

DISCOVER, LIBERATE AND SCALE: UNLOCKING INNOVATION IN THE PUBLIC SECTOR



Hetti Barkworth-Nanton
Chief Executive Officer, Ploughshare

What is the right role for government when it comes to unlocking the value of public sector innovations? Some would argue for a light touch approach, for government to effectively get “out of the way” on the route to market, and others would recommend holding a steadfast interest and firm hand in the commercialisation journey. At Ploughshare we know liberation is key to success, but it takes so much more.

Ploughshare’s impact includes:

140+

Technologies to market

£120m

Gross value added (GVA)

£16m+

Income

£150m+

In exports

15

Spin-out companies
created to date

500

Jobs created

£180m+

Private equity investment
in MOD innovation

When we consider the most successful, highly innovative startups one important factor is how effective they are in maximising the value of the intellectual property they hold. At Ploughshare we work across Government to discover, liberate and scale existing innovations, to find new and inspiring uses for government inventions and investment in science and technology.

This continues the application of public sector research which has shaped the world, including those inventions originally born out of defence R&D and later incorporated into civilian application, including computers, radar, antibiotics and the jet engine.

We operate in an auspicious time for UK science and

technology with Government priority and increased investment set to the goal of achieving science superpower status for the UK. Last year Ministers confirmed the UK’s largest ever budget for public R&D, covering £39.8 billion over 2022 - 2025. This year, the Science and Technology Framework provided strategic focus to five critical technologies; more recently the Chancellor’s Mansion House speech unveiled further measures to drive investment from UK funds into unlisted, high growth UK companies. These are significant steps to address a long-standing issue in the conversion of world-class UK research into new world-class companies, growth and commercial success.

The public sector offers a rich

seam of untapped knowledge assets, across central government these are estimated to total a value of £104 billion, according to analysis in the Dr Andrew Mackintosh’s comprehensive report “Getting Smarter” (2021) which set out the implementation strategy to unlock this greater value, focusing around three pillars of good practice, incentives and access to support.

Ploughshare works with the MOD and public sector partners to unlock innovation and put it into the hands of users for economic and societal benefit – and is working to build further partnerships across the public sector. It was established in 2005 by the **Defence Science and Technology Laboratory** which recognised that a wholly-

owned, but separate company, would be better suited to engage with industry to take on the increasing amount of commercialisation activities and in particular to translate defence science into groundbreaking solutions for wider society. Hence the choice of name of our organisation, with its analogical reference to the biblical phrase of turning “swords into Ploughshares”.

Since then, our remit has expanded to identify, channel and provide support beyond the defence portfolio and more broadly across the public sector. Now we are positioned as an accessible service which partner organisations, such as the **National Oceanography Centre** and the **Met Office**, can use to commercialise their IP.

Independent analysis by SQW reveals that this work has unlocked the licensing of more than 140 new technologies, creating over 500 high-value jobs and £120 million in GVA. This work has leveraged over £180 million in total additional public and private investment through the 17 new companies spun-out of government-owned IP, which include:

- **Presymptom Health**, a company spun-out of the MoD, uses research originally intended to tackle threats from biological infections. Presymptom has created a revolutionary test that can predict when patients will develop infection and sepsis three-days before symptoms appear, an advantage that would be crucial to saving lives, reducing treatment costs and supporting the fight against antimicrobial resistance.
- **P2i** is a company which has revolutionised the conformal coating market, protecting over a billion electronic devices – such as smartphones, wireless stereo

headsets and hearing aids – with the world's largest electronics manufacturers. P2i's patented plasma process increases reliability of products whilst reducing manufacturing costs. It is now a global company with headquarters in the UK and China, and customers across eighteen different countries.

- **Sentinel Photonics** are developing sophisticated technology to detect and protect against laser threats. Ploughshare supported their journey from whiteboard discussion to frontline application in only five years. Sentinel is now exploring the



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technology as a method of detection and threat level assessment when lasers are shone at commercial aircraft or at sporting events, an excellent example of IP translation.

Our record was recognised in the Government's Defence Command Paper (2023) which acknowledged that, in an increasingly “contested and volatile” world the Ministry of Defence will take on an “ambitious new approach to the exploitation of intellectual property (IP)... developing the Government's existing vehicle for spinning out IP, Ploughshare Innovations Limited, and promoting larger-scale commercialisation – to accelerate military capability

delivery... as well as tech sector growth and job creation.” We look forward taking up this opportunity to delivering further economic dividend as well as increased capabilities and resilience.

Our expertise is focused on providing the inventors of breakthrough IP the support needed to create spin-outs and provide the prospect for commercial success. There are two levels of challenge here. First is to increase awareness amongst officials in the public sector that they have the option and capacity to take their innovation beyond government. Second is to provide those

officials with the incentive to take and continue that journey to full completion. The world of work is changing quickly and we offer support on different commercialisation pathways, providing flexible employment models and introducing those in the public sector looking to develop entrepreneurial skillsets.

This is where the Ploughshare Spinout Playbook comes to hand for the public servant as a concise guide. It provides an overview of the steps, from exploratory conversations to deciding on a licensing option or spin-out route to market. Decisions being informed by market insights, a realistic business plan and robust assessment of the IP position.

Readers will be familiar with the metaphorical ‘valley of death’, the challenging transition point where private financing options for founders are limited. Here we have established the Ploughshare Accelerator Fund (PAF), which allows access to early financing to accelerate innovation and build momentum without delay. This funding can cover – and essentially de-risk the costs of – developing new technology prototypes or covering the business planning phase for founders' salaries, providing security on expenses which would otherwise present significant challenge.

When we talk about motivating those innovation leaders to invest their time and commitment, an essential element to consider is the question of equity in the potential spinout. Historically other organisations, including universities, have been accused of retaining too much equity when creating spinout companies, and not providing enough incentive to founders to be successful, which effectively suffocates the company at the earliest stages, hindering development and making it almost impossible to attract external investment. However, certainly amongst the bigger research universities this is changing, with a recent report by TenU, the University Spin-out Investment Terms (USIT) Guide 2023, saying that ‘Starting (founding) equity percentages for the universities between 10-25% are typical’.

Ploughshare and the MOD have been bold and are leading the way across the public sector in this regard, announcing over a year ago that we will only take 20% equity in spinout companies, with the remainder being shared across the founders and management teams. This is a game changer and is already making a huge

difference to the pace and ambition of our spinouts.

Central to our approach in unlocking the wealth of innovations across the public sector is embedding the principles of Equality, Diversity and Inclusion (EDI) through the whole journey to market. This starts internally, where the diversity of our organisation has been transformed over the last 3 years, and we work tirelessly to encourage an open and inclusive culture. Aside from the intrinsic value of this approach, inclusion is key to ensuring we can discover and unlock the maximum amount of IP. When we consider the importance of speed to successful commercialisation, we cannot afford for high-potential IP to be left sitting on the shelf because

of a failure to engage talent from a variety of different backgrounds.

These EDI principles are of value at every stage of the spinning-out pathway. Management teams from spinouts need to benefit from a true diversity of perspectives in that critical early stage, both in terms of considering market applications through to engagement with partners and investors. There has been some good progress in recent years, but there is a huge distance to go, as shown in the Commons' Treasury Committee finding that businesses with all-female founders received only 2% of venture capital funding in 2021, with less than that figure going to black and ethnic minority-led businesses.

Achieving this shift requires sustained and deliberate effort, and success will deliver huge rewards in terms of bolstering the economy, strengthening our national resilience, and unlocking the myriad benefits of new technology to wider society. Ploughshare has set the ambition of unlocking £1 billion GVA by 2030 and we are keen to engage with all those working on this agenda to share perspectives and examine opportunities for collaboration.

The UK public sector is a leading source of innovation with transformational societal and economic potential. Within government, exploitation of IP needs to be seen as a natural consideration for innovation leads, rather than the exception. The Government Office of

Technology Transfer (GOTT) is working extensively across Government to ensure departments are identifying and protecting their knowledge assets, whilst simultaneously putting in place the policies and the enablers to succeed.

Alongside this, where organisations believe they have different innovation assets to be unleashed, Ploughshare is interested in partnership. There is a new generation of innovation-led businesses waiting to emerge out of government. We can give them the best start and ensure that these public innovation assets deliver true public benefit. ■