



Department for  
Science, Innovation  
& Technology

# Insights from the 2022 Survey of Publicly Funded Research and Innovation Organisations

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# 1. Executive Summary

## 1.1 Background

This report presents the findings from a survey of publicly funded research and innovation organisations (PFRIOs) in the UK. This survey was conducted by the Department for Business, Energy and Industrial Strategy (BEIS), now the Department for Science, Innovation, and Technology (DSIT), in collaboration with UK Research and Innovation (UKRI) and the Government Office for Science (GO-Science). Its motivation was for better data on the public-funded Research, Development and Innovation (RDI) system.

The Higher Education Statistics Authority (HESA) produce annual data on research performed by the higher education sector, but limited data and evidence are available to the same extent on other RDI organisations such as Public Sector Research Establishments and UKRI Research Council Institutes, Centres and Units. This survey is one of many DSIT initiatives to fill gaps in understanding of the public RDI system and DSIT is working to build further evidence on these types of organisations, closely collaborating on this with UKRI, GO-Science and other government departments.

The primary purpose of this survey was to inform the Independent Review of the Research, Development and Innovation Organisational Landscape led by Sir Paul Nurse and the government's response to this review. It collected data from organisations on their activities, collaboration with other actors within the RDI landscape, their workforce, their finances, and site locations. The readers should note that the findings from this survey only represent a snapshot of the period of time covered by the survey with most organisations responding between March and April 2022. However, questions were selected to allow for repeat data collection in the future to build trend data and enable comparisons over time, and including questions comparable to those asked by HESA to universities.

The survey covered four groups of publicly funded RDI organisations (PFRIOs):

- **Public Sector Research Establishments (PSREs)**

PSREs are a diverse group of public bodies that perform RDI, provide technical services (such as collecting data) and help to implement regulatory standards.

- **UKRI Research Council Institutes, Centres and Units (RCIs)**

RCIs operate across a variety of sectors and the RDI system to address a range of research missions. They fulfil varied roles and are primarily funded by UKRI.

- **Independent Research Organisations (IROs)**

IROs are organisations that have high-quality research capability, the IROs participating in this survey were mainly galleries, libraries, archives and museums.

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- **Catapults**

Catapults were established by Innovate UK and are independent not-for profit private sector organisations with a primary function of de-risking the transition from research to commercial delivery.

## 1.2 Key findings

The survey received responses from 107 PFRIOs across the range of PSREs, RCIs, IROs and Catapults, this represents a large portion of the PFRIOs in the UK.

### Activities performed by publicly funded RDI organisations

- **PFRIOs perform a wide range of functions in the UK RDI system from performing basic research to providing support to policy-making, service provision and the implementation of regulatory standards.**
- **Applied research was the most commonly reported function with nearly every organisation that responded to the survey reporting this.** 100% of responding PSREs, IROs and Catapults and 93% of RCIs reported that they perform applied research.
- **Eight in ten (84%) of responding PSREs listed having five key functions, demonstrating the breadth of research and innovation activities undertaken by these organisations.** These functions were applied research (100%), providing scientific and technical services (92%), conducting experimental development (84%), facilitating policy-making, service provision and regulatory support (92%) and managing, maintaining and developing capabilities (88%).
- **Policy-making, service provision and regulatory support was selected by the highest proportion of PSREs (24%) as their primary activity,** however the same proportion reported that they have no primary activity (24%), closely followed by applied research as a primary activity (20%).
- **RCIs also reported performing a variety of functions.** Applied research (93%), managing, maintaining and developing capabilities (88%), basic research (81%) and experimental development (81%) were the top selected functions, with applied research and managing, maintaining and developing capabilities the most reported primary activities (28% reported each).
- **The majority of IROs reported performing applied (100%) and basic research (75%), indicating these organisations' strong capacity for conducting research.** Applied research was the highest reported primary activity with (56%), a quarter of the responding IROs (25%) reported to have no primary activity, suggesting that many operate across a range of functions or perform a mix of research.
- **All Catapults surveyed reported conducting applied research and experimental development.** Over three quarters of Catapults also reported facilitating policy making,

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service provision and regulatory support (89%) and managing, maintaining and developing capabilities (78%).

- **The top selected primary function of Catapults was experimental development (44%)** demonstrating their unique role compared to the other organisations.
- **Research within the environment and the biological sciences, health & food disciplines were the most reported disciplines across PSREs and RCIs**, however the majority of IROs sampled (88%) selected conducting research within the social sciences, arts & humanities area. Furthermore, Catapults tended to report that energy (78%) best described the research they conduct.
- **The top two technology families selected across all organisations were AI, Advanced and Digital Computing and Energy and Environment technologies.** These findings illustrate the focus of technological development within the publicly funded RDI system.

## Collaboration

- **PFRIOs actively collaborate with other PFRIOs, Universities and Businesses.** Survey responses indicated that in the last three months the majority of PFRIOs reported actively collaborating with UK universities/higher education institutions, businesses, not-for-profit organisations and other PFRIOs.
- **There is evidence of collaboration between groups of PFRIOs, for example the majority of PSREs (88%) and Catapults (100%) reported collaboration with UKRI institutes** in the last three months. Similarly, 70% of RCIs and 89% of Catapults reported working with PSREs, with the majority of PSREs (76%), RCIs (75%) and Catapults (78%) reporting collaborating with IROs.
- **'Joint research projects' were one of the most reported collaboration activities that PFRIOs participate in.** Provision of technical and scientific services and advisory services were also commonly reported as key collaboration activities across all organisations.
- **Catapults reported collaborating widely, with the majority engaging in all types of activity such as joint research projects, advisory services, and joint training programs with a range of business and public organisations.**
- **Around two-thirds of the PSREs (16 out of 25) reported collaborating with others through the secondment of staff** and 56% (14 out of 25) reported coordinating joint training programs. 'IP licensing deals', one of the least reported collaboration activities, was still reported by 40% (10 out of 25) of the responding PSREs.
- **The least chosen activity for RCIs and IROs was secondment of staff**, with only 37% (21 out of 57) of RCIs and 24% (4 out of 16) of IROs reporting that they engaged with this collaborative activity. Notably however, 'secondment of staff' was selected by 78% (7 out of 9) of Catapults, which is a substantially higher proportion than the other groups.

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## Workforce

- Across PSREs, RCIs and IROs, **RCIs reported the highest proportion of their workforce in R&D, scientific and technical roles compared to the other organisation types (89%)**. In comparison, PSREs and IROs both reported that (71%) of their workforces work in R&D, scientific and technical roles.
- **Within R&D and/or scientific and technical roles, the most common occupations of scientists or researchers were generally reported.** This is true for PSREs (42%) and RCIs (50%) but for IROs, technical professionals or laboratory staff (51%) made up the highest proportion of R&D and/or scientific and technical roles.

## Finance

- **The relative amount PFRIOs spend on R&D as a proportion of their total income varies substantially across organisation type and individual organisation.** Organisations were asked to report on their annual income as well as their expenditure overall and expenditure on R&D. PSREs reportedly spend on average (mean) 33.8%, RCIs 91.9% and IROs 39.8% of their total income on R&D.
- **Expenditure on R&D as a proportion of total expenditure also varied substantially.** PSREs reported devoting on average (mean) 33.6%, RCIs (92.3%) and IROs (44.2%) of their total expenditure on R&D.

## R&I site locations across the UK

- **PSREs had the highest average (mean) number of sites that undertake R&I out of the three organisation groups with 7 sites.** RCIs had 5 sites on average and IROs had 4 sites.
- **The greater South East had the highest number of PFRIO R&I sites in this survey, with 70 sites in London, followed by South East England with 65 and Scotland with 63.** The top regions for RCI and IRO sites are within these two regions, but the regions with the highest number of PSREs R&I site locations are South West England and Northern Ireland with 20.

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## 2. Introduction

### 2.1 Background to the research

The Independent Review of the UK's Research, Development and Innovation Organisational Landscape<sup>1</sup> highlighted the importance of the role that Publicly Funded Research and Innovation Organisations (PFRIOs) play within the UK's RDI system.

The Department for Business, Energy and Industrial Strategy (BEIS), now the Department for Science, Innovation, and Technology (DSIT), the Government Office for Science (GO-Science) and UK Research and Innovation (UKRI) collaborated to produce an organisation-level survey of PFRIOs in the UK.

The purpose of this survey was to collect data to help build an improved picture of the UK's research, development and innovation (RDI) landscape and the organisations within it. Prior to this survey there was a lack of available data concerning the activities, collaboration, workforce, and financing of publicly funded RDI organisations except for universities and businesses for which there are annual surveys conducted by the Office for National Statistics (ONS) and the Higher Education Statistics Agency (HESA). The data collected for this report serves as an important step in providing evidence for future strategic decisions and DSIT is working to build further evidence on these types of organisations, closely collaborating on this with UKRI, GO-Science and other government departments.

### 2.2 Organisations in scope of the survey and coverage

The organisations delivering RDI in the UK are complex and diverse. Subsequently, their classification and the terminology used around these have varied over time. For the purposes of this research, the organisations in scope are briefly defined below. Fuller descriptions of these organisations can be found in the Independent Review of the UK's Research, Development and Innovation Organisational Landscape published in March 2023.

The list of eligible organisations for this survey were agreed upon by BEIS (now DSIT), UKRI and GO-Science and a full list of responding organisations can be found in Annex B.

The survey received 107 responses from PSREs, IROs, RCIs and Catapults. Overall, this represented a high response rate to this survey of 84%, but it needs to be remembered that it is neither a census of organisations or a random probability survey, so it is not entirely representative and statistics are indications rather than true values.

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<sup>1</sup> Department for Business, Energy and Industrial Strategy, Independent Review of the UK's Research, Development and Innovation Organisational Landscape, March 2023, accessed 10<sup>th</sup> July, 2023, <https://www.gov.uk/government/publications/research-development-and-innovation-organisational-landscape-an-independent-review>



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## Public Sector Research Establishments (PSREs)

PSREs are a diverse group of public bodies that perform research.<sup>2</sup> PSREs support RDI through several missions. They provide science advice to inform policymaking, acting as a strategic capability in policy delivery and deliver critical science services for government, business on innovation-related functions, and society<sup>3</sup>. Their research supports a wide range of government objectives including for example, informing policymaking, regulatory functions and some can also provide emergency response services<sup>4</sup>. Examples of PSREs that responded to the survey include the National Measurement Laboratory, Environment Agency, Defence Science and Technology Laboratory, UK Health Security Agency and the Met Office.

## UKRI Research Councils Institutes, Centres and Units (RCIs)

RCIs operate across a variety of different sectors and the RDI landscape to address a range of research missions, whilst also benefitting the wider research and innovation system by providing leadership, expertise, and research infrastructure. They fulfil varied roles, and are primarily funded by UKRI, helping to extend the research capability of the organisation. It is important to note that a substantial number of the RCIs are embedded within Higher Education Institutions (HEIs), aiming to bridge the gap between different publicly funded research streams. Whilst some Institutes are owned by UKRI, so are part of the public sector, others are legally independent organisations.<sup>5</sup> Examples of RCIs that responded to this survey are the Henry Royce and Francis Crick Institutes and the Rutherford Appleton Laboratory.

## Independent Research Organisations (IROs)

IROs that were contacted to take part in the survey consist mainly of organisations in the galleries, libraries, archives and museums space such as the Victoria and Albert Museum and the British Film Institute. These organisations were granted IRO status by the UKRI Arts and Humanities Research Council (AHRC) from 2006/07 onwards to recognise the capacity for high-quality research that contributes to the RDI landscape.<sup>6</sup> We recognise a wider landscape of other IROs exists and we are considering how to better understand this part of the landscape in the future.

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<sup>2</sup> Royal Society (2020) List of public and non-profit research organisations. <https://royalsociety.org/topics-policy/publications/2020/uk-research-organisations/>

<sup>3</sup> Royal Society (2020) The role of public and non-profit research organisations in the UK research and innovation landscape – Explainer. <https://royalsociety.org/-/media/policy/Publications/2020/2020-09-the-role-of-public-and-non-profit-research-organisations-explainer.pdf>

<sup>4</sup> Government Office for Science (2022) Guidance on assessing performance and value of Public Sector Research Establishments. <https://www.gov.uk/government/publications/public-sector-research-establishment-value-framework/guidance-on-assessing-performance-and-value-of-public-sector-research-establishments#fn:2>

<sup>5</sup> For more information please refer to: UK Research and Innovation, Explainer: how UKRI's institutes support research and innovation, June 2023, accessed 10<sup>th</sup> July 2023, <https://www.ukri.org/publications/explainer-ukris-institutes/explainer-how-ukris-institutes-support-research-and-innovation/>

<sup>6</sup> UK Research and Innovation (2017) A decade of success: supporting research in the UK's major culture and heritage organisations, accessed 10<sup>th</sup> July 2023, <https://www.ukri.org/wp-content/uploads/2022/02/AHRC-0102122-ADecadeOfSuccess.pdf>

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## Catapults

Catapults are independent not-for-profit private sector organisations whose primary function is to de-risk the transition from research to commercial delivery. They receive public funding to support innovation by providing R&D infrastructure, specialist knowledge and expertise, whilst collaborating on building capabilities and providing business support.<sup>7</sup> Catapults also foster collaboration between research organisations in the public and private sectors.<sup>8</sup> They operate under a ‘thirds’ funding model split between a core grant (which they receive from DSIT through Innovate UK), collaborative R&D and commercial revenue. In their previous funding period (April 2018 – March 2023) they received £1.2bn of direct public funding.

## 2.3 Methodology overview

The survey received 107 responses from PSREs, IROs, RCIs and Catapults. Overall, this represents an 84% response rate to this survey. Annex A provides further details on the methodology including limitations and Annex B contains a complete list of respondents.

The survey period was Wednesday 9<sup>th</sup> March 2022 to Friday 29<sup>th</sup> April 2022, and 93 responses were received within this time. To boost responses, follow up emails were sent to non-responding organisations resulting in 14 additional responses received from 3<sup>rd</sup> May 2022 to 4<sup>th</sup> October 2022.

Eligible organisations included PSREs, RCIs<sup>9</sup>, selected IROs<sup>10</sup>, and Catapults. Organisations generally answered on behalf of all of their locations/sites/laboratories. Findings for Catapults are only presented for type of activity (Section 3) and collaboration (Section 4) for comparison purposes given the low count of this type of organisation.

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<sup>7</sup> Department for Business, Energy and Industrial Strategy (2021) Catapult Network Review: how the UK's Catapults can strengthen research and development capacity, accessed 10<sup>th</sup> July, 2023, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/975595/catapult-network-review-april-2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975595/catapult-network-review-april-2021.pdf)

<sup>8</sup> “Creating the future through innovation”, The catapult network, 2020, accessed 10<sup>th</sup> July, 2023,

<https://catapult.org.uk/wp-content/uploads/2020/12/Catapult-Network-Impact-Brochure-2020-FINAL.pdf>

<sup>9</sup> There may be minimal double counting in some returns as specific Science & Technology Facilities council (STFC) laboratories filled in the survey.

<sup>10</sup> The survey was not sent to all IROs. The IROs contacted to respond were mostly those in the Arts and Humanities Research Council space at their recommendation.

**Figure 2.1. Survey responses by organisation type**

<b>Organisation Type</b>	<b>Number of Survey Responses</b>	<b>Expected Number of Responses<sup>11</sup></b>	<b>Response Rate</b>
PSRE	25	28	89%
Independent Research Organisation	16	25	64%
UKRI Research Council Institute, Unit, Centre	57	64	89%
Catapult	9	9	100%
<b>Total</b>	<b>107</b>	<b>126</b>	<b>84%</b>

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<sup>11</sup> These expected respondents were agreed upon and contacted to participate directly by either DSIT, UKRI or GO-Science and although we attempted a census of PFRIOs, a full list of organisations does not yet exist and therefore some eligible organisations will not have been captured in this expected number of responses or by the survey.

### 3. Activities performed by publicly funded RDI organisations

The survey asked organisations about the functions they perform in the UK RDI system and the areas that their research focuses on. Figure 3.1 displays the different functions that organisations could select from, they were also able to select 'Other' and provide further details on any additional functions that they perform.

**Figure 3.1 Functions performed by organisations in the UK RDI system**



Figure 3.2 displays the variety of functions that these organisations reported performing in the UK RDI system (multiple options could be selected). All responding Public Sector Research Establishments (PSREs) (25 out of 25) reported performing 'applied research', and nearly all (92%) reported 'providing scientific and technical services', and 'facilitating policy-making, service provision, and regulatory support'. Overall, 84% (21 out of 25) of the PSREs reported performing five of the six functions, showing the breadth of RDI activities undertaken amongst this group. 'Basic research' was the least reported however, with 40% reporting this (10 out of 25).

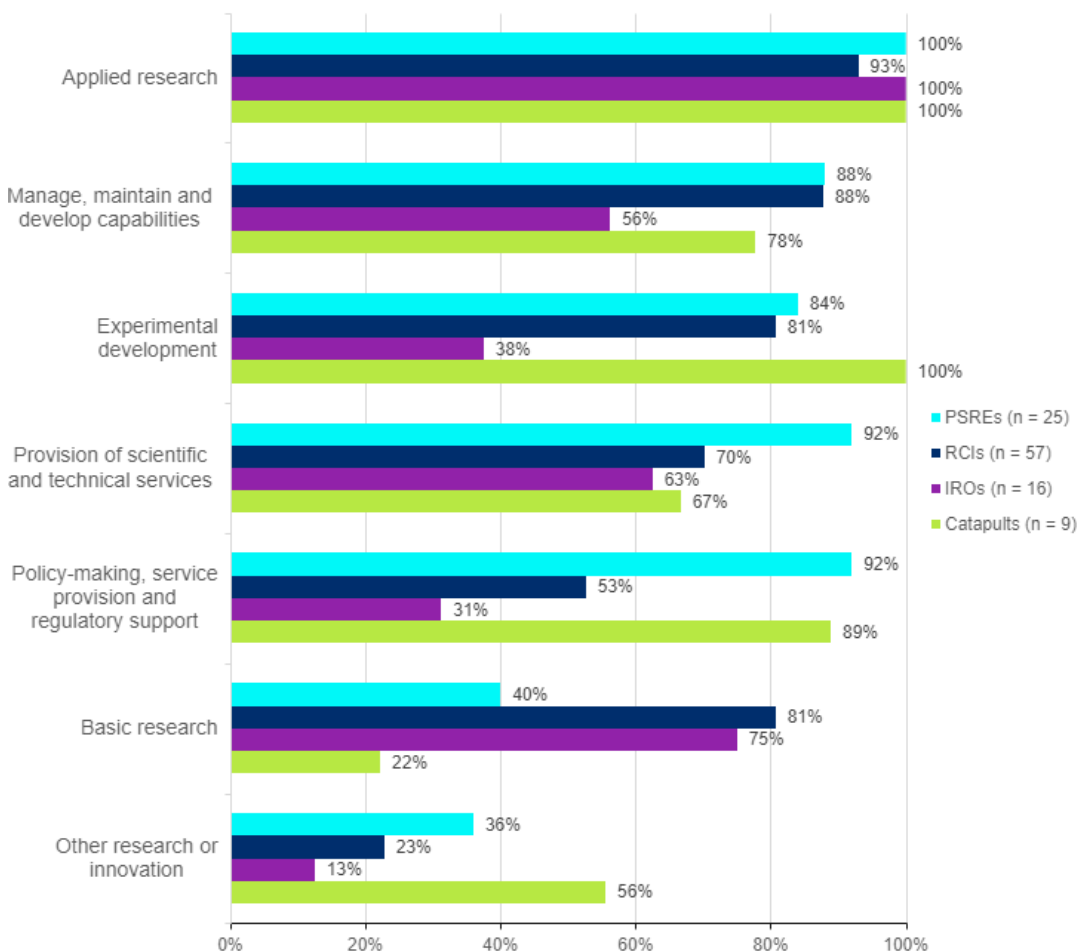
Similar to the responding PSREs, a high proportion of UKRI Research Council Institutes, Centres and Units (RCIs) that responded to the survey reported performing 'applied research' with 93% (53 out of 57) and 'managing, maintaining and developing capabilities' with 88% (50 out of 57). However, while over 90% of the PSREs reported 'policy-making, service provision, and regulatory support' as one of their functions, only around half of the RCIs reported this.

The proportion of RCIs that selected 'basic research' was also higher than that of PSREs (81% compared to 40%).

'Applied research' was reported by all (16 out of 16) surveyed Independent Research Organisations (IROs). 'Basic research', the second most common function, was reported by three quarters of IRO respondents. Over half of the IROs also reported 'providing scientific and technical services' and 'managing, maintaining, and developing capabilities'. Similar to RCIs, fewer IROs reported 'policy-making, service provision, and regulatory support' as a function than PSREs (31% vs 92%). A much smaller proportion of IROs 38% (6 out of 16) reported 'conducting experimental development', compared to RCIs (81%) and PSREs (84%).

'Experimental development' and 'applied research' were reported by all nine Catapults. 'Policy-making, service provision and regulatory support', was the next most common function, reported by almost all Catapults 89% (8 out of 9). Over two-thirds also reported 'managing, maintaining, and developing capabilities' 78% (7 out of 9) and two-thirds selected 'providing scientific and technical services' 67% (6 out of 9). Similar to PSREs, a larger proportion of Catapults stated 'policy-making, service provision, and regulatory support' as a function compared to RCIs and IROs. Whereas a much smaller proportion of Catapults, 22% (2 out of 9), reported that they conducted 'basic research', compared to RCIs with 81% (46 out of 57) and IROs 75% (12 out of 16).

**Figure 3.2 Functions performed by organisations in the UK RDI system**



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## Primary functions

As well as investigating the breadth of functions that these organisations span across, the survey asked organisations to select the primary activity describing what they do. Figure 3.3 displays the primary functions reported across the organisation types. Amongst PSREs ‘policy-making, service provision, and regulatory support’ and ‘applied research’ with 20% (5 out of 25) were most commonly reported. This aligns with the Government Office for Science’s<sup>12</sup> description of PSREs role ‘as a strategic capability in policy delivery and by delivering critical science services for government, business, and society’. 24% of PSREs reported that they had ‘no primary activity (6 out of 25), indicating that PSREs undertake a variety of research and innovation activities within the UK RDI system.

For RCIs, the top selected functions were ‘applied research’ and ‘managing, maintaining and developing capabilities’ with 28% (16 out of 57). Notably, a quarter (14 out of 57) listed ‘basic research’ as their primary function, which is the highest proportion among all four organisation types, with none of the 25 surveyed PSREs or 9 Catapults reporting this. In contrast, whilst just under a quarter of PSREs selected ‘policy-making, service provision, and regulatory support’ as their primary function, a very small proportion of RCIs selected this. None of the RCIs reported ‘experimental development’ or the ‘provision of scientific or technical services’ as their primary function either.

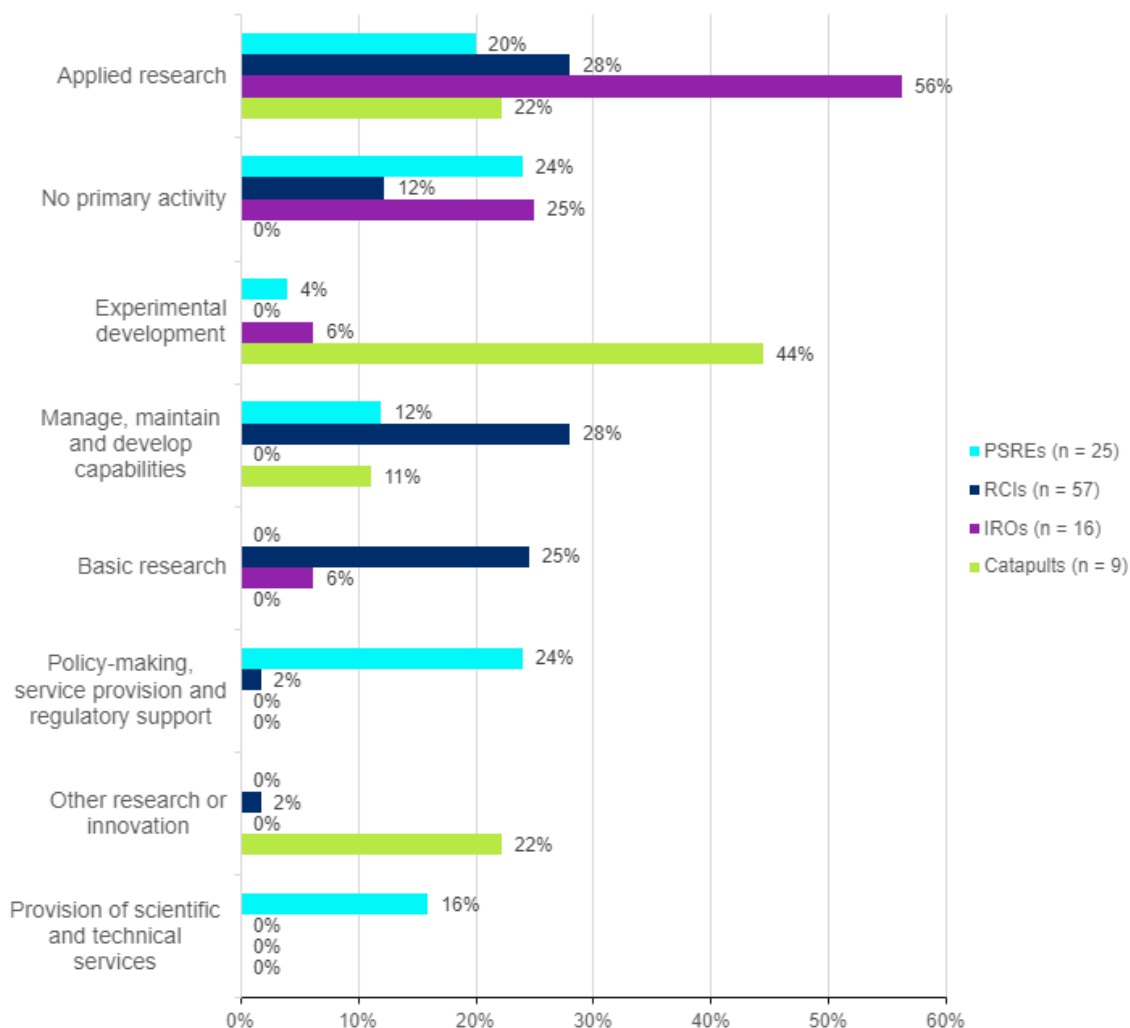
For IROs who reported having a primary function, the majority focused on ‘applied research’ with 56% (9 out of 16), the highest among the four organisation types. Notably, a quarter of the responding IROs (4 out of 16) reported to have no primary activity at all, suggesting that many operate across multiple functions or perform a mix of basic, applied, and experimental development research.

Catapults highest reported primary function was ‘Experimental development’ with 44% (4 out of 9) followed by ‘applied research’ 22% (2 out of 9) and other research and innovation 22% (2 out of 9). The results illustrate that some of the Catapults are strongly focused on experimental development, demonstrating their uniqueness with the highest proportion across the four organisation types. Despite the majority of Catapults reporting that ‘policy-making, service provision and regulatory support’ was one of their functions, no Catapult stated that it was their primary function, suggesting that it is more of a supplementary function of these organisations. Other primary functions such as ‘basic research’ and ‘provision of scientific and technical services’ were also not selected.

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<sup>12</sup> Government Office for Science, Public Sector Research Establishment Value Framework, 22 Jan 2022, accessed on 10 July 2023, <https://www.gov.uk/government/publications/public-sector-research-establishment-value-framework>

**Figure 3.3 Primary functions performed by organisations in the UK RDI system**



## Alignment with research disciplines and technology families

Organisations were asked to identify which categories their research and innovation activities related to and which technology families, as outlined in the Innovation Strategy<sup>13</sup>, their RDI activity aligns with (respondents could select multiple disciplines).

### Research Disciplines

Figure 3.4 illustrates the research disciplines that these organisations identified their work aligns with. PSREs most commonly selected disciplines were ‘Environment’ and ‘Biological sciences, health & food’ with 72% (18 out of 25) and 68% (17 out of 25) respectively. ‘Social sciences, arts & humanities’ was the next most common discipline with 56% (14 out of 25) of PSREs selecting it. The least selected research discipline was ‘E-infrastructure & data’ with

<sup>13</sup> Department for Science, Innovation and Technology, UK Innovation Strategy: leading the future by creating it, July 2021, Accessed 10th July, 2023, <https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

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40% (10 out of 25), although this is still a sizeable portion of PSREs, showing the range of research that these organisations conduct.

For RCIs the most common discipline selected was 'Biological sciences, health & food' which was selected by over two thirds of respondents, 68% (39 out of 57). This was followed by 'Environment' with 53% (30 out of 57) as the most common research disciplines. 'Physical sciences & engineering' and 'E-infrastructure & data' were the next most common disciplines selected with 49% (28 out of 57) and 47% (27 out of 57) respectively.

IRO's most common response was 'Social sciences, arts & humanities' which 88% (14 out of 16) of IROs selected<sup>14</sup>, reflecting the nature of the IROs sampled. 'Environment' was the second most common answer, which was selected by over half of IROs 56% (9 out of 16).

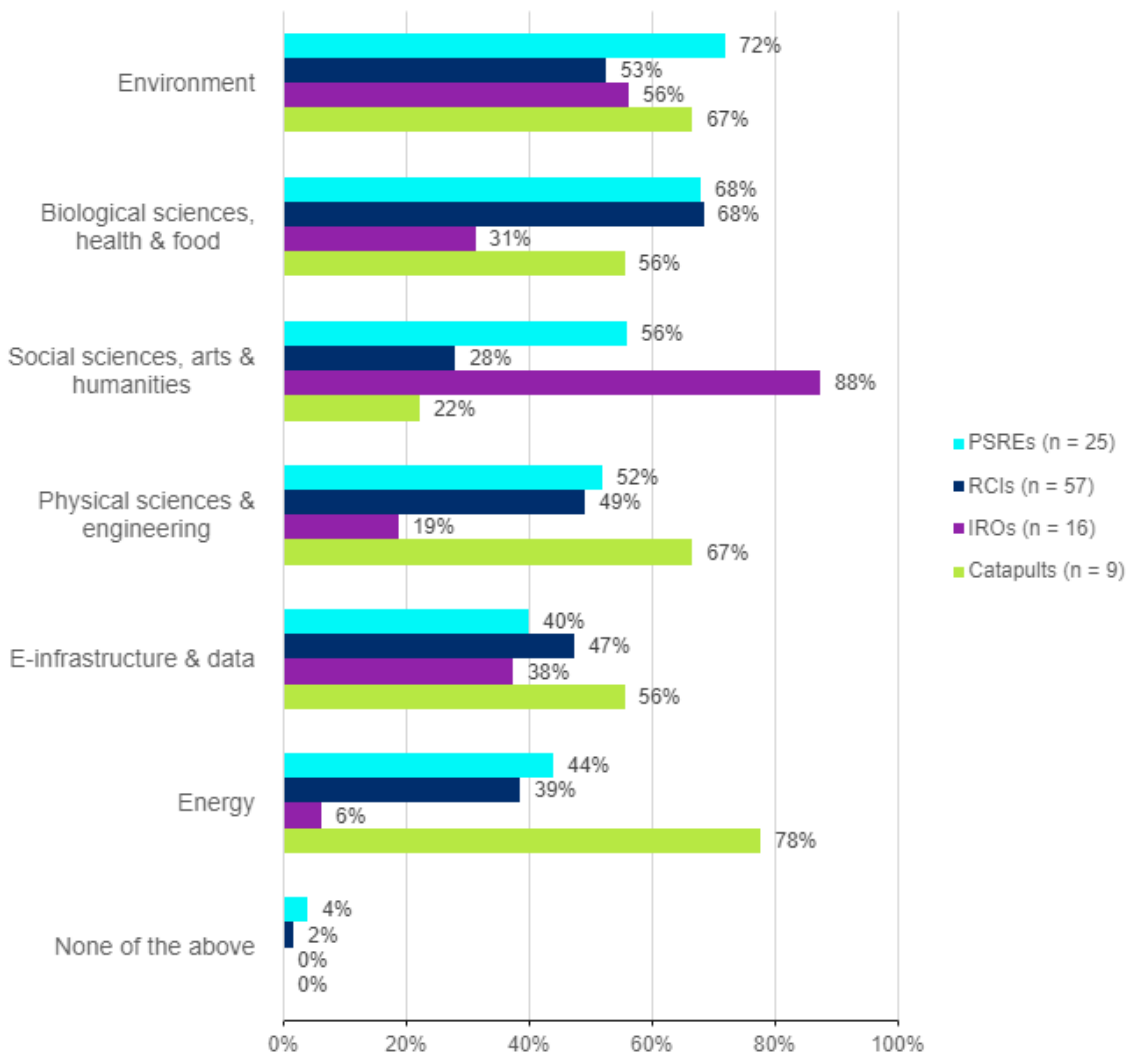
For Catapults, the most common discipline selected was 'Energy' with 78% of respondents (7 out of 9) reporting that their activities are 'Energy' related, which is substantially higher compared to the other organisation types. 'Physical sciences & engineering' and 'Environment' were the next most common disciplines both with 67% (6 out of 9). The remaining disciplines (Figure 3.4) were selected by over half of the Catapults, with the exception of 'Social sciences, arts & humanities' which was only selected by 2 of them, showing the wide range of research conducted by Catapults.

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<sup>14</sup> The survey was sent to a subset of IROs, mainly in the galleries, libraries, archives and museum sectors (GLAM).



**Figure 3.4 Research disciplines**



### Technology Families

Figure 3.5 illustrates the alignment across these organisations to the seven technology families as set out in the UK Innovation Strategy<sup>15</sup>.

‘Energy and Environment Technologies’ and ‘Bioinformatics and Genomics’ were reported by over half of PSREs, 56% (14 out of 25), to be the technology families that their research is associated with. The next most reported family by PSREs was ‘AI, Digital and Advanced Computing’ with 44% (11 out of 25). Less than a quarter reported their research pertaining to ‘Engineering Biology’ and ‘Electronics, Photonics and Quantum’ with 16% (4 out of 25) and 12% (3 out of 25) respectively. A small number of PSREs (5 out of 25) reported that they do not develop new technologies.

<sup>15</sup> Department for Business, Energy & Industrial Strategy, UK Innovation Strategy: leading the future by creating it, July 2021, Accessed on 10<sup>th</sup> July 2023, <https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

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RCIs most reported that their activity is aligned with the technology family of 'AI, Digital and Advanced Computing' with 61% (35 out of 57). The next most reported families were 'Energy and Environment Technologies' and 'Bioinformatics and Genomics' with 51% (29 out of 57) and 46% (26 out of 57) respectively, which were also ranked highly within PSREs.

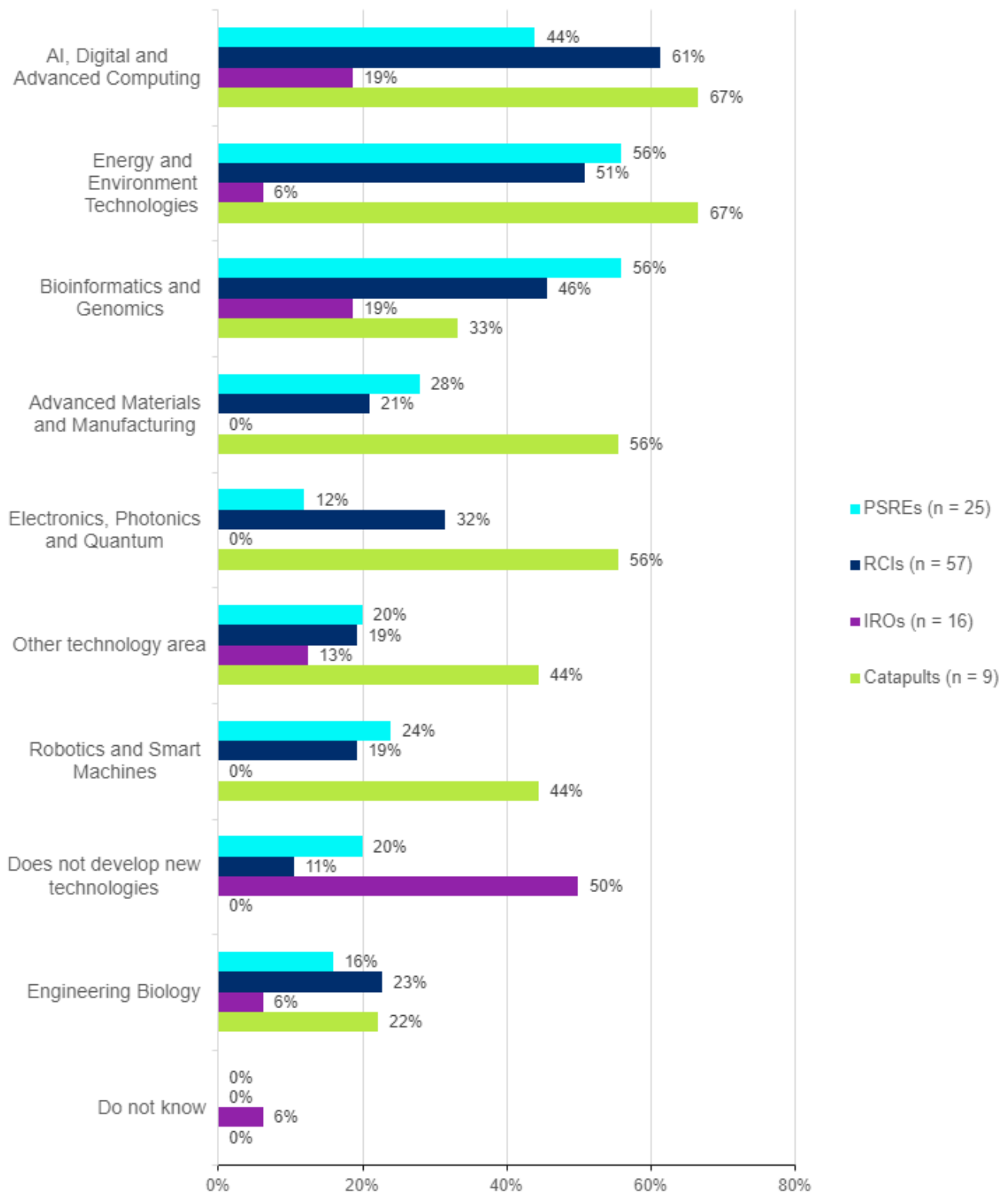
'Does not develop new technologies' was the most common answer to this question for IROs, with half (8 out of 16) responding this. The families most reported to be aligned with IROs activity were 'AI, Digital and Advanced Computing' and 'Bioinformatics and Genomics' with 19% (3 out of 16).<sup>16</sup>

Two thirds of the Catapults 67% (6 out of 9) reported that their activity is aligned with the technology families of 'Energy and Environment Technologies' and 'AI, Digital and Advanced Computing', the highest proportion amongst all organisation types. The next most reported families were 'Electronics, Photonics and Quantum' and 'Advanced Materials and Manufacturing' with 56% (5 out of 9).

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<sup>16</sup> The survey was sent to a subset of IROs, mainly in the galleries, libraries, archives and museum sectors (GLAM).

**Figure 3.5 Technology families**



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## 4. Collaboration

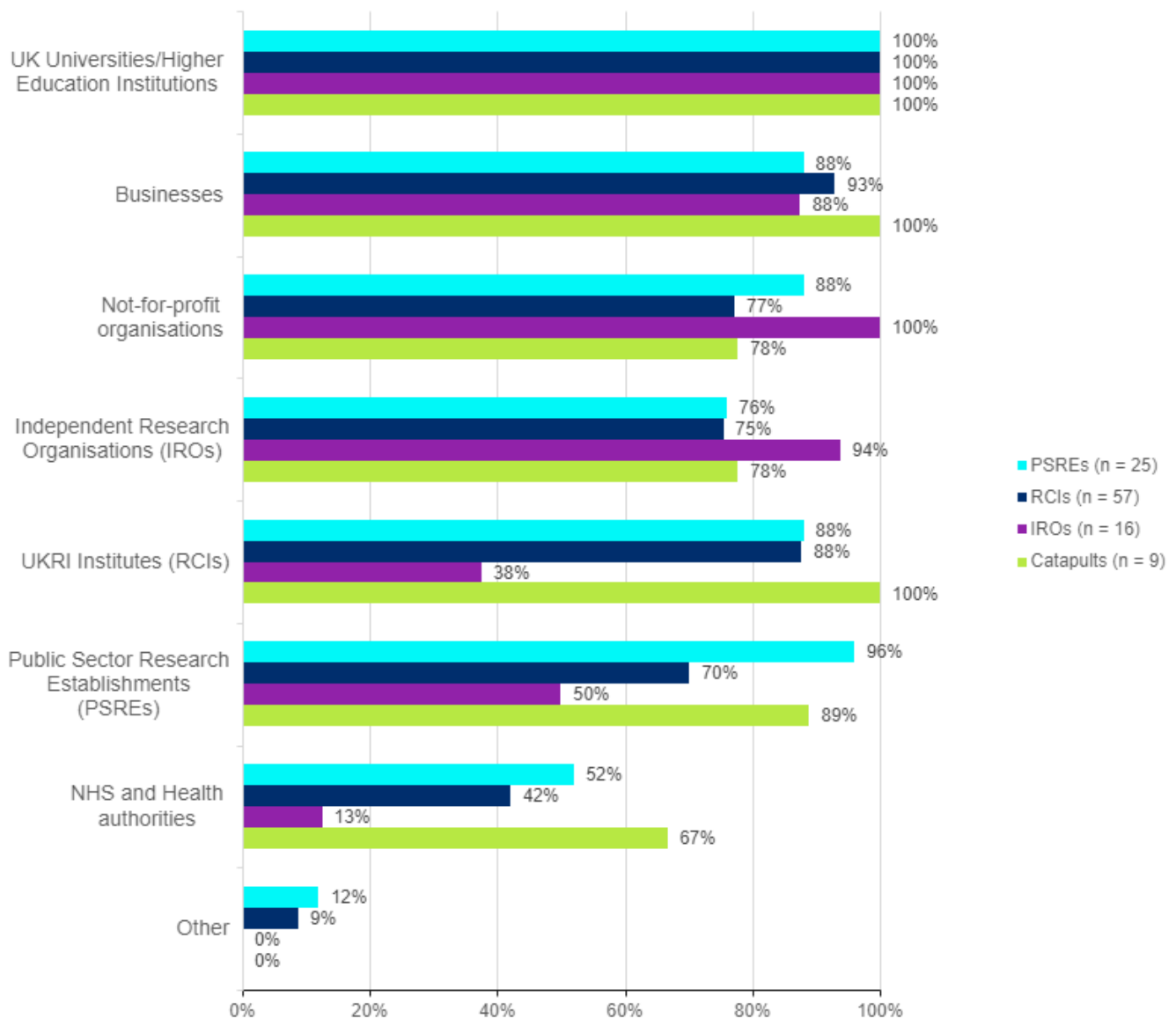
### Collaboration by organisation type

Figure 4.1 displays the type of organisations that PSREs, RCIs, IROs and Catapults reported to have collaborated with in the last three months (organisations could select multiple options). Overall, the survey showed that these RDI organisations collaborate with a broad range of organisation types. Every organisation surveyed reported collaboration with UK universities/higher education institutions. Collaboration with businesses and not-for-profit organisations were also highly reported across all four organisation types.

Regarding collaboration among the organisation types, 88% (22 out of 25) of PSREs and 100% (9 out of 9) of Catapults reported collaborating with UKRI institutes. This is compared to 70% of RCIs (40 out of 57) and 89% (8 out of 9) of Catapults reporting to have collaborated with PSREs. Therefore, collaboration flows between the organisations were reported inconsistently. For example, a higher proportion of PSREs and Catapults reported to have collaborated with RCIs, compared to RCI and Catapult collaboration with PSREs.

Lower levels of collaboration with 'NHS and Health Authorities' were reported across most organisation types, with 67% (6 out of 9) of Catapults and 52% (13 out of 25) of PSREs reporting collaboration with the group whereas IROs reported the lowest collaboration with only 13% (2 out of 16). As for RCIs, 'NHS and Health Authorities' was the only organisation type to not have been selected by the majority of RCIs at 42% (24 out of 57).

**Figure 4.1 Collaboration by organisation type**



## Collaboration activities with other organisations

As well as exploring the types of organisations PFRIOs collaborate with, the survey asked respondents to describe the nature of this collaboration. Figure 4.2 displays these findings (multiple options could be selected).

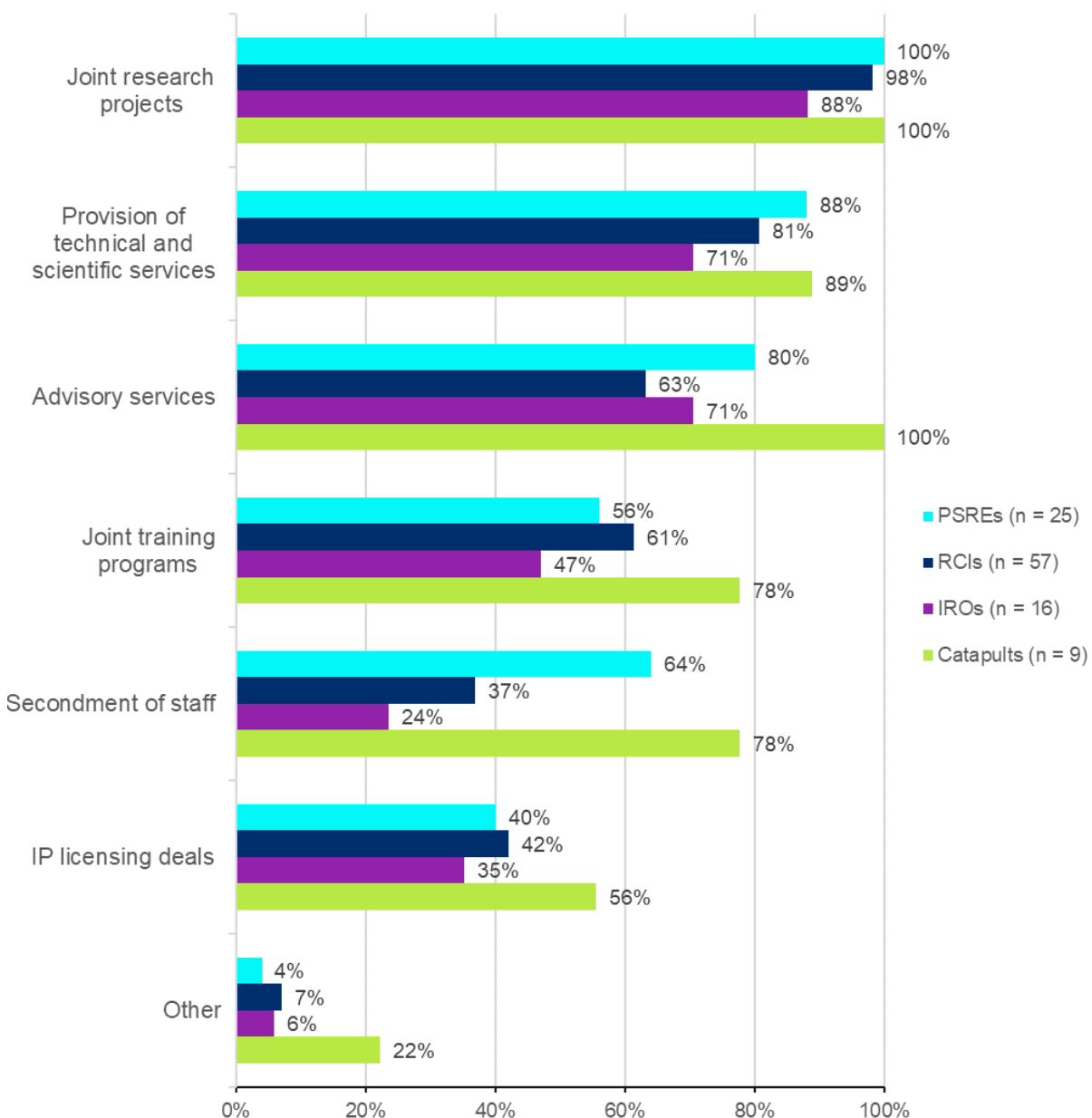
The top three most reported collaboration activities amongst responding PFRIOs were all service-oriented, compared to the other activities respondents could choose from. Amongst PSREs, RCIs and IROs, 'joint research projects', the 'provision of technical and scientific services' and 'advisory services' were consecutively reported the most often. 'Joint research projects' was the most reported collaboration activity with nearly all organisations across the four organisation types reporting this. Over 70% of all responding organisations also reported collaborating with others through the 'provision of technical and scientific services'. The third

highest selected activity was 'advisory services' which was selected by 80% of PSREs, 63% of RCI, 71% of IROs and all Catapults.

Around two-thirds of the PSREs (16 out of 25) reported collaborating with others through the secondment of staff and 56% (14 out of 25) reported coordinating joint training programs. 'IP licensing deals', one of the least reported collaboration activities, was still reported by 40% (10 out of 25) of the responding PSREs.

The least chosen activity for RCI and IROs was secondment of staff with only 37% (21 out of 57) of RCI and 24% (4 out of 16) of IROs reporting that they engaged with this collaborative activity. Notably however, 'secondment of staff' was selected by 78% (7 out of 9) of Catapults, which is a substantially higher proportion than the other groups.

**Figure 4.2 Collaboration activities**



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## 5. Workforce

Fewer organisations provided detail on questions relating to workforce compared to the previous sections, so these estimates should be treated with caution.<sup>17</sup>

The ranges of all these organisations' workforces differ substantially, with responding PSREs varying from 10,700<sup>18</sup> to 102 workers, RCIs varying from 1,692 to 10 workers and IROs varying from 1,480 to 294 workers.

Responding PSREs reported the largest workforces, with an average (mean) of 1,391 employees per organisation. IROs and RCIs reported substantially smaller average workforces in comparison with 632 and 264 average employees respectively.<sup>19</sup>

### **R&D Workforce compared to other roles**

Organisations were also asked about the number of employees who held R&D and/or scientific and technical roles<sup>20</sup> versus the number of employees who held other roles (e.g. policy-making, administration, corporate).

Figure 5.1 shows the median average proportion of employees in R&D and/or scientific and technical and other roles across all three organisation types. Of the three groups, RCIs reported to have the largest proportion of employees in R&D, scientific, or technical roles, followed by PSREs and IROs. Around 89% of the RCI workforce held R&D, scientific, or technical roles.<sup>21</sup> Whereas, around 71% of both the PSRE and IRO workforces held R&D, scientific, or technical roles.<sup>22 23</sup>

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<sup>17</sup> . A total of 85 responding organisations provided at least some information regarding their workforce, including 52 UKRI Research Council Institutes, Centres and Units (RCIs), 22 Public Sector Research Establishments (PSREs), and 11 Independent Research Organisations (IROs).

<sup>18</sup> An extreme outlier was removed as the figure could not be verified.

<sup>19</sup> Average number of employees per organisation based on 20 PSREs, 11 IROs and 55 RCIs.

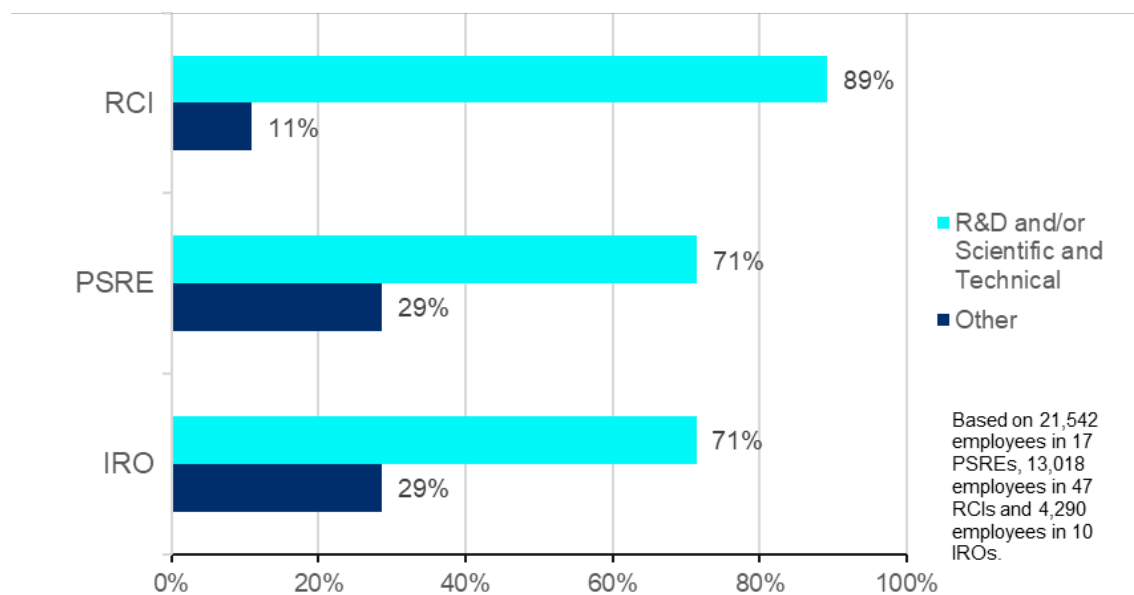
<sup>20</sup> As defined by the Frascati definition of performing R&D: <https://www.oecd.org/sti/frascati-manual-2015-9789264239012-en.htm>

<sup>21</sup> This is based on 37 validated responses from 48 total responses from RCIs after suppressing responses with figures smaller than 10 (out of 60 RCIs).

<sup>22</sup> This is based on 15 validated responses from PSREs after suppressing responses with figures smaller than 10 (out of 22 PSREs).

<sup>23</sup> There were 10 and 7 validated responses respectively from IROs after suppressing responses with figures smaller than 10 (out of 16 IROs).

**Figure 5.1 Workforce by role**



### R&D Workforce Roles

Organisations were additionally asked to provide an approximate number of employees performing R&D and/or other scientific and technical roles across a variety of professions.<sup>24</sup>

Figure 5.2 illustrates the breakdowns of occupations for the R&D and/or scientific and technical roles across the organisation types.

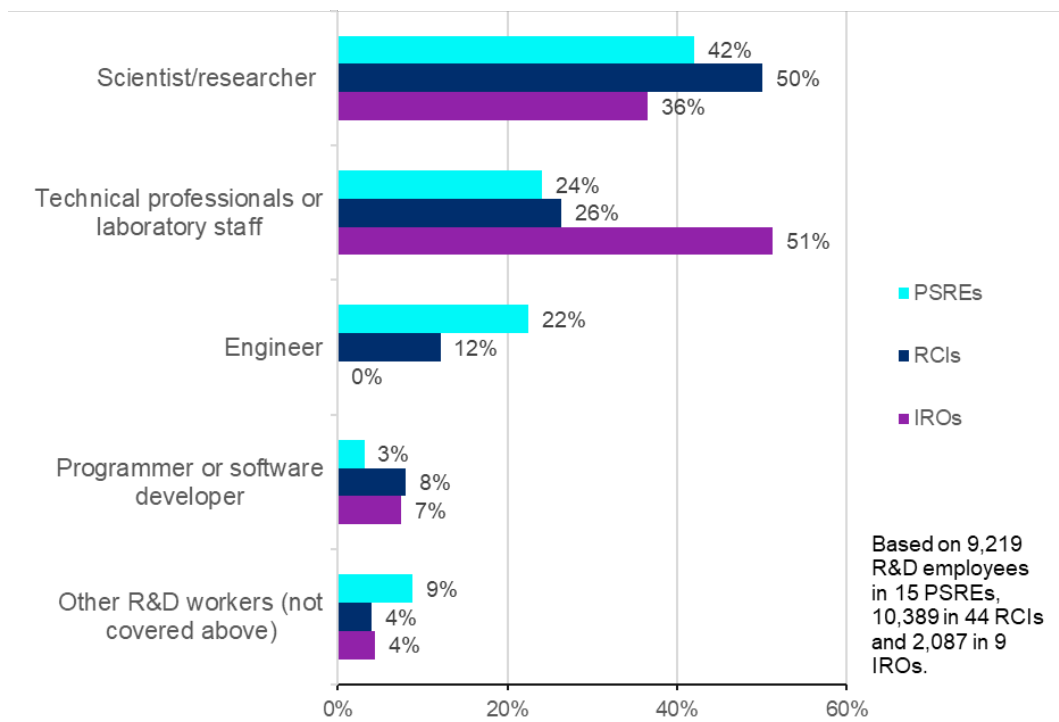
‘Scientist or researcher’ was the most reported profession with 42% of R&D roles in PSREs, with ‘Technical professionals or laboratory staff’ and ‘Engineer’ being the next most reported professions with 24% and 22% respectively.

The findings for RCIs are similar to those of PSREs, with ‘Scientist or researcher’ as the most reported profession with half of the total share (50%) of R&D workers in responding RCIs. The second largest profession was ‘Technical professionals or laboratory staff’ who account for 26%. However, within the IROs the most reported profession was ‘Technical professionals or laboratory staff’ with over half of the total share (51%) and ‘Scientist or researcher’ roles constituting over a third (36%) of the total R&D workforce within IROs.

<sup>24</sup> Professions with less than 2% of the total of R&D performing and/or scientific and technical roles were excluded.



**Figure 5.2 R&D workers by profession**



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## 6. Finance

Fewer organisations provided detail on questions relating to finance compared to the previous sections. Respondents were asked to provide information on their annual income for 2020/2021, as well as their expenditure overall and expenditure on R&D. However, some organisations were able to respond using a different 12-month period.<sup>25</sup> Overall, 85 organisations responded to these questions.

Using the data that each organisation reported regarding R&D expenditure, we calculated the proportion that each organisation spends on R&D as a percentage of annual income and total expenditure. Across the three organisation types, the surveyed RCIs reported the largest mean proportion of their income and total expenditure devoted to R&D with 91% and 92% respectively. The relative proportions displayed in Table 6.2 aligns with the distribution of the R&D workforce characteristics shown in Figure 5.1 with RCIs having the highest proportion of their workforce in R&D and/or Scientific and Technical roles (89%) compared to PSREs (71%) and IROs (71%).

Across all three organisation types the proportions varied substantially with some PSREs and IROs reporting a minority of their income/total expenditure being used for R&D expenditure, with others reporting that a high proportion of their income/total expenditure was being devoted to R&D activities. This may be explained by the breadth of activities that PSREs and IROs conduct, as not all are primarily research organisations.

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<sup>25</sup> 61 reported the information according to the financial year (April 6, 2020 – April 5, 2021), while 22 organisations reported the information with a different start date in 2020 for a 12-month period. Two entries were excluded from the analysis as they were not based on a 12-month period.

**Table 6.2 R&D expenditure expressed as a proportion of income and total expenditure<sup>26</sup>**

	Mean and median R&D expenditure as a proportion of total income (range)	Mean and median R&D expenditure as a proportion of total expenditure (range)
PSREs <sup>27</sup>	Mean: 33.8%, Median: 25.3%, (Range: ~0%* to 100%)	Mean: 33.6 %, Median: 24.1%, (Range: ~0% to 100%)
RCIs <sup>28</sup>	Mean: 91.1%, Median: 98.4%, (Range: 1.8% to 100%)	Mean: 92.3%, Median: 100%, (Range: 1.9% to 100%)
IROs <sup>29</sup>	Mean: 39.8%, Median: 37.8%, (Range: 1.5% to 82.1%)	Mean: 44.2%, Median: 40.5%, (Range: 1.5% to 92%)

<sup>26</sup> The calculations in this table are calculated from R&D spend as a proportion of total income and total expenditure, with those that provided data for both questions and has a proportion of 100% or less. A value of 0% does not correspond to no money being spent on R&D, and this is only applicable to a small subset of the organisations.

<sup>27</sup> Out of the 22 surveyed PSREs, 16 provided data used for the proportion of income and 17 for the proportion of total expenditure.

<sup>28</sup> Out of the 60 surveyed RCIs, 54 provided data used for the proportion of income and 50 for the proportion of total expenditure.

<sup>29</sup> Out of the 16 surveyed IROs, 13 provided data used for the proportion of income and 13 for the proportion of total expenditure.

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## 7. R&I site locations across the UK

The survey explored how many physical sites these organisations have where they perform Research and Innovation (R&I) (including any buildings, observation sites etc.), in each of the 12 UK regions. This provides an indication of the geographical distribution of R&I activities. It is important to note that (as with all the findings throughout this report), the findings within this section do not provide a definitive national picture, as this survey was not a complete review of all RDI organisations across the UK.

Looking at the average (mean) number of physical sites per organisation, across each organisation type, Public Sector Research Establishments (PSREs) had the highest average number with 7 sites. Independent Research Organisations (IROs) had 5 on average and RCIs had 4.<sup>30</sup> The region with the greatest number of sites was London with 70, followed by South East England with 65 and Scotland with 63.

Figure 7.1 illustrates the total number of physical sites<sup>31</sup> in which R&I is undertaken across the three organisation types. PSRE site locations appear to be distributed across the UK with R&I activity undertaken in each of the 12 UK Nations and regions. The South West and Northern Ireland had the most sites with 20 respectively, with South East closely behind with 19. London had only 11 sites with the North East being the region with the least sites with 6.

A large number of UKRI Research Council Institutes, Centres and Units (RCI) R&I physical sites were concentrated in the greater South East, with 43 RCI R&I sites in the South East and 41 sites in London. Scotland had the third most sites with 38, which is aligned with its corresponding number of sites for PSREs and IROs. The West Midlands had the lowest number of RCI R&I sites with 4.

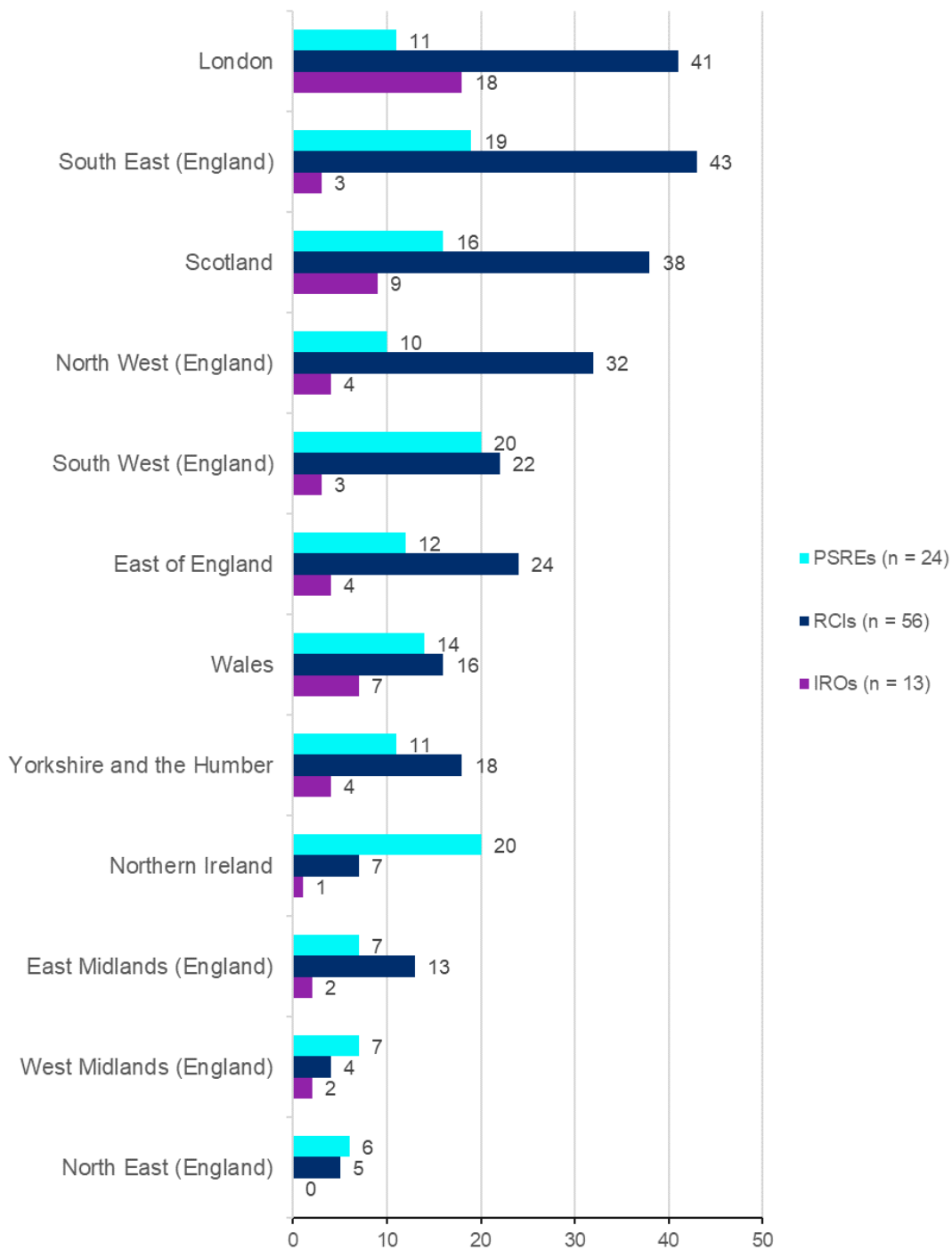
Amongst the responding IROs, London appears to have a substantial share of IRO R&I physical sites. The region with the most IRO R&I physical sites was London with 18, which is more sites than the bottom six regions combined. Scotland and Wales had the next most active R&I sites with 9 and 7 respectively. The rest of the regions all had fewer than 5 sites, with the North East being the only region to have no reported IRO R&I sites, however this may not be indicative of the entire IRO community.

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<sup>30</sup> Average number of sites per organisation based on 21 PSREs, 59 RCIs and 13 IROs.

<sup>31</sup> Sum of sites across all organisations within each PFRIO group.

**Figure 7.1 Number of site locations by organisation type**



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## Annex A – Methodology

The survey received 107 responses from Public Sector Research Establishments (PSREs), UKRI Research Council Institutes, Centres, and Units (RCIs), Independent Research Organisations (IROs) and Catapults. This represents around 84% of the organisations that were invited to respond. Annex B contains a complete list of respondents.

The survey period was Wednesday 9<sup>th</sup> March 2022 until Friday 29<sup>th</sup> April 2022, and 93 responses were received. To boost response, follow up emails were sent to non-responding organisations. 14 additional responses were received from 3<sup>rd</sup> May to 4<sup>th</sup> October 2022.

For questions relating to finance, organisations were asked to answer based on financial year 2020/21 or to specify if they were reporting on a different 12-month period. 72% of responses related to 2020/21.

### Limitations of survey statistics

Findings in this report are drawn solely from the self-reported survey. This approach enabled us to gather data from a broad range of organisations compared to other methods such as interviews. Surveys are subject to limitations such as non-response bias and selection bias, some of which are outlined below, so it is important to take this into account when considering the findings.

Respondents were contacted to participate directly by either DSIT, UKRI or GO-Science and although we attempted a census of PFRIOs, a full list of organisations does not yet exist and therefore some eligible organisations will not have been captured. The status of PFRIOs is also changeable so it is possible that some of the organisations that responded at the time would no longer be eligible for example, if they no longer receive funding from UKRI.

There are several factors which could impact on the quality of the data that was collected for this research for example:

- Completion rates for questions varied
- Some questions may not be applicable to certain organisations
- The data only represents a snapshot in time and given that the data was collected over an extended period of time to maximise responses, responses will differ slightly in relation to the 12-month time period being reported on
- Validation of self-reported information is limited
- Question and response interpretation may have varied across organisations
- Not all organisations targeted responded to this survey (although 84% is a very high response rate compared with most surveys).
- Only a subset of IROs were contacted for this survey from the Arts and Humanities Research Council (AHRC) space

## Annex B – Responding organisations

PSREs	RCIs
<ul style="list-style-type: none"> <li>- Agriculture and Horticulture Development Board (AHDB)</li> <li>- Agri-Food and Biosciences Institute (AFBI) NI</li> <li>- Animal and Plant Health Agency (APHA)</li> <li>- Atomic Weapons Establishment (AWE)</li> <li>- Centre for Environment, Fisheries and Aquaculture Science (CEFAS)</li> <li>- Defence Science and Technology Laboratory (Dstl)</li> <li>- Environment Agency</li> <li>- Fera Science Limited</li> <li>- Forest Research</li> <li>- Health and Social Care Innovations</li> <li>- Historic England</li> <li>- HSE Science &amp; Research Centre</li> <li>- Imperial War Museums</li> <li>- Joint Nature Conservation Committee (JNCC)</li> <li>- Met Office</li> <li>- National Measurement Laboratory (NML)</li> <li>- National Nuclear Laboratory</li> <li>- National Physical Laboratory (NPL)</li> <li>- Natural England</li> <li>- Natural History Museum</li> <li>- Natural Resources Wales</li> <li>- Royal Botanic Gardens, Kew</li> <li>- Scottish Environment Protection Agency (SEPA)</li> <li>- UK Atomic Energy Authority (UKAEA)</li> <li>- UK Health Security Agency (UKHSA)</li> </ul>	<ul style="list-style-type: none"> <li>- ASTeC</li> <li>- British Antarctic Survey</li> <li>- British Geological Survey (BGS)</li> <li>- Central Laser Facility</li> <li>- Centre for Longitudinal Studies (CLS)</li> <li>- Consumer Data Research Centre (ULO), Geography, UCL</li> <li>- Daresbury Laboratory, STFC</li> <li>- Diamond Light Source</li> <li>- Hartree Centre</li> <li>- Health Data Research UK (HDR UK)</li> <li>- Henry Royce Institute</li> <li>- Institute for Fiscal Studies (IFS)</li> <li>- Institute of Biological, Environmental &amp; Rural Sciences (IBERS)</li> <li>- Institute of Zoology, Zoological Society of London</li> <li>- ISIS Neutron and Moun Source</li> <li>- John Adams Institute for Accelerator Science</li> <li>- John Innes Centre</li> <li>- Mary Lyon Centre at MRC Harwell</li> <li>- Medical Research Council (MRC) Laboratory of Molecular Biology</li> <li>- Medical Research Council Protein Phosphorylation and Ubiquitylation Unit at the University of Dundee</li> <li>- Medical Research Council Unit The Gambia at London School of Hygiene &amp; Tropical Medicine</li> <li>- MRC Human Genetics Unit, University of Edinburgh</li> <li>- MRC Metabolic Diseases Unit</li> <li>- MRC Mitochondrial Biology Unit University, University of Cambridge</li> <li>- MRC-University of Glasgow Centre for Virus Research</li> <li>- National Centre for Atmospheric Science (NCAS)</li> <li>- National Centre for Earth Observation (NCEO)</li> <li>- National Oceanography Centre</li> <li>- National Quantum Computing Centre (NQCC)</li> <li>- Nucleic Acid Therapy Accelerator (NATA)</li> <li>- Plymouth Marine Laboratory (PML)</li> <li>- Quadram Institute Bioscience</li> <li>- RAL Space (including Chilbolton Observatory and National Satellite Test Facility)</li> <li>- Research Complex at Harwell</li> <li>- Rutherford Appleton Laboratory</li> </ul>

	<ul style="list-style-type: none"> <li>- SAIL Databank</li> <li>- School of Advanced Study, University of London</li> <li>- Scottish Association for Marine Science (SAMS)</li> <li>- Scottish Government - ADR Scotland</li> <li>- Sea Mammal Research Unit (SMRU)</li> <li>- Science and Technology Facilities Council (STFC) Boulby Underground Laboratory</li> <li>- STFC Particle Physics Department</li> <li>- STFC Scientific Computing Department</li> <li>- Technology Department STFC</li> <li>- The Alan Turing Institute</li> <li>- The Cockcroft Institute</li> <li>- The Faraday Institution</li> <li>- The Francis Crick Institute Limited</li> <li>- The Marine Biological Association (MBA)</li> <li>- The Productivity Institute</li> <li>- The Rosalind Franklin Institute</li> <li>- UK Astronomy Technology Centre</li> <li>- UK Centre for Ecology &amp; Hydrology (UKCEH)</li> <li>- UK Dementia Research Institute (UKDRI)</li> <li>- UK Collaboratorium for Research on Infrastructure and Cities (UKCRIC)</li> <li>- Understanding Society: the UK Household Longitudinal Study</li> <li>- Urban Big Data Centre</li> </ul>
<p><b>IROs</b></p> <ul style="list-style-type: none"> <li>- Amgueddfa Cymru - National Museum Wales</li> <li>- British Film Institute (BFI)</li> <li>- Genome Research Limited</li> <li>- Historic Environment Scotland</li> <li>- Historic Royal Palaces (HRP)</li> <li>- Institute of Development Studies</li> <li>- MOLA (Museum of London Archaeology)</li> <li>- National Museums Scotland</li> <li>- NIAB (National Institute of Agricultural Botany)</li> <li>- Royal Botanic Garden Edinburgh</li> <li>- Royal Shakespeare Company (RSC)</li> <li>- Science Museum Group</li> <li>- Tate</li> <li>- The British Museum</li> <li>- The National Centre for Social Research (NatCen)</li> <li>- Victoria and Albert Museum</li> </ul>	<p><b>Catapults</b></p> <ul style="list-style-type: none"> <li>- Cell and Gene Therapy Catapult</li> <li>- Compound Semiconductor Applications Catapult</li> <li>- Connected Places Catapult</li> <li>- Digital Catapult</li> <li>- Energy Systems Catapult</li> <li>- High Value Manufacturing Catapult</li> <li>- Medicines Discovery Catapult</li> <li>- Offshore Renewable Energy Catapult</li> <li>- Satellite Applications Catapult</li> </ul>