Public Sector Founder Equity & Rewards to Innovators Study

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Wellspring
Knowledge In Sight™

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Government Office for Technology Transfer

About Wellspring

www.wellspring.com

Wellspring is a leading provider of end-to-end technology transfer software and services. Working in technology transfer for over 20 years (previously as IP Pragmatics), we are a trusted, independent partner to universities, research institutes and public sector organisations in over 20 countries. Our team of experienced ex-industry, university TT and IP specialists has active global industry networks and contacts and use this collective expertise alongside extensive market, IP and scientific information resources, to provide analytical rigour and practical insights. We have led several public sector funded reviews across different aspects of the knowledge exchange landscape, examining topics such as spinout equity stakes, proof-of-concept funding, tools to smooth industry-academic collaboration, and evaluation and benchmarking of university knowledge exchange activity. As IP practitioners ourselves who have licensed multiple technologies and set-up several spinout companies, we have first-hand experience of the issues and challenges in commercialising IP, and bring a practical and pragmatic perspective to these assessments.

About the Policy Evidence Unit for University Commercialisation and Innovation (UCI)

http://www.ifm.eng.cam.ac.uk/research/uci-policy-unit/

The Policy Evidence Unit for University Commercialisation and Innovation (UCI) is based at the University of Cambridge and aims to support governments and university leaders in delivering a step change in the contributions universities make to innovation and economic prosperity – nationally and locally – through their commercialisation and other innovation-focused activities and partnerships. It does this by working to improve the evidence base and tools available to key decision makers in government departments, funding agencies, universities, and others as they develop new approaches for strengthening university research-to-innovation and commercialisation pathways.

About the Government Office for Technology Transfer (GOTT)

www.gov.uk/government/organisations/government-office-for-technology-transfer

Established in 2022, the Government Office for Technology Transfer (GOTT), based in the Department for Science, Innovation and Technology (DSIT), supports the UK public sector to unlock the potential of its knowledge assets to deliver value to the UK economy and society. It does this through providing specialist advisory support, capability building and guidance, such as the **Rose Book (https://www.gov.uk/government/publications/knowledge-asset-management-in-government)**

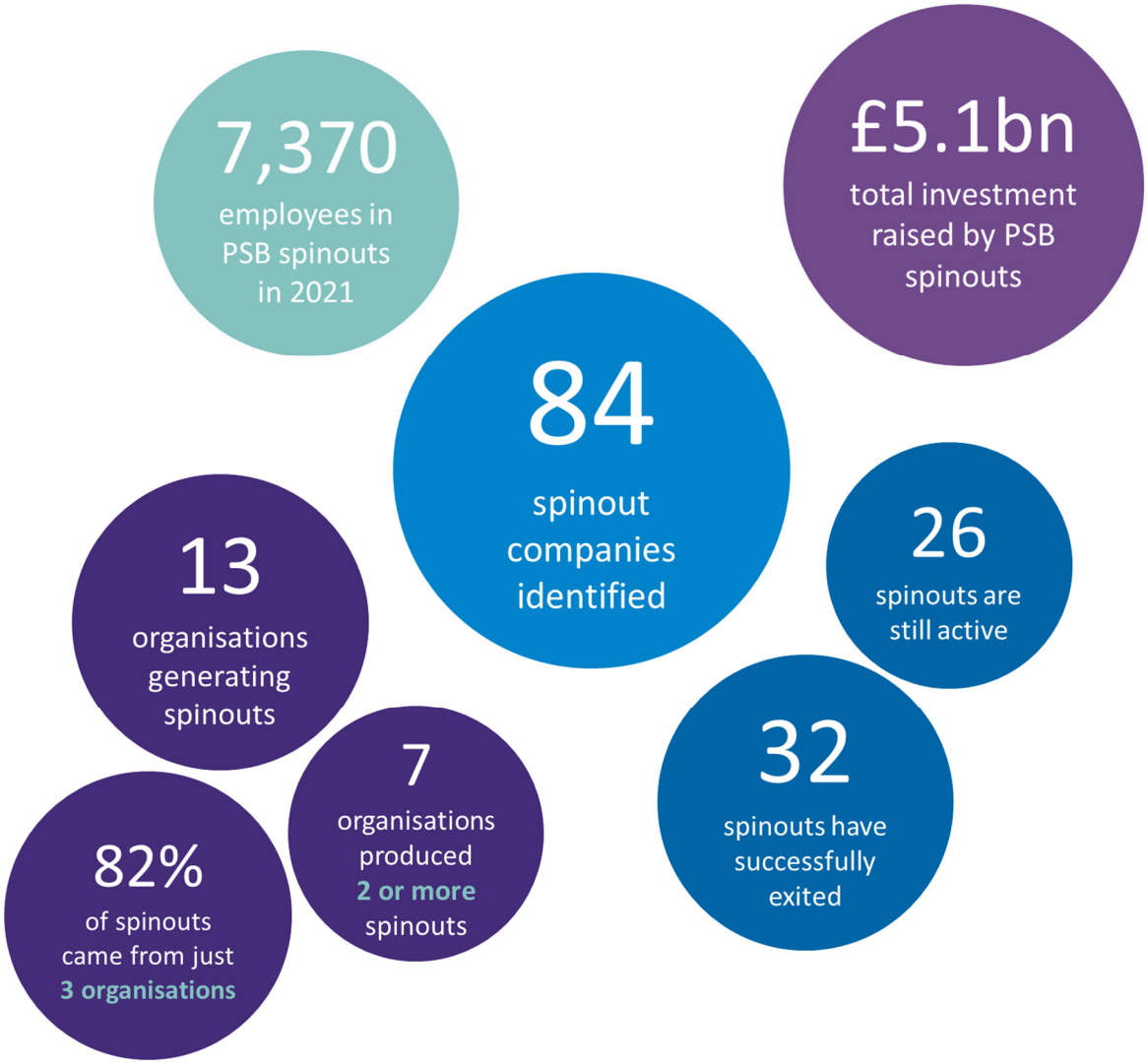
1 Executive Summary

This study was commissioned by the Government Office for Technology Transfer (GOTT) to explore the approaches surrounding spinouts founded on public sector knowledge assets (KAs). Information has been gathered on spinouts founded by public sector bodies (PSBs), which encompasses those central government departments, arm's length bodies and government agencies which have an Accounting Officer responsible under Managing Public Money.

The main aims of the study were:

- Generating a database of spinouts founded on public sector knowledge assets
- Exploring the equity positions taken in these spinouts, and factors influencing this
- Understanding how public sector employees who generated these assets have been involved in the spinouts, whether they receive equity or other rewards
- Make relevant comparisons with the findings, such as to the UK university technology transfer sector
- Suggesting recommendations of good practice.

Some key statistics about the spinouts identified in the study are highlighted below, data as at September 2023 unless otherwise specified.



Spinout trends and approaches

The study identified 84 companies in scope, with the majority of these spun out of just three organisations. As this database is dominated by these three PSBs, and due to issues with obtaining detailed information on deal terms, particularly for the older companies, it has not been possible to draw firm conclusions about the influence of specific approaches to spinout on the success or otherwise of these companies. A more systematic approach to data collection across PSBs for future spinouts is good practice, and would allow PSBs to share and compare data between them, increasing awareness of good practice. This would also allow government to have a better understanding of the outcomes and impacts arising from their funding.

The available data suggests that PSBs in the UK are producing fewer spinouts now compared with 15-20 years ago. Our interviews did not identify any particular reasons for this decline.

With the caveat that data on founding equity positions proved difficult to source, the mean average equity taken by PSBs in their spinouts at the point of foundation was 41%. The distribution around this mean is also large, with the interquartile range (the middle fifty percent of cases) ranging from 9% to 77%. This average masks important variations between PSBs, with some adopting approaches that take much lower founding equity (e.g. for one PSB the mean average was 16%), while others took higher levels. This may reflect different mechanisms of founding the companies, differing priorities, and adopting more of a case-by-case approach to determining appropriate equity levels.

One factor influencing PSB equity stakes is the motivation to keep within the rules set by international standards and decided upon by the Office for National Statistics, which determine entity classification. These include the maximum equity stake (<50%) and limitations on the amount of control that can be exerted by the parent PSB, to ensure that the spinouts are not classified as public sector bodies themselves.

When looking at the percentage of equity taken, it is important to consider whether the licence fee is included in the consideration for equity, or whether it is licensed on separate commercial terms that will potentially bring an ongoing revenue stream back to the PSB. These two elements of the spinout deal are inextricably linked and should not be assessed in isolation. There may be other factors that affect equity stakes negotiated, such as the level of support provided by the PSB in forming the spinout (e.g. proof of concept funding, patent costs, practical support in building the business proposition, brand value), or the support that will be provided post-formation (e.g. access to staff and facilities).

The majority (76%) of the 17 PSBs which provided information on their approach to rewards to innovators have a formal policy in place, or in development. Where a policy did not exist, this was either due to a historically low level of KA generation, or because KA exploitation was seen as a normal part of staff activities. Rewards policies vary and may take the form of: payments relating to patent protection or commercial milestones; general staff recognition awards; a share in the revenue received by the PSB such as royalty payments or revenue from equity sales; or allocation of shares in the spinout. Whilst some founders will leave the PSB to join the spinout full-time, several (but not all) of the organisations allow staff to hold shares in a spinout whilst retaining their staff position within the PSB. Mechanisms such as consultancy, contract research or sabbaticals are useful to allow an innovator to continue to support the spinout. Investors

generally prefer founders who are instrumental in the future success of the company to be incentivised through equity holdings.

Support mechanisms and barriers

It is notable that all three of the PSBs with higher spinout numbers have a dedicated unit (in these cases structured as a separate legal entity) which is responsible for technology transfer support for KA commercialisation and spinout formation. The other organisations in this study have produced only 1-3 spinouts each. In these cases, there was generally lower support levels available, and a lack of corporate memory surrounding individual spinout circumstances, leading to longer timelines and effort required for each new company as the process and approval route are re-invented each time.

Some PSBs reported that they can find it hard to convince the originating innovators to support the development of a spinout. Partly this may be because they are not personally interested in pursuing commercialisation activities, but this is also influenced by the organisational culture. Some interviewees felt that historically, commercialisation of KAs has been a lower priority within their PSB, which are concerned about external perceptions that the government receives a fair return for public spending, and may not be able to benefit from any commercial returns or use these to support further innovation activity. They may also be worried about losing valuable staff members to the spinout, or for them to take time away from their day job to devote to developing the spinout.

A recurring theme for several PSBs (specifically agencies and arm's length bodies) was significant difficulties in getting approval to establish a spinout from their parent government department. Lengthy timescales (particularly obtaining senior ministerial sign off), multiple approval processes and risk-averse cultures have all led to multi-year approval times, which are incompatible with the commercial pace needed in a new spinout. The three PSBs with the highest number of spinouts have all implemented mechanisms which ensure that appropriate expertise and delegated authority is available within the PSB itself.

There is a lack of experience across the range of spinout activities such as the mechanics of spinout formation, navigating the issues of competition law and managing shareholdings in external companies. Most of the organisations studied do not currently have sufficient spinout opportunities to justify specialist in-house support and would welcome additional sources of expertise and advice on what is right and reasonable. GOTT has already provided valued help, in terms of Proof of Concept funding, access to venture capital via UKI2S, guidance and advice, and supporting development of HM Treasury and Cabinet Office guidance and frameworks.

Recommendations for PSBs

Strategy, governance and decision-making

1. To create a supportive culture, PSB Leadership should incorporate commercialisation and spinout formation into their organisational strategy (where this is consistent with their function and remit).
2. PSBs should ensure that they have sufficient expertise and suitable governance processes in place at a local level to permit delegation of spinout approval to within their own organisation.
3. PSBs should implement and communicate a streamlined approval process which balances consideration of the potential financial, legal and governance implications involved in the spinout with appropriate commercial timelines.

Support for spinouts

4. PSBs should implement a clear, formal Rewards to Innovators policy, which is regularly reviewed and incentivises staff to support commercialisation of KAs, including through spinouts.
5. PSBs should provide education, encouragement and mechanisms to support staff who wish to get involved with spinouts pre- and post-formation, such as staff sabbaticals or consultancy arrangements.
6. Where appropriate, PSBs should explore with HMT the retention of (some of) the proceeds of successful commercialisation activities for internal translational support use.
7. PSBs should consider which additional aspects of support it is able to provide to encourage development and early growth of spinouts both before and after foundation.

Management of KAs

8. PSBs should establish a dedicated internal unit to manage commercialisation of KAs, including support for spinout formation.
9. To provide internal expertise, PSBs should employ trained staff or outsource access to experience in commercialisation of KAs (ideally within a public sector setting).
10. If an ongoing pipeline with a higher volume of spinouts is anticipated, then PSBs should consider whether it may be appropriate to structure a separate legal entity to better delegate decision making and to manage and provide dedicated support to the spinouts.
11. When negotiating the terms for the spinout, PSBs should treat each company as a separate case, and should not adopt a uniform approach.
12. Equity terms and licence terms, as well as the level of support given by the PSB pre- and post-spinout should all be considered in combination when PSBs negotiate the terms for their spinouts.

Data

13. PSBs should implement robust record keeping processes on commercialisation, including spinout formation, as a matter of good governance.

Recommendations for GOTT

Guidance

1. GOTT should continue to advocate widely for technology transfer to be considered part of the remit of public organisations.
2. To increase understanding within the sector, GOTT should develop cross-sector guidance and a "how-to" guide for formation of government spinouts.
3. GOTT should develop guidance on the factors that should be considered when negotiating the equity position and licence terms for a PSB spinout, which includes information on possible implications for the Office for National Statistics classification of these companies.
4. In line with current trends elsewhere, GOTT guidance should consider whether adopting a lower level of equity coupled with a fee-bearing licence would also be appropriate in a public sector setting.
5. GOTT should develop and disseminate guidance on good practice in approaches to Rewards to Innovators
6. To reduce bureaucratic delays, GOTT should work with government departments to develop spinout approval frameworks and processes that support an appropriate consideration of potential risks without unduly compromising the timeline needed to realise the spinout's commercial opportunity. Where possible this should include delegation of approval authority to the organisation generating the spinout.
7. GOTT should consider whether advice to PSBs is required on suitable legal structures and governance arrangements for units that support KA commercialisation.

Support

8. GOTT should facilitate access to training in commercialisation and spinout formation, tailored for the public sector, for both technology transfer staff and for innovators.
9. GOTT should consider mechanisms to deliver additional support and expertise to PSBs with only occasional spinout activity, including peer networks, collaborative approaches, or access to outsourced resources.
10. GOTT should continue to develop and promote mechanisms to allow PSBs to access funding and other practical support for their spinouts.

Data

11. GOTT should maintain the database of spinouts generated during this study, and encourage central reporting of new spinouts and the progress of existing companies by PSBs.
12. GOTT should explore routes to allow sharing of information about spinout approaches between PSBs, and provide guidance on consistent data definitions.

Contents

2 Introduction

2.1 Focus of this report

Wellspring, previously known as **IP Pragmatics Ltd,** together with the **Cambridge Policy Evidence Unit for University Commercialisation and Innovation (UCI),** were commissioned by the **Government Office for Technology Transfer (GOTT)** to undertake a study to explore the approaches that public sector organisations take towards the formation of spinout companies which exploit the social, economic and financial value of their knowledge assets (KA). The approach taken to the study is outlined in Appendix I.

In particular, key aims of the study included:

- Generating a database of spinouts founded on public sector knowledge assets
- Exploring the equity positions taken in these spinouts, and factors influencing this
- Understanding how public sector employees who generated these assets have been involved in the spinouts, whether they receive equity or other rewards
- Comparing with the approaches in the UK university sector

This information was used to investigate trends and analyse the approaches used in different scenarios, to suggest recommendations of good practice.

Wellspring would like to thank all those contacted for their help with the provision of information and advice to build this detailed picture of the spinouts arising from the UK public sector.

2.2 Definitions and inclusion

The study focuses on spinouts from organisations which fall within the remit of GOTT support. These public organisations are those headed by an Accounting Officer and responsible for upholding Manging Public Money (as set out in the Rose Book[1] and the "Mackintosh Report"[2]). These include UK central government, including government departments, arm's length bodies, agencies and public bodies, which are typically funded wholly or mainly through public money. It does not include local government, or devolved administrations (and their related bodies), or individual NHS Trusts, or universities. Similarly, some organisations which receive public funding, but are not controlled by government, for example Research Institutes funded by UKRI BBSRC, are out of scope. This has been complicated by the historical nature of this study – some organisations which were in scope for the study at the time that they formed a spinout have subsequently been restructured are no longer in scope. In determining which organisations and

[1] **The Rose Book** - Guidance on the management of knowledge assets such as intellectual property, research and development, and data, in government (https://www.gov.uk/government/publications/knowledge-asset-management-in-government)

[2] **Getting smarter: a strategy for knowledge & innovation assets in the public sector** (https://www.gov.uk/government/publications/getting-smarter-a-strategy-for-knowledge-innovation-assets-in-the-public-sector-the-mackintosh-report)

spinouts should be included, we have been guided by GOTT advice. For the purposes of this report, we are using the term "Public Sector Bodies" or PSBs to describe the organisations which are in scope.

This scope covers a large, diverse set of organisations, and historically only a small proportion of these have actively commercialised their knowledge assets. Not all these bodies have experience of creating a spinout. At the outset it is important to recognise that no comprehensive list of spinouts emerging from PSBs currently exists; constructing this list was a key purpose of this project.

For the study, the following definition of a spinout was used:

Spinout

A company which was formed for the purpose of exploitation of knowledge assets generated by a public sector body. On or around the time of foundation, the spinout issued equity to and/or received a fee-bearing licence or assignment from the public sector body/HM Government

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The definition was deliberately kept quite inclusive, as we discovered that different PSBs adopted different approaches to structuring their spinouts to account for local circumstances. Ultimately, the test was whether the intention was to set up a company which would operate separately from the parent PSB, which had the main purpose of commercialising a knowledge asset from the PSB.

More detailed definitions of the key terms used in the study are included in Appendix II.

2.3 Data collection and completeness

Following extensive engagement with PSBs we identified 84 spinouts that were eligible for inclusion into our database. We encouraged PSBs to identify spinouts as far back as possible, with the earliest identified being founded in 1980. These spinouts emerged from 13 different PSBs that can broadly be categorised into those focusing on health; on science infrastructure and metrology; on defence and nuclear-related technologies; environment, food and agriculture; and public policy development (Figure 1). The breakdown of our database also reveals that the vast majority of spinouts produced by PSBs over the past few decades emerged from just three PSBs: 27 linked to the UKRI Medical Research Council (MRC), 26 linked to the UKRI Science and Technology Facilities Council (STFC), and 16 linked to the Defence Science and Technology Laboratory (Dstl). Note that as discussed above, UKRI BBSRC institutes such as the Babraham Institute, which have produced spinouts, are outside the scope of our PSB classification.

Some of the spinouts also had involvement from universities, either because the founders had joint positions, or through collaborative research. In many of these cases, it was not clear whether the PSB or the university (or both) drove the formation of the spinout. All of the

spinouts we have identified, along with their originating body, and which also had university involvement, are included in Appendix III.

Disclaimer: *Although we have attempted to be as comprehensive as possible in our data collection, it is likely that some spinouts that are in scope have not been identified by this study.* ***GOTT*** *is keen to maintain a full list of PSB spinouts, and would welcome information about any additional spinout companies that may be in scope.* ***You can email the GOTT team at GOTT@dsit.gov.uk.***

Figure 1 Breakdown of the number of eligible PSB spinouts, by PSB organisation and type of PSB focus.

Broad PSB focus	PSB name	Number of spinouts identified	Total number of spinouts by PSB category
Health	UKRI Medical Research Council (MRC)	27	30
	UK Health Security Agency (UKHSA)	2	
	NHS Blood and Transplant (NHSBT)	1	
Science infrastructure & metrology	UKRI Science and Technology Facilities Council (STFC)	26	29
	National Physical Laboratory (NPL)	3	
Defence & nuclear	Defence Science and Technology Laboratory (Dstl)	16	19
	United Kingdom Atomic Energy Authority (UKAEA)	2	
	Defence Evaluation and Research Agency (DERA)	1	
Environmental, food, agriculture	Royal Botanic Gardens Kew (RBG)	1	4
	Central Science Laboratory/ Food & Environment Research Agency (FERA)	1	
	Forest Research	1	
	UKRI NERC - British Geological Survey (NERC)	1	
Public policy	Cabinet Office	2	2

This database is not large, and the spinouts in question have been formed over a period of more than 40 years. This has made it difficult to make meaningful comparisons across different types of PSB, knowledge asset, and industry sector due to the small size of each individual category. We have also faced some issues with data quality, consistency and completeness. We discovered that many PSBs do not have ready access to much of the data that we aimed to collect, particularly for their historical spinouts. Furthermore, **it is important to recognise that, given the concentration of spinout production within three PSBs – UKRI STFC, UKRI MRC, and Dstl – the trends in the PSB spinout production and performance presented throughout this report will largely be influenced by factors affecting these organisations and the types of spinouts they produce.**

Some examples of information that we have not been able to find or were more difficult to access include:

- details of how equity shares were agreed
- presence/absence and details of any licences in place
- identity and role of the innovators

For a high proportion of older spinouts, the "institutional knowledge" and details of what happened are no longer available or accessible. On several occasions it transpired that the details on the process for establishing the spinout companies (including how equity stakes were agreed) have been lost due to relevant people leaving the organisations. Even among more recently incorporated spinouts, (just 23% of the spinouts identified in this study were incorporated in or after 2015), such information was not readily available or respondents did not have the capacity to collate these records within the timeframe of this research project.

Robust record keeping practices for spinout commercialisation activities are essential, not just for internal governance processes, but also to ensure that for spinouts that pre date the professionals currently in post, there is still continuity of information. This is necessary where there is a revenue-bearing licence in place, to ensure that the PSB receives the returns that it is due. This requires an internal recognition of the value of consistent data and record keeping to effectively manage their past, present and future assets and monitor their impacts. An additional benefit is for PSBs to share and compare data between them, to increase awareness and drive good practice, and would also allow government to have a better understanding of the outcomes and impacts arising from their funding.

Where the data limitations do not support robust conclusions, this is highlighted in the relevant analysis sections that follow.

To maintain the confidentiality of the PSBs involved, we have anonymised some of the data and case study reporting. **Please note** that this anonymisation is deliberately not consistently applied throughout the report – so PSB A labelled in one graph or table is not necessarily the same organisation as PSB A in another context.

3 Key trends in the production and performance of public sector body spinouts

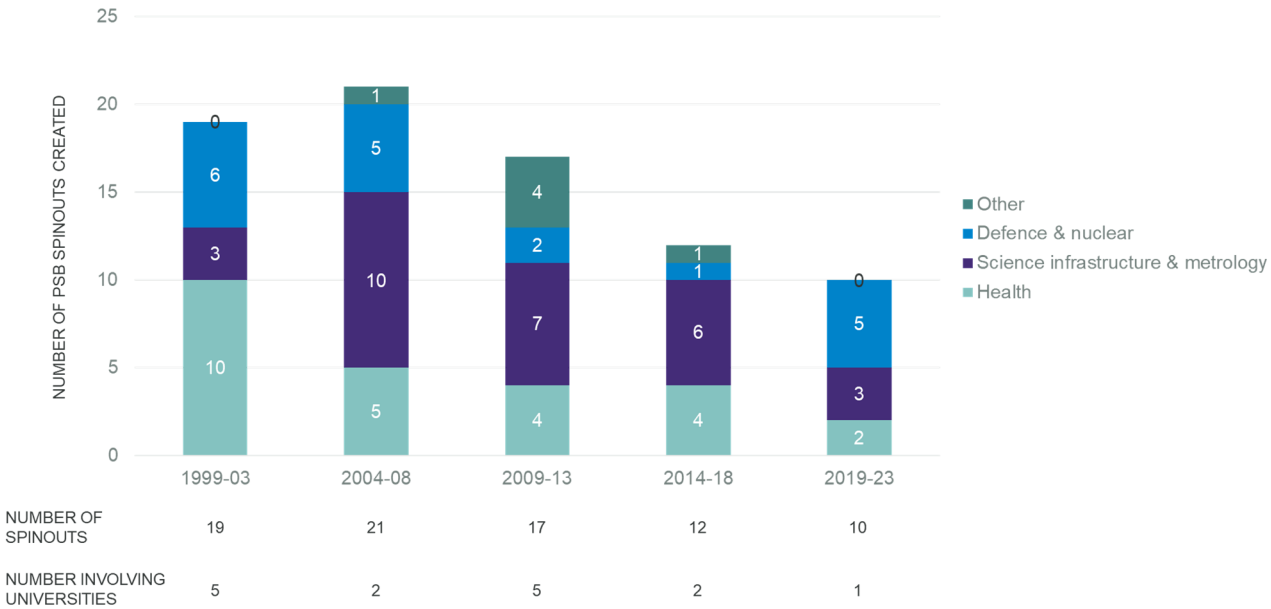
This section presents key insights and trends in the production of spinouts by PSBs and the performance of these companies in raising investment.

3.1 The production of spinouts by public sector bodies

The evidence collected for this study suggests that PSBs in the UK are directly producing fewer spinouts now compared with 15-20 years ago. Figure 2 presents the number of spinouts emerging from PSBs for 5-year periods from 1999-03 to 201923. Between 1999-04, 19 spinouts were founded in total. This rises slightly to 21 companies being founded between 2004-08, with 10 of these emerging from science infrastructure and metrology PSBs (primarily STFC), and a further 5 emerging from those operating in the defence and nuclear technologies domains (primarily from Dstl) and 5 from health-related PSBs (primarily UKRI MRC). By 2019-23, just 10 spinouts in total were founded by PSBs.

Some of the spinouts founded by PSBs are based on a mix of IP developed by the PSB and by universities. Of the 84 spinouts identified in our database, 15 had links to both PSBs and universities.

Figure 2 Production of spinouts by PSBs for different time periods and type of PSBs (grouped by focus).



Note: Five spinouts identified by the PSBs in our database were founded prior to 1999, with the earliest founded in 1980.

The university system witnessed broadly similar trends until around 2018, with increased number of spinouts produced in the second half of the 2000s followed by a decline to a new steady-state between 2013 and 2018. The early increase partly reflected increased incentives for

universities to generate greater numbers of spinouts. In the 2010s incentives changed with a much greater focus on the quality of the spinout rather than the numbers produced.

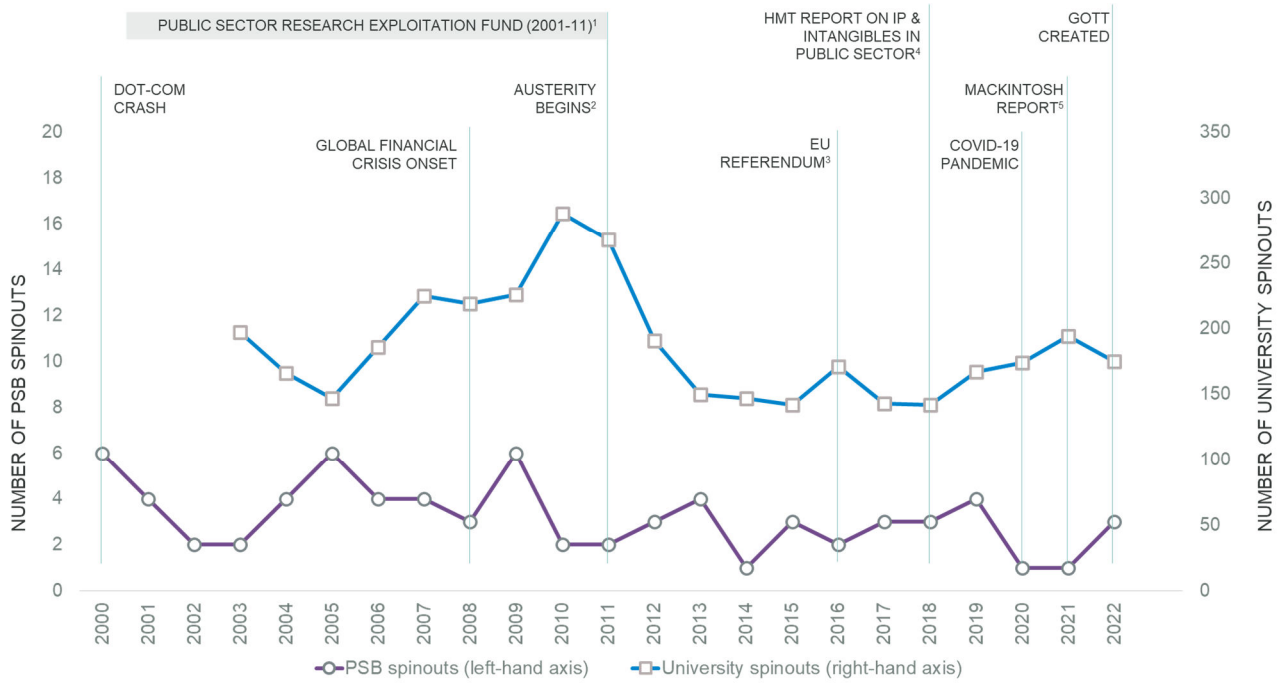
However, since 2018, we have seen a steady growth in the number of spinouts produced by universities (currently 175 per year from 49 universities) (Figure 3). This was coupled with significant increases in the amount of money being invested into these companies[3], suggesting a growth not just in the number of companies but ones that are investable.

It should be noted that in the 2010s the large, global research universities – which are typically the biggest spinout producers have been investing significantly in developing their spinout and IP commercialisation ecosystems. This has included securing access to large amounts of financial capital, for example, Oxford Science Enterprises raising £850 million to invest in Oxford spinouts; Cambridge Innovation Capital raising £500 million for Cambridge-cluster based spinouts, including from the University; UCL closing a second £100 million Technology Fund to invest in its spinouts, building on the success of its first £60 million fund; and most recently Northern Gritstone raising £215 million of a targeted £500 million to invest in the universities of Manchester, Sheffield and Leeds[4]. This has been coupled with developments in, and maturation of, university spinout support ecosystems with the universities that are more active in producing spinouts increasing their support and resources (financial and in-kind) available for their academics (and more recently students) to commercialise their ideas. Much of this support is government-backed, through funding programmes such as the Higher Education Innovation Fund (managed by Research England) and iCURe (managed by Innovate UK). The scale of activity in cities such as Oxford and Cambridge have also helped to drive the development of the wider ecosystem including attracting in professional services, investors, accelerators and others that play an important role in facilitating the spinout process.

[3] Ulrichsen, T.C., Roupakia, Z. and Kelleher, L. (2022). ***Busting Myths and Moving Forward: The Reality of UK university approaches to taking equity in spinouts*.** Cambridge, UK: Policy Evidence Unit for University Commercialisation and Innovation, University of Cambridge. (https://www.ifm.eng.cam.ac.uk/uploads/UCI/knowledgehub/documents/2022_UCI_University_spinout_equity_approaches_report_vExecSumm.pdf)

[4] See reference 3.

Figure 3 Comparison of the trends in spinout production by PSBs and UK universities over the period 2000 – 2022 (note PSB spinouts are tracked on left-hand axis (scale: 0-20); university spinouts on right-hand axis (scale: 0-350).



Note on trendline data: the PSB trendline is based on spinouts from 13 PSBs we identified through this study as having produced spinouts. The university trendline is based on data from 112 of the 168 universities in the UK submitting data to the HESA HE-BCI survey that produced at least one spinout over the period 2003 – 2022.

Notes on key events:

(1) The Public Sector Research Exploitation Fund provided funding to public sector research establishments to support knowledge exchange and capacity building to commercialise their research

(2) The introduction of austerity measures following the 2008 financial crisis, resulting in significant reductions in public spending

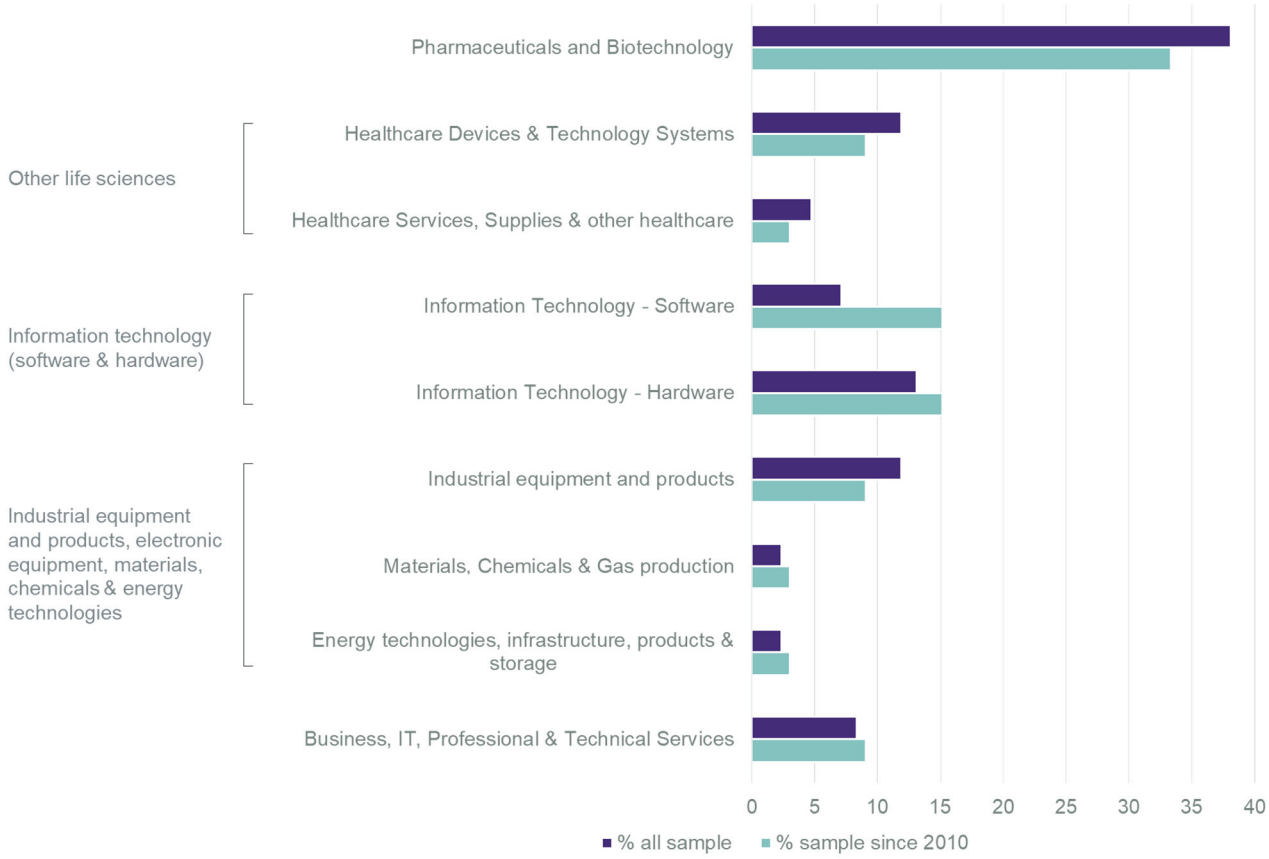
(3) EU referendum in which the UK population voted to leave the European Union. This was followed by a period of increased political, economic, and social uncertainty (compounded by other factors such as the COVID-19 pandemic, and more recently the war in Ukraine and the cost-of-living crisis)

(4) HM Treasury report (2018) *Getting smart about intellectual property and other intangibles in the public sector*

(5) Mackintosh Report (2021) *Getting smarter: a strategy for knowledge & innovation assets in the public sector. The Mackintosh Report*

Sources: PSB spinout data – Wellspring/UCI data collection for GOTT, University spinout data – HESA Higher Education Business and Community Interaction (HE-BCI) surveys

Figure 4 Production of PSB spinouts by industrial sector of operation.



Note: All PSB spinouts (top bar in each row): N = 84; PSB spinouts since 2010 (bottom bar in each row): N = 33

By sector, Figure 4 presents the sectors within which PSBs are operating, with the vast majority in science and technology sectors. Breaking this down, the figure shows that 38% of spinouts produced entered the pharmaceutical and biotechnology sector, 13% entered the software IT sector, 12% entered the IT hardware sector, and 8% entered the business, professional and technical services sectors. The figure also provides the distribution for spinouts produced since 2010 to reflect the sectoral focus of more recent spinouts. Figure 4 also presents sectoral groupings that are used later in this report reflecting the relatively small size of the database preventing a detailed sectoral comparison.

3.2 Types of knowledge assets transferred

The study attempted to identify the types of knowledge assets being commercialised by spinouts emerging from PSBs. The majority of spinouts involved a patentable invention. In addition, multiple examples were identified of spinouts that involved other forms of IP and knowledge assets including know-how and expertise, non-patentable software, copyright (non-software), designs, and services. A few examples were identified of spinouts commercialising production processes, business process innovations, and data/information.

***Note** that it was very difficult to identify the underlying knowledge asset being commercialised by PSB spinouts. This was due to very different levels of information available, with some PSBs*

able to provide detailed insights while others able to provide limited/no information. This made disentangling and categorising the types of KAs involved in each spinout very challenging.

3.3 The performance of spinouts emerging from public sector bodies

This section now turns to what we know about the performance of spinouts emerging from PSBs. We focus here on the ability of PSB spinouts to raise investment, and the current status of the companies including whether they have secured a positive exit (trade-sale or IPO). We also look at employment levels and growth. However, these data are lacking for a significant proportion of our PSB spinout database.

3.3.1 Employment levels and growth

Based on information available from company financial accounts, PSB spinouts directly employed 7,370 people in 2021[5] (Table 1). This has increased from 6,570 employees in 2017. However, as is typical in the context of spinouts, the distribution of employees across the spinout database is heavily skewed, with a very small number of companies employing the vast majority of these individuals. Highlighting this, in 2021 the average (mean) number of employees for spinouts ranked in the top decile for this variable was 1,510. By contrast, the average number of employees for those in the bottom half of spinouts ranked in this way was just 6. For those in the 50th-90th percentile of number of employees, the average was 88. Table 1 also shows that mean number of employees grew the most over the period 2017-21 for this latter group of companies.

[5] Note that we focus here on the number of employees drawn from company financial accounts. Data was not available on the full-time equivalent employment of these companies. We limit our attention to the time period 2017 – 2021. Outside this period the proportion of spinouts with data on the number of employees drops significantly.

Table 1 Number of employees for PSB spinouts, 2017-21.

	Employment figures by year					Compound Annual Growth Rate 2017 21 (%)
	2017	2018	2019	2020	2021	
Total number of employees for all PSB spinouts	6,750	6,750	6,570	6,800	7,370	2.2
Mean number of employees for all PSB spinouts	200	180	190	200	200	0
Mean number of employees for spinouts in top 10% (ranked by number of employees)	1,520	1,480	1,420	1,430	1,510	-0.2
Mean number of employees for spinouts in 50%-90% percentile (ranked by number of employees)	51	58	66	80	88	14.7
Mean number of employees for spinouts in bottom 50% (ranked by number of employees)	5	6	7	7	6	4.5

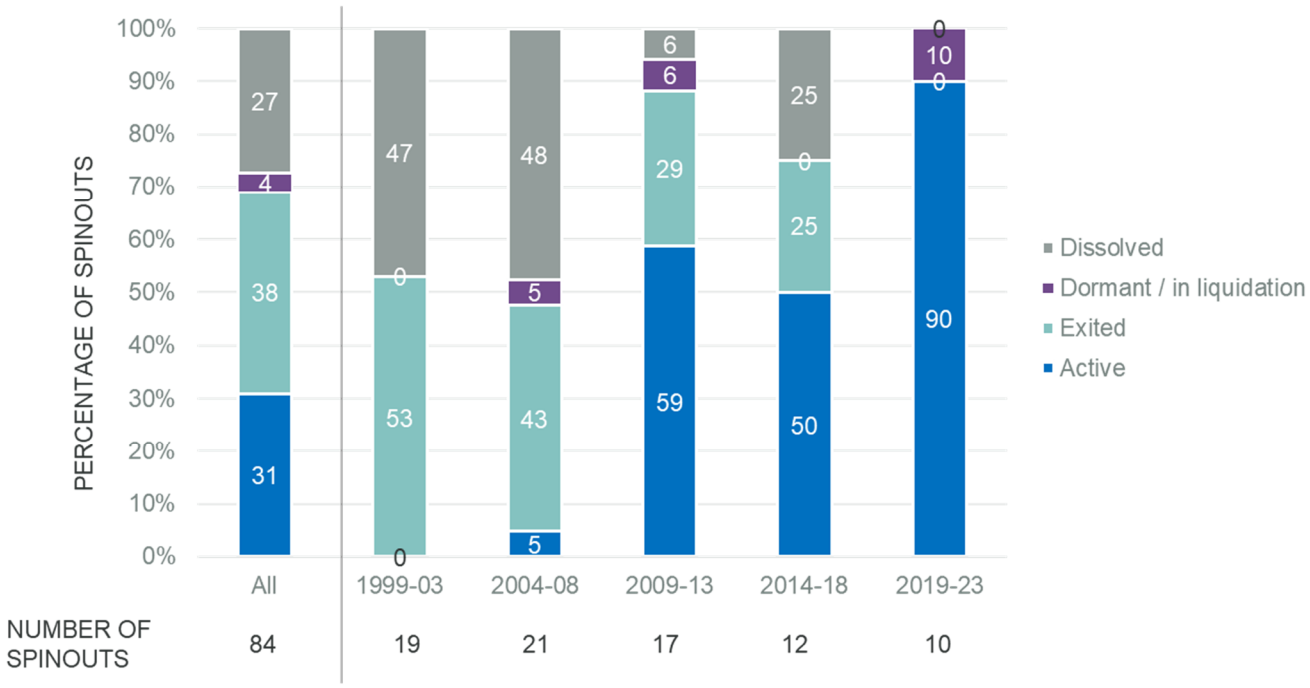
The activity of spinouts will help to create or support employment in their supply chains and elsewhere in the economy (known as multiplier effects), for example through purchasing of materials and other inputs, outsourcing of activities, and spending out of wages, Estimating the indirect and induced employment resulting from PSB spinouts was out of the scope of this report.

3.3.2 Current status of spinouts emerging from public sector bodies

Leveraging information available from Companies House and other sources, we investigated the current status of PSB spinouts founded during different time periods. Across the whole database, 38% of PSB spinouts have achieved some form of exit (e.g. trade sale or Initial Public Offering (IPO)); 31% are currently active, while 27% have been dissolved (Figure 5). Given the types of IP being commercialised through these PSB spinouts – often high-risk technologies with long development and commercialisation times, it is perhaps unsurprising that the proportion of spinouts achieving a positive exit increases with the age of company. Note that the identification of the spinouts in our database was typically based on the recall of individuals within PSBs. Given this, it is possible that the further back in time we go, we are more likely to identify spinouts that have been successful rather than those that were setup and were not ultimately successful.

Also evident from Figure 5 is the relatively high-risk nature of PSB spinouts over the longer term – for example while 43% of spinouts founded between 2004-08 have achieved a positive exit, 48% of spinouts have dissolved. As with many high-technology ventures, spinouts are typically commercialising high-risk, high-reward technologies; while some will succeed many will typically fail.

Figure 5 Current status of spinouts emerging from public sector bodies and founded in different time periods.



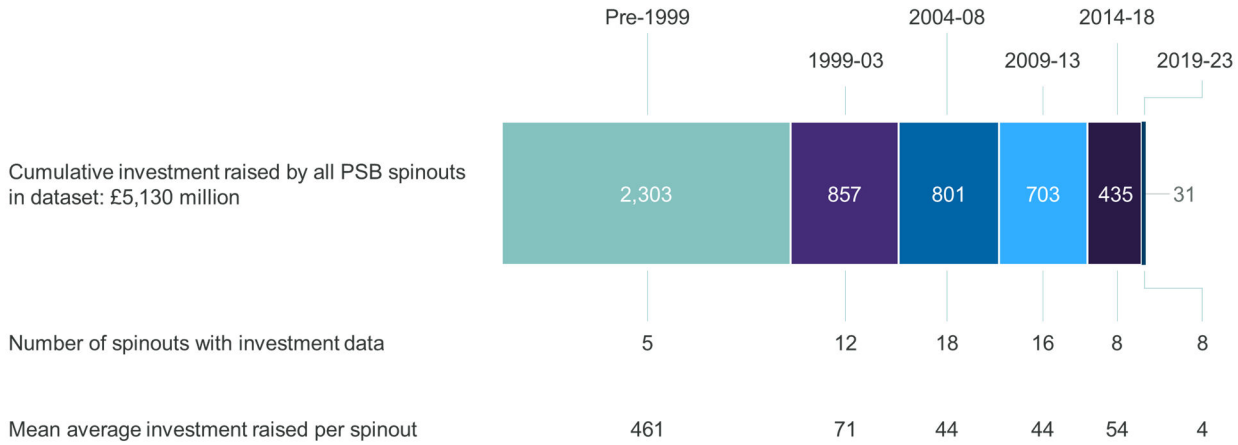
Note: 5 spinouts in our database were founded prior to 1999.

3.3.3 Investment raised by spinouts emerging from public sector bodies

The spinouts in this study raised £5.1 billion of investment (Figure 6). The majority of this is investment from private sources, although it also includes investments from some pre-seed/seed investors backed by public funds (e.g. UK Innovation and Science Seed Fund and British Business Bank), and grants from organisations such as Innovate UK.

This total amount raised by spinouts in our database is unsurprisingly skewed towards older companies, reflecting cumulative funding over time, with those founded prior to 2004 raising £3.16 billion, those founded between 2004-08 raising £801 million; and those newest eight spinouts founded within the past five years for which we were able to obtain investment data raising £31 million. The figure also shows that after the first five years, for spinouts between 5-15 years old, the mean average amount of investment raised per spinout is broadly similar at £44-54 million.

Figure 6 Cumulative total investment raised by PSB spinouts, by period of foundation (dataset limited to PSB spinouts that have raised investment during this time).



Source: Wellspring/UCI analysis based on internal data supplied by PSBs, Beauhurst and PitchBook data

In addition to the total amount of investment raised by PSB spinouts, we also examined the amount of investment secured as part of their first and second funding rounds (Table 2). Across all PSB spinouts, the median amount of investment raised by PSB spinouts during their first raise was £613,000. This rises to £1.39 million for PSB spinouts in the pharmaceutical and biotechnology sector; likely reflecting the significant development costs and capital intensity of the innovation process in this space. In most cases, the mean first investment raise is much higher than the median, reflecting a highly skewed distribution, with a few companies raising significantly more than most. At the second round of investment, the median amount of funding raised by PSB spinouts was £1.29 million, increasing to £6.5 million for those in the pharmaceutical and biotechnology sector (mean of £9 million).

Table 2 Scale of investment raised by PSB spinouts in different sectors in their first and second funding rounds.

	FIRST INVESTMENT RAISE			SECOND INVESTMENT RAISE		
	Number	**Mean (£s)**	**Median (£s)**	**Number**	**Mean (£s)**	**Median (£s)**
Pharmaceuticals and biotechnology	16	3,176,000	1,385,000	12	9,065,000	6,540,000
Other life sciences	10	4,388,000	910,000	8	1,846,000	775,000
Industrial / electronic equipment and products, energy technologies, materials & chemicals	10	517,000	388,000	7	1,569,000	1,280,000
Information technology (software & hardware)	9	278,000	200,000	6	1,162,000	620,000
Business, IT, professional & technical services	5	207,000	70,000	3	1,700,000	200,000
All	50	2,068,000	613,000	36	4,072,000	1,290,000

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Beauhurst and PitchBook

Table 3 looks at the amount of funding raised by PSB spinouts founded prior to 2014 during their first and second rounds broken down by the current status. Recall from Figure 5 that for this cohort, while many have seen a positive exit, many have also been dissolved. Table 3 shows that both the mean and median average first and second investments for spinouts that have exited, and for those that have are now listed as dissolved is significantly higher than for those that are still active. Second round investment is much higher for those that have subsequently exited compared with those that have now dissolved or are still active. Note here that the list of spinouts that have both exited and have second round investment data is dominated by companies in the pharmaceutical / biotechnology sector; this may explain the much larger investment figure, with the cost of developing new products in this sector requiring substantial investment over many years.

As with the findings on the survival of PSB spinouts, these findings lend further support to the idea that these companies are high-risk, high-reward propositions. Understanding the reasons behind this finding would require further research and be worth investigating.

Table 3 Scale of investment raised by PSB spinouts founded prior to 2014 based on their current status. Sample was limited to this period to allow for sufficient time for longer-term outcomes to be realised.

	FIRST INVESTMENT RAISE			SECOND INVESTMENT RAISE		
	Number	**Mean (£s)**	**Median (£s)**	**Number**	**Mean (£s)**	**Median (£s)**
Exited	13	2,506,700	1,130,000	8	7,820,000	7,285,000
Active	10	432,800	194,000	9	1,553,300	720,000
Dissolved	11	3,681,500	606,000	7	2,145,700	1,000,000

Notes:
1 - Data was available for just 2 PSB spinouts that are currently dormant or in liquidation. These have been removed from the table due to the very small size of this category.
2 – Of the 13 companies that have exited and have first round investment data, 5 of them are in the pharmaceutical / biotechnology sector and 2 further spinouts are in other life science sectors. Of the 8 companies that have exited and have second round data, 5 are in the pharmaceutical / biotechnology sector.

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Beauhurst and PitchBook

4 Typical deal terms for spinouts emerging from public sector bodies

This section explores the typical deal terms negotiated by PSBs with their spinouts, focusing particularly on the distribution of equity between the PSB and founders and whether or not the IP was assigned into the spinout or licensed into it with some form of financial payments.

At the outset, it is important to recognise the challenges of identifying the distribution of equity at the point of foundation in ways that enable easy comparisons between PSBs. While the shareholdings of companies have to be declared publicly through Companies House, both at incorporation and annually post incorporation, our experience in analysing spinouts from both universities and PSBs is that organisations incorporate companies and transfer in the IP in different ways. For example, in some cases the parent organisation will incorporate the company and own 100% of the shares. When ready, the IP will be transferred in and the individual founders awarded shares in the company. These PSB and founder founding shares then become diluted as investment enters the company and the company develops.

The reverse can also occur, with the founders (or an investor) incorporating the company and approaching the parent organisation to acquire / access the IP. At this point, the equity to be allocated to the parent organisation, along with how the IP will be transferred into the company (assign, license) is negotiated. Complicating matters further for these cases is that investment may already have entered the spinout and the initial shares of the founders and founding investors diluted and valued. In other cases, the distribution of equity between the PSB and founders is reflected in the incorporation documents.

As such, the point of 'foundation' of the spinout – defined here as the point at which the IP enters the company to be commercialised – may be different from the legal company incorporation date and can be very difficult to isolate. Once identified, it can then be very difficult to determine the distribution of equity between PSB and founders that is meaningful and comparable, and accounts for the different ways in which spinouts are founded and how initial investment enters the company.

Our efforts to estimate the initial distribution of equity were also made more challenging due to the lack of digitised records of the deal terms in many cases, and in particular for older spinouts. We had to rely on efforts made by PSB staff to identify the PSB founding equity, and the identity of the PSB founders, and this was not possible in a relatively large number of cases. For these we made every effort to estimate the founding equity distribution based on information available through Companies House records.

4.1 Equity terms

4.1.1 Equity distribution at foundation

Acknowledging the significant challenges in identifying comparable data on the founding equity distribution, Table 4 presents the average (mean) founding equity taken by PSBs in their spinouts. Across our whole database, PSBs took a mean average of 41% in their spinouts, with an

interquartile range (middle 50% of cases) ranging from 9% to 77%. The mean has decreased over time, however, with spinouts founded from 2010 onwards seeing 38% equity being awarded to their parent organisation (interquartile range of 9% to 69%) compared with 44% for companies founded prior to this point (interquartile range of 10% to 80%).

We also see big differences between spinouts emerging from different PSBs[6]. For example, for PSB D the average mean equity taken by the organisation at foundation for their spinouts founded since 2010 was 10%, while for PSB J it was 33% and PSB Y it was 67%. Digging into the data, there appeared to be little similarity in approaches between PSBs with a similar technology focus (e.g. health, science infrastructure and metrology, defence etc.) or for spinouts focusing on different sectors. There also appeared to be little consistency in approach within each PSB (with the exception of PSB D) (Figure 7), suggesting deal terms have been negotiated on a case-by-case basis.

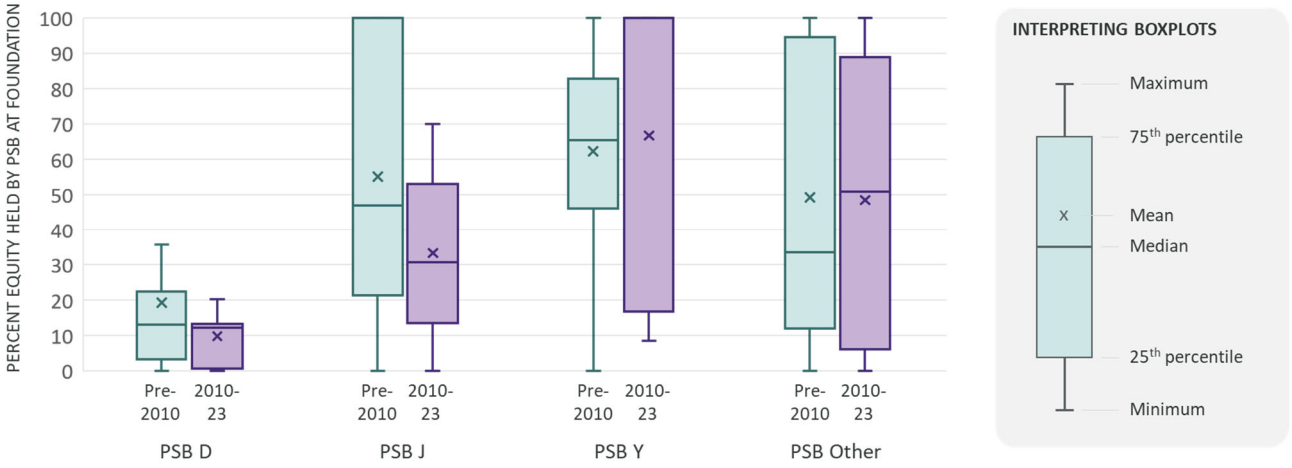
Table 4 Average (mean) founding equity taken by PSBs in their spinouts (% of total shareholding)

AVERAGE (MEAN) PSB FOUNDING EQUITY IN SPINOUT (% of total shareholding)			
PSB	**All**	**Pre-2010**	**2010 – 2023**
PSB D	16	19	10
PSB J	47	55	33
PSB Y	64	62	67
PSB Other	49	49	48
All	41	44	38

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House

[6] Given the relatively small number of spinouts in the PSB spinout database we are unable to undertake a reliable analysis of the average equity positions for most of the PSBs (many have produced fewer than five spinouts). Nevertheless, we believe there are valuable insights from looking at differences in the observed approaches across different PSBs. We therefore present the distributions of equity for the three PSBs that produce the largest number of spinouts. These have been randomly assigned the letters D, J, and Y. The labelling is used consistently throughout this section.

Figure 7 Distributions of PSB founding equity in their spinouts, for different PSBs and different time periods



Note: we only show boxplots (distributions) where we have at least 5 observations

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House

We also examined the amount of equity held by the founders of the spinout for specific PSBs, identified using the same letter labels as in Table 4 and Figure 7. Across all spinouts founded from 2010 onwards, founders received 35% of equity, up from 21% for those founded in earlier years. Again, we observe significant variation in the experiences of spinouts emerging from different PSBs, with founders of spinouts from PSB J (since 2010) receiving 50% of the equity, and just 17% for spinouts from PSB Y, and 27% for spinouts from PSB D. Note that part (although likely not all) of the explanation of these differences lies in the differences in approaches to incorporating the company outlined in the introduction to this section and the challenges associated with measuring the founding equity distribution at the point of foundation.

Table 5 Average (mean) founding equity taken by founders in spinouts emerging from PSBs (% of total shareholding)

AVERAGE (MEAN) FOUNDER FOUNDING EQUITY IN SPINOUT (% of total shareholding)			
PSB	**All**	**Pre-2010**	**2010 – 2023**
PSB D	28	29	27
PSB J	29	15	50
PSB Y	17	18	17
PSB Other	32	28	33
All	27	21	35

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House

4.1.2 Types of shares

Most PSBs take simple, ordinary shares at the foundation of the spinout. In a few cases, different classes of ordinary shares are issued (A, B etc.), preferred shares or special shares were taken by the PSB, conferring rights and obligations that differ from other shareholders.

There was no evidence of shares with anti-dilution clauses being taken by PSBs in their spinouts. This approach has emerged as increasingly common amongst large US research universities. It is our understanding that few UK universities seek anti-dilution clauses as a typical approach, with the exception of Imperial College London, who trialled it with the introduction of their Founders Choice option[7].

Table 6 Types of shares taken by PSBs in their spinouts at foundation (% of all PSB spinouts)

TYPES OF SHARES TAKEN BY PSB AT FOUNDATION (% all PSB spinouts)			
	All (N = 84)	**Pre-2010 (N = 51)**	**2010 – 2023 (N = 33)**
Ordinary	79	75	85
Alphabet ordinary (A, B, C)	17	22	9
Preferred	5	4	6
Special shares	1	2	0
Unknown	10	12	6
Other	2	2	3

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House

4.1.3 Equity dilution

The equity taken by PSBs and founders at the point of spinout foundation typically dilutes as investment enters the company and the company develops. New shares are typically issued to incoming investors and to create or expand option pools to incentivise employees. As new shares are issued, unless anti-dilution clauses exist that can compensate, or existing shareholders acquire additional shares as part of the investment round (e.g. as part of PSB

[7] Details on Imperial College London's approach can be found here: https://www.imperial.ac.uk/enterprise/staff/creating-a-spinout-company/founders-choice/, accessed on 27th October 2023

follow-on investments), the shares held by existing shareholders will represent a smaller proportion of the company's total shareholding.

Table 7 attempts to examine the extent to which the equity held by PSBs in their spinouts dilutes over time as investment enters the company. To do this we limit our attention to those spinouts that have evidence of raising investment where we would expect equity to become diluted. We look at this by the spinouts' formation periods, recognising that older companies will have had more time (and often need) to raise more investment and hence we should see equity being diluted further. For each spinout we identified the current PSB shareholding based on information available from Companies House, or if the spinout had exited or was no longer active, we captured the final shareholding position.

Table 7 shows that, as would be expected, where significant amounts of investment have been raised, the equity held by the PSB becomes significantly diluted. For example, for spinouts founded between 2005-09 and have raised investment (raising an average of £38.2 million), the equity held by the PSB fell from a mean average of 53% at foundation to 22%. For those founded between 2010-14, PSB equity fell from 46% to 25%, while those founded between 2015-19, the equity held by the PSB fell from 36% to 19%. For the most recent spinouts, which have raised on average (mean) £6.4 million, PSB equity fell just slightly on average from 20% to 19%.

Table 7 Dilution of PSB equity holdings in their spinouts, for PSB spinouts founded in different periods

PSB EQUITY DILUTION				
Spinout founded during period:	**Mean investment raised by PSB spinouts (£ millions)**	**Mean PSB Founding Equity (%)**	**Mean PSB Current Equity OR final equity position prior to exit (%)**	**Percentage point reduction in equity position for PSB (%)**
2005-09	38.2	52.6	22.1	30.5
2010-14	40.7	45.7	25.1	20.5
2015-19	40.1	36.0	19.3	16.7
2020-23	6.4	20.0	19.5	0.5

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House, Beauhurst and PitchBook

4.2 Licensing terms

Spinout deals consist of terms that extend beyond the negotiated distribution of equity between founders and the PSB that shape the obligations, risks, and distribution of rewards from success and failure. Crucial amongst them is whether and how the IP is transferred into the company. Formal IP can be assigned or licensed, or licensed initially before being assigned based on some criteria. Licences to IP can involve both financial terms (e.g. upfront fees, milestone payments,

royalties) and non-financial terms (e.g. with regards to exclusivity, fields / geographies of use, sublicensing etc.).

While detailed information on the licensing was unfortunately not available in most cases, we were usually able to identify whether the IP was either assigned to the company or involved a fee-bearing licence (Table 8). This was the case in almost three quarters of PSB spinouts and was similar across time periods.

Table 8 Presence of a licence to the intellectual property as part the spinout deal (% of all PSB spinouts)

PRESENCE OF A LICENCE AS PART OF SPINOUT DEAL (% all PSB spinouts)			
Presence of an assignment or fee-bearing licence	**Period**		
	All (N=84)	**Pre-2010 (N=51)**	**2010 – 2023 (N=33)**
Yes	74	73	76
No	15	16	15
Unknown	11	12	9

Source: Wellspring/UCI analysis based on internal data supplied by PSBs

5 Comparing the equity terms and investment performance of spinouts from universities and public sector bodies

In this section, we compare the equity terms of spinout deals, their survival and exits, and their investment potential between spinouts originating from PSBs and those emerging from universities.

In comparing spinouts from PSBs and universities, we must recognize important differences between these parent organisations which will inevitably shape their approaches to taking founding equity. As exempt charities (albeit largely publicly funded), universities have much greater autonomy than PSBs to set their own policies and approaches to commercialising IP. The research that leads to the spinouts is typically driven by academics who are themselves largely autonomous in terms of developing their research portfolios, shaping their research directions and sourcing funding to do so. Nevertheless, it is essential to acknowledge that universities play an important role by offering resources, infrastructure and support that enables this research. Furthermore, an increasing number of universities are actively engaged in providing support and investment such as proof of concept funding, seed funding, assistance in business plan development, and the facilitation of initial investors connections. Universities have benefitted from years of encouragement to commercialise and form spinouts, alongside funding to build in-house teams to support spinout formation and develop and share good practice with their peers. These efforts contribute to the development of research ideas into commercialisable propositions. By contrast, PSB staff are mission-led, following government-directed and government funded work programmes. PSBs have different frameworks and controls on managing public money which inform how they ensure a fair return is obtained for government and taxpayer investment in the KAs behind the spinout.

5.1 Context

The university system in the UK produces many more spinouts than the PSBs do, with the largest research universities now producing 10+ spinouts per year. As a result, they have much more exposure to key trends in the market for investment. In addition, a major report by UCI in 2022[8] looking at the different approaches of UK universities to taking equity in their spinouts showed that many universities active in producing at least some spinouts have been reviewing their approaches to ensure they are fit-for-purpose moving forward. Overall, the study showed that there has been a downward trend in the amounts of founding equity being taken by universities in their spinouts (at the point of foundation before any investment enters the company and any dilution takes place, for example in allocating shares to incentivise incoming CEOs and teams). Recently, TenU, has introduced the University Spin-out Investment Terms

[8] Ulrichsen, T.C., Roupakia, R. and Kelleher, L. (2022) ***Busting Myths and Moving Forward: The Reality of UK university approaches to taking equity in spinouts***. Cambridge, UK: Policy Evidence Unit for University Commercialisation and Innovation, University of Cambridge. (https://www.ifm.eng.cam.ac.uk/uploads/UCI/knowledgehub/documents/2022_UCI_University_spinout_equity_approaches_report_vExecSumm.pdf)

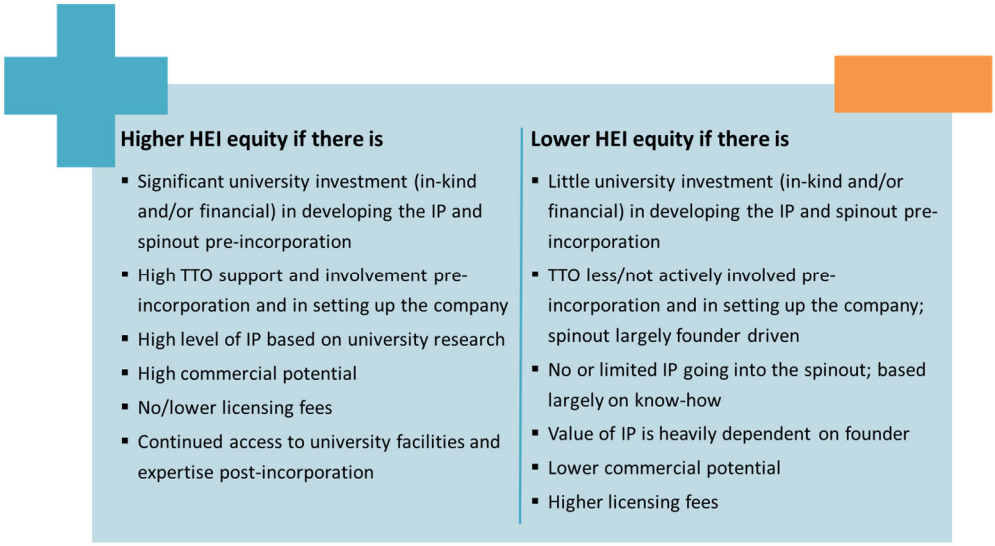
(USIT) guide[9] with the primary objective of simplifying and optimising negotiation processes. While it primarily caters to the life sciences sector, it offers a comprehensive negotiation framework drawn from the experiences of the six UK members of TenU (Cambridge, Oxford, UCL, Imperial, Edinburgh, and Manchester), along with insights from key investors in UK spinouts.

In recent years, despite this downward trend, there has been an active debate among various stakeholders in the community on how much equity universities should take. This discussion led to the HM Treasury and Department for Science, Innovation and Technology (DSIT) review of university spinouts[10], which has not been published at the time of drafting this report. The UCI 2022 report also explored the reasons why universities typically take founding equity in their spinouts. These included:

- To meet their obligations as exempt charities;
- To allow them to compensate their employees for the inventions they create
- To reflect the resources invested by the university (money, time, effort – 'sweat') in supporting the development of the spinout pre-foundation
- To keep as much cash in the spinout as possible during the early years of development, with equity being traded off against financial terms on the IP licence.

The amount of equity was also shaped by the specifics of the spinout. These are captured in Figure 8.

Figure 8 Factors driving higher and lower equity positions for individual spinout cases



Source: Reproduced with permission from Ulrichsen, T.C., Roupakia, Z. and Kelleher, L. (2022). *Busting Myths and Moving Forward: The Reality of UK university approaches to taking equity in spinouts*. Cambridge, UK: Policy Evidence Unit for University Commercialisation and Innovation, University of Cambridge.

[9] TenU (2023) **University Spin-out Investment Terms** TenU Guide (https://ten-u.org/news/the-usit-guide)

[10] **https://www.gov.uk/government/news/university-and-investor-experts-to-head-up-review-of-uk-spin-out-landscape**

5.2 The data underpinning the comparative analysis

Comparisons with the spinouts in the university sector were limited by the size of the database for which detailed comparative data are available. Our comparative study draws on a comprehensive dataset on university spinouts compiled by the Policy Evidence Unit of University Commercialisation and Innovation (UCI). The data was gathered from fifteen universities located across the UK, and covers universities that have a minimum research income of £90 million and some spinout activity. The database has decent coverage across the UK (well beyond the Golden Triangle) and the larger research universities. These institutions represent approximately 12% of the population of higher education institutions in the UK (excluding specialist institutions) that report data to the HESA Higher Education Business and Community Interaction (HE-BCI) survey. During the period 2014/15 and 2021/22, these universities generated almost half of all spinout companies in the UK and captured 83% of the total external investment raised by all UK university spinouts[11]. The dataset encompasses a wide range of information, including details on spinout production and investment activities dating back to the 2000s. Additionally, it includes data on founding equity taken by universities and other deal terms, such as licensing and anti-dilution provisions, for spinouts formed since 2015.

Where internal information on investment was not available, we sourced investment data from the commercial venture capital database, PitchBook. It is important to note that when comparing the first and second investment rounds, we excluded grants, such as those from Innovate UK, focusing on angel and venture capital, as measures of "early success". Where there were conflicts between information drawn from different sources, we made informed decisions on how to best reconcile them, based on the confidence we had on each source of information.

For the comparative analysis presented in this section, we have excluded spinouts that originate from a combination of PSB and university Intellectual Property (IP).

When comparing investments, our analysis centres on spinouts formed during the period 2010 – 2021. This balances our confidence in data availability prior to 2010 with the need for a sufficiently large number of PSB spinouts with which to make meaningful comparisons with the university system. This resulted in a list of 22 PSB spinouts and 568 university spinouts (Table 9).

When looking at the founding equity taken by PSBs and universities, we further narrow our focus to the spinouts founded between 2015 and 2021. This is due to the lack of information outside this period for the university database. This resulted in a list of 14 PSB spinouts and 462 university spinouts, although not all of these spinouts have complete investment data (Table 9).

We must recognise, here, that the number of PSB spinouts in our list is small. This limits the power of the comparative analysis, and in particular prevents robust comparisons at more granular levels such as the sector of spinout. Furthermore, there were just 3 spinouts founded during 2015-21 in our database with both PSB and university equity ownership (7 spinouts founded between 2010-21 of which just 5 had investment round data). Due to this very small number, it was not possible

[11] Source: HEBCI HESA data, **https://www.hesa.ac.uk/data-and-analysis/business-community/ip-and-startups**

to meaningfully compare how spinouts with joint ownership compared with PSB-only spinouts on either equity terms or investment potential.

Table 9 Comparing the composition of the PSB and university spinout datasets.

COMPARING THE PSB AND UNIVERSITY SPINOUT DATASETS								
	SPINOUTS FORMED BETWEEN 2010 – 2021				SPINOUTS FORMED BETWEEN 2015 – 2021			
	Public sector bodies		Universities		Public sector bodies		Universities	
Industry	**Number of spinouts**	**Mean total investment raised (£ millions)**	**Number of spinouts**	**Mean total investment raised (£ millions)**	**Number of spinouts**	**Mean total investment raised (£ millions)**	**Number of spinouts**	**Mean total investment raised (£ millions)**
Pharmaceuticals and biotechnology	5 (23%)	64.6	183 (32%)	53.4	2 (14%)	187.7	148 (33%)	48.4
Other life sciences	4 (18%)	2.7	122 (21%)	20.0	3 (21%)	2.6	96 (21%)	8.2
Industrial / electronic equipment and products, energy technologies, materials & chemicals	3 (14%)	3.5	68 (12%)	107.2	2 (14%)	1.1	51 (11%)	8.8
Information technology (software & hardware)	8 (36%)	5.3	137 (24%)	25.5	7 (50%)	6.3	111 (25%)	17.6
Business, IT, professional & technical services	2 (9%)	199.2	37 (7%)	25.4	0 (0%)	n/a	29 (6%)	1.9
Other	0 (0%)	n/a	21 (4%)	35.5	0 (0%)	n/a	13 (3%)	16.3
All	22 (100%)	39.3	568 (100%)	44.2	14 (100%)	22.7	448 (100%)	24.0

Note: excludes spinouts that involves IP from both the university and PSB

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, Beauhurst and PitchBook data

Table 9 shows how the PSB and university spinout datasets compared based on the sectors the spinouts were operating in. Of note is that the university dataset has a higher proportion of spinouts in the pharmaceuticals and biotechnology sector compared to the PSB list. Conversely, the PSB dataset has a relatively larger representation in the IT-software and IT-hardware sectors (albeit small number of companies in our PSB dataset).

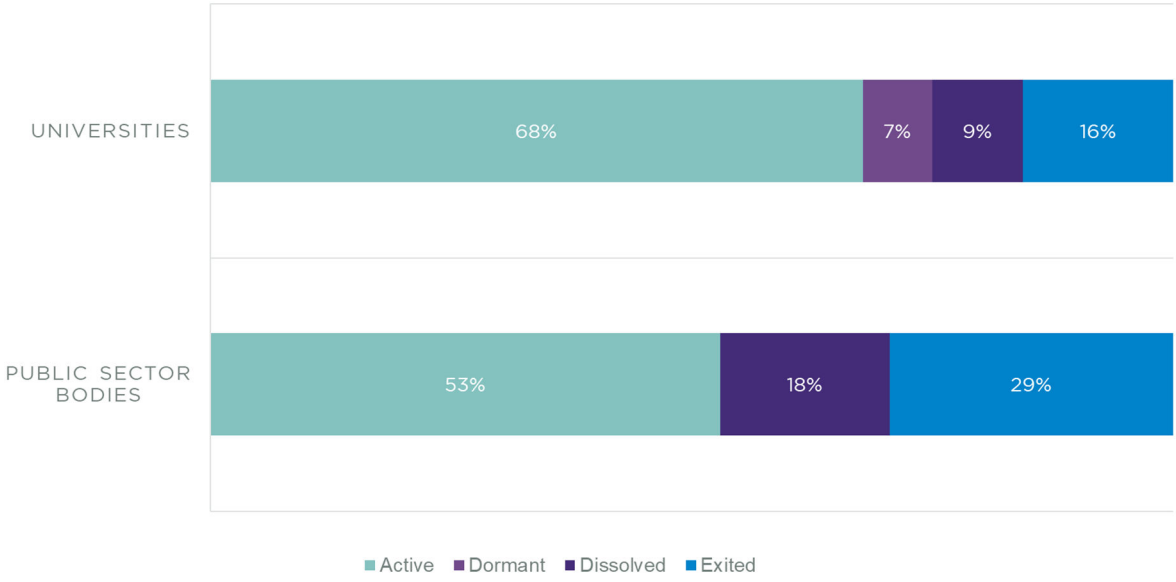
Table 9 also presents, for information, the mean total investment raised to-date for the PSB and university spinout databases for each of the two periods. It shows that the mean total investment raised for university spinouts is 12% and 6% higher than the mean total investment raised for PSB spinouts for the periods 2010-2021 and 2015-2021, respectively.

5.3 Spinout outcomes

We begin our analysis by examining what has happened to PSB and university spinouts, in terms of their current trading status. In particular, we look at what proportion of companies have achieved a positive exit (an IPO or trade-sale), are still active, or have been dissolved. The status was evaluated as of 2023, and results are presented in Figure 9. We limit our database to those spinouts founded between 2010 and 2018 to allow for the commercial viability of the companies to be tested at least to some extent by the market.

We find that a greater share of PSB spinouts founded during this period have achieved a positive exit compared with their university counterparts. PSB spinouts were also more likely than university spinouts to have been dissolved, although if university spinouts that are currently dormant are included (i.e. the share that are either dormant or dissolved), there is much less difference between the two datasets[12]. University spinouts founded during this period are more likely to still be currently active. These findings suggest that PSB spinouts tend to experience quicker exit or failure than university spinouts.

Figure 9 Comparing the current status for spinouts emerging from universities and PSBs and founded between 2010 and 2018.



Note: The chart is based on 360 university spinouts and 17 PSB spinouts with known current status.

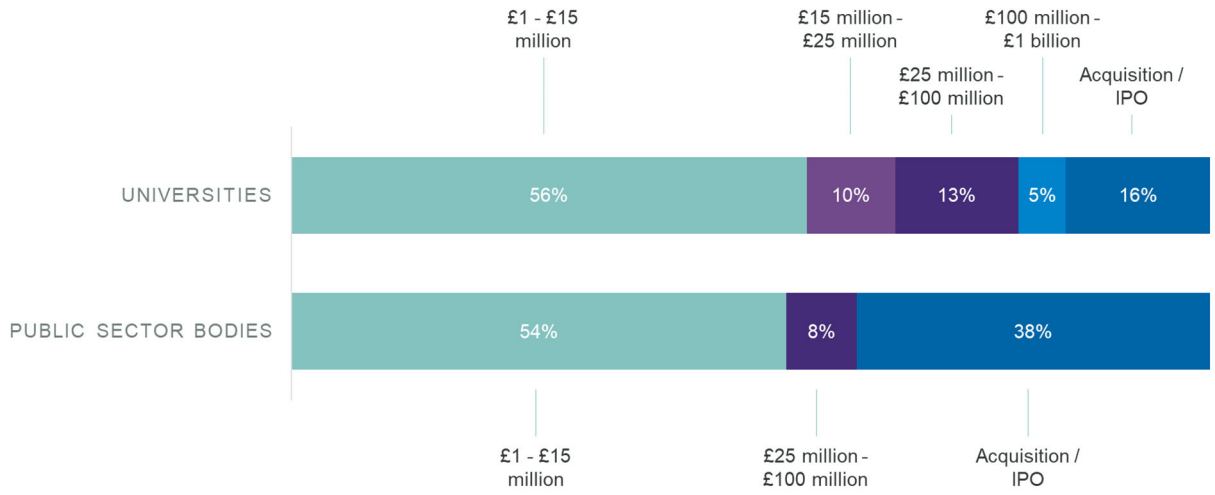
Source: Wellspring/UCI analysis based on internal data supplied by PSBs, and data sourced from Companies House

[12] Note that the PSB spinouts that were identified as dormant in our dataset were founded outside the period of focus for this specific analysis (2010-2018).

5.4 Raising investment

To examine the investment outcomes of spinouts, we first look at the proportion of companies founded between 2010 and 2018 raising different levels of investment to-date (i.e. the sum of all investment rounds since foundation) or having achieved a positive exit through an IPO or trade sale. Limiting the dataset to spinouts founded more than five years ago recognises the significant development time required by many technology intensive spinouts to move beyond their seed phase into scale-up and growth. The results are shown in Figure 10. It shows that, while PSB spinouts are more likely to go through an IPO or trade sale university spinouts are more likely to have raised substantial investment (more than £25 million). Interestingly, a similar (and sizeable) proportion of PSB and university spinouts secured investments of less than £15 million.

Figure 10 Comparing the distribution of total investment raised and positive exits for spinouts emerging from universities and PSBs founded between 2010 and 2018 (percent of each dataset raising different amounts of investment or achieving a positive exit). Spinouts that raised funds and then exited are only included in the exits category.



Note 1: The dataset for this specific analysis was limited to those spinouts raising at least some investment or which have exited. This explains the difference in the percent of PSB spinouts that have exited compared with the finding presented in Figure 9.
Note 2: The chart is based on 330 university and 13 PSB spinouts with available investment or exit information.

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, data sourced from Companies House, Beauhurst and PitchBook data

We turn our focus to the amounts of funding raised by PSB and university spinouts during their first and second-round investments rounds. This attempts to explore whether companies emerging from different organisations may be finding it harder to raise their initial investments to fund their early development phase. Here we focus our dataset of spinouts founded between 2010 and 2021 to give us the largest possible number of PSB spinouts to drive the analysis.

Table 10 shows that the median first investment secured by PSB spinouts, at £620,000,was 24% higher than that for university spinouts, which stood at £500,000. However, it is important to note that the distribution of experiences of these spinouts is highly skewed, with the mean average first-round investment for university spinouts much higher at £2.6 million, compared

with £1.2 million for PSB spinouts. The same pattern occurs in the second-round of funding, where the standard deviation around the mean investment for university spinouts is just under ten times higher than that for PSB spinouts (Table 11).

Table 10 Comparing the amount of investment raised by university and PSB spinouts during their first investment round raised.

FIRST INVESTMENT RAISE (SPINOUTS FOUNDED BETWEEN 2010 2021)				
	Number of spinouts in the dataset	**Mean (£)**	**Standard deviation (£)**	**Median (£)**
Universities	476	2,576,616	10,829,085	500,000

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, Beauhurst and PitchBook data

Table 11 Comparing the amount of investment raised by university and PSB spinouts during their second investment round raised.

SECOND INVESTMENT RAISE (SPINOUTS FOUNDED BETWEEN 2010 2021)				
	Number of spinouts in the dataset	**Mean (£)**	**Standard deviation (£)**	**Median (£)**
Public Sector Bodies	11	1,773,636	1,665,480	1,300,000
Universities	329	5,464,976	15,965,180	1,250,000

Source: Wellspring/UCI analysis based on internal data supplied by PSBs, Beauhurst and PitchBook data

5.5 Founding equity

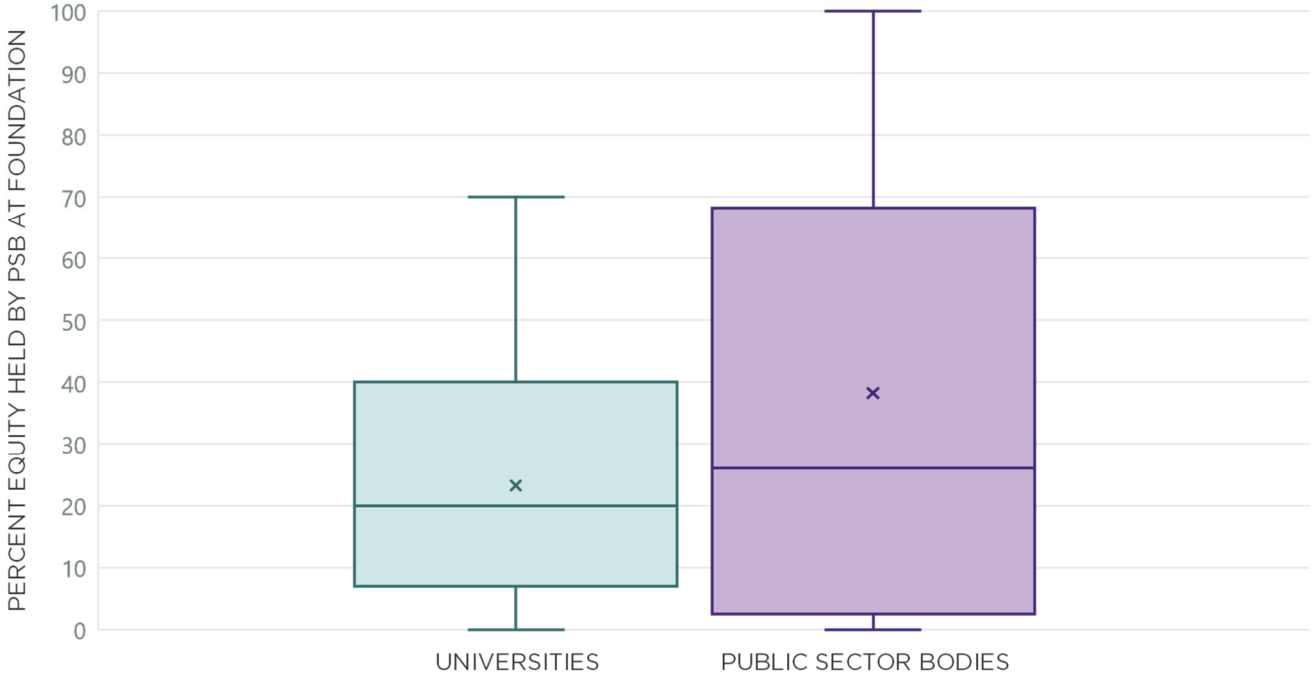
This final section turns to a comparison of the founding equity taken by PSBs and universities in their spinouts. Our analysis here is limited to spinouts founded between 2015 and 2021 due to the limitations of the university dataset.

At the outset, it is important to note that it was much harder to secure robust information from PSBs on the negotiated equity split between the organisation and the spinout founders than it was for universities. This was in part due to the availability of this information within PSBs. It was

also due to the difficulties in identifying a clear point of spinout foundation given differing processes through which spinouts are founded. These were set out in section 4. In some cases spinouts may be founded by the parent organisation, at which point it will hold 100% of the equity and award a proportion of this to the founders at an appropriate juncture. In other cases, the founding innovators will incorporate the company, owning 100% of the shares. They will transfer some of these shares to the parent organisation as part of the negotiations over accessing the IP; at this point investors may have already invested in the company and acquired shares. Further still, some spinouts will see the negotiated split between the parent organisation and founding innovators reflected in the incorporation documents.

Acknowledging this important caveat, our findings indicate that, typically, PSB typically take a higher median founding equity stake in their spinouts compared with universities (Figure 11). Moreover, we also see much greater variation around the median for PSB spinouts. These patterns may be shaped by the structure of the two 2015-21 datasets, for example by the specific technologies being commercialised by the spinouts and the sectors into which they are entering, or by differences in how PSBs and universities set up their spinouts. Due to the small PSB dataset size, it was not possible to conduct a more granular analysis, such as one focused on sector-specific data or the examination of licence or anti-dilution terms.

Figure 11 Comparing the levels of equity taken by universities and PSBs in their spinouts at foundation, for spinouts founded between 2015 and 2021.



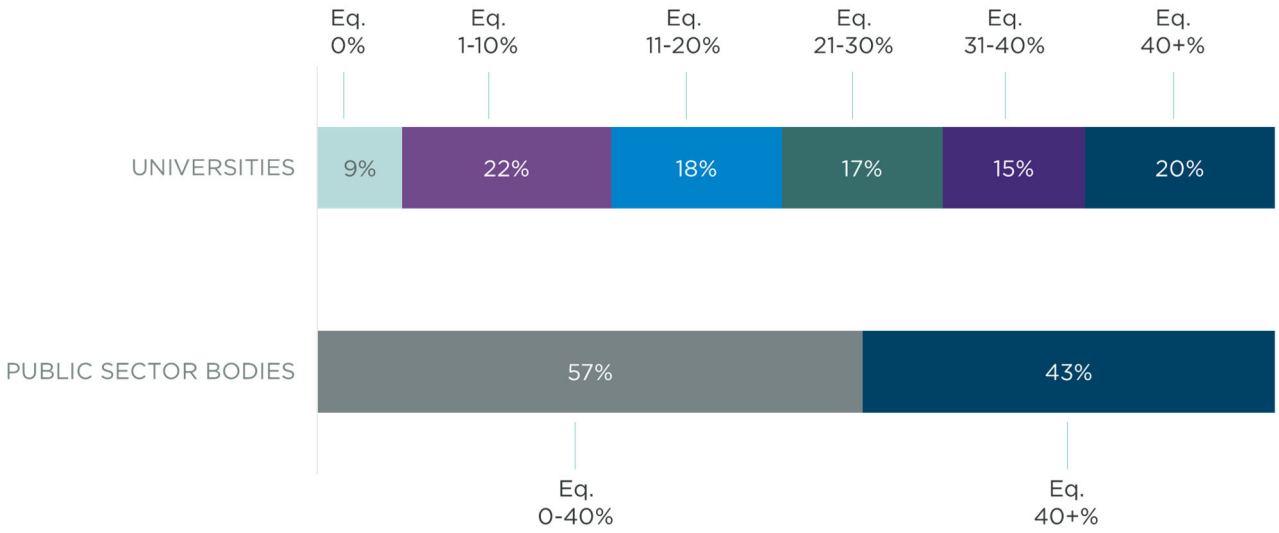
Note: Chart based on 351 university spinouts and 14 PSB spinouts with available equity information.

Source: UCI analysis of university spinout database and compared with the Wellspring/UCI analysis of the PSB dataset

Figure 12 provides a more detailed breakdown of the levels of founding equity taken by PSBs and universities in their spinouts. It shows that historically, PSBs, have taken founding equity

stakes that exceed 40% much more often than universities have. This occurred in more than 40% of PSB spinout cases, compared with 20% for universities. Recall, however, that different PSBs also appear to have very different approaches, with one organisation typically taking a mean average of 10% founding equity in their spinouts founded since 2010, while another takes a mean average of 33% across their spinouts founded during this period.

Figure 12 Comparing the proportion of spinouts with different ranges of parent organisation founding equity between PSB and university spinouts, for spinouts founded between 2015-21



Note 1: There were too few PSB spinout observations during the period 2015 – 2021 to break down the data into the full set of categories.
Note 2: Chart based on 315 university spinouts (excluding equity category with anti-dilution provisions) and 14 PSB spinouts with available equity information.

Source: UCI analysis of university spinout database and compared with the Wellspring/UCI analysis of the PSB dataset

Figure 12 also shows another feature of the university system highlighted in the UCI 2022 report on their approaches to taking founding equity in their spinouts; that universities exhibit a diverse range of approaches and even within a single institution, multiple approaches can co-exist. This reflects the view that there is no 'one-size-fits-all' approach, and the wide range of spinout cases and contexts, different types and amounts of IP being commercialised, and different amounts of support and resources being devoted to the company's development, warrant different types of approaches.

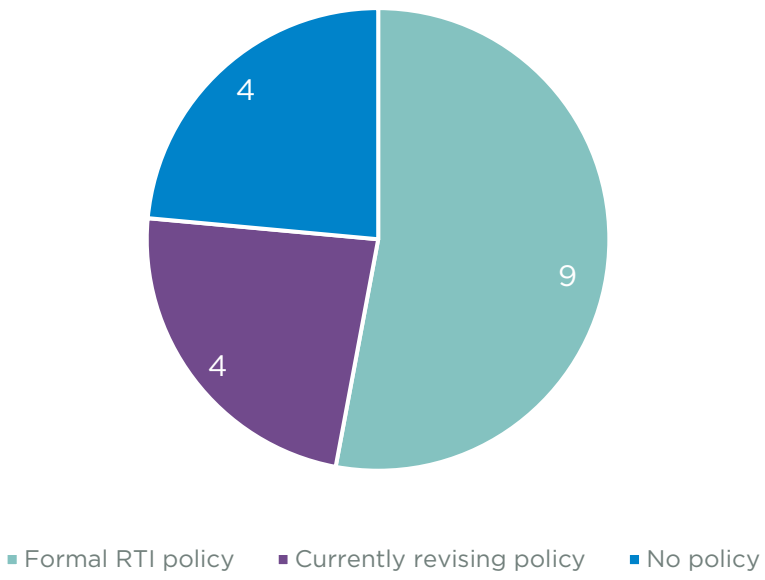
6 Rewards to innovators

The study also explored whether the PSBs had put in place a formal policy that describes how the innovators behind the knowledge assets may be rewarded if these assets are successfully commercialised. Information about rewards to innovators (RTI) was requested from all the organisations that we engaged during the study, and was received from 17 organisations. This analysis includes nearly all the PSBs which have generated spinouts, as well as some PSBs that have not (yet) founded a spinout company. The majority of these organisations either have a formal policy in place, or are in the process of finalising or updating their policy.

Number of PSBs with a formal RTI policy in place	Number of PSBs currently in the process of writing, revising, or finalising their RTI policy.	Number of PSBs with no formal RTI policy in place
9	4	4

Source: Wellspring/UCI analysis of internal data provided by PSBs

Figure 13 Rewards to Innovators policies within PSBs



Several of the PSBs contacted did not have a formalised RTI policy or it was currently undergoing significant revision and therefore did not wish to share it. In organisations where they did not have an RTI policy, this was either because:

- the PSB has not felt the need to implement such a policy due to historically low levels of KA that it would regard as suitable for commercialisation.
- the PSB is of the view that innovative contributions are undertaken in the course of the employee's normal duties and as such, no separate rewards framework specifically for KA commercialisation is needed.
- There was no demand from PSB for staff to put this kind of policy in place.

6.1 What is rewarded?

Specific activities and rewards vary from organisation to organisation. Among PSBs that do have Rewards to Innovators (RTI) policies in place, these are generally aimed towards rewarding the commercialisation of 'hard' IP, i.e. patents and any income generated as a result of out-licensing activities, recognising that individuals may be eligible for compensation, in line with their rights under the Patents Act.

There are generally three mechanisms used by these PSBs to reward commercialisation activities. The overarching aim of these policies is to attract, retain and incentivise entrepreneurial and innovative staff by allowing them to benefit from the results of commercialisation activity, in line with similar schemes in the private or university sectors. These are described below, and more information about how these rewards are used in practice is given in Section 6.3.

IP based rewards

Rewards are given to staff based on the successful identification, protection and / or commercialisation of intellectual property rights (IPR). Rewards can be linked to several stages of the IPR process, for example:

- Invention disclosure
- Patent application
- Granting of a patent
- Licensing or other commercialisation of registered IP (patents, trademarks, designs) as well as unregistered IP (know-how, materials, software).

These rewards could also be applicable to other forms of IP, for example trademarks, copyright, plant breeders' rights etc.

Income based rewards

Rewards are given to staff based on their contribution for generating commercial revenue and / or profit for the organisation. Rewards are normally based on a percentage of the revenue generated and are on a sliding scale.

Spinout equity rewards

Public sector bodies may offer rewards in the form of equity in a venture (e.g., joint venture, spinout) to staff who are involved in founding the venture. In the event of a sale or acquisition of the company, shareholders would then receive a financial return.

Other rewards

There are instances where innovator contributions that, due to the business needs or the nature of the knowledge asset, are not appropriate for patents and/or commercialisation opportunities and therefore royalty income is not an option. Some organisations recognise this through other means such as special merit awards and skills payments that can provide a monetary reward for

their contribution on a discretionary basis. Several organisations have mechanisms to celebrate and publicise success in commercialisation, such as "Innovator of the Year" awards, or internal (non-financial) recognition.

6.2 Who is rewarded?

RTI schemes normally discriminate who is rewarded for the successful commercialisation of the research or expertise. This may include:

- The staff who generated the knowledge asset ("inventors")
- The staff who championed or supported the commercialisation of the KA ("innovators")
- The staff who appear on the patent ("patent inventors")
- The staff who steered the commercialisation of the KA ("technology transfer staff")

Successful innovation and commercialisation is normally a team effort and schemes require a mechanism for sharing the reward across different participants. Within the university sector, it is unusual to allocate rewards to Technology Transfer staff, and many universities exclude this unless the staff member leaves to join the spinout, due to the perceived risk of conflicts of interest. We did however find examples of this type of reward in more than one PSB; this was accompanied by mechanisms to address conflict of interest concerns through a separation of responsibilities.

6.3 How are they rewarded?

Staff may be rewarded with a range of financial and non-financial awards. These are typically discretionary and can include:

Fixed 'milestone' rewards

Fixed rewards of a pre-set sum can be given to staff upon reaching a tangible milestone. This reward is typically deployed when, for example, certain stages of the patenting process are reached, such as, a reward at first patent filing which may be followed by a second one-off cash payment upon the patent being granted, Specific milestone requirements among PSBs vary based on cash amount and the events that must take place before a payment is to be made. Examples of PSBs that operate this type of reward are summarised in the anonymised Table 12 below.

Table 12 Comparison of milestone rewards to innovators at anonymised PSBs.

Organisation	Reward on first patent filing	Reward on patent grant	Reward on licensing of patent
PSB A	-	£250 to inventor(s)	£250 to inventor(s).
PSB B	If one inventor: £240 If two inventors: £360 (to be shared) If three inventors: £480 (to be shared)	Grant of EPO or US patent, whichever is first. If one inventor: £900 If two inventors: £1500 (to be shared) If three inventors: £1800 (to be shared)	Awarded a percentage of the gross or net receipts in the case of a successful commercialisation of the invention.
PSB C	If one inventor: £200 If two inventors: £300 (to be shared) If three inventors: £400 (to be shared)	Grant of EPO or US patent, whichever is first. If one inventor: £750 If two inventors: £1250 (to be shared) If three inventors: £1500 (to be shared)	Awarded a share of licensing income (net of costs)
PSB D	£250 for UK & EU patent application £250 for a US patent application	£250 for UK & EU granted patent. £250 for a granted US patent	Awarded a share of licensing income (net of costs)
PSB E	-	-	A £500 ex-gratia award per patent will be made to the named inventor(s) of any patent on evidence of its first external use Also awarded a share of licensing income (net of costs).
PSB F	If one inventor: £200 If two inventors: £300 (to be shared) If three inventors: £400 (to be shared)	Grant of EPO or US patent, whichever is first. If one inventor: £750 If two inventors: £1250 (to be shared) If three inventors: £1500 (to be shared)	Awarded a share of licensing income (net of cost)

Source: Wellspring/UCI analysis of internal data provided by PSBs

Such patent awards must be funded in some way as they are paid to the inventors before any income is realised. The PSB's intellectual property budget can sometimes allocate funding for this type of reward, or royalties from previous IP commercialisation may be used to fund future inventor rewards. Some PSBs reported that this type of award raised staff interest in the

innovation and patenting process. At another PSB, this reward type was treated with more scepticism and reported that, despite significant patent activity, several patents end up as "trophy patents" that have not been commercialised commercially.

Awarding a share of licensing income

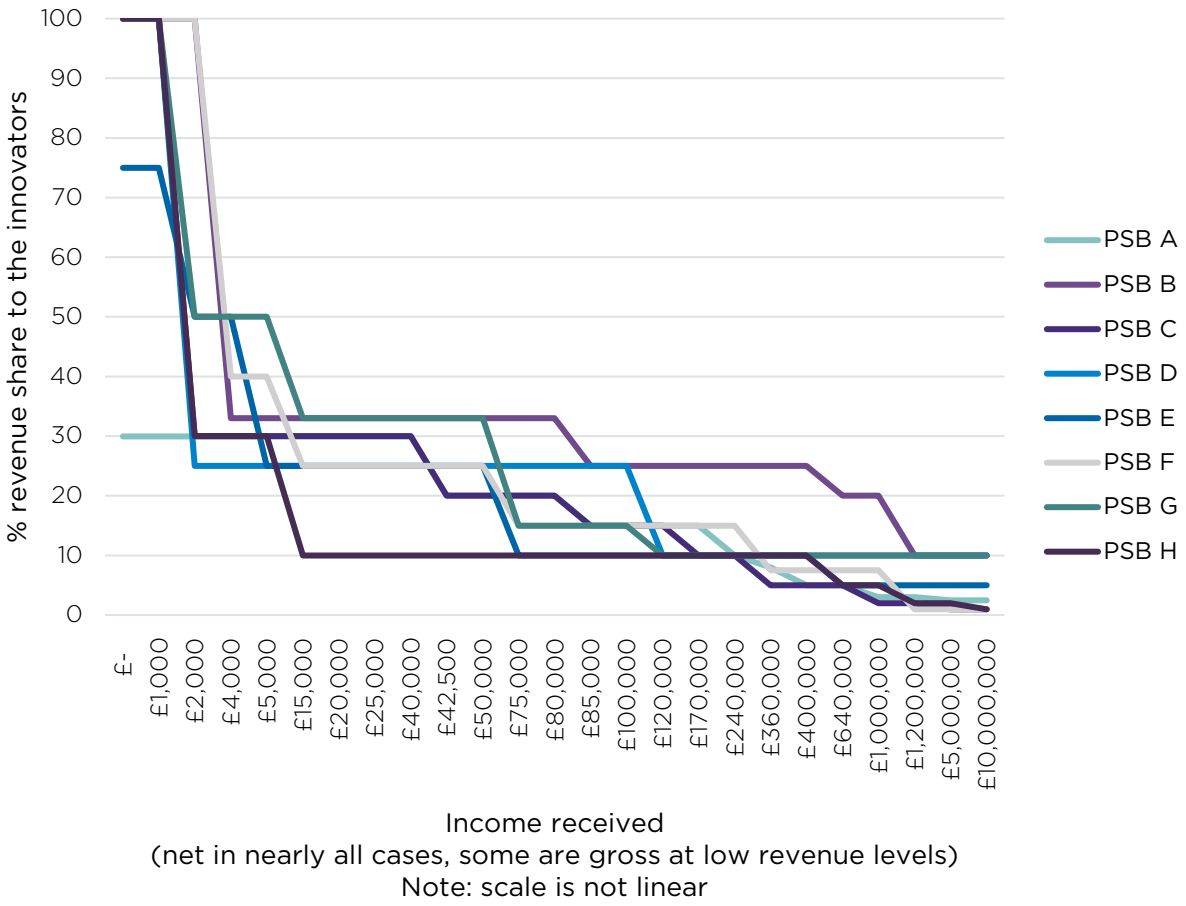
A percentage of the revenue generated by a particular activity is given to the staff that produce the revenue / saving / profit. This can be:

- **Fixed/Tapered**: The percentage can be fixed across all amounts of revenue but generally they are a tapered percentage with the staff receiving the majority (up to 100%) of the early revenues (e.g., the first £1,000 - £2,000). This reflects the reality that most commercialisation produce only modest revenue (in 2021/22 the average income to universities from non-software IP licenses was £102k[13]; anecdotal evidence from our interviews suggests that it is often less than this in the PSBs studied).
- **Gross/Net**: Rewards may also be paid on gross revenues (before patenting / licensing costs have been taken out) or net revenues (after patenting / licensing costs have taken out). Many schemes pay rewards on gross for early revenues so that the staff get some of the early rewards which otherwise would be "swallowed up" on patenting fees. Rewards then switch to paying on net revenue at a certain higher revenue level.

Figure 14 shows a comparison of revenue sharing approaches (anonymised).

[13] **Research England: An Update on IP Related and Commercialisation Activities in England in 2021/22** (https://www.ukri.org/wp-content/uploads/2023/09/RE-150923-IPRelatedCommercialisationActivitiesEngland2021To2022.pdf)

Figure 14 Stylised representation of revenue shares to innovators at anonymised PSBs



Source: Wellspring/UCI analysis of internal data provided by PSBs

From our experience in the university sector, the revenue percentage that is shared with the innovators at higher returns (£5k+) are generally lower in the public sector than at universities, where the most generous universities may share 70-80% for mid-sized returns, and up to 50%, even at very high revenues. This may reflect the different role expectations on public servants vs academics explored in more detail in sections 5 above and 7.1 below, as well as a perception that higher rewards from government investment should be returned to government use, in line with the rules on use of public funds.

Spinout equity rewards

PSBs can allow inventors to be offered equity in a spinout situation, however as discussed previously, there is less uniformity in the specific equity levels granted by the originating organisation. Indeed, within RTI schemes, many PSBs are 'silent' on the issue of spinout equity and licensing of IP to spinouts, instead preferring to address it on a case-by-case basis when a spinout arises from within the organisation. In cases where a PSB has a well-documented history of spinning companies out, their RTI scheme typically explicitly allows inventors to be offered equity, although specific splits for a particular spinout may be negotiated between the research organisation and the innovator(s). In our direct interviews, some commented that PSBs are seen as "lagging behind" UK Universities in terms of the equity stake offered to the spinout founders.

A small number of PSBs currently forbid a member of staff to hold equity in a spinout company unless they leave the organisation to join the new company. However, others have developed and implemented policies which allow current staff to also hold equity in a spinout.

7 Discussion

7.1 Approaches to public sector spinout deals

While there are three PSBs which are well versed in spinout formation, most PSBs studied have relatively little experience, having only produced 1-3 new companies each. This has led to us finding that there is a lack of consistency to various PSB's approaches to spinouts, with respect to factors such as equity, rewards to innovators, etc., with some having to rebuild the process each time a new spinout arises.

As such, organisations may go several years without forming a spinout, so the PSB risks losing the experience and lessons learned along the way that can be crucial to creating a successful spinout. This "memory loss" is often exacerbated through movement of employees to new roles and organisations. A number of PSBs commented that this significantly increased the time and effort involved in each spinout, as governance and approval mechanisms also have to be re-invented, and risks assessed each time. Along with the knowledge of how to structure the company, links to investor capital and other support mechanisms are likely to be limited in these PSBs, reducing the chances of success for their spinouts.

Some PSBs, such as Royal Botanic Garden, Kew[14] have declared their intention to form more spinouts in future and are therefore beginning to think more carefully about their approach to doing so, and put in place reproducible, recorded processes.

It is notable that all three of the most prolific PSB have a dedicated unit (in these cases structured as a separate legal entity) which is responsible for technology transfer support for KA commercialisation and spinout formation. For Dstl, this is Ploughshare Innovations Ltd, a wholly owned subsidiary of Ministry of Defence. For UKRI STFC, it is STFC Innovations Ltd, which is wholly owned by UKRI. For UKRI MRC, it is LifeArc, an independent charity which supports medical research through the early stages of translation into new products, processes and technologies. A number of the larger research intensive universities (including UCL, Cambridge, Oxford, Manchester) also use a similar separate company model, though others use internal resources or (for example Imperial and Birmingham) have previously used a separate company and now brought the activities back in-house.

It is not possible to determine from the evidence available whether the presence of a separate entity is instrumental in increasing the number of spinouts, or if the number of spinout opportunities drives the need for a separate organisation to manage them. In either case, the approach appears to be successful for these organisations. In particular, they have put in place governance arrangements with authority delegated to the unit to allow them to make decisions about spinout formation without requiring individual approval from their parent government department each time. One stated reason focusing a separate legal entity was to take on any risks of holding shares in external companies, and to take on the burden of governance. Even if the PSB does not (currently) have the critical mass to require a separate company, the creation

[14] https://www.kew.org/about-us/press-media/greensphere-agreement

of a dedicated technology transfer unit (i.e. an internal person or team) with a remit to support commercialisation and spinout formation would be a useful starting point.

In contrast, other PSBs have reported that the need to navigate internal Departmental review processes and then obtain ministerial approval results in lengthy delays to spinout formation, or has meant that a different route altogether has been taken, and a spinout opportunity missed.

7.1.1 Equity stakes

In the data analysis, we discovered that, with the exception of one of the three most active PSBs, which always takes a relatively low equity stake, the other PSBs showed a wide variation in the equity stakes that they take on spinout foundation. We did not find a consistent message in our interviews on the reasons for taking a particular equity position in a particular spinout case; indeed in many cases the underlying reasons (particularly for the older spinouts) were not known by the current staff.

Amongst the PSB interviewees, there was a high level of independent consensus that the equity held by PSBs should not exceed 50% (in part due to Office for National Statistics (ONS) and National Audit Office (NAO) rules that would probably make such spinouts public sector bodies themselves). Although this conflicts with the data which shows that several companies originally had shareholdings that were higher than this, in most cases these are believed to have received investment shortly after foundation that diluted the PSB shareholding below 50%. Some PSBs commented that a shareholding of ~25-30% for the PSB on incorporation "sounds about right", but others take a much higher share. That being said, a number of companies set up by some PSBs in the past were originally incorporated as wholly owned subsidiaries, with the external investment added later. There have been instances where the spinout has failed to raise external investment and as a result has remained a wholly owned subsidiary of the PSB.

It is worth noting that the ONS/NAO rules don't just cover equity percentages, but also the level of potential control that the PSB can have over the spinout. If they have significant control, then the spinout may still be classified as a public sector body even if they hold <50% equity – examples may include whether the PSB can control or veto the company strategy, senior management or Board appointments, receipt of investment, borrowing and similar activities.

The data analysis also showed that PSBs on average take a higher stake in their spinouts than universities do. This is likely to be influenced by different drivers in the two situations.

For example, the pressures on PSBs are different. Their responsibilities in terms of managing public money mean they are under more scrutiny from both the government and the public to show that the originating organisation is getting a fair return for public money, and that assets are not being "given away" below fair market value. Another difference is the source of the innovation. Within a university, funding is made available to researchers / academics to build their own research portfolio, driven by their own interests and curiosity. In contrast, at PSBs the KAs are typically developed as part of government work, and directed by government and the PSB. In this regard, some PSB spinouts may be more similar to a corporate spinout where the asset is not of core-business interest to the parent company and there is no freedom to develop it in house, but it is still seen to have commercial value. In these cases, the originating company would typically take a large share of the equity in the corporate spinout.

From the investors' perspective, there will always be a push to drive down the equity of the founding organisation (in favour of founders' shares where those individuals will be active in the ongoing spinout activity), though this can be rebalanced by investors at a later date if they feel the innovators should receive additional equity to maintain their engagement. From this perspective, the role of the PSB in the future success of the spinout may be minimal, or may be significant, for example if it is continuing to provide access to facilities, expertise, research capabilities, equipment, or indeed as a customer of the spinout itself.

From the PSB perspective, some interviewees felt that equity splits between the PSB and founders should also depend on the level of PSB support provided to the company pre- and post-spinout, in addition to any agreed IP licensing terms (which are discussed in the next section). Some examples of the types of support that were mentioned in the interviews are listed below, and discussed further in section 7.1.5.

- Proof of concept funding to develop the spinout knowledge asset
- Investment into patent or other IP costs to protect the asset
- Practical support for the formation of the spinout, business planning, finding staff and investment
- Ongoing access to staff/facilities/equipment/space/etc within the PSB

In universities, the industry sector of the spinout and the type of knowledge asset may also have an effect on the equity stake taken by the university – typically companies based on software or know-how would have a lower university equity stake and those in the healthcare sector would have a higher stake. The list of PSB spinouts does not have enough examples from different sectors to be able to make any judgements about whether this holds true for PSBs as well. Unlike universities, each PSB is more likely to focus on spinouts that have similar knowledge assets and industry sectors so this may not affect decisions made by an individual PSB, but could be relevant to comparisons between PSBs.

7.1.2 Absence/Presence of royalty-/fee-bearing licence

Experience suggests that many UK universities will seek equity in (part) consideration for reduced or lack of royalties on a licence. This approach has been evolving in recent years, with more universities adopting the approach advocated in the USIT Guide of taking a lower equity stake alongside a separate revenue-bearing licence. It is therefore important to understand whether the spinout deals involved a royalty-bearing licence or not and hence whether this shapes the amount of equity taken by a public sector body. A general rule-of-thumb would be that the PSB would take a larger equity stake in scenarios where there are little or no royalties payable on the licensed IP. Anecdotal evidence from our interviews suggests that higher PSB equity stakes are often but not always associated with the provision of a fully paid-up licence, i.e., the equity stake taken by the PSRE is in part given in return for the IP. However, none of the policies we have seen make explicit reference to this, and PSBs were unable to supply us with detailed data from licensing agreements (such as royalty rates, fees, exclusivity rights, etc.), to allow us to support this assertion.

The PSBs which produce the highest number of spinouts all mentioned that the terms of the licence would affect the level of spinout equity taken. Two of these would routinely ask for a

revenue-sharing licence as part of the spinout deal. These payments would normally be structured so that they only arise after a certain time period and/or level of revenues and are weighted towards larger payments in later years, so that the spinout only has to pay back into the PSB when it is on a firm financial footing, to give it the best chance of success in the early days.

UKRI MRC reported that even a small % royalty can bring real value for them. Their approach is therefore generally to take a balanced approach between equity stake, royalties and other financial considerations, which gives them the best chance of a return whether the spinout is acquired, or goes on to develop and licence out or market products.

In another example, the PSB did not grant a licence to the spinout, mainly because the "asset" in this case was the experience and expertise of the staff that were moving into the company. However, they did take an equity stake, and received a return through dividends from the company profits – in this respect, this spinout was different from the more high risk, new technology based companies which typically take many years to generate revenues, and much longer to become profitable.

7.1.3 Anti-dilution provisions on associated public sector body equity stake

Within the university sector, some organisations (most notably Imperial in the UK) have been experimenting with taking small but anti-dilutable equity rather than higher amounts of dilutable equity. It is important to distinguish these types of equity. In the US, this has been more common for some years, and this has caused some confusion when comparing UK to US practices but not understanding the underlying differences. Anti-dilution can take different forms from options to 'top-up', pre-agreed payments linked to exit/acquisition, and un-dilutable shares up until a certain financing round (e.g. Series A) or amount raised. Traditionally, this type of structure has been unpopular with investors, who may try to remove these provisions in later investment rounds.

We found no evidence of anti-dilution mechanisms used in PSB spinouts; this was confirmed by interviewees. However, at least one PSB has taken steps to maintain their level of influence in certain spinouts by investing in further fundraising rounds.

7.1.4 Value in the brand of a PSB

One founder commented that having a government department behind the spinout gave credibility to their product and approach. Another PSB noted that the relationship with the originating body not only gave them access to a ready-made first customer; it also gave other government departments comfort that the service was fit for purpose in a government context. This "brand credibility" is a knowledge asset in its own right.

We are also aware of (non-spinout) companies where employees have set up companies outside the PSB, and have used their prior (or ongoing) relationship with the PSB as part of their marketing material on their websites. These examples suggest that there may be an inherent value in the branding of the originating body in some cases, and this may also reflect on the equity level or other benefit that the PSB should receive if their brand is used.

7.2 Support for spinouts

As discussed above, the size of the equity stake taken by a PSB in their spinout may depend on the type and level of support that they give to the new company. Several PSBs compared the situation in their organisation with that in universities, and felt that they generally need to provide a higher level of input than their university counterparts to make a spinout happen, as the PSB innovators are less likely to be driving this process. Some PSBs have dedicated technology transfer units, with a remit to encourage, support and drive commercialisation activities, whilst other include this type of support in related roles, such as the IP function.

Nearly all the spinouts studied had some form of formal IP or patent protection associated with the knowledge asset, and investment in this protection is usually the first level of support provided by the PSB.

Access to Proof of Concept (PoC) funding, both from within the PSB and now via GOTT through the KA Grant Fund and others is vital to be able to generate supporting evidence for the commercial viability of the spinout proposition. One PSB also mentioned that for them this needs to be linked to mechanisms which allow "buy-out" of staff time from their normal duties to allow them to devote some time and resources to development of the spinout. UKRI STFC have an internal Proof of Concept fund that they can use to support these activities, and Ploughshare have recently set up an Accelerator Fund, but for other PSBs it is more difficult to find internal funding.

UKRI STFC have retained returns from past spinouts, which has been invested into subsequent innovations projects. Another PSB mentioned that they are currently trying to negotiate a similar arrangement with HM Treasury to retain some of the returns from successful commercialisation to stimulate further translational activity. By using the revenues they generate from commercialisation of their knowledge assets, they hope to ring-fence some of this income to support proof of concept funding.

Lack of entrepreneurial experience amongst their staff was mentioned by several PSBs as a barrier to spinning out, and some PSBs have attempted to counter this by providing training and/or access to accelerator programs and similar support schemes. For example, GCHQ ran an Accelerator scheme in 2019, and UKRI MRC held an entrepreneurial event for their employees last November.

Other support that can be provided to the spinout may be access to staff time via consultancy, facilities, lab and office space, contract research and services, etc on terms that are flexible, fair and beneficial to both the spinout and the parent PSB. One PSB reported that it has been able to support pre-spinout activity using in-kind investment of time and resources, allowing the opportunities to mature to the point where they are viable businesses. UKRI STFC also has dedicated incubator facilities on site at their Rutherford Appleton Laboratory site. This is not exclusively for use of their spinouts, but they can benefit from its use.

Some PSBs described arranging for access to external commercial advice, or helping to identify, hire, and in some cases fund professional company management to develop the business proposition. One PSB said that they effectively employed the CEO of one of their companies for a year before it was spun out. The more active PSBs also have staff who are able to help with

market research, and development of the company business plan. Provision of suitably qualified Board Directors, either from within the PSB, or using externals with relevant experience can also not only help the business to thrive, but also maintain a connection with the parent PSB. This model has been used successfully by the Cabinet Office.

Connections to potential investors is another important factor. One PSB said: "**Access to risk capital is vital for us**", to provide funding for potential spinout companies in their early days. This is not just help with access to investors, but also on how to pitch for investment, and advice and support for negotiation of investment terms and conditions. There are a small number of specialist investors who are closely associated with PSB spinout investments, in particular UKI2S, which is established through government funding (via Departments and PSBs) to invest in PSB spinouts and in national priority areas[15] Other PSBs may be able to access specific investment funds which match their interests, for example GCHQ and the National Security Investment Fund, or RBG Kew and Greensphere. UKRI STFC has retained some exit proceeds and is able to re-invest, itself, into other spinouts.

One PSB has used an internal incubation model to allow a spinout to grow within the PSB environment to the point where it was revenue-generating and could stand alone as an independent entity. This included payment of the salary of a CEO for a year, whilst the business built up sales. Other support that a PSB may provide include provision of back-office services such as IT, HR, and accounting.

[15] https://gott.blog.gov.uk/2022/07/29/gott-funding-helps-to-expand-uk12s-early-stage-venture-financing-into-knowledge-assets/

7.3 Involvement of innovators in the spinout

7.3.1 Rewards to innovators / individual recognition initiatives

As described in the analysis above, most of the PSBs have Rewards to Innovators schemes which allow their staff to share in the benefits of spinout success. These take a wide range of approaches, and there is not enough information in our dataset to determine whether any or all of these are actually successful in stimulating spinout activity. Some PSBs reported that their approach has changed over time, for example one PSB initially did not award any equity to the innovators, but now allows this in certain circumstances.

This should be qualified by the observation in The Mackintosh Report that **"financial reward is rarely the primary source of motivation for public servants and such schemes should be carefully designed so not to create perverse incentives or undermine the wider ethos of the organisation."** This was reflected in our interviews, where financial gain was seen as secondary for many of the PSB staff, who are more motivated by their alignment to the mission of the organisation. Similarly, a NESTA study[16] attempted to identify what motivates public servants to innovate and what enabling conditions, cultures and incentives are needed to do so. This concluded that public servants draw on intrinsic motivations in their work, and that they are more likely to respond to empowerment, rewards and celebration, as well as to seeing the effects and benefits of their innovations.

One PSB said that their rewards to innovators scheme enabled PSB staff to become minority shareholders (and that equity would increase based on the success of the business) – alongside university partners, the originating organisation, and private investors as appropriate. The PSB thought that the scheme worked well, and the innovators were engaged in making the spinout a success.

Not all innovators responsible for the spinout's IP choose to work for the spinout, take equity, or receive a portion of licence incomes. When there has been a financial return upon the event of the spinout's exit, one PSB has rewarded inventors via a notional shares scheme. Notional shares are essentially shares that are 'set aside' for founders without them appearing on the cap table. This means that the innovators may still receive a benefit of the share of equity upon the event of a sale.

In another example of rewards to innovators as it relates to equity returns, one PSB used an employee benefit trust to reward both their staff members who moved into the new spinout as well as new incoming spinout staff from elsewhere. The trust was a separate shareholder in the company, and employees were subsequently entitled to a share of any benefits realised from the sale of equity in the spinout.

[16] https://www.nesta.org.uk/report/why-motivation-matters-in-public-sector-innovation/

7.3.2 Role of innovators in the spinouts

In our interviews, we came across examples of a number of different mechanisms for staff to take a role in the spinout after it was formed. These include:

- Granting staff permission to engage with the spinout through a consultancy arrangement, whilst remaining in their original position
- Allowing a secondment for the staff to work full or part time for the spinout as it becomes established, but then return to their original PSB position
- Provide support for the spinout by carrying out contract research for the company from within the PSB
- Staying within the PSB, but receiving an equity stake in the spinout company
- Leaving the PSB to join the spinout company full time, with or without an equity stake

Not all the options listed above are available to all staff at all PSBs. Indeed, one PSB said that while they do not ban inventors from taking equity in spinouts, questions around conflicts of interest have been raised elsewhere in government, which puts pressure on this PSB to find alternative methods to involve the innovator in the spinout. Others reported that innovators who are eligible to receive an equity stake in a spinout have turned down the opportunity, and chosen not to be involved.

Case study – Dstl spinout

A relatively recent spinout from Dstl illustrates several of these options in one company. The technology for the spinout was developed by a group of scientists, who had different ambitions. One inventor has not taken any equity in the company and will not be involved in its future development, but will be eligible to share in any licence revenues through the Rewards to Innovators scheme. Another has received equity and joined the spinout full time, whilst a third has retained their position part-time at Dstl, but has also taken equity in the company and works part-time for the spinout.

The potential spinout roles and options available to Dstl staff, and the implications for the rewards they receive, are explained in the Ploughshare Spinout Playbook **step-6-understanding-your-options** (https://ploughshare.co.uk/playbook/spin-out-preparation-and-pathways/step-6-understanding-your-options/)

Some PSBs reported that they can find it hard to convince the innovating staff to support a spinout. Reasons for this are multifaceted. Generally, the innovating staff are public servants first and foremost, may not wish to be entrepreneurs and , are not incentivised enough to take on

risk. Another PSB commented that the staff in their organisation typically do not have the skill sets needed to lead a spinout.

Interviewees said:

- **"There is a cohort of creative scientists, but they are generally not entrepreneurial."**
- **"The majority of the companies spun out of [PSB] do not contain full-time inventors."**
- **"They didn't join the organisation to make money".**
- **"There was not a massive incentive to give up my Civil Service job… My salary wasn't going to triple, share options weren't attractive, would not have the same pension benefits as in the Civil Service."** Founder of a PSB spinout

However, investors really care about the management and staff of a company. To ensure the best chances of spinout success, one PSB will often encourage the innovator to join the spinout as a chief scientific officer (or similar) via a consultancy arrangement, or where the PSB pays for their time.

UKRI STFC said that they spend a lot of time thinking about how to convince inventors to commercialise their IP. One mechanism of doing this is by providing them with proof-of-concept funding, which enables the inventor to allocate project time towards their idea. The staff member(s) pitch for funding and authorisation from their UKRI STFC department director. UKRI STFC said there is a corporate strategy for seeking spinouts from different sections of the organisation, but in contrast to the university spinout environment, it is usually driven by STFC innovation staff, rather than the innovator, and can only proceed with explicit support from the director of the division.

7.4 Cultural barriers

7.4.1 Low appetite for commercial activities

The appetite for spinout formation has been growing in recent years, but historically, commercialisation of IP assets has been often viewed as something that falls outside the public sector mission, unlike in universities. The sentiment was that PSBs generating money might be considered inappropriate. Only 15 of the over 300 public sector bodies that fall under the remit of GOTT have been found to have ever generated a spinout.

In part, this is because they are conscious of government and public scrutiny, combined with low motivation within the organisations. In some cases they do not need (and/or would not receive) the financial returns of successful commercialisation, and managing equity stakes in another company is seen as a complication, raising potential pitfalls of subsidy rules and competition law. One respondent said that **"it feels like a strange position for government to be a shareholder in a private company long-term".**

Several of the PSBs interviewed are still in the early stages of implementing the recommendations of the Mackintosh Report and Rose Book, and appreciate that it will take time to set up support structures, change the mindset of both management and staff, and incubate potential spinout opportunities. **"We want to do more to encourage spinouts, but it isn't part of the organisational strategy".**

Another issue is that in some cases, PSBs have not historically been incentivised, because they could not retain and reuse some or all of the revenues they generated from commercialisation of their knowledge assets, or to ring-fence this income internally to support technology transfer activities, rewards to innovators schemes, proof of concept funding, and/or innovation activity. In some cases, any revenue became part of the central budget, but in others, this revenue went to HM Treasury, and was not received by the PSB at all. PSBs now have the right to discuss their ability to retain income from knowledge asset commercialisation with HM Treasury (Consolidated Budgeting Guidance, paragraphs 4.70-4.71), which was agreed between HMT and the Knowledge Asset Team (GOTT's precursor). Not all PSBs appear to be aware of this provision, however.

7.4.2 Lack of experience and expertise

Often there is limited recent experience of how to set up and support spinouts in the first place, so it is difficult for staff to know what is right and reasonable and what is not. Staff responsible for commercial activities at one PSB said they do not have the expertise, experience, or resources available to them in-house to help support spinout activities; indeed, they have previously leant on informal support/advice from by commercial staff at another PSB, recognising it was not their responsibility to do so. The interviewee acknowledged that, due to the low overall KA commercialisation potential within their PSB, it would be impractical to have dedicated in-house support for spinout formation. Instead, having awareness of and access to a more centralised technology transfer office for support would be beneficial to them, and likely other PSBs in a similar position. Perhaps this could be shared between groups of related PSBs.

> **"A 'how to' spinout guide for government would be great to see"**

As mentioned previously, Ploughshare, STFC Innovations and LifeArc, have the most experience in generating and supporting PSB spinouts. Ploughshare has recently expanded its remit beyond Dstl to provide support services to other PSBs (Atomic Weapons Establishment, Ministry of Defence, Met Office, National Oceanography Centre) on a fee basis. LifeArc provides a similar role for certain medical research charities (though not to our knowledge to other PSBs). STFC Innovations has provided informal advice to others on an ad hoc basis. GOTT also provides support and advice to PSBs on the range of knowledge asset commercialisation routes, through its technology transfer team, but is not resourced to provide full time technology transfer support to all the PSBs in scope. UK Government Investments (UKGI) is another source of advice, though more relating to large scale commercialisation projects and joint ventures than smaller spinout formation.

The spinouts we identified also included examples of companies which are co-founded by PSBs and universities. In these cases, it was not always clear which organisation was driving the spinout, but there are certainly examples where the PSB benefitted from the greater experience of their university partners.

7.4.3 Concerns about loss of staff, skills, and IP

There was a concern expressed among some PSBs that spinouts pose a risk through staff leaving the PSB, having benefitted from time and investment into training and developing their skills, which are needed by the PSB itself.

"We feel it is sometimes better to find the time to have the staff member be seconded to the licensee and get rewards via kudos and potentially receive a share of licensing royalties."

There may be a reluctance to allow the staff member to take time away from their "day job" to devote their efforts to developing a potential spinout. In some organisations, this requires senior management approval (Director or equivalent).

One PSB mentioned that, due to the nature of their scientist's roles and the sector they sit in, the staff culture is extremely opposed to commercialisation activities: **"The wellbeing of the planet is the most important, so the idea of commercial [impact] does not sit well with them…"** This PSB's scientists prefer to publish results and open-source data – rather than first protecting their IP. More pragmatically, it is typical for the potential markets of their knowledge assets to be incredibly niche: **"anything that could be developed would only be used by a handful of people… there just isn't a market for it… after accounting for paying for patents etc., miracles would have to happen for innovators to benefit".** That's not to say the PSB does not test market potential at all; they have collaborated with a university business school by feeding ideas through an MBA program.

Another concern is that by spinning out, the PSB may end up losing access to assets that are still useful to them. One PSB reported that are unable to assign IP to a spinout, and there is a reluctance to do so – it was reported that there are instances across government where this has not worked in its favour and have ended up paying a large amount to re-procure IP that the government originally owned – which is both costly to taxpayer and a source of embarrassment. In the University sector, assignment is not usually the mechanism of choice to give the spinout the right to commercialise the knowledge assets, and with the correct terms and controls within a licence agreement, this type of situation can be avoided.

Another concern related to assignment of IP is that the spinout may decide to pursue something else that is more profitable and is no longer motivated to develop the original IP. This is relevant particularly in cases where a PSB has created a spinout to carry out specific tasks or to develop new technologies that are needed by the PSB. By the time the PSB expects or needs the technology to be ready, it may have been abandoned in favour of something else for which the PSB has no need. One PSB has tried to mitigate this by working instead with exploitation partners which are existing companies, and making sure there is a clause in the licence that says they are committed to meeting certain milestones. They saw this as easier than trying to set up a similar arrangement with a spinout. There is no particular reason why the same approach could not be applied to a spinout, and indeed performance milestones are common in licences from universities to their spinouts.

7.5 Governance barriers

7.5.1 Process and delays disincentivise spinout formation

A recurring theme that emerged during our interviews was that several PSBs – particularly those with low levels of spinout activity and no dedicated company to support KA generation and commercialisation – have faced significant friction from their parent governmental department in getting approval to establish a spinout. One respondent said the biggest difficulty during the spinout process was **"the lack of clarity, inconsistent, and risk-adverse government policy on establishing spinouts".** They reported some inconsistency, long timescales and lack of clear decision-making processes with HMT and the NAO in particular – which reduced their confidence and made the venture more burdensome on them. This point was echoed by another PSB, who found that securing Secretary of State approval, specifically for the option to take an equity stake, was "a very difficult and protracted process with too much bureaucracy".

In one case, getting permission from the relevant government department to spinout was reported to take 3-4 years. Funding was required to continue product development in the meantime, and this was met initially within the PSB via grants, but this route was no longer available once the product was ready for launch. As the spinout was not yet created, external investment could not be raised, and eventually supplying the product to the governing authority at an agreed price was the only way to continue to fund development .

We heard more than one report of a PSB that deliberately chose not to take equity in a new spinout, due to the complications and delays that would cause. One PSB has an agreement with their partner university to receive a share of any equity returns, but do not hold any equity in the spinout on their own behalf. Another potential spinout remained as a wholly owned subsidiary, as the government department would not give approval for a spinout with external private sector investment, and a third was set up with a licence but no equity, to avoid delays and to allow the technology to continue to be developed and not lost.

7.5.2 Delegation of authority

Different levels of delegated authority present another challenge. It is often much easier for a PSB to license their KAs to an existing commercial company, as they can make decisions about licensing within the PSB, whilst spinout decisions require approval from their parent department's Secretary of State. It is not clear why most commercialisation decisions (eg licensing, assignment, consultancy, brand use) are often delegated below ministerial level, but equity holding and spinouts are often not. This has driven PSBs to choose to pursue a licensing route, even for KAs which might be better suited to a spinout.

Complicated PSB governance structures can also increase barriers to forming spinouts, particularly in cases where the PSB has multiple classifications e.g. being both an independent charity and an arms-length body of a government department. Unless authority is delegated to within the PSB, then multiple approvals are likely to be needed from the relevant internal management structures, governance board(s), and where relevant then escalated to their parent government department and then the Secretary of State. Each of these multiple stakeholder groups need to consider and approve what may a novel approach, and may have different attitudes to the potential financial, legal and governance implications involved in a spinout.

> **"The governance process of commercialising something is tortuous… doable, but painful. Licensing isn't too bad, but to get something registered through Companies House there is a lot of bureaucracy involved including getting approval from the Secretary of State."**
> - PSB interviewee

7.5.3 Historic experiences

There have been instances in the past where a spinout or joint venture has not gone well, leading to organisational reluctance for the PSB to get involved in similar ventures again. For example, a PSB reported that an attempt to establish a shared equity joint venture that did not go well, and led to parliamentary committee hearings and public scrutiny, which has resulted in a reluctance to explore more joint ventures or spinouts.

7.5.4 The role of GOTT

Despite these barriers, many organisations are now trying to make changes to their approach and processes as a direct result of the Mackintosh Report.

The very existence of GOTT sends a strong message that technology transfer does fall within the remit of PSBs. Furthermore, GOTT translational funding, via the Knowledge Asset Grant Fund, has been mentioned as "transformational" for the development of spinouts. Other helpful initiatives from GOTT described elsewhere in the report include facilitating access to investment capital through UKI2S, provision of KA commercialisation guidance in the Rose Book, and facilitating discussions with HMT.

GOTT can also play a continuing role in educating both PSB senior management and staff, and their government departments on the benefits and sensible processes to mitigate the risks of spinout formation, to allow this activity to happen more freely and frequently.

There was broad consensus during our interviews that greater knowledge and awareness of the approaches taken by other PSBs would be very beneficial to provide guidance for others when forming spinouts. GOTT would be well positioned to gather, consolidate and disseminate guidance on good practice for formation of spinouts by PSBs.

7.6 Alternative routes

Whilst this study has focused on spinouts, we also came across other related company-based mechanisms used by different PSBs to commercialise their KAs.

Joint ventures (JVs) have been used in a number of cases, for example the formation of Fera Science Ltd from the Food and Environment Research Agency/Central Science Laboratories in partnership between DEFRA and Capita Ltd.

The Cabinet Office have used JV structures to separate out a number of functions which could operate as a standalone business and attract other clients (often still within government). Examples are:

- Crown Hosting (physical hosting of legacy IT services)
- Shared Services (payroll, HR, contracting, etc)
- My CSP (Civil Service pension scheme)
- Indessa (debt collection)

In some cases, these were set up to expand the customer base, but in others the advantage was a more efficient business resulting in cost savings to the government.

In these cases, where the government office is both a shareholder and a commissioner of services it is very important to separate out these roles within the PSB, otherwise the relationship can become conflicted and very difficult to manage. This can become particularly acute if a government tendering process cannot be shown to be fair and open, for example if there is only one potential provider.

Another route is to set up internal business units, which may become independent trading subsidiaries. An example of this is Cefas Technology Ltd, which is a wholly owned subsidiary of Cefas established to manufacture and sell data logging tags for environmental monitoring of fish and aquatic mammals.

GCHQ has used a not for profit/open source/public good route to expand the impact of a number of initiatives, particularly from the National Cyber Security Centre (NCSC), examples include Web Check, Cyber First, and Cyber Chef. This type of route can be particularly useful for PSBs looking to commercialise data-heavy KAs, as it can be difficult to navigate the rules on Re-Use of Public Sector Information to identify a valid commercialisation route.

We also found an entire ecosystem of start-ups set up by ex-employees from public sector bodies.

- Several companies have been set up by employees who have left the organisations. One PSB gave a number of examples where there had been internal discussions about potential commercialisation opportunities, but there was no internal process, governance, structure or route to support these. As these cases were dependent on the skills and knowledge of the staff, rather than specific tangible, protectable, or codified knowledge assets that went into formation of the company, it was easier for the employees to leave and set up the new venture independently.

- Another PSB reported some more sensitive circumstances, where staff were made redundant or re-organised, and so were due to leave the organisation but wished to set up a company to commercialise technology that would otherwise be discontinued within the newly structured PSB. In this case, it was decided to "set the technology free".
- In these cases, no licence was required, nor equity taken, so they are not spinouts in traditional sense even though they are typically dependent on the experience gained by the individuals as part of their role in the PSB, and in some cases their reputation from their employment there.

8 Recommendations

The Rose Book: Guidance on knowledge asset management in government[17] has been developed for the government by GOTT, to provide guidance to support PSBs in their management of their knowledge assets (KAs). This clarifies good practice and provides recommendations, but does not mandate actions or behaviours. The Rose Book currently only provides high level information about key considerations for spinout formation. This study, informed by our prior experience, has identified some actionable recommendations, that could potentially supplement the Rose Book. It is important to recognise that although this report focuses on spinouts, this is not the only option. Whilst all PSBs have and/or generate knowledge assets, only a certain number of these KAs from a subset of the PSBs will be suitable for commercialisation, and for many of these opportunities, spinout formation will not be the most appropriate route, These recommendations address ways to improve the relatively small number of situations where spinout formation from a PSB is both a suitable and a desired option.

1. **The PSB culture should encourage spinout formation**: Encourage PSBs to view spinout formation as "part of their mission" where this is consistent with their function and remit. This includes educating PSB senior leadership and their parent government departments that spinouts can be compatible with obtaining value for public funding if properly managed. Education, encouragement and empowerment of staff is also important. Mechanisms such as staff sabbaticals or consultancy arrangements can maximise the chances of spinout success whilst ensuring that the PSB does not lose access to valuable staff, or to the expertise and IP that it needs to continue its public mission.

   Recommendations for PSBs

   - PSB Leadership should incorporate commercialisation and spinout formation into their organisational strategy (where this is consistent with their function and remit).
   - PSBs should provide education, encouragement and mechanisms to support staff who wish to get involved with spinout formation, such as staff sabbaticals or consultancy arrangements.

   Recommendations for GOTT

   - GOTT should continue to advocate widely for technology transfer to be considered part of the remit of public organisations.

2. **Remove bureaucracy and delegate decision-making authority wherever possible**: Several PSBs (particularly agencies and ALBs) reported lengthy timescales and multiple approval processes to allow them to set up a spinout, which has resulted in missed opportunities and high levels of frustration. The PSBs which have formed the highest numbers of spinouts have put in place mechanisms which avoid the requirement for protracted review processes culminating in individual Secretary of State approval for

[17] https://www.gov.uk/government/publications/knowledge-asset-management-in-government/the-rose-book-guidance-on-knowledge-asset-management-in-government-accessible-webpage

every spinout, by ensuring that appropriate expertise and delegated authority are available at a suitably local official level (e.g. the CEO or director of an agency or ALB, or appropriate Senior Civil Servants within government departments). There is an ongoing role for GOTT in education of the parent departments, HM Treasury and the National Audit Office in where the risks and benefits may or may not lie, and in providing a framework that would enable more streamlined decision-making, throughout. We would recommend that the authority to approve a spinout should be delegated to suitably experienced officials, and should generally not need approval from outside the originating body.

Recommendations for PSBs

- PSBs should ensure that they have sufficient expertise and suitable governance processes in place at a local level to permit delegation of spinout approval to within their own organisation.
- PSBs should implement a streamlined approval process which balances consideration of the potential financial, legal and governance implications involved in the spinout with appropriate commercial timelines.

Recommendations for GOTT

- GOTT should work with government departments to develop spinout approval frameworks and processes that support an appropriate consideration of potential risks without unduly compromising the timeline needed to realise the spinout's commercial opportunity. Where possible this should include delegation of approval authority to the organisation generating the spinout.

3. **Increase availability of spinout expertise within or available to the PSBs**: Many PSBs with no spinout experience, or only occasional spinout formation reported a lack of corporate memory, in-house expertise and resources to support spinout activity. A more formalised network of support from their peers, and/or advice from a centralised organisation such as GOTT or others would be valuable.

Recommendations for PSBs

- PSBs should employ trained staff or outsource access to experience in commercialisation of KAs (ideally within a public sector setting).

Recommendations for GOTT

- GOTT should develop a "how-to" guide for formation of government spinouts.
- GOTT should facilitate access to training in commercialisation and spinout formation, tailored for the public sector, for both technology transfer staff and for innovators.
- GOTT should consider mechanisms to deliver additional support and expertise to PSBs with only occasional spinout activity, including peer networks, collaborative

approaches, or a more formalised access to technology transfer support or to outsourced resources.

4. **Create a dedicated unit (or even a separate legal entity) to manage the commercialisation of KAs and support spinout activity:** It was notable that the three PSBs which have founded the highest numbers of spinouts all have a separate legal entity dedicated to support the commercialisation of their intellectual assets. This is also true for many of the most research intensive universities. We do not have the evidence to determine whether this is a cause or an effect, but when a PSB is in the situation of having suitable underlying knowledge assets and a desire to create a higher number of spinouts, then this appears to be an effective mechanism to provide the necessary expertise and support. As a first step, a dedicated internal unit with a specific remit to support identification, development, management and commercialisation of KAs would be an appropriate group to support spinout formation

Recommendations for PSBs

- PSBs should establish a dedicated internal unit to manage commercialisation of KAs, including support for spinout formation.
- If an ongoing pipeline with a higher volume of spinouts is anticipated, then PSBs should consider whether it may be appropriate to structure a separate legal entity to better delegate decision making and to manage and provide dedicated support to the spinouts.

Recommendations for GOTT

- GOTT should consider whether advice to PSBs is required on suitable legal structures and governance arrangements for units that support KA commercialisation.

5. **A range of relevant support mechanisms are needed to foster spinout formation**: There are many approaches that can support spinout formation, which may include:
   - Investment into IP/patent protection
   - Access to Proof of Concept funding, both within the PSB and via the GOTT KAGF and others. This should be linked to mechanisms which allow "buy-out" of staff time from their normal duties to allow them to devote some time and resources to development of the spinout
   - This could be further supported by giving the PSB the ability to retain and reuse some or all of the revenues they generate from commercialisation of their knowledge assets, and to ring-fence this income to support such proof of concept funding, technology transfer activities, rewards to innovators schemes, and/or innovation activity. PSBs now have the right to discuss this option with HMT.

- Consider training for entrepreneurial staff, and/or access to accelerator programs and similar support schemes, such as the iCURe programme which is available to some PSBs.
- Developing mechanisms through which the spinout can gain access to PSB staff time, facilities, lab and office space, contract research and services, etc on terms that are flexible, fair and beneficial to both the spinout and the parent PSB. This could include incubator facilities for new spinouts and startups.
- Provide access to external commercial advice, support for hiring professional company management, skills for business plan development, etc
- Help with access to investors (including UKI2S), pitching for investment, advice and support for negotiation of investment terms and conditions
- Support for legal formation of the company, and potentially provision of back-office services such as IT, HR, accounting, etc
- Granting staff permission to engage with the spinout as needed, for example through a consultancy arrangement with the spinout, or a secondment whilst the spinout is set up
- Provision of suitably qualified Board Director(s)

Recommendations for PSBs

- Where appropriate, PSBs should explore with HMT the retention of (some of) the proceeds of successful commercialisation activities for internal translational support use.
- PSBs should consider which additional aspects of support it is able to provide to encourage development and early growth of spinouts both before and after foundation.

Recommendations for GOTT

- GOTT should continue to develop and promote mechanisms to allow PSBs to access funding and other practical support for their spinouts.

6. **Spinout processes must be clear and well communicated**: The Ploughshare Spinout Playbook is a good example of the type of information that could be included, and the transparency of communication. The specific guidance contained within it may not be applicable for all PSBs, but the principles of clear and open communication are welcomed, explaining the different scenarios which are possible, and the implications of each decision.

Recommendations for PSBs

- PSBs should develop and communicate clear explanations of the processes and approval routes that are applied within their specific organisation, and signpost to sources of support for spinout formation.

Recommendations for GOTT

- GOTT should develop and disseminate cross-sector guidance on good practice for spinout formation that is applicable in the public sector.

7. **Encourage innovators**: Clear communication of the rewards that can be expected by innovators is also recommended. A formal Rewards to Innovators policy, regularly reviewed, is a useful part of a strategy to encourage spinout formation. This requires careful consideration to ensure that the incentives offered lead to the desired behaviours. Mechanisms that are currently used within PSBs include:
   - Payments linked to filing and/or grant of patents
   - Payments linked to achievement of certain commercial milestones
   - General staff recognition and reward mechanisms
   - Staff equity holdings in spinouts (including whilst continuing in a public sector post)
   - Sharing of revenues received from licensing income and/or equity realisations
   - Ability for staff to support the spinout through consultancy or sabbatical, whilst retaining their PSB position

Recommendations for PSBs

- PSBs should implement a clear, formal Rewards to Innovators policy, which is regularly reviewed and incentivises staff to support commercialisation of KAs, including through spinouts.
- PSBs should provide mechanisms that allow staff to devote time to develop an opportunity towards a spinout, and to support the spinout post-formation through consultancy or sabbatical.

Recommendations for GOTT

- GOTT should develop and disseminate guidance on good practice in approaches to Rewards to Innovators.

8. **Proper record keeping is vital**: Robust record keeping practices for spinout commercialisation activities are essential, not just for internal governance processes, but to ensure continuity of information and decision-making consistency of approach and accountability. Many PSBs do not currently have this information readily available, and so are also unable to develop good and consistent practice, track approaches against outcomes, or ensure that they are receiving the returns that are due e.g. that licensing revenues are properly tracked and received. This requires an internal recognition of the value of knowledge assets and the relevance of consistent data and record keeping to support internal drivers. It may also be encouraged by external interest in this data (for example from GOTT). More broadly, consistent collection of information and data would then allow PSBs to share and compare approaches and data, to increase awareness and drive good practice. For some types of data, this would require agreement across the

PSBs on how to classify and codify the data. Suggested data that would be valuable to record and retain in a consistent manner include:

- Company identification data (e.g. Company name, Registration number, year of formation)
- Type of knowledge asset(s) being transferred
- Initial shareholder information and early investment details
- Details of the associated licence deal terms
- Identity of the Founders from the PSB
- Any Reward to Innovators arrangements
- Ongoing links and relationships between the PSB and the spinout
- [Ideally] Current status, valuation, employment figures, etc for the spinout

Recommendations for PSBs

- PSBs should implement robust record keeping processes on commercialisation, including spinout formation, as a matter of good governance.

Recommendations for GOTT

- GOTT should maintain the database of spinouts generated during this study, and encourage central reporting of new spinouts and the progress of existing companies by PSBs.
- GOTT should explore routes to allow sharing of information about spinout approaches between PSBs, and provide guidance on consistent data definitions.

9. **Equity stakes in spinouts should not be set in isolation**, but in the context of the terms of the IP licence, and the level of support provided to the spinout: A pre-set, uniform equity stake for each PSB in all their spinouts is not recommended, as this would not take into account the individual circumstances of the company foundation, the terms of the licence to the knowledge assets that are involved, and the level of support provided by the PSB. It is notable within the study database that there is a very wide distribution of equity stakes taken by the PSB in their spinouts, which suggests that a case-by-case approach is already being taken. It is worth noting that PSB equity stakes of >50% may mean that such spinouts would also be considered to be public sector bodies rather than independent entities (this is not the only relevant factor). Trends in the University sector (driven in part by initiatives such as the USIT Guide, and the spinout review) are currently favouring a lower stake for the University, and a higher stake for the founders, particularly when this is to incentivise founders who will be contributing to the future success of the spinout. The circumstances within PSBs are not the same as for Universities, however, and the external influences that apply will also be different. In particular, the internal environment and the drivers for creating a spinout may be different, and PSBs face a higher level of scrutiny to ensure that public money is being correctly managed, and a fair return is obtained for government and taxpayer investment. In many cases, the innovators may be less likely to be closely involved in the spinout's formation and future development than they typically are in a university setting.

Factors that should be considered when negotiating the spinout equity and licence deal include:

- Whether the licence is revenue-free, or includes commercial terms (such as the inclusion of up-front fees, milestone fees, and/or royalty payments).
- Level of historic investment in the development of the opportunity such as PoC funding, patent costs, and Expected ongoing future access to staff/facilities/equipment/space/etc at non-commercial rates
- Sector and type of knowledge asset
- Expected level of future involvement of the innovators in the spinout
- Access to the brand value that attaches to the association of the spinout with the reputation of its parent PSB

Recommendations for PSBs

- PSBs should treat each spinout as a separate case, and should not adopt a uniform approach.
- Equity terms and licence terms, as well as the level of support given by the PSB pre- and post-spinout should all be considered in combination when PSBs negotiate the terms for their spinouts.

Recommendations for GOTT

- GOTT should develop guidance on the factors that should be considered when negotiating the equity position and licence terms for a PSB spinout, which includes information on possible implications for the NAO classification of these companies.
- In line with current trends elsewhere, GOTT guidance should consider whether adopting a lower level of equity coupled with a fee-bearing licence would also be appropriate in a public sector setting.

Appendix I: Approach

The study was undertaken between April and October 2023. During the project, detailed and comprehensive information has been gathered where available for each of the spinouts examined, as well as general information on approach to spinouts from the originating PSBs. We discovered that many PSBs do not have ready access to much of the detailed data that we aimed to collect, particularly for their historical spinouts, so where possible this was supplemented using publicly available data.

In compiling the review, Wellspring (previously known as IP Pragmatics) has used the following methods:

- Discussions with the GOTT team to gather background information, and leverage existing links with current PSB partners.
- Desk-based research – collation of information from a range of sources via
    - the UK Companies House,
    - published sources: the Mackintosh report, Rose Book, etc
    - other data already held by GOTT,
    - routine Internet searches to identify other relevant public sources including company websites, PSB annual reports, and press releases,
    - use of Wellspring's proprietary database, Scout,[18] along with market report databases that it subscribes to from sources such as Beauhurst database,[19] a comprehensive online platform that tracks thousands of high-growth companies,
    - Searches of the Fame, PitchBook and Gateway to Research databases (carried out by the UCI team).
- Analysis of the UK spinout ecosystem, equity stakes as well as IP licenced, using a combination of all of the above information alongside Wellspring's and UCI's existing knowledge of this sector.
- Direct interviews with public sector body representatives following the introductions from the GOTT team, complemented by interviews with stakeholders from Wellspring's existing networks.
    - The aim was to supplement secondary (published) sources of information with primary sources, as some of the existing lists (e.g., from Beauhurst, Gateway to Research) might exclude certain types of spinouts, and typically do not include extensive details investigated as part of the current study.
    - All participants in the study were provided with a project briefing document.
    - Interviews were held with representatives from 16 PSBs and related organisations.
    - In addition, 11 PSBs that were in scope of the study confirmed that they have not produced any spinouts.

Wellspring would like to thank all those contacted for their help with the provision of information and advice to build this detailed picture of the spinouts arising from the UK public sector.

[18] https://www.wellspring.com/products/scout

[19] https://platform.beauhurst.com/

One of the overarching aims of the current study was to identify and characterise the full population of spinouts originating from the PSBs examined. Wherever possible, the fundamental data collected on spinouts included:

- Company Name
- Company Registration Number
- Website
- Incorporation year
- Spinout date (Foundation Year) – The year in which the public sector body first took equity in/provided a licence to the spinout, which might be different from the incorporation year
- Technology Area- Any internal description of the type of technology being commercialised by the spinout
- Current status

As well as some more detailed information on:

- Initial shareholdings – equity held by the associated public sector body in spinout Associated public sector body equity stake pre-money (including any equity taken for cash investment, equity taken in consideration of an IP licence) (% of total equity)
- Rewards received by innovators and role in the spinout
- Details of the licence from the PSB
- Fundraising history

Appendix II: Acronyms, Abbreviations And Definitions

Abbreviations for organisations mentioned in this report	
BBSRC	Biotechnology and Biological Sciences Research Council
DSIT	Department for Science, Innovation and Technology
Dstl	The Defence Science and Technology Laboratory
GCHQ	Government Communications Headquarters
GOTT	Government Office for Technology Transfer
HMT	His Majesty's Treasury
Met Office	The Meteorological Office
MoD	Ministry of Defence
MRC	Medical Research Council
NAO	National Audit Office
NHSBT	National Health Service Blood and Transplant
NPL	National Physical Laboratory
ONS	Office for National Statistics
RBG, Kew	Royal Botanic Gardens, Kew
STFC	Science and Technology Facilities Council
UKAEA	United Kingdom Atomic Energy Authority
UKGI	UK Government Investments
UKRI	UK Research & Innovation

Acronym	Description
ALB	Arm's Length Body
IP	Intellectual Property
IPR	Intellectual Property Right
KA	Knowledge Asset
KAGF	Knowledge Asset Grant Fund
PoC	Proof of Concept
PSB	Public Sector Body (used as a general term to encompass all the public organisations which were in scope for this study)
RTI	Rewards to Innovators
USIT Guide	University Spin-out Investment Terms Guide

Definitions used in this study	
Anti-dilution provisions	Mechanisms through which the size of an equity stake is protected or maintained when further investment or shareholders enter the company. Anti-dilution can take different forms from options to 'top-up', pre-agreed payments linked to exit/acquisition, and un-dilutable shares up until a certain financing round (e.g. Series A) or amount raised.
Foundation date	In relation to the setup of the spinout, foundation date has been defined as the point at which the IP enters the company to be commercialised. This may be different from the legal company incorporation date, but can be very difficult to identify without insight from the company or founding PSB, and where this was not available we have assumed that the foundation and incorporation date are the same.
Knowledge assets	The intellectual property that an organisation holds, the skills and experience of its staff and its reputation, such as inventions, designs, certain R&D outcomes, data and information, software and source code, know-how and expertise.

Definitions used in this study	
Licence	A contract under which IP rights are transferred from one party to another for the purpose of commercialisation.
Public Sector Body (PSB)	Central government departments, arm's length bodies and government agencies with an Accounting Officer who is responsible for upholding Managing Public Money (MPM).
Spinout	
Royalty-/ fee-bearing licence	A licence which includes payment of fees to the licensor, for example milestone payments or royalties on sales

Appendix III: Identified spinouts

Government Department	Originating PSB	Company Name
Cabinet Office	Cabinet Office	AXELOS
		Behavioural Insights Ltd
Department for Energy Security and Net Zero	United Kingdom Atomic Energy Authority (UKAEA)	LuffyAI
		Tokamak Energy
Department for Environment Food & Rural Affairs	Royal Botanic Gardens (RBG), Kew	Polypharmakos [20]
	Central Science Laboratory / Food and Environment Research Agency (FERA)	Forsite Diagnostics
Department for Science, Innovation and Technology	UKRI Science and Technology Facilities Council (STFC)	Atheras Analytics
		Cella Energy [21]
		Cobalt Light Systems
		Constellation technologies ltd
		Cryox
		DSoFt Solutions
		Exa-Informatics
		Formeric
		Jupiter Diagnostics
		Keit Spectrometers
		L3 Technology Ltd
		Laserthor
		Microvisk Technologies
		MIRICO
		Orbital Optics
		Oxsensis
		Petrra[22]
		PowerPredict
		Quantum Detectors
		Rutherford Optics
		Scitech Precision
		Sunborne Systems Ltd

[20] Polypharmakos is a spinout from Kew in collaboration with the University of Cambridge

[21] Cella Energy was a spinout from UKRI STFC in collaboration with Oxford University

[22] Pettra was a spinout from UKRI STFC in collaboration with The Institute of Cancer Research, University of London

Government Department	Originating PSB	Company Name
		Teratech Components
		The Electrospinning Company
		ThruVision
		vivaMOS
	National Physical Laboratory (NPL)	AgPlus Diagnostics
		Pireta
		Thermology Health
	British Geological Survey	International Geoscience Services
	UKRI Medical Research Council (MRC)	AERES Biomedical
		Aptuscan [23]
		Ardana Bioscience Ltd
		Avidis [24]
		Bicycle Therapeutics PLC
		Cambridge Antibody Technology Group Plc
		Cambridge Genetics Ltd [25]
		Camphos Therapeutics Limited
		CellTech Ltd
		CMP Therapeutics Ltd [26]
		Constructive Bio
		Domantis
		Etiologics Limited
		Gendaq
		Geneservice
		Heptares Therapeutics
		Inflectis Bioscience SA
		Oxxon Therapeutics Ltd [27]
		PepGen [28]

[23] Aptuscan was a joint spinout with the University of Leeds

[24] Avidis was a joint spinout with the University of Cambridge

[25] Cambridge Genetics was a joint spinout with the University of Cambridge

[26] CMP Therapeutics was a joint spinout with University of Oxford

[27] Oxxon Therapeutics was a joint spinout with the University of Oxford

[28] Pepgen was a joint spinout with the University of Oxford

Government Department	Originating PSB	Company Name
		Phosphate Therapeutics
		Prolifix
		Raindance Technologies [29]
		RiboTargets
		Senexis Ltd [30]
		Therexsys
		Ubiquigent [31]
		Virogen
Department of Health & Social Care	UK Health Security Agency	Porton Biopharma
		Syntaxin
	NHSBT	Scarlet Therapeutics Ltd [32]
Forestry Commission	Forest Research	C-Cure Solutions Ltd [33]
Ministry of Defence	Dstl	Acolyte Biomedica
		Alaska Food Diagnostics
		Claresys Ltd
		Clearwater Hydroacoustics
		Enigma Diagnostics
		ESROE
		FIOS AI Ltd
		Leading Light Scientific
		P2i Ltd
		Presymptom Health
		ProKyma
		Remo Technologies Ltd
		SALT
		Sentinel Photonics
		Sherwood Therapeutics
		Telesemica Ltd
	Defence Evaluation and Research Agency (DERA)	QinetiQ

[29] Raindance technologies was a joint spinout with Harvard University and ESPCI Paris

[30] Senexis was a joint spinout with the University of Manchester

[31] Ubiquigent is a joint spinout with the University of Dundee

[32] Scarlet Therapeutics is a joint spinout with the University of Bristol

[33] C-Cure Solutions was a joint spinout with the University of Surrey