. Chart 2 is a heatmap which maps the patents owned by the Top 5 to a taxonomy of technologies.

**Chart 2: A&D Top 5 by technology area**

	Boeing	Airbus	Safran	UTC*	Lockheed Martin
Motorisation & Propulsion	1283	1820	5188	3104	480
Aircraft design	1514	3324	935	983	505
Materials & Manufacturing	2296	1811	772	326	414
Optics	844	406	189	148	625
Wireless & Communication	841	526	499	60	270
Flight Management and Control	937	838	173	100	214
Software & Interface	864	362	366	90	191
Navigation & positioning	424	318	92	55	321
Imaging & Detection	363	116	691	37	186
Power Systems	275	191	269	650	108
Control Systems	631	813	157	98	135
Electric Systems	273	119	76	135	176
Temperature management	56	47	29	177	48
UAV	251	175	20	16	23
Miscellaneous	569	487	663	517	398
<b>Total</b>	<b>11421</b>	<b>11353</b>	<b>10119</b>	<b>6496</b>	<b>4094</b>

Cipher, our analytics solution, harnesses AI to automate the production of this analysis - so that this information is always accessible.

Having introduced the status quo, the big question is what does the future hold?

**TECHNOLOGIES WITH THE CAPACITY TO DISRUPT**

Our recent IP Strategy Survey asked generally about disruptive technologies. Bobby Mukherjee, Chief Counsel Intellectual Property and Technology Law, BAE Systems summarised the position for A&D:

*“Robotics, autonomy, human machine interfaces, cybersecurity and drones are key areas. It’s important to recognize that there is an intensely competitive landscape., It’s really important that we understand what IP rights are out there, not just for the traditional players, but also for the non-traditional players.”*

In this context, non-traditional players include new entrants, large technology companies and start-ups. We illustrate this in chart 3 by analysing the top 10 owners in 3D printing and cybersecurity.

There is no A&D company in either chart. This suggests that the incumbents will take a different approach to R&D in these areas, with an increased need to collaborate with technology companies. Boeing has a particular interest in start-ups:

As Brian Schettler, MD of the Horizon X fund for Boeing explains:

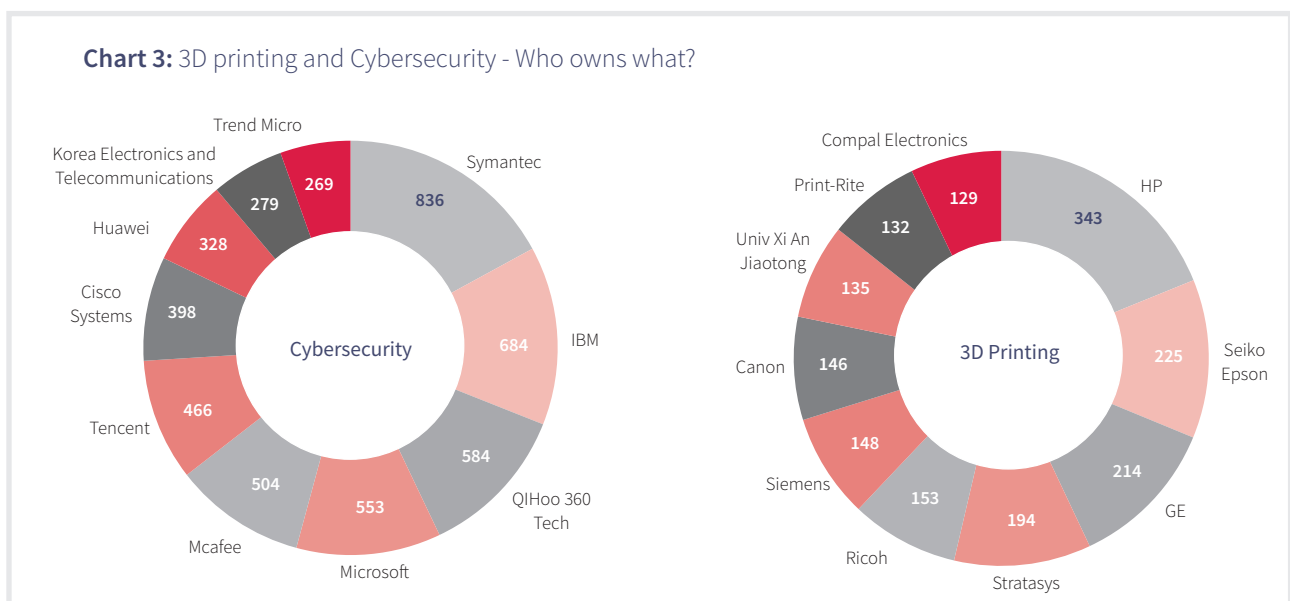
*“Horizon X is a corporate led innovation initiative with the focus of tapping into new sources of innovation, helping overcome the not invented here syndrome, and appreciating the fact that aerospace is ripe for disruption”*

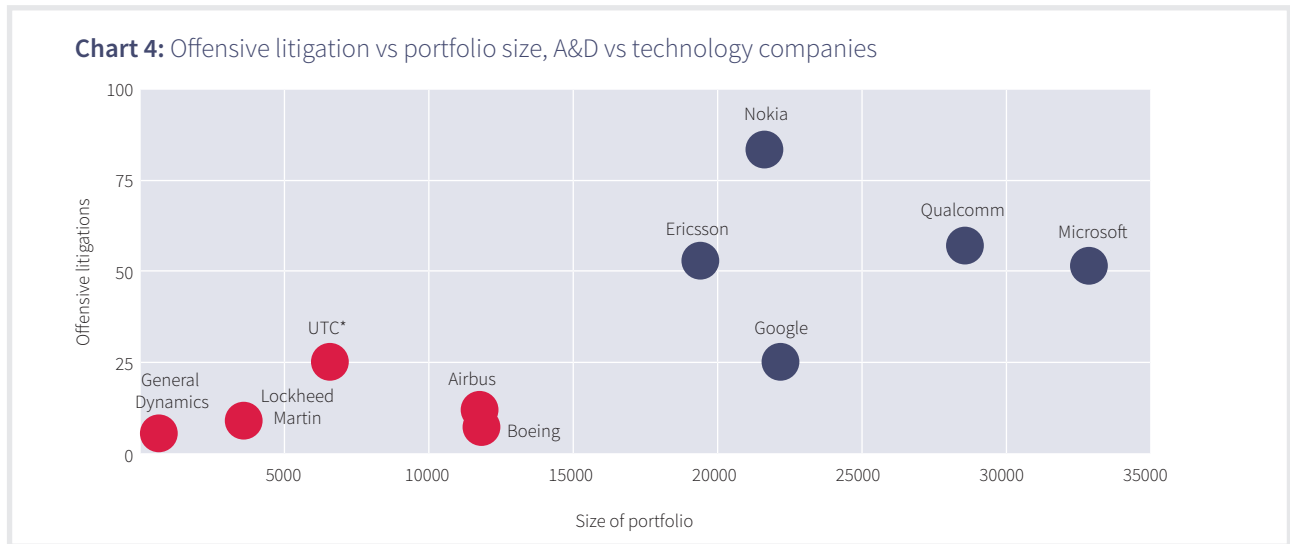
Lockheed Martin Ventures doubled the size their fund to \$200m in June. The competition for those technologies that transcend industry specific application, such as AI ad autonomy is intense.

In the recent Strategy& report on Aerospace and Defense Trends, they say, by reference to the historically low level of A&D R&D spend, that “slow-walking R&D efforts has never been a recipe for long-term success” and observe that “commercial technology entrants have large and growing workforces dedicated to developing new technologies and can innovate rapidly”.

**LITIGATION IS LIKELY TO INCREASE**

Technology companies are involved in far more patent litigation than A&D companies. This is the same level of détente as exists in many other sectors on the verge of epic disruption such as automotive. Chart 4 compares the litigation profile of selected A&D companies with a similar cohort of tech companies.





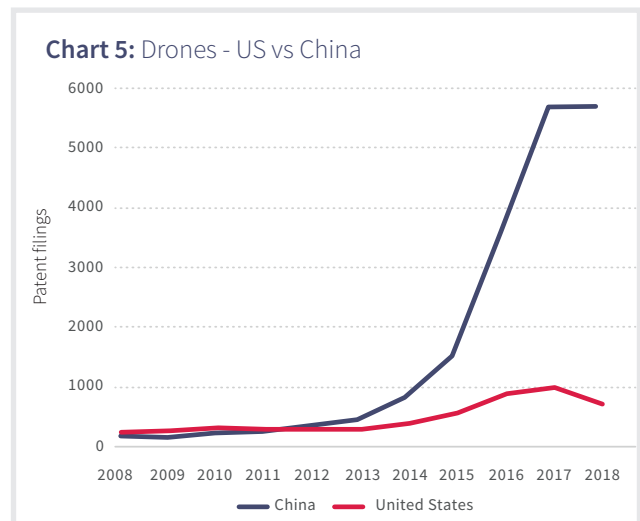
This is a gentle reminder that patents play a very different role across sectors, but that the next industrial revolution is likely to require fresh thinking around how best to integrate IP strategies with changing corporate strategies.

While our research indicates that NPE risk has not gone away, the A&D sector is going to be a tough nut to crack. “If NPEs don’t have a case, we will not pay them to get them off my back. Under my watch, that’s not what we will do” is how Bobby Mukherjee sums up BAE Systems’ position.

**CHINA - A NEW REALITY**

Many reports are dismissive of China patenting, arguing that it’s quantity over quality and the result of State incentives creating distortion. While there is some truth in rhetoric of this sort, our research across many of the key technologies tells another story.

Chart 5 compares drone patenting in the US and China. If you start combining this data with concerns about “swarm intelligence” (where dozens of drones are used to overwhelm enemy targets) and suggestions that China attract up to 60% of investment into AI, you realise that China’s shifting approach to intellectual property should be carefully monitored.



**PATENTS ARE IMPORATNT WHEN COMBATTING NEW FORCES**

While patents have historically been important to A&D, the way in which they have been understood and exploited is about to change. There are a variety of reasons.

First, the legacy A&D portfolios will need to adapt to disruptive technologies. Secondly, patents are currency in technology deals - in traditional A&D supply chains the role of patents has been largely passive. Thirdly, litigation risk in A&D has traditionally been low. This is likely to change in a connected and autonomous world, where the fight has already started for intellectual property supremacy.

This report was first published in July 2018 in the Cipher IP Strategy Report. It has been updated for the Airbus conference.

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