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# MAPPING THE INNOVATION AND COMMERCIALISATION INFRASTRUCTURE FOR ROBOTICS AND AUTONOMOUS SYSTEMS (RAS) IN THE UK

IRC Report No: 049

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## About the Innovation and Research Caucus

The Innovation and Research Caucus supports the use of robust evidence and insights in UKRI's strategies and investments, as well as undertaking a co-produced programme of research. Our members are leading academics from across the social sciences, other disciplines and sectors, who are engaged in different aspects of innovation and research systems. We connect academic experts, UKRI, IUK and the ESRC, by providing research insights to inform policy and practice. Professor Tim Vorley and Professor Stephen Roper are Co-Directors. The IRC is funded by UKRI via the ESRC and Innovate UK, grant number ES/X010759/1. The support of the funders is acknowledged. The views expressed in this piece are those of the authors and do not necessarily represent those of the funders.

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## Executive Summary

### Context and study objectives (Section 1)

Robotics and Autonomous Systems (RAS) technologies are widely recognised as critical to the UK's future economy. RAS technologies have the potential to transform productivity, competitiveness, and service delivery across a wide range of sectors, including manufacturing, energy, healthcare, logistics, defence, construction, and maritime industries. The 2035 [Smart Machines Strategy](#) estimated that, based on current adoption trends, “the total economic impact of RAS uptake across all selected sectors is estimated to be in the region of £6.4 billion by 2035” (BEIS, 2021, p. 11).

However, despite a strong research base and significant economic potential, the UK lags behind other G7 countries in the application of robotics technologies (The National Robotarium, 2024). In 2022, the UK was the only G7 country with a robot density below the global average (Innovate UK, 2022). These indicators point to persistent challenges on the demand side of the RAS ecosystem, with growing consensus that the UK faces a critical adoption gap in RAS technologies.

Complementing this demand-side perspective, this report provides an evidence-based analysis of the UK RAS sector from the perspective of domestic RAS developers/firms/businesses, and the infrastructure that supports, or constrains, their progression from research through to commercialisation and scale-up. The report's focus is therefore primarily on the supply side, with the aim of developing a more holistic understanding of how the UK can capture greater long-term value from not only the adoption of RAS technologies but also their domestic development.

Thus, the primary objective of the study is to examine the infrastructure landscape supporting the development and commercialisation of RAS technologies in the UK, identify gaps in provision, and highlight investment opportunities. The report adopts a broad definition of 'infrastructure', encompassing both physical assets and facilities, as well as organisations that provide 'soft' support to RAS companies, such as funding bodies and industry networks. The analysis focuses mainly on open-access facilities and assets. Specifically, the report set out to achieve four objectives, namely:

- (i) Identify and characterise firms within the UK RAS business landscape.

- (ii) Identify soft and physical public-access infrastructure supporting RAS developers across Technology Readiness Levels (TRLs).
- (iii) Examine the perspectives of RAS businesses and industry experts on gaps in infrastructure provision and wider innovation and commercialisation challenges.
- (iv) Identify gaps and investment opportunities to strengthen support for RAS commercialisation in the UK

In terms of scope, the report focuses on sectors that are ripe for the integration of RAS technologies and where support challenges exist despite significant opportunities: Manufacturing (and Advanced Manufacturing), Indoor Logistics and Warehouses, Marine/ Maritime, Food and beverage, Medical/health sector, and Defence.

## Our approach (Section 2)

Our approach to understanding commercialisation infrastructure is outlined in detail in Jibril et al. (2023). Essentially, to understand and map the commercialisation infrastructure landscape for RAS and to identify gaps and investment opportunities, we follow a sequential process consisting of three key areas of activity:

- (i) Synthesis of existing evidence of RAS development, commercialisation and adoption in the UK
- (ii) Evidence gathering through
  - » Industry interviews (10)
  - » Real-Time Industrial Classifications
  - » Infrastructure mapping
- (iii) Expert consultations.

## Prior evidence (Section 3)

Existing evidence indicates that the UK has a relatively strong support ecosystem for the early-stage development of RAS technologies. However, several persistent challenges continue to hinder development and commercialisation. These include:

- » A fragmented policy ecosystem
- » Limited coordination and collaboration among developers
- » Infrastructure deficits, particularly in relation to testing facilities

- » Skills shortages
- » Regulatory uncertainty
- » Ongoing challenges related to market adoption.

## Understanding the business landscape of Robotics and Autonomous Systems in the UK (Section 4)

Based on new analysis conducted with data from The DataCity Ltd, this section provides an overview of the UK business landscape engaged in RAS, comprising developers and adopters. Real-Time Industrial Classifications (RTICs) using Web-Scraped data on firms' activities identified 2,141 unique businesses in RAS in 2025, covering more than 3,000 geographical locations. Key insights from the business landscape analysis are:

- » The UK RAS business ecosystem is dominated by microbusinesses with fewer than ten employees, concentrated mainly in Manufacturing and Advanced Manufacturing, with additional activity in Maritime and Logistics and Warehousing. Interview evidence suggests that developers increasingly target Health and Social Care and other societal applications, indicating a sectoral misalignment between current RAS development activity and the types of smart machines UK firms, particularly SMEs, would need to adopt at scale to realise projected productivity gains.
- » The geographical distribution of RAS firms is multi-centred. While London and the South East remain important hubs, distinct regional profiles are evident, including high private investment intensity in Cambridge and clear sectoral specialisation in clusters, which tends to align with their regional industrial contexts
  - » Clusters such as Southampton–Portsmouth and Aberdeen show a relatively higher share of maritime and mobility-related RAS applications, consistent with the presence of maritime, logistics, and engineering-intensive activities.
  - » In contrast, clusters such as Cambridge and London exhibit stronger representation in healthcare-related RAS applications (including pharma, diagnostics, and assistive technologies), reflecting a more research-intensive and knowledge-driven orientation.

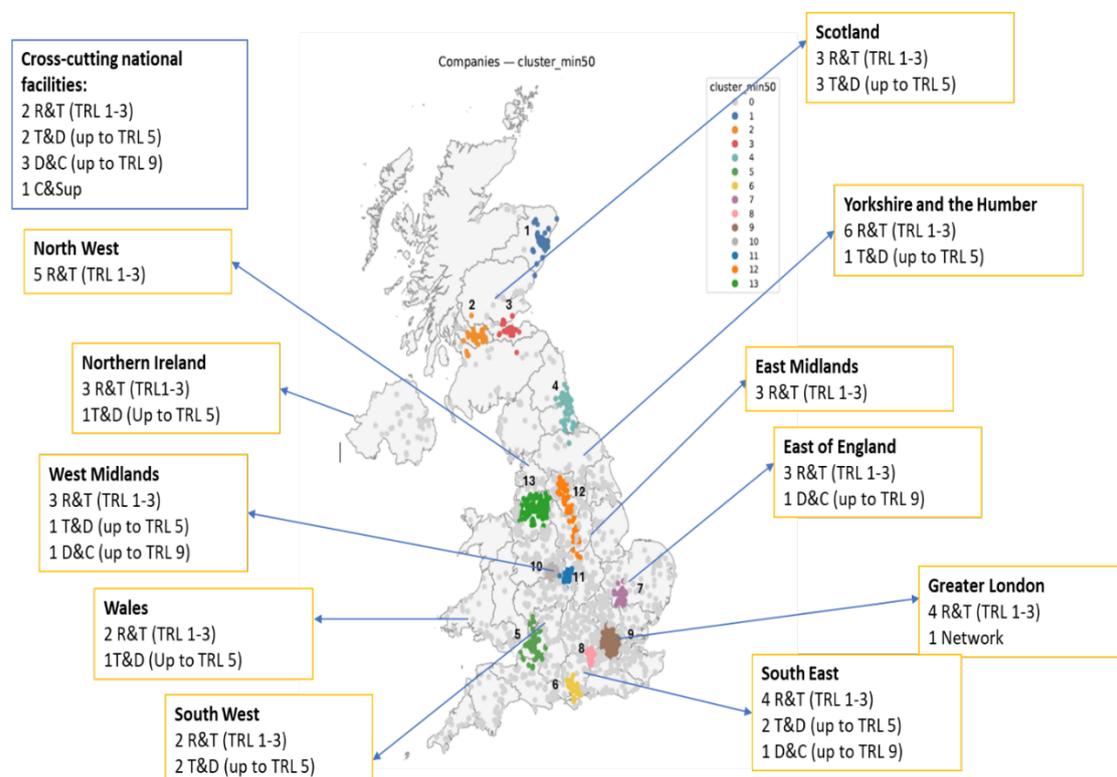
- » Clusters including Leicester–Coventry and Leeds–Sheffield–Nottingham display a comparatively higher share of manufacturing- and packaging-oriented RAS applications, consistent with more industrially embedded ecosystems.
- » Funding patterns across the RAS sector are uneven and fragmented. Although more firms have accessed private investment than Innovate UK grants, private funding is highly concentrated in a small number of areas, particularly Medical and Healthcare applications, while public grant support reaches fewer firms and varies significantly by region and sector.
- » Notably, Edinburgh (mean £1.0m) and Gloucester–Bristol (mean £0.9m) appear relatively more IUK-intensive on average, pointing to potentially stronger engagement with publicly funded innovation programmes in these locations.
- » While the UK RAS landscape overall is dominated by micro-firms, the Medical and Healthcare sector, alongside Defence, rely more heavily on established, larger-scale corporate structures, potentially reflecting closer alignment with state-led markets. These sectors also have the highest shares of firms accessing both private investment and Innovate UK grants, indicating comparatively strong engagement with external funding sources.

## Infrastructure for commercialisation of Robotics and Autonomous Systems in the UK (Section 5)

- » The UK's RAS infrastructure is strongly weighted towards world-class research and early-stage translation, with a pronounced deficit in mid- to high-TRL facilities supporting demonstration, commercialisation, and scale-up. This early-stage infrastructure is overwhelmingly university-led.
- » Of the 76 infrastructure organisations identified, around one-fifth provide soft support, while physical infrastructure is dominated by research-only and research-and-translation facilities, which together account for two-thirds of physical infrastructure provision.
- » By contrast, infrastructure supporting later-stage translation, demonstration, commercialisation, and scale-up remains limited and unevenly distributed: while most regions are characterised by strong research and early translation

capabilities, only a small number, notably Scotland and the South East, span a broader range of TRLs across the innovation pipeline.

- » Multi-sector collaboration and functional overlap across applications supported by physical infrastructure are most evident at early TRLs and become increasingly specialised and less frequent at higher TRLs. Facilities frequently provide joint support for Advanced Manufacturing and Health or Pharmaceuticals, with Defence and Maritime combinations also common. This pattern indicates overlapping capabilities across specific RAS application areas.
- » There are regional differences in the prevalence of infrastructure supporting the commercialisation of RAS technologies (see figure below). A few regions, such as the South East, West Midlands, East of England and Scotland, stand out for hosting infrastructure across multiple TRLs. These include translation, demonstration and limited commercialisation facilities, supported by national-scale facilities and soft infrastructure. Other regions, like the North West and East Midlands, have that mainly infrastructure support early-stage RAS activity.



Source: Authors

Figure 1: Geographical Distribution of RAS infrastructure

## Business perspectives on current infrastructure provision and wider commercialisation challenges (Section 6)

We conducted ten semi-structured interviews with three RAS experts and seven RAS businesses operating across medical technologies, nuclear decommissioning, health, maritime, and manufacturing. Across interviews, respondents described a set of systemic and operational constraints that collectively limit the UK's ability to scale RAS innovation. These challenges relate to awareness and access to support infrastructure, regulation, funding across the innovation lifecycle, and skills, talent, and supplier constraints:

- » **Limited awareness of, and access to, existing support infrastructure:**
  - » Developers reported difficulty identifying relevant facilities and support organisations, as well as challenges accessing them within commercially meaningful timeframes.
  - » Physical infrastructure, such as the locations of some Catapults, was also often perceived as geographically remote from firms, increasing costs and limiting practical use.
  - » On the demand side, potential adopters often lack understanding of what RAS technologies can deliver in operational settings.
  - » These information failures were seen to weaken both supply-side development and downstream adoption, pointing to a need for better coordination, clearer signposting, and greater user engagement.
- » **Regulatory barriers**, particularly in safety-critical sectors such as maritime, were seen as hindering innovation. Regulatory frameworks are seen as slow to adapt to technological change, with regulators perceived as risk-averse and having limited incentives to enable experimentation.
  - » The extent of regulatory challenges differed between sectors, highlighting the importance of regulatory clarity: Nuclear decommissioning RAS firms reported that regulatory constraints were more manageable, perhaps reflecting that development processes in this sector had been explicitly designed around regulatory requirements.

- » **Funding challenges** also limit the development and commercialisation of RAS. Expert respondents emphasised that public funding remains fragmented and disproportionately focused on early-stage research, with limited support for late-stage validation, deployment, and scale-up, consistent with a persistent “valley of death” between development and commercialisation.
  - » Several business respondents contrasted UK provision unfavourably with international contexts, particularly the United States, where longer-term and more flexible funding was perceived to support experimentation and scaling more effectively.
  - » While finance was identified as a central constraint by experts, some firms reported that they had adapted to these conditions through collaborative R&D, customer-funded development and commercialisation, or by avoiding investment-led growth strategies altogether. This suggests heterogeneity in financial exposure and business models within the RAS sector.
- » **Skills, talent, and supplier-related constraints** were also frequently cited by businesses.
  - » Businesses struggle to recruit engineers and programmers with the interdisciplinary skills required to integrate robotics, artificial intelligence, sensing, and data systems.
  - » Immigration policies were perceived as restricting access to international talent.
  - » Post-Brexit trade arrangements were seen as increasing the cost and complexity of accessing international suppliers and talent, especially for smaller firms.
- » **Adoption seen as a lever for commercialisation:** Respondents emphasised that UK manufacturing demand is largely met by imported RAS products, leaving domestic developers focused on health, social care, education (relying on the government as a market) or else niche applications.
  - » Demand-led adoption was seen as the key missing policy lever. Respondents argued that stimulating domestic demand would deliver productivity and employment benefits while creating space for UK firms to scale, as illustrated by international examples such as China.

- » Weak domestic uptake, especially among SMEs, was seen as suppressing incentives to innovate and scale; this reinforces a vicious cycle of low demand, limited development and deployment, and fragmented domestic capabilities.
- » Since most manufacturing-based RAS solutions are imported, stronger local adoption is seen as essential for building a coherent domestic ecosystem and supporting future development and commercialisation.

## Investment opportunities (Section 7)

Our analysis suggests a series of investment opportunities which could strengthen the commercialisation ecosystem for RAS in the UK. Each of these reflects the triangulation of evidence from previous reports on the sector, our own industry and infrastructure mapping, and discussions with RAS firms and industry experts. The key investment opportunities we have identified are as follows:

- » **Invest in High-TRL testing and demonstration facilities, aligned with sectoral specialisation of regions.**

A consistent finding of our research is the relative scarcity of mid- to high-TRL infrastructure for testing and validating RAS technologies. This is against the backdrop of the UK's possession of strong research and early-stage translation facilities (TRL 1-3). Thus, while these lower TRL facilities are relatively well developed, there is a marked drop-off in provision at higher-TRL stages where firms need to validate, demonstrate and de-risk technologies in operational environments. This gap is particularly acute for a sector dominated by micro and small firms, for whom access to these facilities is often critical. Therefore, investment should prioritise providing high-TRL testing and demonstration infrastructure, which should be aligned with regional sectoral strengths and/or existing capability overlaps across application areas. Also, this should be supported by sustainable funding models that keep facilities accessible, affordable, and commercially relevant, as well as provide support across the entire TRL spectrum.

» **Improve coordination and collaboration among RAS stakeholders**

To address fragmentation in the RAS technologies' policy ecosystem, collaboration among RAS researchers/experts, developers, and policymakers should be enhanced across the UK. This can be achieved by establishing regular regional/national forums or roundtables where these stakeholders can exchange ideas and insights. These forums can facilitate discussions on regulations, standards, and funding strategies/opportunities, focusing on specific sectors (such as healthcare or manufacturing), which can enable targeted collaboration to address sector-specific challenges and streamline processes for technology adoption.

» **Adopt demand-led strategies to strengthen incentives to commercialise and scale up.**

The evidence suggests that weak and uncertain demand, especially outside the health/medical, defence, and other RAS sectors where government is a key customer, remains a critical constraint on RAS commercialisation in the UK. Thus, in these non-government dependent sub-sectors, low demand and adoption rates easily feed back into firms' development trajectories by limiting both investment and learning. Demand-led strategies, as suggested by an expert respondent, therefore represent a significant investment opportunity. These could include adoption support, challenge-based procurement, or mechanisms that reduce risk for early users of UK-made RAS technologies. By stimulating lead markets and encouraging first-of-a-kind deployments, such interventions can help bridge the gap between technical feasibility and market viability. In turn, this can accelerate scale-up while simultaneously addressing the UK's well-documented automation gap.

» **Differentiate support according to state-led and market-led commercialisation pathways.**

The report identifies important differences in commercialisation dynamics across RAS application areas. In sectors such as healthcare and defence, where the state acts as a major customer or financier, stronger public incentives help offset barriers linked to market readiness, adoption risks and regulatory complexities. In contrast, market-led RAS sectors such as manufacturing, logistics or construction, face sharper commercialisation challenges, as firms must secure

private customers in fragmented markets with limited tolerance for risk. Hence, investment strategies should explicitly recognise these differences. There is scope to adapt the successful elements of state-led models in market-led sectors, such as long-term funding and procurement signals or structured test-and-adopt pathways.

» **Develop a comprehensive infrastructure directory to improve visibility, access and international marketing of the UK RAS capabilities.**

Finally, this report identifies significant gaps in developers' awareness of facilities/infrastructure and access. Firms frequently report difficulty navigating a fragmented ecosystem of inaccessible facilities, networks and support organisations, particularly beyond their immediate area of operation or region. Hence, an investment in a comprehensive, regularly updated infrastructure directory would help address these information failures. Such a resource could build on or complement existing initiatives, such as Innovate UK Business Connect's facilities mapping, while extending its reach and strategic coherence. Beyond improving domestic access, a well-designed directory would also support international marketing of UK RAS capabilities, which will reinforce the UK's position as a globally attractive location for RAS development, testing, and deployment.

# 1. Context and aims of the report

## 1.1 Introduction

Robotics and Autonomous Systems (RAS)<sup>1</sup> technologies have been widely recognised as critical for the UK's future economy. This is considering their strong potential to transform productivity, competitiveness and service delivery across wide-ranging sectors, including manufacturing, energy, healthcare, logistics, defence, construction, maritime industries and others (see *inter alia* [BEIS 2021](#), [2023](#); [WEAHSN, 2020](#); Innovate UK, 2022a<sup>2</sup>, [2022b](#); [The Robotics Growth Partnership, 2025](#)). Thus, over the past decade, successive UK government strategies and commissioned studies have sought to articulate this potential and to estimate the economic gains that could accrue from wider adoption of RAS technologies. Some notable examples include *Smart Machines Strategy 2035*, BEIS (2021)'s *The Economic Impact of Robotics and Autonomous Systems across UK Sectors*, UKRI and Innovate UK's (2022) *The UK RAS Landscape*, and thematic foresight reports such as *The Future of Care Robotics and Autonomous Systems*. Collectively, this body of work has played an important role in establishing the scale of opportunity associated with the UK's deployment of RAS and in highlighting the productivity, efficiency and societal benefits that accrue to the UK economy as a result.

However, the overwhelming emphasis of existing evidence - with the notable exception of Richardson *et al.* (2025) - is on the demand side of the RAS ecosystem: adoption trajectories, sectoral use cases, potential productivity impacts and downstream economic benefits, with a consensus that the UK faces a critical adoption challenge in RAS. While these perspectives are essential, they provide only a partial account of the conditions required for the UK to capture full long-term value from RAS technologies. In a white paper authored by Richardson *et al.* (2025), it is argued that

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<sup>1</sup> We adopt the BEIS (2021) definition of Robotics and Autonomous Systems (RAS) for its comprehensiveness. According to [BEIS \(2021\)](#) "Robotics and autonomous systems (RAS) include machinery and physical systems that can act independently of human control, by sensing, reasoning and adapting to a given situation or environment. In contrast to more traditional machines that have a single, pre-determined purpose, RAS applications are able to understand what is happening in their sphere of operation and tailor their behaviour to particular circumstances with varying degrees of decision-making autonomy."

<sup>2</sup> Unpublished report

despite strong research and software expertise, the UK lacks the manufacturing capacity to produce robots at scale, leading to reliance on imported components, low industrial adoption, and economic value losses. Nevertheless, generally, less systematic attention has been paid to the supply side of the UK RAS sector, in particular, to UK RAS companies that are striving to develop and commercialise RAS technologies, and to the innovation and commercialisation infrastructure that shapes their ability to scale up.

Our report addresses this question and provides a comprehensive, evidence-based exploration and analysis of the UK RAS sector from the perspective of domestic RAS companies and the infrastructure that supports (or constrains) their journey from research to market commercialisation and scale-up.

Therefore, by systematically mapping the UK RAS business landscape alongside the physical and “soft” infrastructure that underpin innovation and commercialisation, this report shifts the analytical lens from adoption-only outcomes to domestic UK RAS capability formation, commercialisation pathways, and scale-up capacity. In doing so, this report complements existing strategies, while also providing new insights into why strong research performance and high estimated economic potential have not yet translated into sustained, globally competitive UK RAS industries at scale.

## 1.2 Study objectives

This report set out to understand the UK RAS sector by identifying the physical and non-physical infrastructure and other support that UK RAS businesses require to translate and commercialise the UK’s world-class RAS research and innovations. The study adopts a broad view of ‘infrastructure’, including not only physical assets and facilities but also organisations providing ‘soft’ support to RAS companies, such as funding organisations (like EPSRC, UKRI/Innovate UK) and industry networks (such as UK RAS Network, BARA, UK Automation Forum, etc.). Specifically, the report set out to achieve the following four objectives:

- (i) Identify and characterise firms in the UK RAS business landscape.
- (ii) Identify soft and physical public-access infrastructure supporting RAS companies (developers) across Technology Readiness Levels (TRLs).

- (iii) Explore the perspectives of RAS businesses and industry experts on gaps in infrastructure provision and other innovation and commercialisation challenges in the sector.
- (iv) Identify gaps and investment opportunities for enhancing RAS sector commercialisation support in the UK.

In line with these objectives, the report maps the innovation and commercialisation infrastructure landscape for the UK RAS sector and identifies the interconnections between different aspects of infrastructure, the gaps in provision, the challenges, and the opportunities for enhancing RAS commercialisation and scale up. In terms of scope, we collaborated with RAS policymakers and stakeholders to identify sectors ripe for RAS technologies integration and where support challenges persist despite significant opportunities. We thus focus on the following sectors of application: Manufacturing (and Advanced Manufacturing), Indoor Logistics and Warehouses Marine/ Maritime, Food and beverage, Medical/health sector, and Defence. The latter two mainly operate in public or state markets and may therefore benefit from state incentives, which are generally lacking in sectors less reliant on government as a key customer; here, the development and commercialisations of RAS technologies are potentially subject to more barriers related to market readiness for adoption.

The remainder of the report is organised as follows. Section 2 provides an overview of our approach and methodology. A synthesis of the existing evidence on the barriers and challenges to commercialising RAS in the UK is provided in Section 3. Section 4 provides an overview of the business landscape of RAS companies, using novel data to explore the characteristics of various RAS sub-technology areas and geographical concentrations of companies. Section 5 examines the infrastructure landscape, identifying physical facilities and organisations that provide soft support to the UK RAS developers. Also in this section, the state of RAS activities and the availability of infrastructure in UK regions are explored. Section 6 presents findings from 10 in-depth interviews with industry experts and RAS businesses, which provide us with practical insights into commercialisation barriers and how infrastructure support can be enhanced to meet the needs of UK RAS companies. Conclusions and investment opportunities/recommendations are provided in Section 7.

## 2. Our Approach

Our approach to understanding commercialisation infrastructure is outlined in detail in Jibril et al. (2023a). To understand and map the commercialisation infrastructure landscape for robotics and autonomous systems (RAS) in the UK, and to identify gaps and investment opportunities, we follow a sequential process consisting of three areas of activity (see figure 2 below): literature review, evidence gathering and consultation exercises; together, these allow us to identify future investment opportunities. In this Section we provide a brief overview of each stage of the process; detailed methodologies are provided in the relevant sections of the report.

First, we review the existing literature to identify the state of the UK RAS sector, commercialisation barriers, and any recommendations previously put forward regarding commercialisation and scale-up challenges in the sector.

In the evidence-gathering phase, we mapped the UK RAS business and infrastructure landscapes and conducted in-depth interviews with RAS businesses as well as industry experts. To gain a good understanding of the business landscape, we used company-level data collected through Real-Time Industrial Classifications (RTICs) and applied Machine Learning and Web Scraping techniques. This allowed us to identify UK firms in diverse applications of RAS. It also allowed us to identify geographical clusters of activity in the UK RAS sector and to examine the characteristics of businesses in these clusters.

The second aspect of evidence gathering involved an analysis of the infrastructure landscape for RAS firms in the UK, drawing on a typology of innovation infrastructure to categorise both 'soft' infrastructures, such as networks, as well as physical facilities and assets serving different Technology Readiness Levels (TRLs). We explore the extent to which these infrastructures are co-located with geographical clusters of business activity. Additionally, we complemented the evidence gathering by conducting in-depth interviews with three (3) RAS experts and seven (7) business respondents working across medical, nuclear decommissioning, health, maritime, education/research, and manufacturing. This was aimed at understanding the perspectives of these critical stakeholders on the potential gaps in infrastructure provision, as well as any other insights into commercialisation and scale-up challenges.

We consulted an extensive group of policy, industry, and academic stakeholders with expert knowledge of the UK RAS sector. These consultations provided insights that helped to sense-check our approaches and results, refine our recommendations, and identify potential future research areas.

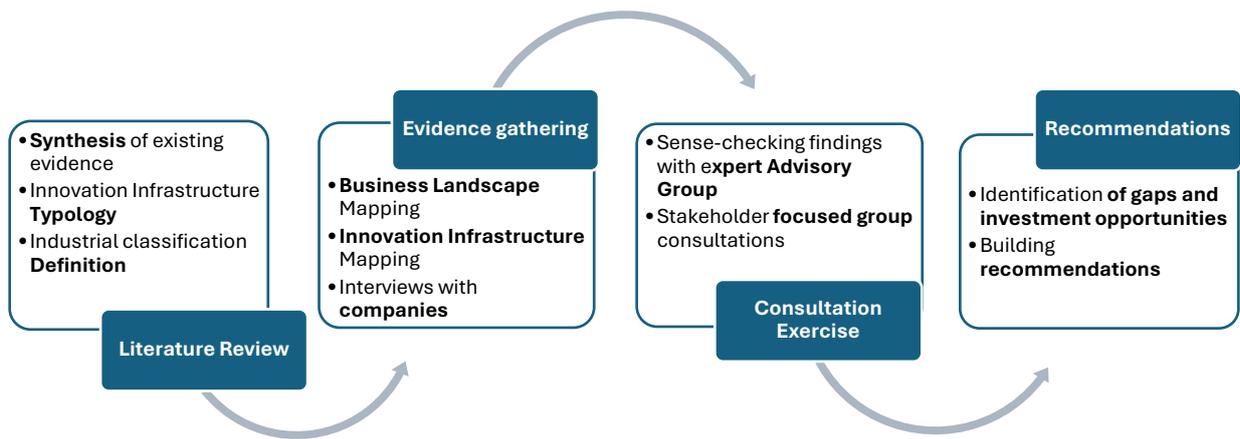


Figure 2: Our approach to understanding Engineering Biology innovation and commercialisation infrastructure and identifying gaps

### 3. Synthesis of existing evidence: Barriers to the development and commercialisation of robotics and autonomous systems (RAS) in the UK

#### 3.1. Introduction

##### *Defining RAS*

Robotics and Autonomous Systems (RAS) have been defined in various ways. We provide three samples of these definitions below:

*“Robotics and autonomous systems (RAS) include machinery and physical systems that can act independently of human control, by sensing, reasoning and adapting to a given situation or environment. In contrast to more traditional machines that have a single, pre-determined purpose, RAS applications are able to understand what is happening in their sphere of operation and tailor their behaviour to particular circumstances with varying degrees of decision-making autonomy.”* ([BEIS 2021](#))

*“Interconnected, interactive, cognitive and physical tools, able to variously perceive their environments, reason about events, make or revise plans and control their actions. They perform useful tasks for us in the real world, extending our capabilities, increasing our productivity and reducing our risks”* ([UK Parliament \(Science & Technology Committee\), 2016](#)).

*“smart, connected machines... acting as tools to support us, working alongside us or alone, making independent decisions and even learning... generating... data, using artificial intelligence to reason, classify, control and interact”* ([Lloyd's Register Foundation's Foresight Review \(2016\)](#)).

In addition to possessing some degree of reasoning, a key characteristic of RAS technologies is 'autonomy' ('*independent decisions*' or '*control of their actions*'). This is “*the ability of a machine to perform a task without human input.*” (Australian Army, 2022). While both terms can, in certain contexts, be used interchangeably to refer to “*processes that may be executed independently, from start to finish, without any human intervention*”, automation/automated processes, “*usually involve well-defined tasks that*

*have known, consistent outcomes and are conducted in structured, predictable environments, such as factories.*” (UK Parliament, 2016).

Moreover, while all three definitions capture the essence of the subject matter of our study, we adopt the BEIS (2021) definition above for its comprehensiveness. The UK’s ‘Smart Machines 2035’ strategy appears to have adopted the third definition. Also important to note here: Robotics and Autonomous Systems (RAS) have, in many contexts, often been used synonymously with Robotics and AI (RAI), the latter term being more common in the digital sector. Others (e.g., HVM Catapult, 2024) have used the term “automation and robotics (A&R)” instead of RAS.

## 3.2. Challenges in RAS Development, Commercialisation, and Adoption in the UK

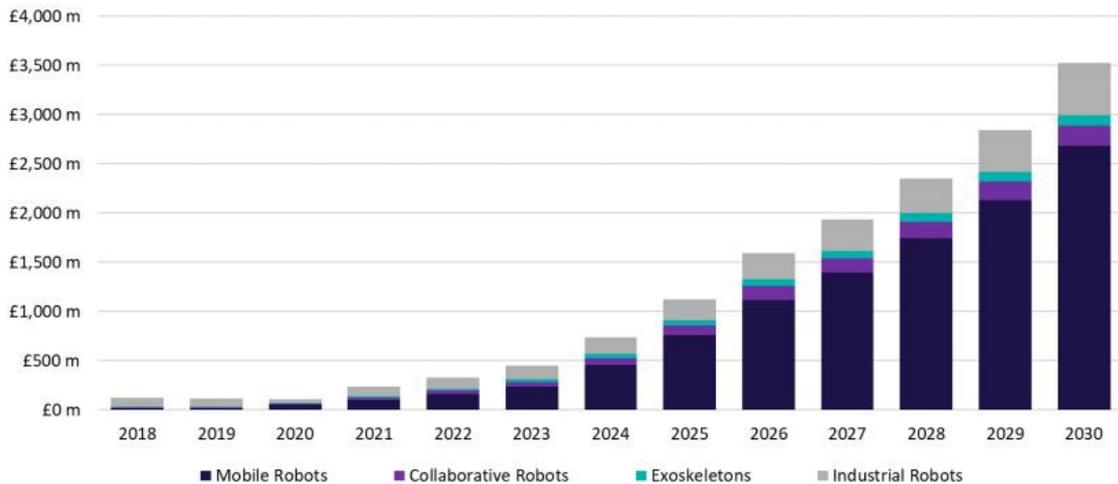
### 3.2.1. Characterising The UK RAS Sector: Strong Base, High Potential but Low Performance

The UK RAS sector benefits from a strong research base from UK universities and a network of academic centres dedicated to RAS research. These include the Bristol Robotics Laboratory, the Edinburgh Centre for Robotics, Sheffield Robotics, and Imperial College London. In fact, the UK has been acknowledged for possessing “*a diverse and established set of instruments to support and implement*” the development of RAS. For instance, in a 2018 visit to Japan by a select group of members of the UK Parliament, “*parliamentarians in the Japanese Diet singled out the UK’s university research base as a major strength*” for RAS development (UK Parliament, 2019). This submission is supported by the fact that the United Kingdom “ranks 1st for research quality in Robotics” and third worldwide for early-stage private investment within the robotics sector ([International Federation of Robotics](#) in [UK Government, 2024](#)).

Earlier contributions highlighted a strong support ecosystem for early-stage development of RAS technologies. Published in July 2014, the first UK [RAS 2020 strategy](#) also acknowledged that the UK was “*building on strong foundations*” of funding and organisational support structures in its drive for RAS development and adoption. Among other things, the report recognised the UK Government’s efforts to raise the profile of technological innovation through increased funding, the identification of RAS

as one of the Eight Great Technologies, and the establishment of the Catapult centres. It also noted the role of the Technology Strategy Board (TSB), now Innovate UK, in supporting the intermediary stages of the innovation cycle by assisting companies in bringing novel products to market. Similarly, the strategy highlighted the importance of Research Councils and UK universities for sustaining the innovation pipeline through early-stage research and development. The creation of a unified Knowledge Transfer Network (KTN) is also highlighted as a means of strengthening the national innovation infrastructure, whereas the Royal Academy of Engineering was recognised for offering an independent perspective and for its direct support of innovation through the Enterprise Hub.

Apart from the UK's strong base in early-stage research, translation, and private investment in RAS technologies, significant economic benefits and potential are estimated to exist within the UK economy for RAS development and adoption. In a 2021 [study](#) commissioned by the UK Government, it was estimated that the overall economic impact of adopting RAS in the UK could reach approximately £6.4 billion by 2035, with £4.4 billion projected to be concentrated within the warehouse and logistics sector alone (BEIS, 2021). In fact, drawing on robot shipment forecasts from ABI Research (2020), the BEIS (2021) report projects that the UK RAS market will expand at a compound annual growth rate exceeding 40% between 2020 and 2030. Hence, by the end of this period, the market is anticipated to reach an estimated value of nearly £3.5 billion. The report further anticipates that a substantial share of this growth is expected to be driven by the increasing adoption of mobile robots, i.e., defined as robots capable of navigating their surroundings without reliance on external infrastructure (see the following figure 3 for the projected size of the UK robotics market by 2030, based on growth trends).



Source: BEIS (2021)

**Figure 3: Projected size of the UK robotics market by 2030, based on current growth trends**

However, despite a strong research base and high economic potential, several challenges have combined to inhibit the realisation of the UK's full potential in RAS development and adoption. For instance, in terms of robot density (measured as the number of operational industrial robots per 10,000 employees in the manufacturing industry for 2023), the UK ranks 24<sup>th</sup> worldwide<sup>3</sup> with 111 robots per 10,000 employees, which is below the global average of 162 units per 10,000 employees for 2023 ([International Federation of Robotics, 2024](#); Miller, 2023). As a result, the UK lags behind all G7 countries in robots' applications (The National Robotarium, [2024](#)). In fact, the UK is the only G7 country with a robot density below the world average (Innovate UK, 2022).

Therefore, in the next section, we explore the challenges/barriers that stand in the way of RAS technology development and adoption in the UK.

### 3.2.2. The Challenges and Barriers to RAS Development and Adoption in the UK

Existing literature is replete with reports that have attempted to identify the challenges facing the RAS sector in the UK (see *inter alia* Lloyd's Register Foundation, [2016](#); UK Parliament, [2016](#), [2019](#); BEIS, [2021](#); HVM Catapult, [2024](#); Regulatory Horizon Council,

<sup>3</sup> According to other sources this ranking has improved to 22<sup>nd</sup> world wide (see Innovate UK, 2022)

[2023](#)). These reports have provided the impetus for the UK government to develop a series of strategies that aim to address the identified problems with a view to founding a robust RAS technology sector (see, for instance, UK RAS 2020 strategy, [2014](#); Eight Great Technologies, [2014](#); UK RAS Network White Papers, [2023](#); Smart Machines 2035 strategy, [2025](#), etc.)

Following our review and syntheses of these reports and strategies, we identify the following problems highlighted in the literature to be the key challenges that affect the development, commercialisation, and adoption of RAS technologies in the UK:

i. **Fragmented policy ecosystem**

A problem often cited in the literature as a barrier to the development/adoption of RAS technologies in the UK is the fragmented and poorly co-ordinated RAS policy ecosystem. Fragmentation and lack of coordination span government-funded research centres and the general policy ecosystem. For instance, the most recent UK RAS strategy (The Smart Machines 2035 [strategy](#)), found the existence of “fragmentation and silos” in the RAS (or what the report refers to as ‘smart machines’) ecosystem which, the report argues, limit collaboration and scalability; hence, the strategy recommends the setting up of “the Office for Smart Machines”<sup>4</sup>, where *“the UK Government should scope and launch a patient 10-year Smart Machine Research and Innovation programme top down across all its funding agencies”*. A survey of the RAS sector also highlighted “that the UK RAS manufacturing ecosystem is fragmented and disconnected” (Richardson *et al.*, 2025). Coordinating a strategically planned portfolio of initiatives from the top down, as argued in the report, minimises fragmentation, disconnection, and redundancy in comparison to existing bottom-up programmes. This, the report concludes, will enhance the potential for meaningful impact (*ibid*). Similar problems and recommendations have also been raised in earlier reports, for instance, in the [report](#) by the UK Parliament (2016, p.31), which led to suggestions for setting up the RAS Leadership Council.

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<sup>4</sup> The Office for Smart Machines (OSM) is planned to be ‘a trusted body, almost certainly within the government tent, to drive the necessary coordination and convening’ of RAS stakeholders and policy.

## ii. **Lack of coordination and collaboration among stakeholders**

Lack of co-ordination among stakeholders in the UK RAS sector is also a challenge. According to a [report](#) by Defra (2022), although some degree of collaboration exists among academics, developers, and growers, there is notably less cooperation among technology developers themselves. For instance, the report finds that many private-sector robotic developers, often backed by private equity investment, tend to prioritise safeguarding their intellectual property, which limits knowledge sharing. Not only that, due to fragmentation in research and development efforts among Research and Technology Organisations (RTOs) and academic institutions, there were instances of duplication where multiple stakeholders “*have been working on the same common problem.*” (ibid). Earlier, in 2014, authors of the [UK RAS 2020 strategy](#) raised similar concerns about “*fragmented communities of researchers, industrialists and civil servants*” (UK RAS, [2014](#), p.3). A fragmented, siloed ecosystem of technology developers thus appears to be a persistent feature of the UK RAS landscape.

## iii. **Infrastructure deficit**

The need to develop facilities for testing, evaluating, and improving the performance of infrastructure robots in the UK has been observed in a white paper (UK [RAS Network White Paper](#), 2017). The authors of the white paper found that existing facilities for such testing are mostly “small-scale, fragmented and uncoordinated”, and that unless this is improved, the RAS technology developers “*will need financial and commercial incentives and protection to share, operate and manage test facilities that advance the development of robust robotic solutions for the benefit of the sector.*” (ibid). Also acknowledging the need for sufficient RAS facilities and infrastructure, a recent [report](#) (HVM Catapult, 2024, p.34) recommends the “*creation of regional accelerators/incubator facilities*” dedicated to RAS technologies in order to support “*their access to customers through showcasing events as well as access to technical expertise and test facilities*”. The UK-RAS Network’s [2023 white paper](#) has also identified the same problem and made similar recommendations (UK RAS Network White Papers, 2023, p.17).

In the area of the development and adoption of driverless cars, the need for “*large-scale realistic testing facilities, urban laboratories and private roads where innovative modes of transport can be trialled and perfected*” has also been recognised (see UK RAS,

[2014](#), p.8). An unpublished Innovate UK (2022) report also identified “[t]he need for development of physical and digital infrastructure for the more widespread testing of Robotics” in the UK. Specifically, digital infrastructure, such as access to high-speed internet, has been found critical for the adoption of advanced technologies (Jibril & Roper, 2025). Hence, suggestions have been made for policy interventions to improve access to high-speed broadband, 4G and 5G to support both the development and uptake of RAS technologies (BEIS, [2021](#), p. 20; Jibril & Roper, 2025). A stakeholder quoted in the UK Parliament (2016) emphasises this problem thus:

*“It is critical that one should be able to prove, test, measure and validate the reliability, performance, safety and ethical compliance—both logically and statistically/probabilistically—of such robotics and artificial intelligence systems before they are deployed”*

#### iv. **Skills deficits and educational Gaps**

RAS demands a different set of operator skills, as well as distinct installation and integration expertise, compared to those required in non-RAS industries (Lloyd’s Register Foundation, [2016](#), p.39). One of the early RAS [reports](#) by the UK Parliament (2016, p.13) observed the *“domestic shortage . . . of the key skills needed in robotics and AI”*. This shortage, the report added, not only posed a serious challenge for the smooth uptake of RAS technologies in the UK but also can complicate *“some of the more potentially negative impacts of robotics and AI on employment”* (ibid). The report therefore emphasised the importance of augmenting investment in STEM courses and of generally adapting the UK education system to respond to the digital skills crisis affecting the development and uptake of RAS technologies. It concludes that the UK’s success in RAS development and adoption *“depend on the ability of businesses, educators and government to anticipate future skills requirements and provide the right training and education for the coming decades”* (UK Parliament, 2016, p.13).

Another [report](#) by the UK Parliament (2019, p.9) raised similar concerns about *“a lack of digital skills among parts of the workforce”*, concluding that the government needed to support the workforce and businesses in upskilling, reskilling, and retraining to enhance productivity, growth, and reindustrialisation. Richardson *et al.* (2025, p.26) also found that *“Skills shortages and a lack of specialised expertise are . . . major concerns.”*

Others suggested that increased *“funding for apprenticeships could help to address the shortage of digital skills”* (BEIS, [2021](#), p.84).

v. **Regulatory and legal uncertainty**

Witnesses cited in the UK Parliament [report](#) (2016, p.22) highlighted that the ethical, legal and regulatory issues associated with robotics and autonomous systems (RAS) required immediate attention, and that appropriate governance frameworks should be established. Another report by the Regulatory Horizon Council ([2023](#), p.14) found that *“...the regulatory landscape governing the use of robotics and autonomous systems (RAS) in the UK is fragmented”* which leaves adopters and developers *“uncertain about the correct regulatory pathways.”* In fact, the most recent Smart Machines 2035 strategy identified *“regulatory hurdles”* as one of the key impediments that make the *“UK lags behind global leaders in industrial robotics adoption”*. In this regard, the suggested recommendations<sup>5</sup> generally include the creation of *“a framework of regulation and assurance that creates trust in RAS”* (Lloyd’s Register Foundation, [2016](#), p.33), though the report acknowledges that regulating technology can be challenging, as rapid technological advancements often outpace regulatory frameworks to stay up to date.

vi. **Adoption- Commercialisation feedback loop**

There is no ambiguity in the literature over the existence of barriers to the adoption of RAS technologies in the UK. However, what is less clear is the extent to which these adoption barriers and challenges feedback to, and affect, the development of RAS technologies in the UK. In a recent evidence review for DSIT, Jibril & Roper (2025) identified three technological factors that continue to impede the adoption of robotics and autonomous systems (RAS) technologies in the UK. These include concerns over RAS technologies’ functionality, functional adequacy, and risks; the extent of complexity, compatibility, complementarity and alignment with existing systems/technologies; and consistency with business and wider strategic objectives.

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<sup>5</sup> For detailed and specific recommendation on the issues of regulations in the RAS sector see chapter 3 of the Regulatory Horizon Council ([2023](#)) report and, for regulations on data capture and safety issues, see section four of the Lloyd’s Register Foundation ([2016](#)).

In the BEIS (2021, pp. 52-53) report, other adoption barriers have also been identified. These include costs of RAS technologies, the fragility of some tasks, taboos/cultural sensitivities, and additional workforce skills requirements. We leverage our findings from the interviews to understand whether these adoption challenges feed back into RAS technology development in the UK. However, it is crucial to point out here that the BEIS (2021) report quoted above finds that lower rates of adoption of RAS technologies in the UK have resulted in an automation gap, which, if left unaddressed, could lead to the loss of an estimated £141 billion in gross value added (GVA) from the UK economy by 2035.

There are sectoral variations in the extent of adoption. Some sectors where the UK is seeing increasing adoption of RAS across various industries include manufacturing, healthcare, and agriculture (BEIS, [2023](#)). In healthcare, robotic surgery “*continues to provide innovative solutions to assist surgeons and improve outcomes*” (UK Parliament, [2016b](#)), with the number of robotics-assisted surgery procedures in England exponentially increasing from 2011/12 to date (NHS England, [2025](#), p.10). The successes of the adoption of RAS technologies in the UK healthcare sector might be attributable to government funding and other direct support for the NHS. It is also reasonable to attribute the defence sector’s successes in RAS technology development/adoption to government funding or direct support. In a recent successful trial, a single operator successfully controlled three uncrewed/unmanned aerial vehicles (UAVs) to detect and classify threats (Defence Science and Technology Laboratory, [2025](#)). However, these state incentives are generally lacking in sectors less reliant on government as a key customer; in such sectors, the development and commercialisation of RAS technologies are potentially subject to additional barriers related to market readiness for adoption (see Jibril & Roper, 2025, for details).

## 4. The UK business landscape for robotics and autonomous systems (RAS)

### 4.1. Introduction: Identifying RAS companies

To identify businesses operating in Robotics and Autonomous Systems (RAS), we draw on firm-level data from The Data City, a UK data science company whose classification outputs have also informed the Government's recent Innovation Clusters mapping work (DSIT, 2024). The Data City constructs Real-Time Industrial Classifications (RTICs) by combining large-scale web data collection with machine learning methods applied to company websites.

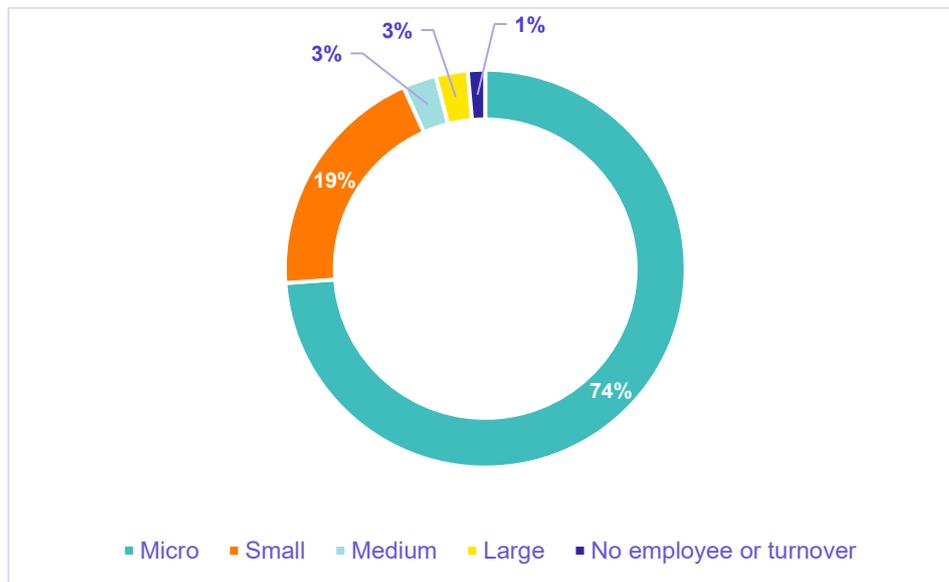
The Data City builds Real-Time Industrial Classifications (RTICs) by scanning company websites and using machine learning to group firms that do similar things or use similar technologies. In simple terms, an RTIC is a list of companies that appear to be working in the same area, based on what they say and show online. This approach is useful for RAS because many RAS firms do not fit neatly into standard industry codes such as SIC or NACE. RTICs can pick up newer, more specialised activities by using a combination of keywords and sector taxonomies. The process starts with a set of known company websites to train the model, which then generates an initial list of firms. The Data City then carries out manual checks to remove obvious mismatches and improve accuracy.

In this report, we use The Data City's RAS RTIC as our main dataset to identify UK businesses active in the RAS sector.

### 4.2 Analysis of the overall business landscape

Figure 4 below shows the size profile of businesses engaged in RAS. The RAS RTIC cohort consists of 2,141 firms, with a distribution heavily weighted toward smaller enterprises. Microbusinesses - defined as firms with fewer than 10 employees and an annual turnover of less than £1 million - constitute the vast majority of the group at 74%. Small businesses (10-50 employees and £1 million-£15 million turnover) represent 19% of the cohort, while Medium-sized businesses (50-250 employees and £15 million-£54 million turnover) and large businesses (more than 250 employees and more than £54 million turnover) each account for 3%. A final 1% is attributed to firms with no employees

or turnover. These size<sup>6</sup> categories are based on UK Government definitions, highlighting that the sector is predominantly driven by micro-scale operations.



**Figure 4: Company size profiles of UK RAS businesses**

Table 1 presents the descriptive statistics for the RAS RTIC cohort. While the total population consists of 2,141 firms, the analysis is based on a slightly smaller subset due to varying levels of data availability across metrics. The sample shows a high degree of variance, with a mean employment of 50.6 people and an average annual turnover of £11.7 million. However, the substantial standard deviations - 482.2 for employment and £109.3 million for turnover - indicate a highly skewed distribution. This "long tail" effect is characterised by a vast majority of microbusinesses existing alongside a few large-scale outliers, the largest of which employs over 18,008 staff and generates over £2.8 billion in annual revenue. Financial support also varies, with 354 firms receiving Innovate UK grants (averaging £1.5m), while a smaller group of 288 firms successfully attracted private investment at a much higher average of £21.7 million per firm.

<sup>6</sup> Firm size categories are based on UK Government definitions (see <https://www.gov.uk/government/publications/life-of-a-company-annual-requirements/life-of-a-company-part-1-accounts>)

**Table 1: Descriptive statistics for the UK RAS sector**

	Obs.	Mean	Std. dev.	Min	Max
Number of employees	2,141	50.6	482.2	0	18008.0 <sup>7</sup>
Turnover (£m)	2,141	11.7	109.3	0	2872.4
Private Investment (£m)	288	21.7	126.0	0	1501.9
Innovate UK grants (£m)	354	1.5	4.7	0	45.7

### Target Sectors (Sub-RTICs)

The Robotic Autonomous Systems (RAS) RTIC comprises 30 sub-RTICs. For this study, we focus on 12 targeted sub-RTICs: Consumer (Retail & Hospitality), Healthcare (Assistive, Diagnostic, Pharma, Rehab, and Surgical), Infrastructure (Construction), Logistics and Industry (Logistics/Warehousing, Manufacturing, and Packaging), Mobility (Maritime), and Security. These areas were selected as they align most closely with the scope of our analysis, while other sub-RTICs, such as agriculture, energy, and space, were not included. Table 2 provides the categorical framework for the analysis by defining the 12 target subsectors within their respective overarching industries. It details the specific scope of robotics applications for each area, such as invasive surgical procedures or autonomous warehouse logistics.

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<sup>7</sup> The firm with the maximum number of employees is in the RAS logistics sub-technology and it has 18,008 employees.

**Table 2: definition of RAS target sectors.**

	Sub-RTICs	RTIC definition
Food and Beverage	Consumer: Retail & Hospitality (14 firms)	Robotics used in hospitality and retail, in shops, malls, retail parks, hotels, conference and exhibition venues. Covering cleaning, delivery, advertising, marketing, promotions, guest relations, hotel services, navigation services and stock monitoring and control.
Medical/Healthcare	Healthcare: Assistive (7 firms)	Robots used to provide assistance to patients or assistance for clinical staff in interacting with patients. Covers both at-home and clinical environments.
	Healthcare: Diagnostic (2 firms)	Robots used in non-surgical procedures, covering non-invasive sample taking, internal and external diagnostics and patient positioning for diagnostics.
	Healthcare: Pharma (108 firms)	Robots and automation used in pharmaceutical laboratories, in sample testing laboratories, pharma industry manufacturing and in pharmacy logistics within a clinical environment.
	Healthcare: Rehab (11 firms)	Robots used to provide rehabilitation and patient assessment services. Includes exoskeletons and rehabilitation services for recovery from surgery and trauma
	Healthcare: Surgical (14 firms)	Robots used for invasive procedures with varying degrees of autonomy or guided by a clinician. Covers surgical procedures and invasive sample taking.
Manufacturing and Advanced Manufacturing	Infrastructure: Construction (36 firms)	Robots used in the construction of infrastructure, on land, underground, on sea and undersea. Covers building and demolition, preparation of building materials, land clearance and preparation for construction, and construction of bridges, tunnels and other elements of transport, industry and energy infrastructure
	Manufacturing (470 firms)	Robotics used in the manufacture of goods, including the manufacture of parts, sub-assemblies and full product assembly. Robotics used in the manufacturing of goods, including food, and the production of materials. Includes circular economy

	Sub-RTICs	RTIC definition
Indoor Logistics and Warehousing	Logistics / warehousing (153 firms)	Mobile robots operating within warehouses and in logistics operations, e.g., in factories, supermarkets, delivery centres, etc. Covers robot suppliers, whole system suppliers and warehouse operators with robotics as a core capability.
	Packaging (185 firms)	Robots and automation used in packaging, particularly focusing on fast-moving consumer goods
Marine/Maritime	Mobility: Maritime (209 firms)	Robots operating on or under the water, either at sea or within inland waterways. Covers robot suppliers, operators and those delivering professional services based on robots working on or under water.
Defence	Security (78 firms)	Robots used in any military-based use case across land, sea and air. Covers all aspects, from logistics to operational use, and includes military-related service provision relevant to military robotics.

Source: The Data City

Within this focused group, **Manufacturing** emerges as the most prominent target subsector, with 470 firms. Other significant target areas include **Mobility: Maritime (209 firms)**, **Packaging (185 firms)**, and **Logistics/warehousing (153 firms)**. The healthcare-related target subsectors show varying levels of activity, led by **Healthcare: Pharma (108 firms)**, followed by **Healthcare: Surgical (14 firms)**, **Healthcare: Rehab (11 firms)**, **Healthcare: Assistive (7 firms)**, and **Healthcare: Diagnostic (2 firms)**. Rounding out the 12 targets are **Security (78 firms)**, **Infrastructure: Construction (36 firms)**, and **Consumer: Retail & Hospitality (14 firms)**. Collectively, these 12 target subsectors account for 1,287 of the total firm occurrences, while the remaining 18 subsectors are categorised as "Other"<sup>8</sup> comprise 1,000 occurrences,

<sup>8</sup> The remaining 18 subsectors are: Integrators, Mobility: Unmanned Aerial Systems / Drones, Energy: Oil Gas, Grid & Other, Energy: Renewables, RAS Component Suppliers, AI Software, Agriculture: Milking Animals, Agriculture: Vertical Farming, Mobility: CAV / Self-driving vehicles, Space, Infrastructure: Inspection and Maintenance, Agriculture: Weeding Seeding and Harvesting, Energy: Recycling, Energy: Nuclear, Consumer: Sports and Entertainment, Consumer: Cleaning, Consumer: Mowing, and Consumer: Educational.

bringing the total across all categories to 2,287. As illustrated in Figure 5, the sectoral distribution of these firms highlights that Manufacturing and Advanced Manufacturing constitute the largest share of the cohort at 22%. At the same time, the 'Other' category, representing the 18 excluded subsectors, accounts for 44% of the overall landscape.

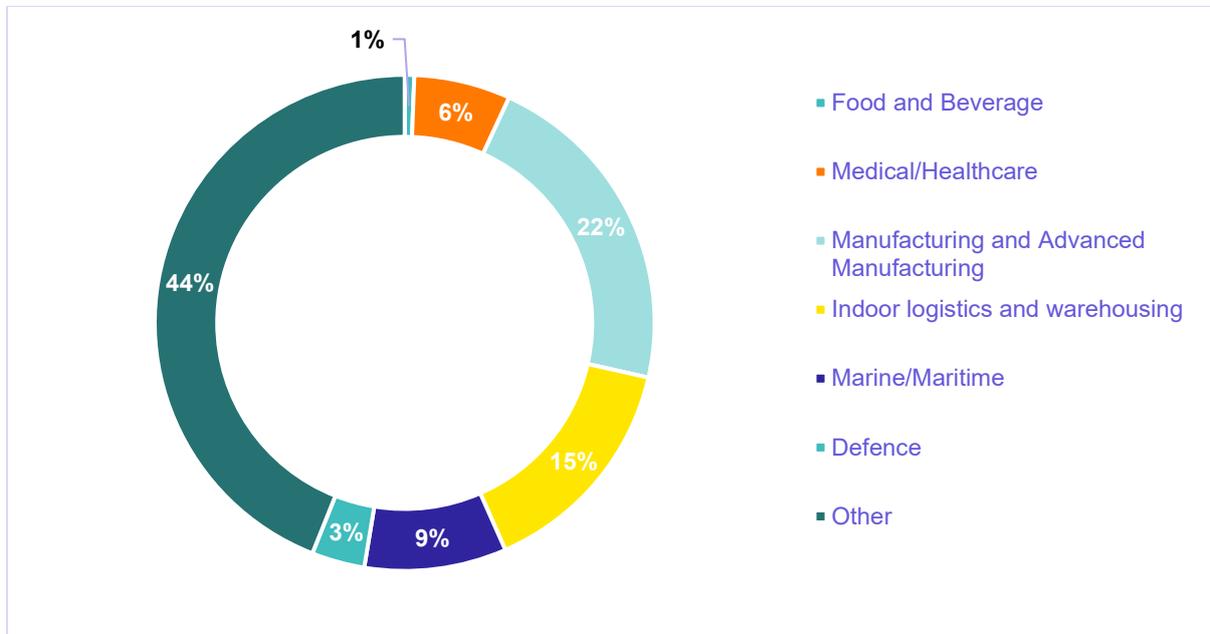
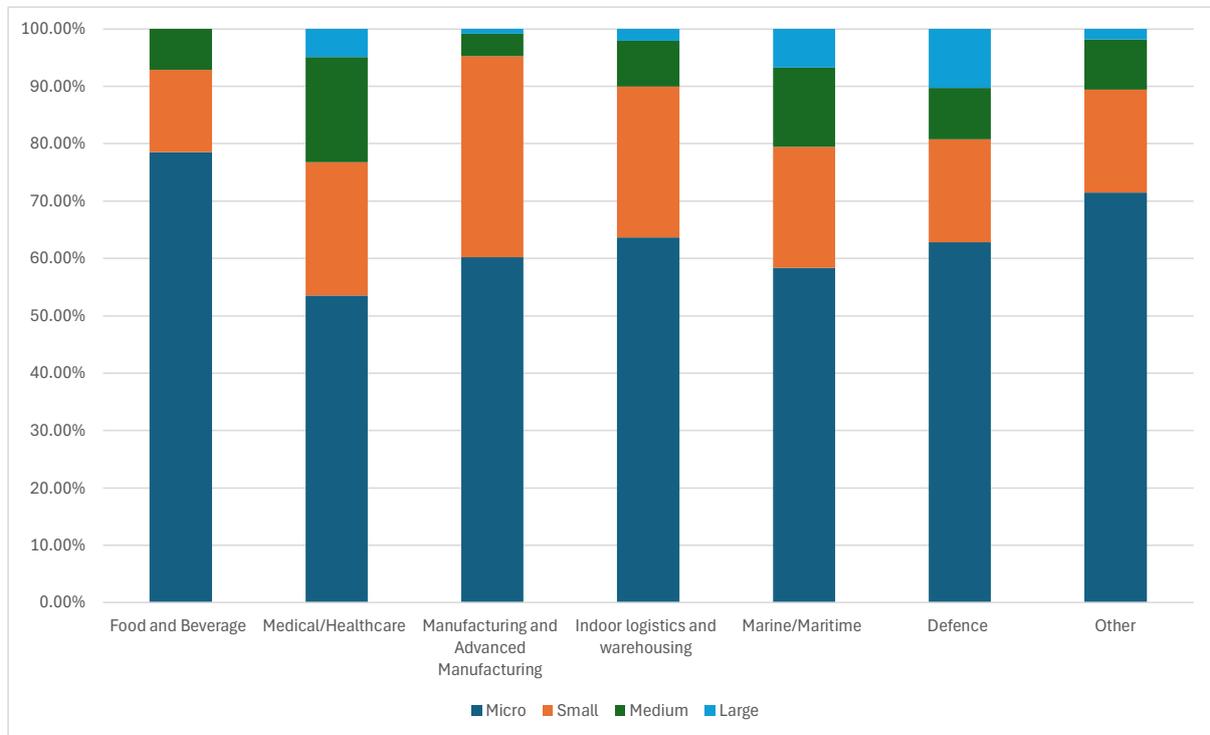


Figure 5: Target sector profiles of UK RAS businesses

### 4.3 Analysis of the business landscape by RAS target sectors.

Figure 6 compares the business size profiles across the target sectors. An analysis of these profiles reveals a dominant presence of smaller entities across the UK RAS landscape, though the specific composition varies significantly by industry. Micro-entities constitute the largest segment in every category, reaching their highest concentration in the Food and Beverage (78.57%) and Other (71.50%) categories. Conversely, Medical/Healthcare presents the most balanced distribution, having the lowest proportion of micro-firms (53.52%) and a substantial combined presence of Medium (18.31%) and Large (4.93%) organisations. The Manufacturing and Advanced Manufacturing sectors are notable for having the highest proportion of small businesses at 35.08%, while the Defence sector has the highest concentration of large enterprises at 10.26%. These variations suggest that while the UK RAS landscape is primarily driven by micro-firms, sectors like Defence and Medical/Healthcare lean more heavily

on established, larger-scale corporate structures, perhaps reflecting their state market focus.



**Figure 6: Size profiles by target RAS sectors**

Table 3 provides the descriptive statistics for employment, turnover, private investment, and Innovate UK (IUK) grant funding for each target sector. While the mean figures suggest substantial scale in certain areas- most notably in Defence, which shows a mean turnover of £57.0m and 218.3 employees - the median values reveal a different reality for the typical firm. Across all sectors, the medians for turnover and employment are significantly lower than their respective means; for instance, the median turnover in the Indoor logistics and warehousing sector is just £0.6m compared to a mean of £27.1m. This extreme disparity, coupled with high standard deviations (such as 1063.1 for employees in Indoor logistics), indicates a highly skewed distribution in which a small number of very large outliers - including firms with turnover up to £2,872.4m - inflate the sectoral averages. As a result, median values may provide a more informative indication of the characteristics of the typical firm across most sectors, which tend to be smaller in scale in terms of employment and turnover.

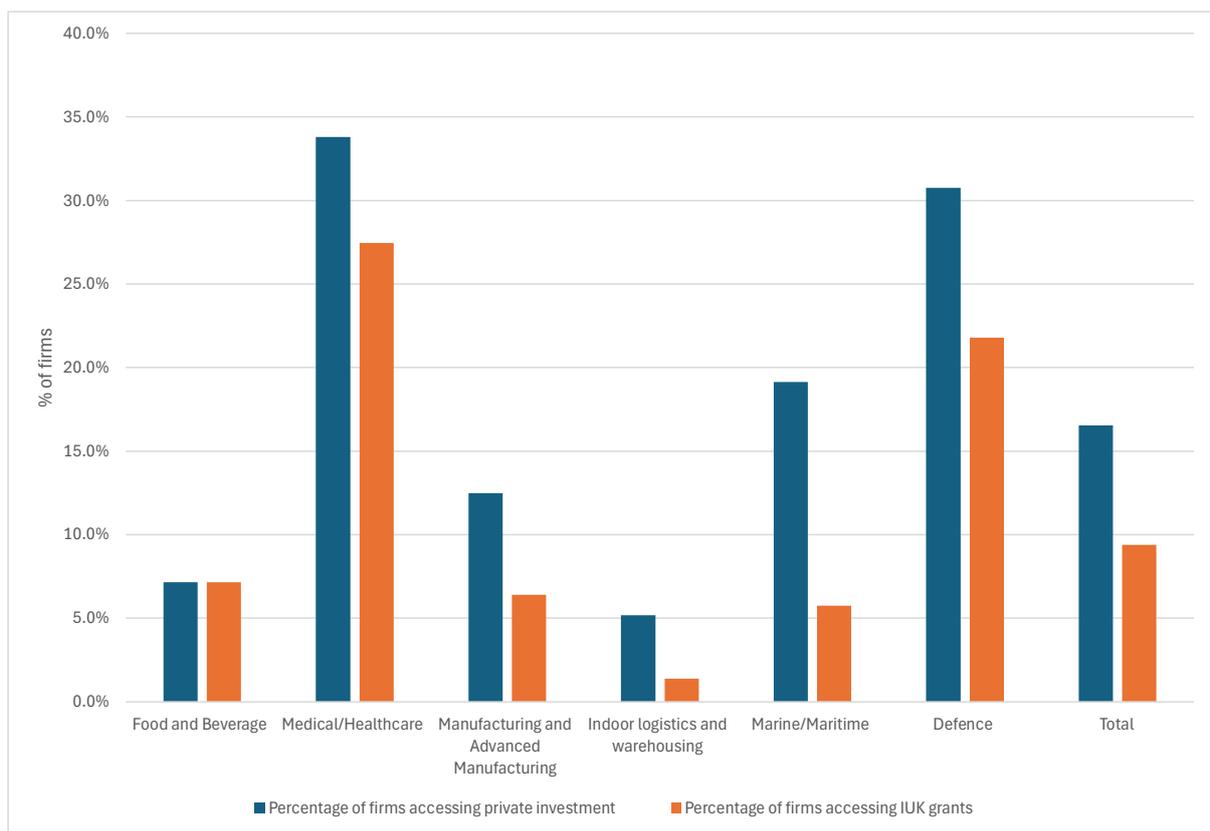
**Table 3: Summary statistics by target sectors**

	N	Mean	Median	SD	Min	Max
<b>Food and Beverage (14)</b>						
Number of employees (estimated)	14	15.7	2.5	33.4	0.0	122.0
Turnover (estimated, £m)	14	2.6	0.1	6.7	0.0	24.9
Private investment (estimated, £m)	1	0.1	0.1	.	0.1	0.1
IUK grant funding (estimated, £m)	1	8.6	8.6	.	8.6	8.6
<b>Medical/Healthcare (142)</b>						
Number of employees (estimated)	143	57.0	7.0	138.7	0.0	1007.0
Turnover (estimated, £m)	143	9.5	0.5	28.5	0.0	238.5
Private investment (estimated, £m)	48	0.9	0.4	1.0	0.0	4.1
IUK grant funding (estimated, £m)	48	42.8	3.7	149.7	0.0	939.6
<b>Manufacturing and Advanced Manufacturing (493)</b>						
Number of employees (estimated)	493	18.9	2.0	79.2	0.0	1417.0
Turnover (estimated, £m)	493	3.4	0.2	20.0	0.0	302.3
Private investment (estimated, £m)	74	0.9	0.2	1.4	0.0	6.9
IUK grant funding (estimated, £m)	57	3.1	0.5	9.9	0.0	71.3

	N	Mean	Median	SD	Min	Max
<b>Indoor logistics and warehousing (338)</b>						
Number of employees (estimated)	289	88.8	4.0	1063.1	0.0	18008.0
Turnover (estimated, £m)	289	27.1	0.6	208.6	0.0	2872.4
Private investment (estimated, £m)	15	0.4	0.1	0.7	0.0	2.8
IUK grant funding (estimated, £m)	10	7.7	0.0	22.4	0.0	71.3
<b>Marine/Maritime (209)</b>						
Number of employees (estimated)	209	74.9	3.0	396.6	0.0	5410.0
Turnover (estimated, £m)	209	19.7	0.4	90.5	0.0	1160.6
Private investment (estimated, £m)	40	2.4	0.9	8.2	0.0	45.7
IUK grant funding (estimated, £m)	31	2.2	0.0	7.2	0.0	38.8
<b>Defence (78)</b>						
Number of employees (estimated)	78	218.3	2.5	1190.6	0.0	9025.0
Turnover (estimated, £m)	78	57.0	0.2	304.6	0.0	2187.0
Private investment (estimated, £m)	24	2.2	0.9	3.7	0.0	13.8
IUK grant funding (estimated, £m)	19	3.4	0.8	5.2	0.0	18.3

Source: Calculated by authors based on 2025 RAS RTIC data provided by the Data City

Figure 7 shows that across all RAS target sectors; a larger proportion of firms have accessed private investment than Innovate UK (IUK) grant funding. This indicates that private finance is more widely used than public grant support within the RAS ecosystem. Medical/Healthcare and Defence stand out, with the highest shares of firms accessing both private investment and IUK grants, suggesting relatively strong engagement with external funding sources in these sectors. In contrast, sectors such as Indoor logistics and warehousing and Marine/Maritime exhibit much lower access to IUK grants, despite a non-trivial share of firms securing private investment. Overall, the figure highlights substantial sectoral variation in both the level and composition of funding accessed, with public grant funding reaching a smaller, more concentrated subset of firms compared to private investment.

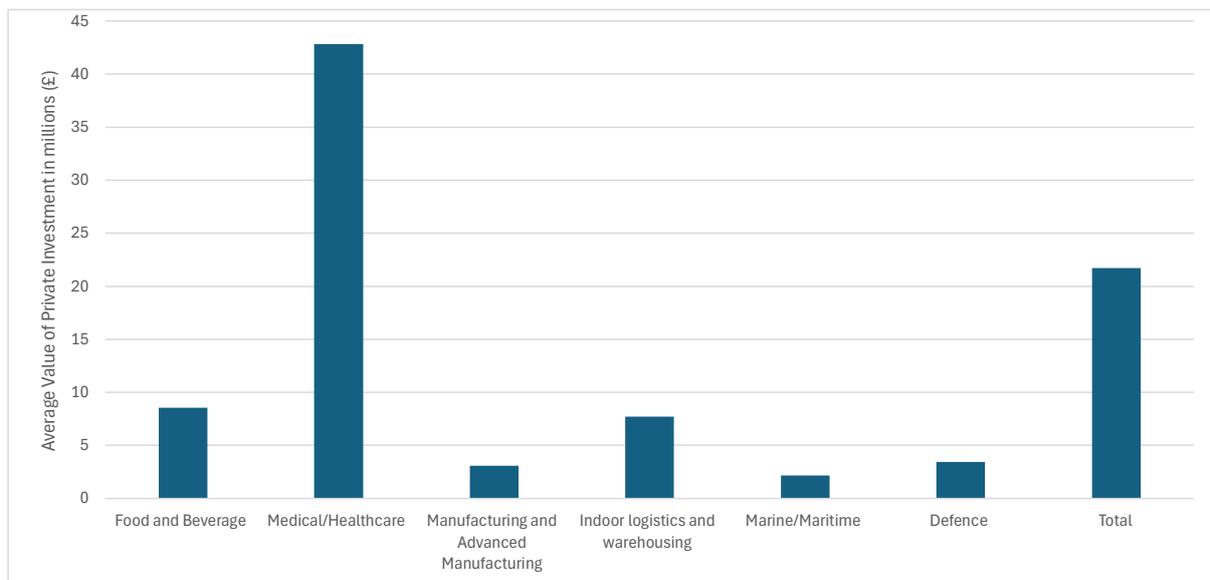


**Figure 7: Proportion of RAS target sectors accessing private investment compared to IUK grants**

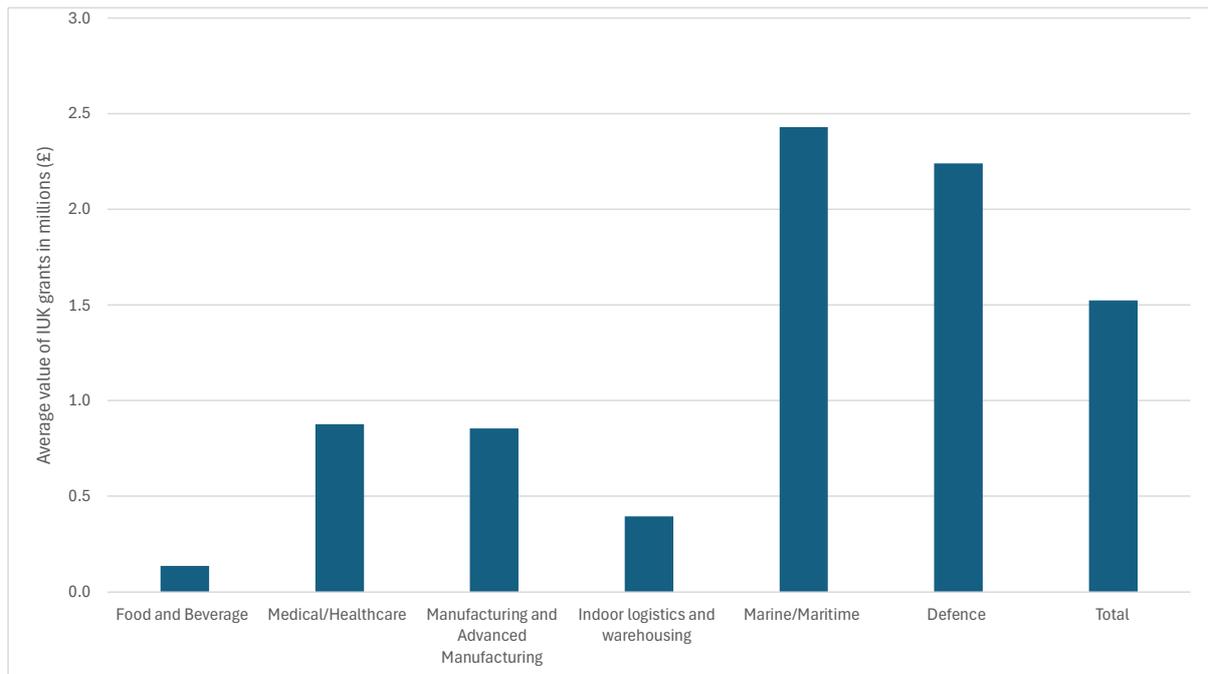
Building on the patterns in Figure 7, which show how widely private and public funding are accessed across sectors, Figures 8 and 9 examine differences in the average amounts of private investment and Innovate UK grant funding received by funded firms.

Figure 8 shows that average private investment is highly concentrated in a small number of sectors, most notably Medical/Healthcare, where average private investment per funded firm exceeds £40 million, followed by Defence. In contrast, sectors such as Manufacturing and Advanced Manufacturing, Marine/Maritime, and Indoor logistics and warehousing receive substantially lower average levels of private investment, generally remaining below £10 million per funded firm.

Figure 9 indicates a different pattern for public funding. Average IUK grant values are highest in Marine/Maritime and Defence, at approximately £2.4 million and £2.2 million respectively, with more moderate levels observed in Medical/Healthcare (just under £1.0 million) and Manufacturing and Advanced Manufacturing. Average grant values are lowest in Food and Beverage and Indoor logistics and warehousing, at around £0.15 million and £0.4 million respectively. Taken together, Figures 8 and 9 highlight differences in the distribution and scale of private and public funding across the RAS target sectors.



**Figure 8: Average private investment by RAS target sectors**



**Figure 9: Average IUK grant by RAS target sectors**

## 4.4 Analysis of the geographical distribution of the UK RAS sector

### 4.4.1 Identifying geographical areas of business concentration using heatmaps

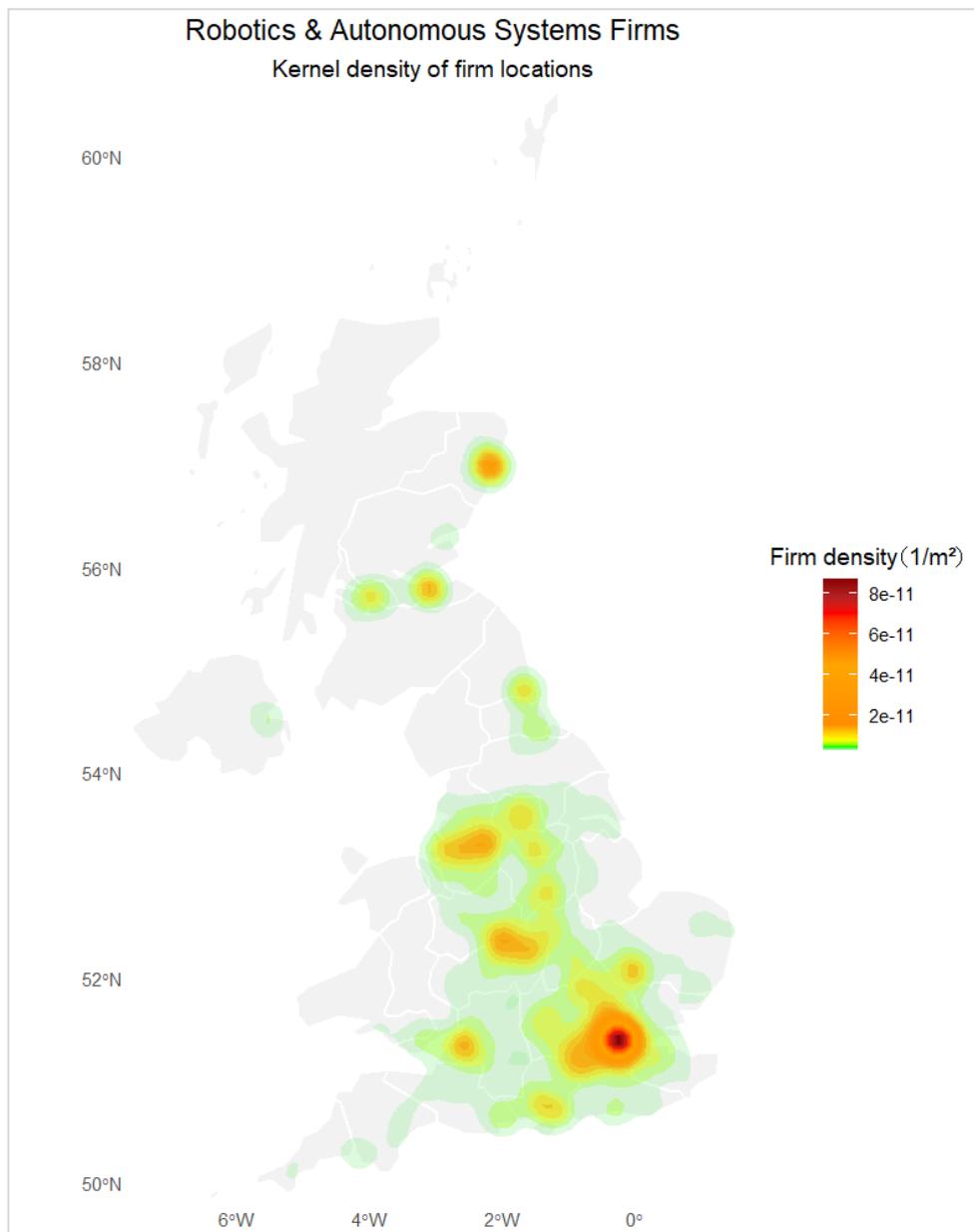
Figure 10 presents a kernel density heatmap illustrating the geographical distribution of firms operating in the UK Robotics and Autonomous Systems (RAS) sector. As an initial exploratory step, this simple heatmap is used to examine the relative spatial concentration of RAS businesses in the UK.

The heatmap reveals a highly uneven spatial distribution of RAS firms across the UK. The most pronounced concentration is observed in London and the South East, which emerges as the primary hotspot of RAS activity. This region exhibits the highest firm density, suggesting that it functions as a central hub for RAS-related business activity, likely reflecting the agglomeration advantages associated with large metropolitan areas, including access to finance, skilled labour, research institutions, and downstream markets.

Beyond London and the South East, secondary clusters are visible in parts of the Midlands and Northern England, indicating the presence of additional, though less intense, centres of RAS activity. These clusters may correspond to regions with

established industrial bases, advanced manufacturing capabilities, or proximity to major universities and research institutions. In contrast, much of Wales, Northern Ireland, and more peripheral regions of Scotland display relatively low firm densities, suggesting limited RAS business presence outside a small number of concentrated hubs.

The heatmap highlights a clear core-periphery pattern in the spatial organisation of the UK RAS sector. While RAS firms are distributed nationwide, economic activity is strongly concentrated in a small number of urban and economically dense regions.



**Figure 10: Geographical heatmap of RAS businesses based on the 2025 Real Time Industrial Classification**

#### **4.4.2 Identifying geographical areas of business concentration using cluster analysis**

While kernel density heatmaps provide an intuitive and descriptive overview of the spatial concentration of RAS firms, they remain limited in their ability to formally delineate discrete clusters or to distinguish meaningful concentrations from background noise. To move beyond visual inspection, we therefore complement the heatmap analysis with a cluster-based approach that explicitly identifies geographically coherent groupings of RAS activity (see figure 10).

We apply the HDBSCAN (Hierarchical Density-Based Spatial Clustering of Applications with Noise) algorithm to firm-level location data from The Data City's RAS RTIC. HDBSCAN is particularly well-suited to this context because it allows cluster density to vary across space and does not require the number of clusters to be pre-specified, making it robust to heterogeneous spatial patterns. Crucially, this approach helps mitigate the limitations of traditional clustering techniques, which tend to identify large cities or dense urban areas as clusters simply because of their underlying socio-economic density, rather than sector-specific agglomeration.

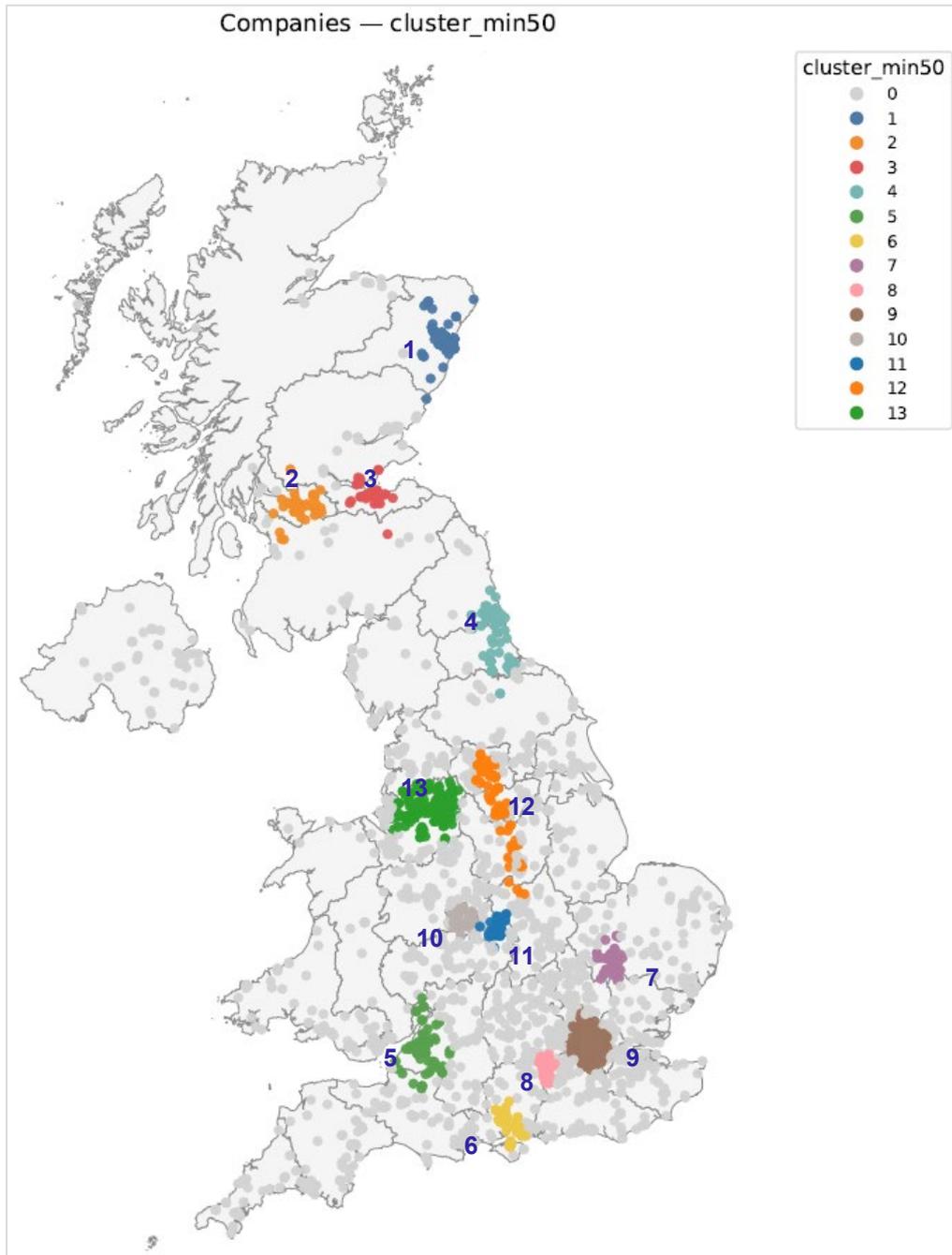


Figure 11: Geographical clusters of RAS business in the UK

Figure 11 presents the spatial distribution of RAS firms along with the clusters identified by the HDBSCAN algorithm, where only clusters exceeding a minimum size threshold (min = 50 firms) are retained. Several key patterns emerge.

First, the results confirm the presence of multiple, geographically distinct clusters of RAS activity across the UK, rather than a single dominant core. While major urban regions continue to feature prominently, the identified clusters are not uniformly

centred on the largest metropolitan areas, suggesting that RAS activity is not solely driven by general urban density.

Second, clusters are observed in both established economic centres and a number of non-metropolitan locations, suggesting that RAS activity is not solely driven by general urban density and may reflect more localised, sector-specific dynamics.

Third, a substantial number of firm locations remain unclustered and are classified as noise, highlighting the fragmented and uneven nature of RAS activity outside core clusters. This reinforces the view that, while agglomeration effects are important, a non-trivial share of RAS firms operate outside dense spatial groupings, potentially reflecting different business models, market orientations, or stages of firm development.

The HDBSCAN results provide a more nuanced picture of the UK RAS landscape, revealing a spatial pattern characterised by multiple distinct centres of activity. By dynamically adjusting to local density conditions, this approach enables a clearer distinction between genuine sectoral clusters and areas that appear dense merely due to broader urbanisation effects.

**Table 4: Summary statistics by RAS cluster**

Cluster Location	Cluster Number	N*	N	Employment		Turnover		Private Investment		IUK funding	
				Mean	Median	Mean (£m)	Median (£k)	Mean (£m)	Median (£k)	Mean (£m)	Median (£k)
Unclustered	0	1827	1298	50.5	3	12.6	282.9	1.2	0	0.3	0
Aberdeen	1	179	118	88.4	4	24.7	384.7	0.2	0	0.2	0
Glasgow	2	69	59	123.2	3	30.0	302.6	0.3	0	0.5	0
Edinburgh	3	75	64	103.1	4	22.2	288.8	1.9	0	1.0	0
Newcastle upon Tyne - Middlesbrough	4	120	84	44.8	2	17.0	162.0	0.3	0	0.2	0
Gloucester - Bristol	5	105	91	40.1	4	11.5	280.3	1.0	0	0.9	0
Southampton - Portsmouth	6	67	56	130.3	5	71.8	282.5	0.8	0	0.4	0
Cambridge	7	80	66	48.4	6	7.1	230.6	19.7	0	0.5	0
Wokingham - Farnham	8	58	54	292.4	3	65.5	576.9	0.1	0	0.6	0
London	9	486	387	32.7	2	16.2	150.0	8.9	0	0.2	0
Birmingham	10	63	56	52.9	4	8.3	334.4	0.1	0	0.2	0
Leicester - Coventry	11	60	49	45.1	2	55.9	77.4	0.3	0	0.5	0
Leeds - Sheffield - Nottingham	12	129	114	33.8	3	39.3	384.9	0.3	0	0.1	0
Manchester - Liverpool	13	179	151	39.6	2	22.0	201.7	0.1	0	0.1	0

Note: N\* represents the number of company locations, while N indicates the number of unique firms within the cluster.

Source: The Data City (2025).

Table 4 complements the spatial clustering results by showing that the identified HDBSCAN clusters are not only geographically distinct, but also heterogeneous in their firm composition and economic profiles. Two broad patterns stand out.

First, the distributions of firm size and financial outcomes are highly skewed across all clusters, as reflected by the significant gaps between means and medians. For example, median employment is generally low (typically 2–6 employees), while mean employment is substantially higher in many clusters—most notably Wokingham–Farnham (mean 292.4; median 3) and Southampton–Portsmouth (mean 130.3; median 5). A similar skew appears in turnover and investment variables, where medians are often close to zero even when means are sizable. This indicates that cluster-level averages are frequently driven by a small number of larger firms or large transactions. In contrast, the typical firm implies a long tail of micro and small enterprises—consistent with the sectoral structure of emerging technology domains.

Second, clusters differ systematically in their economic scale and funding/investment profiles, suggesting that the “multi-centred” RAS geography also corresponds to different types of regional hubs, rather than a single uniform model of agglomeration.

**London (Cluster 9)** is the largest clustered agglomeration by firm count ( $N = 387$ ;  $N = 486^*$ ), but it does not show the highest average turnover or employment. **N** denotes the number of unique firms, while **N\*** refers to the number of company locations within the cluster. This is consistent with an ecosystem dominated by many smaller firms and service-oriented activities. London nevertheless attracts substantial private investment on average (mean £8.9m), indicating strong access to investor networks, even if this is concentrated among a small subset of firms (median private investment = 0).

**Cambridge (Cluster 7)** stands out as the most investment-intensive cluster, with a markedly high mean private investment (£19.7m) despite modest mean employment (48.4) and turnover (7.1). This pattern is consistent with a cluster characterised by venture-backed firms and R&D-intensive activity, where valuation and financing can outpace current revenues.

Several clusters exhibit high mean turnover relative to others, notably **Southampton–Portsmouth (mean turnover £71.8m)**, **Wokingham–Farnham (£65.5m)**, and **Leicester–Coventry (£55.9m)**. Together with their employment figures, these clusters may reflect a stronger presence of scale-up or industrially embedded firms

(e.g., engineering/manufacturing-linked RAS applications), rather than predominantly early-stage startups.

By contrast, some clusters (e.g., **Gloucester–Bristol**, **Newcastle upon Tyne–Middlesbrough**, **Manchester–Liverpool**) show moderate mean turnover and employment, consistent with diversified regional ecosystems where RAS activity may be distributed across smaller firms and embedded within broader local industrial structures.

Innovate UK (IUK) funding is present across clusters but remains highly concentrated, with a median IUK funding equal to zero in all clusters. This suggests that public support reaches only a minority of firms, and that cluster-level averages reflect the presence of a few funded organisations rather than broad-based funding across the local ecosystem. Notably, Edinburgh (mean £1.0m) and Gloucester–Bristol (mean £0.9m) appear relatively more IUK-intensive on average, pointing to potentially stronger engagement with publicly funded innovation programmes in these locations.

**Table 5: Private investment and Innovate UK funding among recipient firms by RAS cluster (mean and median)**

Cluster Location	Cluster Number	N	Private Investment		N	IUK funding	
			Mean (£m)	Median (£k)		Mean (£m)	Median (£k)
Unclustered	0	111	13.8	1,510	196	2.0	361.7
Aberdeen	1	5	4.2	1,140	10	1.9	663.1
Glasgow	2	6	2.7	2,435	9	3.5	334.5
Edinburgh	3	14	9.0	1,150	17	3.7	286
Newcastle upon Tyne - Middlesbrough	4	5	4.9	1,560	15	1.3	323.6
Gloucester - Bristol	5	14	6.8	3,725	23	3.5	660.5
Southampton - Portsmouth	6	4	11.3	2,385	11	2.0	901.7
Cambridge	7	20	65.1	6,380	23	1.3	340.7
Wokingham - Farnham	8	5	0.8	100	11	2.9	871.9
London	9	47	75.1	2,790	70	1.3	333.6
Birmingham	10	2	1.8	1,815	7	1.8	330.7
Leicester - Coventry	11	6	2.4	750	14	1.6	177.7
Leeds - Sheffield - Nottingham	12	7	5.2	3,370	17	0.8	214.2
Manchester - Liverpool	13	6	1.9	1,080	22	0.9	180.5

*Note: Excludes firms with zero private investment or zero IUK funding.*

*Source: Data City (2025).*

Table 5 provides a complementary view by reporting mean and median values conditional on receiving funding, excluding firms with zero recorded private investment or zero Innovate UK (IUK) funding. This allows us to distinguish between (i) whether funding is widespread within clusters (as implied by the zero medians in Table 4) and (ii) the typical scale of funding among recipients. For Innovate UK funding, Table 5 suggests that the typical award size among recipients varies across clusters. Some clusters display relatively higher median IUK funding among funded firms (e.g., Southampton-Portsmouth and Wokingham-Farnham), whereas others show lower median values, pointing to differences in the intensity of public support conditional on participation.

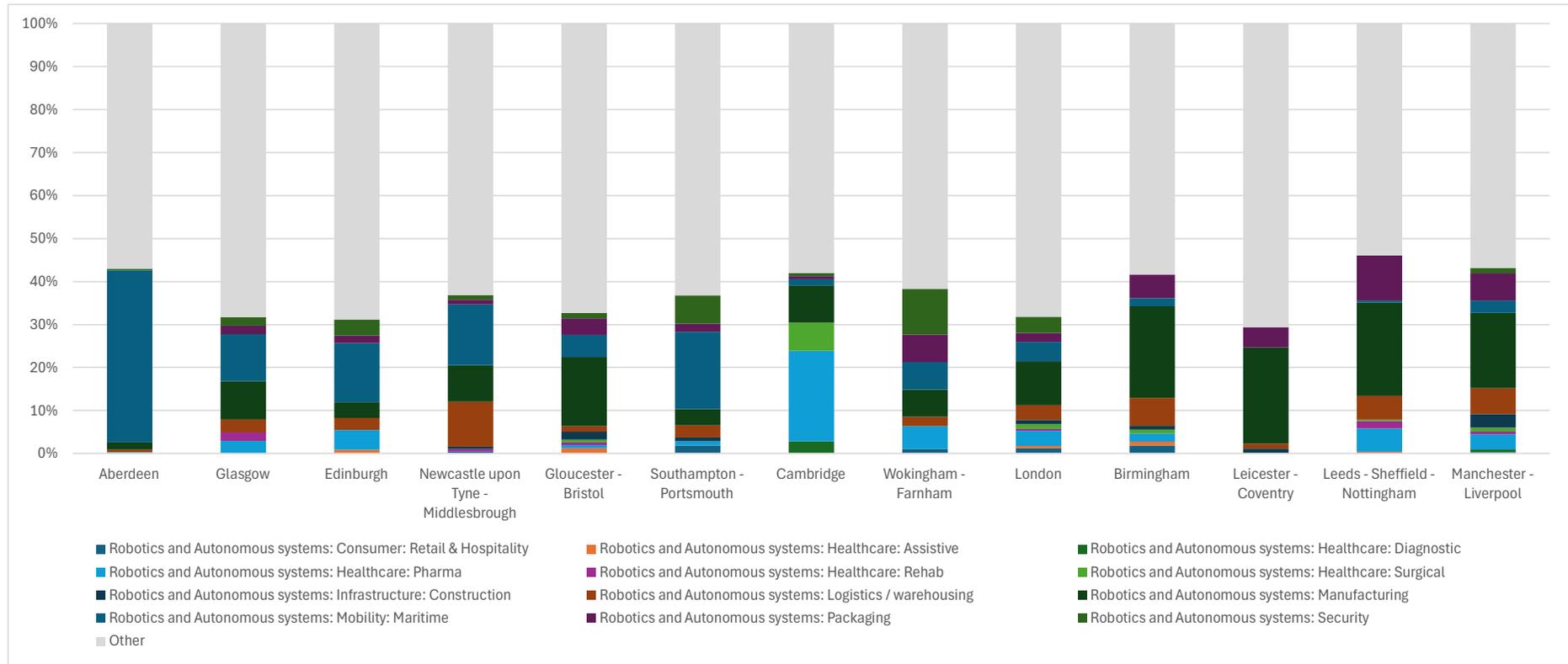


Figure 1: RAS target sectors across clusters and regions

Figure 12 illustrates the distribution of target application sectors of RAS firms across identified clusters and regions, expressed as proportional shares. Two key insights emerge.

First, the figure reinforces the functional heterogeneity of RAS clusters, showing that clusters differ not only in scale and funding profiles (as demonstrated in Table 4), but also in the sectoral orientation of RAS activity. While all clusters exhibit some degree of diversification, distinct patterns are evident in the relative prominence of specific application domains, suggesting that clusters specialise in different segments of the RAS value space rather than converging on a single dominant model.

Second, several clusters display clear sectoral emphases that align with their regional industrial contexts. For example, clusters such as Southampton–Portsmouth and Aberdeen show a relatively higher share of mobility- and infrastructure-related RAS applications, consistent with the presence of maritime, logistics, and engineering-intensive activities. In contrast, clusters such as Cambridge and London exhibit stronger representation in healthcare-related RAS applications (including pharma, diagnostics, and assistive technologies), reflecting a more research-intensive and knowledge-driven orientation. Additionally, clusters including Leicester–Coventry and Leeds–Sheffield–Nottingham display a comparatively higher share of manufacturing- and packaging-oriented RAS applications, consistent with more industrially embedded ecosystems.

Taken together, Figure 12 complements the spatial and firm-level analyses by showing that the UK RAS landscape is not only multi-centred in geographical terms, but also functionally differentiated across regions, with clusters specialising in distinct application domains rather than replicating a single, homogeneous agglomeration model. In Appendix 1, we show the geographical clustering of firms in our 6 target sub-sectors.

## 5. The UK robotics and autonomous system (RAS) infrastructure landscape

### 5.1 Introduction

In line with our framework for innovation and commercialisation infrastructure in emerging technologies (see Jibril et al. 2023), the infrastructure supporting commercialisation includes physical assets and ‘soft’ infrastructure. ‘Soft infrastructure’ includes institutions and organisations that provide resources, services and networks which support innovation and commercialisation. The research and commercialisation value chain consists of different stages: early-stage research, industrial translation and demonstration, the commercialisation of new products, and scaling up. Both physical and soft infrastructure can support the various stages of innovation and commercialisation. To accommodate the types of organisations that can support RAS development/commercialisation in the UK, we adapted our original infrastructure framework by delineating three broad categories of soft infrastructure and four categories of physical infrastructure as follows:

#### **Three categories of soft infrastructure**

**Research and Innovation Ecosystem Enabling Organisations (EEOS)** fund Research and Innovation in RAS sector. They include funding organisations such as EPSRC, UKRI, Defence Science and Technology Laboratory, IUK, and Department of International Trade (DIT). These organisations provide a ‘System Guidance’ function to the innovation system (Bergek et al., 2008); they provide targeted and strategic organisational investments in the UK RAS sector with a view to supporting knowledge creation, knowledge diffusion, or both.

**Strategic Coordinating Organisations (SCOs)** include sectoral bodies, trade organisations, and Knowledge Transfer Networks, which are regarded as credible integrators of knowledge. They include organisations like IUK Business Connect and The National Robotarium. These organisations may work closely with the R&I ecosystem enablers to develop and implement the strategic direction for the UK RAS sector. They may also function as thought leaders, widely recognised as critical players in the innovation system and may hold considerable convening power within the sector. They enable ‘Knowledge Diffusion through Interaction’ (Bergek et al., 2008) by facilitating knowledge flows within the innovation system, identifying and integrating knowledge from outside the system, and serving as intermediaries for collaboration.

**Industry and Research Networks** include organisations such as sectoral bodies and trade organisations, but unlike strategic coordinating organisations, they typically have a narrower

research, industry, or geographical focus, and they are further away from the strategic activities of R&I ecosystem enablers. Nevertheless, they provide important soft support to their members, including networking opportunities, bringing together research and industry actors, introducing potential investors, signposting members to funding opportunities, etc. These include organisations such as UK-RAS Network, Robotics Forum, Automate UK, BARA (British Automation & Robot Association), UKIVA (UK Industrial Vision Association), etc.

#### **Four Categories of Physical infrastructure:**

**Research and Translation (R&T) infrastructure** refers to facilities and assets that support basic RAS research and research aimed at proving the feasibility of the technology, for example, through experimental proofs of concept. These are usually laboratory-scale facilities. This infrastructure tends to support Technology Readiness Levels (TRL) 1 to TRL 3.

**Translation and Demonstration (T&D) infrastructure** encompasses facilities and assets that support the industrial translation of research, moving beyond lab validation to validation in the relevant environment, enabling, for example, the development of RAS prototypes. These facilities typically support TRL 3 to TRL 5

**Demonstration and Commercialisation (D&C) infrastructure** comprises larger-scale facilities, typically operating at pilot and demonstration scales. They include the Satellite Applications Catapults, RACE (Remote Applications in Challenging Environments), UKAEA, and the Manufacturing Technology Centre. These facilities may support up to TRL 9.

**Commercialisation and Scale-up (C&S-up) facilities** tend to be similar to Demonstration and Commercialisation facilities, except they focus more on products that have already achieved a degree of market penetration, supporting these to produce at levels that deepen market penetration or enable scale-up. There is, of course, considerable overlap in functions across different infrastructure categories. The classification above recognises this, and the categories represent the highest TRL levels each facility supports. It is also worth clarifying that for both T&D and D&C infrastructure, we use 'Demonstration' in the sense of technology readiness.

## **5.2. Characterising the UK infrastructure landscape for RAS**

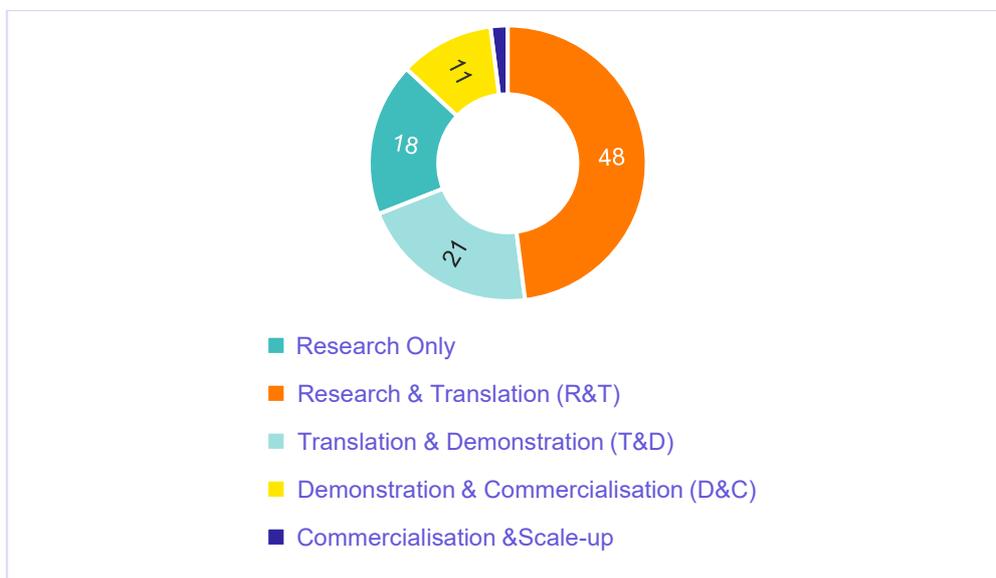
To identify the soft and physical infrastructure supporting firms in the UK RAS sector, we conducted a review of the existing literature, including academic papers, news articles, and

reports produced by government and other stakeholders. We consulted a wide range of stakeholders and experts. In relation to physical infrastructure in particular, we also drew on data from: (i) InfraPortal, the UK research and innovation infrastructure portal, which hosts a catalogue of more than 750 publicly funded research and innovation infrastructures open to users; and (ii) company websites. In addition, we carried out broad online searches using Google and Google Scholar, employing key terms such as ‘Robotics and Autonomous Systems (RAS) infrastructure in the UK’, ‘UK RAS infrastructure/organisations’, ‘UK RAS facilities’, and ‘organisations supporting the RAS sector in the UK’.

We identified seventy-six organisations, with sixteen providing soft support, including seven Ecosystem Enabling Organisations (EEOs), two Strategic Coordinating Organisations (SCOs), and seven Research and Industry Networks. A total of sixty physical infrastructure facilities were identified, including ten Research only facilities, thirty Research & Translation facilities, thirteen Translation and Demonstration (T&D) facilities, six Demonstration and Commercialisation (D&C) facilities, and one Commercialisation and Scale-up (C&S) facility. Thus, about 21% of the infrastructure organisations identified are soft infrastructure (EEOs, SCOs and networks). Within the physical infrastructure, facilities predominantly focus on research only (17%) and research and translation (50%), which collectively account for 67% of the total physical infrastructure. Mid- to high TRL physical infrastructure (T&D, D&C and C&S-up) collectively constitutes only 33% of the overall physical infrastructure (See Figures 13 and 14 below).

As in our [Agri-tech report](#), the distribution of RAS infrastructure is consistent with the observation made by a former Bank of England Chief Economist, Andy Haldane, who described the UK as an innovation ‘[hub without spokes](#)’. In other words, this research also demonstrates that the UK has a strong RAS research (and early translation) base with more facilities spread at lower TRLs and in the soft infrastructure category (EEOs, SCOs, Networks, research and early-stage translation) than at higher TRLs (Translation, Demonstration, Commercialisations and Scale-up). This may explain why the UK struggles to reap the benefits of RAS and other emerging technologies that it is excellent at generating world-class research in, prompting the introduction, in February 2025, of the ‘[Smart Machine Strategy 2035](#)’ report. However, the Smart Machine Strategy focuses on the demand/adoption side of RAS, whereas this report focuses on the supply/UK domestic RAS development side.

Table A in Appendix 2 lists all the UK RAS infrastructure organisations we have identified, their categories within our infrastructure framework, their primary sources of funding (public or private), and their geographical locations. Table B in Appendix 2 matches RAS infrastructure to the specific RAS sub-sectors that they support. Note that here we focus only on the capabilities of the facilities to support the six sectors within the scope of this study; they may have additional capabilities for supporting other RAS sub-sectors. Here we observe that multi-sector collaboration is most common in early-stage TRLs (1-5), dominated by combinations involving Manufacturing and Advanced Manufacturing with Healthcare, Defence, or Marine sectors. At higher TRLs (7-9), combinations appear to become rarer and more specialised.



**Figure 13: Categories of Physical Infrastructure Landscape for UK RAS (%)**

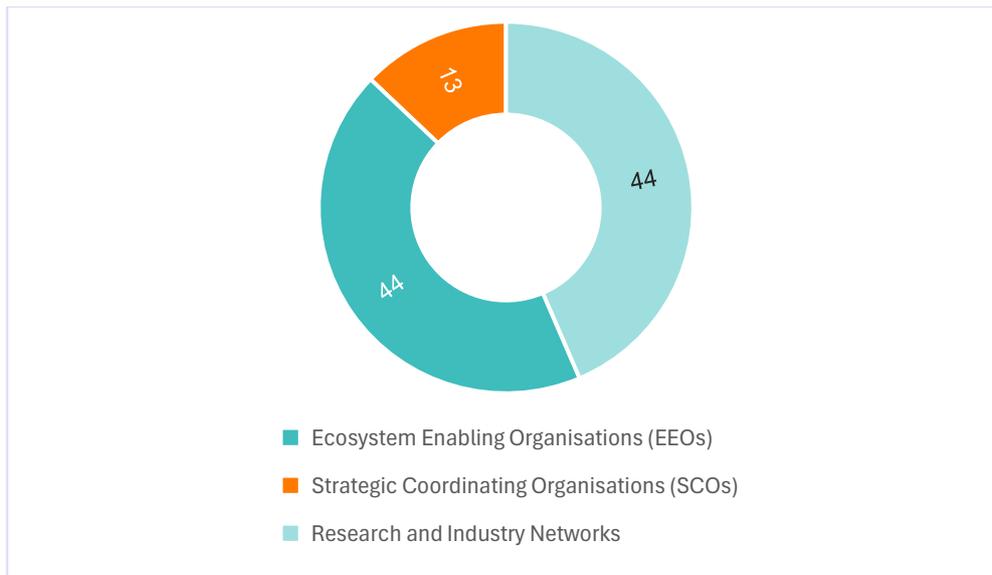


Figure 2: Categories of Soft Infrastructure Landscape for UK RAS (%)

### 5.3 Geographical distribution of RAS Infrastructure

Most of the soft infrastructure for RAS has a national spread, i.e., the Ecosystem Enabling Organisations, Strategic Coordinating Organisations and Research/Industry Networks (see Table A in Appendix 2). Here, we look at the geographical distribution of the identified physical facilities and, overall, two patterns emerged:

» ***Research and early-stage translation infrastructure dominate most regions' RAS landscape***

Most regions (e.g. the North West, East Midlands, East of England, Wales, Northern Ireland, Yorkshire & Humber) are characterised by strong, mostly university-led RAS research and training centres. However, capabilities beyond early translation RAS in these regions are limited. The majority of RAS infrastructure operates at **research-only** or **research and translation (TRL 1-3)** stages. Higher-TRL facilities (translation, demonstration, and commercialisation) are comparatively scarce. Infrastructure supporting **demonstration, commercialisation, and scale-up (TRL 7-9)** is rare and unevenly distributed.

» ***A small number of regions span the full innovation pipeline***

Despite the preponderance of research and early translation facilities in most regions, a few regions such as Scotland and the South East stand out for hosting infrastructure across multiple TRLs. These include translation, demonstration and limited commercialisation facilities, supported by national-scale facilities and soft infrastructure.

Other patterns that can be discerned from the RAS infrastructure we have identified (see Table A in appendix 2) are:

» **Strong dominance of university-led infrastructure:**

RAS activity across all UK regions is overwhelmingly anchored in universities, with most facilities embedded within higher education institutions rather than stand-alone or privately run centres.

Figure 15 shows the prevalence of each type of infrastructure by region and across TRL levels. This information is presented alongside the map of business clusters to help understand the co-location of infrastructure relative to clusters of business activity.

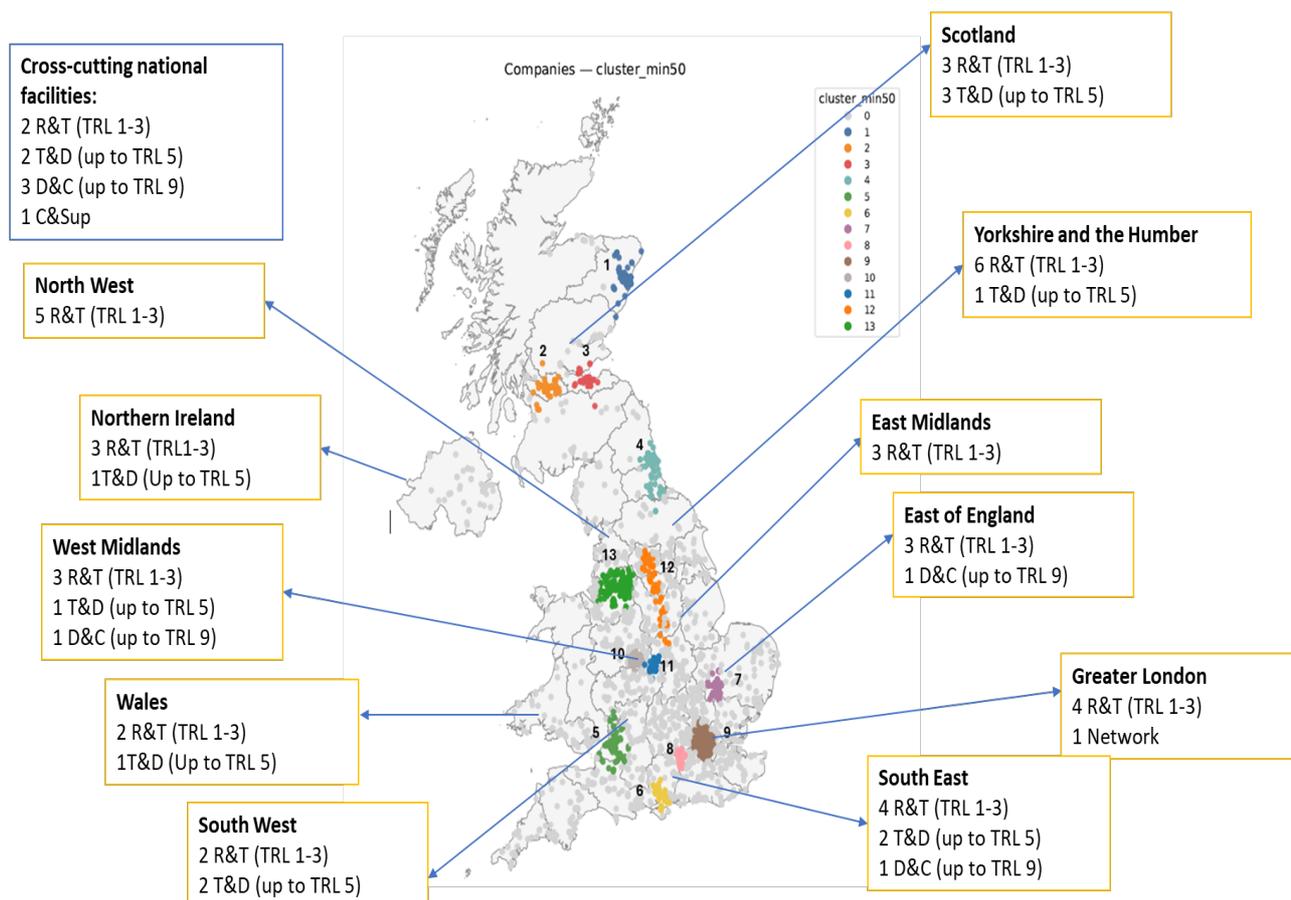


Figure 3: Geographical Distribution of RAS infrastructure

## 5.4 Regional RAS profiles and associated infrastructure

Here we provide a general overview of the RAS landscape in each region before summarising regional infrastructure.

### 5.4.1 Yorkshire & Humber

The Yorkshire and the Humber region has significant research, innovation and some industry activity in RAS. Several leading universities in the region, such as the University of Sheffield, University of Leeds, and University of York, host active RAS research groups that focus on areas such as autonomous industrial robots, medical and assistive robotics, human-robot interaction, and software engineering for safe autonomy. These include Sheffield's [Robotics and Autonomous Systems](#), Leeds' [Institute of Robotics, Autonomous Systems and Sensing](#) and York's [YorRobots](#). Also, these institutions also participate in national networks that coordinate robotics research across the UK thereby helping to strengthen the links between academia and industry. Moreover, international firms like Universal Robots have established a presence in Sheffield and Leeds and provide regional manufacturers with access to collaborative robotics technology, automation and training (Machinery, [2023](#)). This region's strong manufacturing heritage and facilities such as the Advanced Manufacturing Research Centre (AMRC) further support RAS development and adoption. In terms of funding, companies/businesses in Yorkshire and the Humber have benefited from innovation funding for automation and agri-robotics. In fact, since the start of 2023, Innovate UK "has awarded around 800 grants to businesses in Yorkshire and Humberside" (Business Cloud, [2025](#)).

However, like the rest of the UK, RAS infrastructure in this region mainly focuses on research (4 facilities) and research and early translation (2 facilities) with a single translation and demonstration facility (see Table 6 below).

**Table 6: RAS Infrastructure in Yorkshire & Humber**

Infrastructure	Framework position	Publicly funded	Location	Region
1 Centre for Automation and Robotics Research (CARR)	Research only	Y	Sheffield Hallam University	Yorkshire and the Humber
2 Digital Innovation Network	Research only	Y	University of Sheffield/Sheffield Hallam University	Yorkshire and the Humber
3 Sheffield Robotics	Research only	Y	University of Sheffield	Yorkshire and the Humber
4 YorRobots	Research only	Y	University of York	Yorkshire - North
5 The Robotics at Leeds	R&T	Y	University of Leeds	Yorkshire and the Humber
6 Advanced Manufacturing Research Centre (AMRC) - The University of Sheffield	R&T	Y	Sheffield	Yorkshire and the Humber
7 Advanced Manufacturing Research Centre	T&D	Y	Sheffield	Yorkshire and the Humber

## 5.4.2 Greater London

Greater London is an important research and innovation hub for RAS technologies. For instance, among other London-based universities, the University College London (UCL) hosts active RAS research, including the [Autonomous Manufacturing Lab](#) (AML), which works on multi-robot systems and autonomous processes with industry partners and King's College University's [Centre for Robotics Research](#) (CORE). London is also home to autonomous vehicle development companies such as Wayve and Zenic. In fact, Wayve and Uber announced, early June 2025, a partnership to “develop and launch public-road trials of Level 4 (L4) fully autonomous vehicles in London” (Wayve, [2025](#)). Similarly, RAS infrastructure in Greater London mainly focusses on research and translation (3 facilities) with one network (International Society of Automation UK) (see Table 7 below).

**Table 7: RAS Infrastructure in Greater London**

Infrastructure	Framework position	Publicly funded	Location	Region
1 ISA UK Section (International Society of Automation UK)	Network	N	London	Greater London
2 The UCL EPSRC RAS capital facility	Research only	Y	University College London	Greater London
3 The Micro-Engineering Facility for Medical Robotics	R&T	Y	Imperial College London	Greater London
4 The Centre for Robotics Research (CORE)	R&T	Y	King's College London	Greater London
5 The Centre for Advanced Robotics at Queen Mary (ARQ)	R&T	Y	Queen Mary University of London	Greater London

### 5.4.3 Scotland

Supported by world-class university centres, Scotland has developed a significant research and innovation base in RAS. The National Robotarium in Edinburgh, a £22.4 million purpose-built facility led by Heriot-Watt University in partnership with the University of Edinburgh, acts as the UK's national centre for robotics and AI research. This facility provides high-specification laboratories for RAS testing and development and for fostering industry collaboration and skills development (Herriot-Watt University, [Undated](#)). In fact, Scotland's universities are central to research excellence in RAS, particularly through the Edinburgh Centre for Robotics, which brings together over 50 investigators to work on autonomous systems, safe human-robot interaction and industry-aligned applications in diverse sectors from healthcare to construction and energy. The centre also trains doctoral researchers and collaborates with industry partners through an aligned doctoral programme (Edinburgh Centre for Robotics, [Undated](#)). Other bodies such as the Scottish Research Partnership in Engineering (SRPe) RAS Thematic Leadership Group also play important roles in the strategic coordination of RAS research and innovation among Scottish Universities. This group links academic expertise from institutions including Glasgow, Edinburgh Napier, Strathclyde and others to foster collaboration and align research to industrial and societal challenge areas.

Hence, in addition to the strong presence of research and early translation infrastructure (2 facilities), Scotland also has an impressive presence of some higher TRL RAS infrastructure (4 translation and demonstration facilities) (see Table 8 below).

**Table 8: RAS Infrastructure in Scotland**

Infrastructure	Framework position	Publicly funded	Location	Region
1 Communications, Sensing, and Imaging (CSI) group	R&T	Y	University of Glasgow	Scotland
2 The Edinburgh Centre for Robotics	T&D	Y	A joint venture between the University of Edinburgh and Heriot-Watt University	Scotland
3 Edinburgh Centre for Robotics (ECR)	T&D	Y	Edinburgh	Scotland
4 The National Robotarium	T&D	Y	Edinburgh	Scotland
5 Built Environment - Smarter Transformation (BE-ST) (formerly CSIC)	T&D	Y	Scotland	Scotland
6 Centre for Artificial Intelligence & Robotics (CAIR)	R&T	Y	Edinburgh University	Napier Scotland

#### 5.4.4 South East

The South East of England (including counties such as Oxfordshire, Surrey and Hampshire) plays a significant role in the UK RAS ecosystem through research, academic strength and specialist companies. The University of Oxford's Oxford Robotics Institute (ORI) is one of the region's leading research centres, bringing together multidisciplinary groups to advance research, translation and demonstration in autonomous perception, planning, control and robotic systems (Enterprise Oxfordshire, [2025](#)). Also, at the heart of RAS capability in the South East is RACE (Remote Applications in Challenging Environments), which is a national robotics test facility operated by the UK Atomic Energy Authority (UKAEA) at Culham Science

Centre in Oxfordshire. RACE focuses on remote handling and autonomous robotics, particularly for challenging environments such as hazardous inspection and autonomous vehicle testbeds, and forms part of the UK Government’s national RAS Strategy infrastructure. In fact, RACE offers extensive test environments, including mock road networks for autonomous vehicle trials and supports connected autonomy research (UKAEA, [2025](#)). Moreover, universities in the region, for instance, Surrey and Sussex, offer academic courses in RAS, thereby helping to strengthen a strong pipeline of skills and research that support both foundational RAS science and applied robotic and autonomous systems engineering.

Thus, from our findings (see Table 9), in addition to infrastructure for RAS research and early translation (two research only and two research and translation facilities), the South East also possesses two translation and demonstration facilities and one demonstration and commercialisation facility.

**Table 9: RAS Infrastructure in the South East**

	<b>Infrastructure</b>	<b>Framework position</b>	<b>Publicly funded</b>	<b>Location</b>	<b>Region</b>
<b>1</b>	The Autonomy USRG	Research only	Y	University of Southampton	South East
<b>2</b>	The Robotics and Mechatronic Systems Research group (RMSR)	Research only	Y	University of Sussex.	South East
<b>3</b>	STAR LAB at Surrey University	R&T	Y	Guildford	South East of England
<b>4</b>	Oxford Robotics Institute	R&T	Y	Oxford	Oxfordshire - South East

5	Oxford Robotics Institute (ORI), University of Oxford	T&D	Y	Oxford	Oxfordshire
6	Satellite Applications Catapult	T&D	Y	Oxfordshire	Oxfordshire - South East Region of England
7	RACE (Remote Applications in Challenging Environments) UKAEA	D&C	Y	Culham (near Abingdon)	Oxfordshire.

### 5.4.5 East of England

RAS in the East of England is mainly anchored in academic research and education, with notable contributions from Cambridge, Hertfordshire, Essex and others. These institutions support RAS through core research, doctoral training collaborations (especially in agri-food robotics) and engineering education (University of Cambridge, [2019](#)). Thus, this region contributes to the UK’s broader RAS ecosystem mainly through interdisciplinary research, skills development and participation in country-wide knowledge exchange. Also, cross-cutting/nation-wide soft infrastructure organisations and RAS networks such as EPSRC and UK-RAS Network influence RAS activity in this region by fostering collaborations, workshops and shared research agendas (UK RAS STEPS, [2025](#)). RAS infrastructure in this region is predominantly research and translation-based (3 facilities) with one demonstration and commercialisation facility (see table 10 below).

**Table 10: RAS Infrastructure in East of England**

Infrastructure	Framework position	Publicly funded	Location	Region
1 The Adaptive Systems Research Group	R&T	Y	University of Hertfordshire	East of England
2 The Essex Robotics group	R&T	Y	University of Essex	East of England
3 The Machine Intelligence Laboratory	R&T	Y	University of Cambridge	Cambridgeshire/East of England
4 Satellite Applications Catapult	D&C	Y	Cross cutting	East of England

**5.4.6 East Midlands**

In this region, RAS activity is also strongly university-led, with the principal regional hub being the [Lincoln Centre for Autonomous Systems \(L-CAS\)](#) at the University of Lincoln. This centre undertakes internationally recognised research in mobile robotics, autonomy, perception and human-robot interaction, with a particular strength in agri-food robotics. L-CAS leads the EPSRC Centre for Doctoral Training in Agri-Food Robotics, which is a national programme delivered with the University of Cambridge and the University of East Anglia (McGowan, [2019](#)). Thus, this region possesses three research and translation facilities for RAS (see Table 11).

**Table 11: RAS infrastructure in East Midlands**

Infrastructure	Framework position	Publicly funded	Location	Region
1 The Lincoln Centre for Autonomous Systems (L-CAS)	R&T	Y	University of Lincoln	East Midlands
2 The Intelligent Automation Centre	R&T	Y	Loughborough University.	East Midlands
3 The Rolls-Royce University Technology Centre (UTC)	R&T	Y	University of Nottingham	East Midlands

### 5.4.7 West Midlands

In the West Midlands, RAS activity is anchored by a formal cluster and active research involvement. [The West Midlands RAS Cluster](#), established in May 2024 by the Manufacturing Technology Centre (MTC) and the University of Birmingham, acts as the focal point for RAS activity. The cluster aims to advance the development and deployment of robotics and autonomous systems across the West Midlands through an increase in productivity, supporting high-skilled employment, and strengthening the regional supply chain for RAS technologies. The region is also active in RAS education and research with three research-related infrastructure (1 research only and two research and translation facilities) and one translation and demonstration facility (see Table 12).

**Table 12: RAS Infrastructure in West Midlands**

Infrastructure	Framework position	Publicly funded	Location	Region
1 The Intelligent Robotics Laboratory	Research only		University of Birmingham	West Midlands
2 The National Centre for Precision Farming	R&T	Y	Harper Adams University	West Midlands
3 The Robotics and Autonomous Systems: The Smart and Connected Vehicle	R&T	Y	University of Warwick	West Midlands
4 Birmingham Extreme Robotics Lab (ERL)	T&D	Y	University of Birmingham	Midlands

### 5.4.8 South West

Like other regions, the South West possesses some RAS research capabilities in addition to hosting a couple of higher TRL RAS infrastructure. In terms of RAS research, the University of Bath’s Centre for Autonomous Robotics (CENTAUR) specialises in research in robust, flexible and interconnected autonomous systems across disciplines, whereas the Bristol Robotics Laboratory (BRL) is the region’s flagship RAS centre and the largest multidisciplinary robotics research facility in the UK. Higher TRL RAS infrastructure in this region includes [Smart Sound Plymouth](#), a national marine autonomy testbed operated by Plymouth Marine Laboratory, which provides authorised water space for trials of uncrewed autonomous systems across surface and sub-surface platforms, which supports maritime, defence and blue economy applications. The region also benefits from access to facilities such as the EPSRC-backed [Hot Robotics](#) infrastructure, which makes specialised autonomous robots and test spaces available to researchers (e.g. nuclear research). Thus, this region possesses one research-only facility, one research and translation and two translation and demonstration facilities (see Table 13 below).

**Table 13: RAS Infrastructure in the South West**

Infrastructure	Framework position	Publicly funded	Location	Region
1 Bristol Robotics Laboratory (BRL)	R&T	Y	Bristol	South West
2 Centre for Autonomous Robotics (CENTAUR)	Research only	Y	University of Bath	South West
3 Hot Robotics	T&D	Y	Bristol	South West
4 Smart Sound Plymouth	T&D	N	Plymouth	South West England

#### 5.4.9 North West of England

The North West of England has a strong research-led RAS landscape centred on the region's universities. Major institutions like the University of Salford, the University of Manchester, Lancaster University, the University of Liverpool, and Liverpool John Moores University host well-established RAS groups. The University of Salford's [Autonomous Systems and Advanced Robotics \(ASAR\) centre](#) is one of the region's most prominent RAS assets, recognised nationally for large-scale experimental facilities and applied research in industrial, nuclear, aerospace and healthcare robotics. Also, the University of Manchester's [Centre for Robotics and AI](#) provides interdisciplinary leadership in intelligent autonomy and real-world robotic systems, while Liverpool-based institutions contribute strengths in autonomous perception, verification and robot learning (University of Liverpool, [2018](#); Liverpool John Moores University, [undated](#)). Thus, the RAS infrastructure in this region is dominated by research and early translation (5 facilities) (see Table 14 below).

**Table 14: RAS Infrastructure in the North West of England**

Infrastructure	Framework position	Publicly funded	Location	Region
1 The Lancaster Intelligent, Robotic & Autonomous Systems Centre (LIRA)	R&T	Y	Lancaster University	North West of England
2 The Centre for Autonomous Systems Technology (CAST)	R&T	Y	University of Liverpool	North West of England
3 The Northern Engineering and Robotics Innovation Centre (NERIC)	R&T	Y	Salford	North West
4 Centre for Robotics & AI (University of Manchester) / CRADLE	R&T	Y	University of Manchester	Greater Manchester/ North West England
5 The Autonomous Systems and Robotics (ASAR)	R&T	Y	University of Salford, Manchester	Greater Manchester/North West of England

#### 5.4.10 Northern Ireland

The RAS landscape in Northern Ireland is also largely research driven. For instance, Queen’s University Belfast offers advanced postgraduate teaching in robotics and artificial intelligence, which prepares graduates for careers in autonomous systems and related industries. This is supported by the Advanced Manufacturing Innovation Centre (AMIC), which integrates digitalisation, automation and robotics research with industrial partners. Also, Ulster University has active robotics and intelligent systems research through its [Centre for Industrial Digitalisation, Robotics and Automation \(CIDRA\)](#), providing “a collaborative platform, cutting-edge facilities, and research aligned with industry needs” (Ulster University,

[undated](#)). Thus, RAS infrastructure in Northern Ireland consists of three research and translation and one translation and demonstration facility (see Table 15 below).

**Table 15: RAS Infrastructure in Northern Ireland**

Infrastructure	Framework position	Publicly funded	Location	Region
1 The Centre for Intelligent Autonomous Manufacturing Systems (i-AMS)	R&T	Y	Queen's University of Belfast	Northern Ireland
2 Centre for Industrial Digitalisation, Robotics and Automation (CIDRA)	R&T	Y	Ulster University	Northern Ireland
3 Cognitive Analytics and Digital Robotics Innovation Centre (CADRIC)	R&T	Y	Ulster University	Northern Ireland
4 InnoTech Centre, South West College	T&D	Y	Cookstown	Northern Ireland

#### 5.4.11 Wales

RAS in Wales is research-oriented with Cardiff University’s [Centre for Artificial Intelligence, Robotics and Human-Machine Systems](#) and [Autonomous Systems and Robotics Laboratory](#), undertaking “cutting-edge research that aims to solve practical problems driven by real-world industrial applications” with “cutting-edge equipment” including advanced robotic platforms and sensors for research and industry collaboration. Also, Cardiff Metropolitan University’s Eureka Robotics Centre has been recognised by the Digital Technology Cluster (DTC) as “one of 11 specialist centres in the UK equipped with cutting-edge facilities that enable collaboration between industry and academia.” (Cardiff Metropolitan University, [Undated](#)). Thus, RAS infrastructure for Wales comprises two research and translation and one translation and demonstration facility (see Table 16 below)

**Table 16: RAS Infrastructure in Wales**

Infrastructure	Framework position	Publicly funded	Location	Region
1 EUREKA Robotics Centre	R&T	Y	Cardiff Metropolitan University	Wales
2 Centre for Artificial Intelligence, Robotics and Human-Machine Systems	R&T	Y	Cardiff University	Wales
3 Autonomous systems and robotics laboratory	T&D	Y	Cardiff University	Wales

## 6. Interviews with RAS experts and businesses

In this section, we synthesise findings from ten semi-structured interviews with three RAS experts and seven business respondents working across medical, nuclear decommissioning, health, maritime, education/research, and manufacturing. Interviews were conducted virtually via MS Teams. Thus, in what follows, we first distil the principal challenges facing UK Robotics and Autonomous Systems (RAS) firms/businesses and then explore how respondents understand the interface between RAS commercialisation and adoption.

### 6.1 Challenges Facing Robotics and Autonomous Systems (RAS) Businesses in the UK

Our interviews reveal a recurring pattern of systemic and operational constraints that impede the UK’s capacity to scale RAS innovation effectively. These challenges broadly fall into six interrelated domains: awareness and access to infrastructure/support/incentives; regulation; funding and the ‘valley of death’; skills and talent; and supplier issues.

**(i) Awareness, access, and infrastructure gaps:**

Respondents highlighted a significant awareness gap among both RAS tech developers and potential adopters. Developers struggle to identify what forms of support are available, where they are located, and how to access them. One respondent noted that although support may exist, some companies remain unaware of it or are unable to access it within the time frame they need:

*“There is the support there, there’s probably a lack of awareness of it, but there’s also the time factor.” (Business Respondent 5)*

Another respondent pointed out that support facilities are situated far from the businesses that need them, making access difficult:

*“I think that’s common with a lot of the catapult centres that they get put in in inaccessible locations” (Business Respondent 7).*

A similar lack of awareness was identified among potential adopters, particularly regarding what RAS technologies are capable of:

*“I don’t think enough organisations are actually aware of what robotics can do.” (Expert Respondent 2)*

This underscores the need to better inform developers about existing support organisations and infrastructure, as well as raise the awareness of potential adopters (UK businesses) on the transformative power of RAS technologies.

**(ii) Regulatory barriers:**

Another key theme raised by respondents concerns the lack of clarity and dynamism in the UK RAS regulatory environment. Regulatory regimes, especially in the maritime sector, were described as “*stifling innovation*”, unable to keep pace with the speed of technological change or, in the case of RAS adoption, affected by the risk aversion of regulators. These themes were echoed in the following excerpts from respondents operating in the Maritime and manufacturing sectors:

*“I think the main issue is I’d say **regulation and the regulatory authority that is the MCA [Maritime and Coastguard Agency]**, and the main issue that all of RAS companies [in the sector*

face] as innovators... *It's the regulation authorities that are really stifling innovation*" - **Business Respondent 1 (Marine/Maritime)**

*"I think the other challenge is around regulation. There's really no clarity; there's no reason for regulators to take any risks"* - **Business Respondent 4**

Arguing further on regulators' risk aversion, **Business respondent 4** added that *"our [UK] regulators are in charge of risk, but they have none of the reward aspect to it. Your kind of relying on individual regulators making a decision to basically put themselves at risk to allow something, [yet they have] no ability... to make a risk assessment around the benefit of that risk."* This, they suggested, creates an imbalance that discourages flexibility and innovation in RAS regulatory decision-making.

However, a manager of RAS company, specialised in developing robots for nuclear decommissioning, maintained that they are *"used to it [regulatory issues]...[because] the whole business is developed around regulation"* (**Business Respondent 2**).

### (iii) **Funding logic and the "valley of death":**

Both expert and business respondents highlighted that public support is fragmented and overly weighted towards early-stage activity, with insufficient provision for late-stage validation and scale-up. As one expert explained:

*"Government funding... is very silo-oriented... very good on the lower TRL... very difficult to scale it up... there is a lot of this valley of death happening."* (**Expert Respondent 1**)

This concern was echoed by a business respondent, who offered the following reflection:

*"... So, we [in the UK] are too short termists and we don't support companies long enough through the R&D process into commercialisation compared to other countries which is why we like to work in America. We can get American Government funding way easier than UK and we're a British company, you know and that's crazy. That's totally crazy... At the moment I think they [UK Government] like short term headlines and to be able to pat themselves on the back because they've developed some cool technology. But I don't think there's any long-term strategy around how we actually get this stuff to a high TRL level."* (Business Respondent 2)

The national *Smart Machines 2035* strategy (2025) similarly recognises these challenges and calls for end-to-end support across the innovation lifecycle.

Also, an expert respondent who regularly engages with RAS companies argued that finance is indeed a central problem for RAS developers in the UK:

*“Well, I think top of their list is finance. They tend to live from hand to mouth and in a quite a precarious situation. That’s...one of their biggest issues.”* - **(Expert Respondent 2)**

In fact, a business respondent also suggested that some of his colleagues moved to other countries because opportunities for financing/facilities are better there:

*“I know a lot of colleagues who have moved over to America, for example, because there’s a lot of money being poured into experimentation, building, testing things over there, or moved elsewhere across in Europe.”* **Business Respondent 7.**

However, compared to the recurrence of finance as a problem identified by developers in the IRC reports on Agri-Tech (Salihu et al., [2025](#)) and Biotechnologies (Jibril et al., [2024](#)), finance did not feature prominently among the RAS businesses interviewed. While this may be due to differences in the sample sizes of respondents interviewed for the different emerging technology sectors, a respondent made the following interesting comments:

*“There are issues around that [finance], but I suppose we’re so used to them that we don’t really see them as finance problems. There’s a lot of hot money sloshing around in robotics, but it’s mostly investment money, and we’re not particularly interested in that because we’re not aiming for an investment-fuelled sprint and exit approach to running a company. Most of our customers are sensible with their money and very easy to work with in financial terms, so we don’t have much trouble with trade finance. In terms of development finance, we carry out a lot of R&D collaborations, which secure some of the development funding we need, and at other times we work with customers who are able to fund the development themselves.”*  
**(Business Respondent 3).**

#### **(iv) Skills, talent, supplier issues:**

Another constraint identified by RAS companies is access to the right mix of technical and interdisciplinary skills required for successful scale up and commercialisation of innovations. Many RAS developers struggle to recruit engineers and programmers capable of integrating

robotics with artificial intelligence, sensing, and data systems. Respondents articulated the problem thus:

*“In terms of access to skills, yeah, it's a nightmare. I mean, the UK has spent the last 20 years making itself an impossible place to run a company in in terms of access to skills. The Home Office has done an amazing job basically telling people to f\*\*\* o\*\*... So yeah, the UK under the guise of its hostile environment...has built a border control policy which just tells people who might want to come here to engage in the kind of things we do, ‘Don't do that!’. Just don't! Go away’..... which is a real shame, because 20 years ago, 25 years ago, that was not the case. We had very good freedom of movement. We were pretty flexible about people coming here and working here, particularly Europeans.” (Business Respondent 3)*

*“Trying to find and hire the right people for the right task and job is a very challenging and difficult one” - (Business Respondent 6).*

Another respondent pointed out that this problem is more acute for small-scale companies, as existing talents are poached by larger-scale firms:

*“There's a limited talent pool... deep-pocketed organisations... skew the talent pool.” (Business Respondent 7).*

Apart from restrictive immigration policies and talent poaching highlighted above, post-Brexit trade arrangements were also mentioned as another “bigger” supply-side bottleneck. A business respondent explained this further in the excerpt below:

*“The bigger challenges are typically around things like access to suppliers. Again, UK customs [make] it really, really hard to buy stuff. It's just really hard to buy stuff now if you want to use a supplier who is not in the UK, then you're going to have a member of staff whose job is dealing with UK customs. And again, that's a relatively recent change over the last 10 years, but it makes it much, much harder to work because of this. The difficulty of access to partner Organisations, if they're not in the UK at all” (Business Respondent 3).*

These supply-side problems, the respondent suggested, not only add to costs but also discourage experimentation and early adoption, especially among smaller firms that lack logistical capacity.

## 6.2 Interface Between Commercialisation and Adoption.

On the interface between commercialisation and adoption in the UK RAS sector, it emerged from our interviews that this is largely informed by the orientation of the UK RAS developers. According to respondents, the UK RAS developers mainly focus on developing niche or customised RAS products mostly for domestic, educational research, health and social care purposes. As a result, these companies mostly have either private individual and public/state-based customers, rather than large businesses and SMEs (private sector). Hence, very few of UK RAS companies do, as the excerpt from Expert Respondent 2 suggests [our emphasis], focus on developing manufacturing robotic solutions for use by businesses/SMEs:

*“So it's interesting, a lot of the companies that we see first-hand [in the UK] are developing robotics for societal needs and to overcome problems that are more widespread. So, they might be focusing in on things that are related to green energy or sustainable energy, or they might be involved in things that are related to healthcare or social care, very few are actually developing, you know, manufacturing robotic solutions because they're kind of out there. So the adopters of those kinds of technologies tend to be a bit different. So, it tends to be more public sector. So when it comes to healthcare and social care, we're looking at the NHS and you're looking at all of the local authorities that run their social care budgets and the social care provision, and there's a whole conversation we could have there about how difficult all of that is, **but I think the adoption side of things when it comes to the SMEs, and particularly the manufacturing SMEs, is already covered by existing products.** It's more a case of them adopting and using those products.*

*Then if you look at it from the other end of the landscape and we look at the developers, the robotics developers and where they would be marketing their products, it's not in manufacturing so much itself, it's elsewhere.”* **Expert Respondent 2**

The above submission was confirmed by a RAS developer who made the following remarks:

*“It [lack of RAS adoption] doesn't have a massive impact on us because what we're doing is slightly different. It's...we're helping people innovate in robotics and at that point, it's kinda not so much about industry adoption, it's about their being innovators who are going like I can see a problem and I want to use a robot to solve that problem.”* **Business Respondent 3.**

However, this may not mean the complete absence of RAS developers within UK that face commercialisation challenges resulting from UK's slow or inadequate level of RAS technology adoption. This, as per our interview findings, is a problem for companies in the Agri-tech and horticulture sector. For instance, the owner of a RAS company that specialises in developing/providing solutions to farmers answered "Yes, *absolutely!*", when asked if there is a feedback loop between commercialisation-adoption, adding, "*from our experience farmers have been willing to work with us to actually test or trial [our technologies]*" (**Business Respondent 6**). However, the respondent complained that connecting to potential end-users/adopters could sometimes be a challenge for them even when they could see the desire to test new technologies among these potential adopters.

*"I think there's a huge potential for engagement and adoption, but it just comes down to having that link, they [an end-user] found us just because I appeared on TV that he was watching last year having dinner one evening. That isn't a reliable way of connecting people together, but there's definitely that desire for 'let's try out something new. Let's test something new [among] both organisations and homes. What there isn't there is to necessarily work with, let's say, big companies that may collect a lot of data and then expect you to pay for the privilege of being able to do that. Whether that's an opinion squarely from farmers, I've heard it from a lot of them. That's why some of them don't even trust."* - **Business Respondent 6**.

However, an expert respondent pointed out that developers do not often tailor their products in line with customer needs:

*"Quite often there is a disconnect between developers and adopters because the developers do not fully understand the adopter's needs and pains. Instead, they create technologies that might fit but never quite solve the adopter's full needs or create new problems. For me, an example of this is the current humanoid robot trend; undoubtedly its clever technology but (in my opinion), no one developer has articulated a compelling use case that has accelerated adoption (why have a robot that washes your dishes when you have a dishwasher in your kitchen anyway?). This means we end up in a situation where the technology needs of the adopters are not considered and are too underdeveloped to support adoption of higher TRL solutions so they are reluctant to adopt the technology because it doesn't fit their needs."* - **(Expert Respondent 3)**.

## i. The RAS demand and adoption problem

On the whole, we observed the existence of a structural imbalance between what UK RAS developers produce and RAS technologies (or ‘smart machines’) UK businesses need to adopt to capture value, which according to an estimate, can “increase UK Gross Value Added (GVA) across sectors from £6.4 billion to a massive £150 billion by 2035.” ([Smart Machine 2035 strategy](#), 2025). This structural imbalance informed the submission of Business Respondent 4 who vehemently argued that the problem with the UK RAS sector stems from “[t]he dynamics of demand, not so much the supply, because I’m fairly confident that supply will follow demand once demand crystallise it.” He added that:

*“So yeah, for me, it’s about demand. It’s about consolidated demand. It’s using the power of the UK economy to drive demand and then if there is a supply side focus, the first bit should be around the funding side to be able to facilitate and support the growth of the suppliers [RAS developers]”* **Business Respondent 4.**

On the mechanics of market-based solutions for the UK RAS sector, business respondents emphasised that effective industrial policy for robotics and automation should begin by stimulating domestic demand. They argued that demand-led adoption would secure national productivity and employment benefits regardless of the origin of supply, while still creating opportunities for domestic firms to scale into that supply. Current UK firms were seen as confined to niche segments due to fragmented market signals and funding incentives. Respondents suggested that stronger and more assertive government action to drive adoption would catalyse a more robust domestic ecosystem, noting international examples where demand-side pulls, such as in China, have shaped market development more effectively than supply-first approaches:

*“If you start at the demand side and you crystallise UK’s clarity around driving demand, the outcome is, for the UK irrespective of wherever the solutions come from, you get the productivity and all the benefits associated to that adoption....But to be frank, the market will solve that problem when the problem is there to be solved.... It’s all about the market dynamics. If the UK was more assertive and aggressive around the way in which it was going to drive the adoption of robotics and automation, then you would inevitably create a community and reinforce the community around that to be able to deliver that. I think it has to be a market first pull and that’s kind of what you see in China.”*-**Business Respondent 4.**

However, a respondent maintains that, notwithstanding the orientation of the UK RAS developers, the lack of adoption still *affects the drive for suppliers* to develop marketable solutions. They highlighted weak domestic demand as a constraint on the development of marketable automation solutions. Although robotics markets are global, limited UK adoption reduces incentives for firms to innovate locally and expand from a domestic customer base. Respondents noted that while components are often imported, the UK has the capacity for systems integration, and this could be scaled if domestic uptake were stronger. In their view, higher local adoption would generate initial markets for smaller firms, support exports over time, and ultimately stimulate greater innovation in novel technologies.

*“I think there’s an element to lack of demand from companies affecting the drive for suppliers developing marketable solutions. But the automation market is global, so just because UK companies aren’t adopting automation as fast as other countries, it doesn’t mean they can’t sell or develop new products for other regions. It’s certainly a preference that smaller manufacturers like to buy and sell to UK-based companies as a starting point, and once established, would look to export. So if there isn’t local demand for marketable solutions then it’s less likely that a company will start to develop something, if their first entry to a market is overseas.”* **Business Respondent 5.**

Generally, the UK’s failure to capture value from the adoption of RAS technologies has often been largely attributed to slower adoption among SMEs and businesses (Jibril & Roper, 2025). Also, in another recent review, 74% of SMEs in the advanced manufacturing sector were found to be operating without robots (DSIT, 2025). Corroborating this, a respondent (Expert Respondent 1) attributed the poor adoption of RAS by SMEs in the UK to the service-oriented nature of the UK economy, distinctive SMEs’ logic on RAS adoption, and the silo-oriented nature of UK government funding that prioritises early-stage technology development over and above adoption.

*“... there is a low adoption of robots in the UK compared for example with some other countries. If you compare with Germany and... Italy, you know. But also, it’s true that...some of them [low adoption] may be justified partially because [the] UK economy is more service oriented. And there’s a large percentage of service-oriented type of companies. But also...there is a large number of small and medium size enterprises, SMEs basically which have different logic all together from technology point of view development and so on. So,*

*there's a second potential reason...[relating to the fact that]...government funding supporting development of technology is very silo oriented.*

*So, in other words, they'll be working with robotics people to develop robotics technology, but they don't link it to application of this technology. Therefore, it's very good on the lower tier level of technology readiness level. But it's very difficult to scale it up between the two higher tier level which is different logic. So, there is a lot of this valley of death happening.”* **Expert Respondent 1**

Another respondent attributed the adoption problem to risk aversion by UK businesses:

*“I think this largely depends on whether the businesses in question are risk adverse or not. If they are risk adverse, then their willingness to adopt new technologies will be very low and so adoption will be slow. If they are not risk adverse and prepared to accept a few failures along the way, then I think adoption is much easier for them. A good example here is the commercial space industry who generally want complete assurance before they will adopt any type of technology (particularly if it involves critical assets or humans). As such they are unwilling to accept robotics and autonomous operations until someone else has proven the technology; this is hindering adoption of these technologies. I think this is similar across many industries; businesses are afraid to adopt anything they don't fully understand or have the right capabilities to utilise in fear of it damaging their business. This then hinders the development of marketable solutions which then slows down adoption; it's a 'vicious circle' that's difficult to break out of.”-* **(Expert Respondent 3).**

With UK RAS developers mostly operating in the early to mid-stage of the TRLs, we gathered from respondents that almost all mature RAS technologies that businesses in the UK can adopt for productivity development and value capture are imported mainly from China, Europe, and US.

*“Right now, they [RAS technologies] would be mostly imported. Yeah, in fact, entirely imported, because we don't really have a manufacturing sector for the kind of things that SMEs would want, which would be EMRS [Enhanced Mobile Robotic Systems], AGVs [Automated Guided Vehicles] and Cobotting arms [Collaborative Robot Arms].”* **Expert Respondent 2.**

## 7. Summary, conclusions and recommendations

This report examined the UK's Robotics and Autonomous Systems (RAS) sector mainly from the supply-side perspective of RAS developers, focusing on the innovation and commercialisation infrastructure that underpins UK RAS capability development. We also explored the commercialisation-adoption interface. Drawing from new firm-level data sourced via machine learning and web-scraping from the Data City, a synthesis of evidence and gathering of RAS infrastructure from desk-based research, and analysis of in-depth interviews with industry and expert respondents, the report: reviewed existing literature on the state and challenges that affect the development of the UK RAS sector; identified and classified the UK RAS infrastructure in terms of technology readiness levels (TRLs) and geographical/regional distribution using cluster analysis; characterised the UK RAS firms/businesses in terms of technology applications, geographical spread and access to funding opportunities; explored the perspectives of RAS businesses and industry experts on gaps in infrastructure provision and wider innovation and commercialisation challenges; and identified the gaps and investment opportunities for successful UK RAS commercialisation.

Hence, triangulating all the evidence, the key finding of the report is this: the UK has a strong RAS research base and some early-stage translation infrastructure (mostly TRLs 1-3). However, these strengths are not translating into sustained commercial outcomes at scale. Other equally important findings and investment opportunities are highlighted in the ensuing paragraphs.

The UK RAS ecosystem is characterised by a large and diverse population of firms, predominantly micro and small businesses, operating across manufacturing, logistics, maritime, healthcare and defence. RAS activity is geographically dispersed but clustered around regions with established industrial or research capabilities. Funding patterns, however, are uneven. While private investment is more prevalent than public grant support, it is concentrated in a small number of sectors and locations, notably healthcare and defence, leaving many firms in market-led sectors exposed to financing gaps as they attempt to move beyond early-stage development.

The infrastructure landscape also mirrors these patterns. Provision is heavily skewed towards university-led research and early translation, with comparatively limited availability

of RAS facilities that support mid- to high-TRL activities such as translation, demonstration, commercialisation and scale-up. Insights from in-depth interviews with businesses and experts reinforce these findings. Also, firms struggle to navigate a fragmented support ecosystem, face regulatory uncertainty in safety-critical applications, encounter persistent skills shortages, and operate in a domestic market where demand for RAS remains weak, except in a small number of state-supported sectors (defence and health/medical RAS applications). These challenges are mutually reinforcing: low adoption dampens incentives to invest, innovate, and scale up, which, in turn, constrains the development of robust domestic supply chains and capabilities.

Thus, by and large, the evidence suggests that the UK RAS sector's challenge is not one of research quality or early-stage translation activity, but of having the wide-ranging infrastructure and related support to translate, validate, commercialise and scale up RAS research and innovations. Hence, addressing this requires a shift in emphasis from further expansion of early-stage capabilities towards targeted investments that support validation, adoption, and scale up, while recognising the differing commercialisation pathways across sectors.

On this basis, the report identifies five priority investment opportunities thus: **(i)** the development of accessible, high-TRL testing and demonstration facilities aligned with regional sectoral strengths, to help firms de-risk technologies in real-world environments; **(ii)** improvement of collaboration among UK RAS stakeholders **(iii)** demand-led interventions, such as challenge-based procurement and adoption support, to stimulate early markets and strengthen incentives to commercialise; **(iv)** differentiated support models that reflect the contrasting needs of state-led sectors (such as healthcare and defence) and market-led sectors (including manufacturing and logistics); and **(v)** investment in a comprehensive, visible and regularly updated directory of RAS infrastructure to improve access, coordination and international positioning of the UK capabilities.

Now that you have read our report, we would love to know if our research has provided you with new insights, improved your processes, or inspired innovative solutions.

Please let us know how our research is making a difference by completing our short feedback form [via this link](#).

You are also welcome to email us if you have any questions about this report or the work of the IRC generally: [info@ircaucus.ac.uk](mailto:info@ircaucus.ac.uk)

Thank you

The Innovation & Research Caucus

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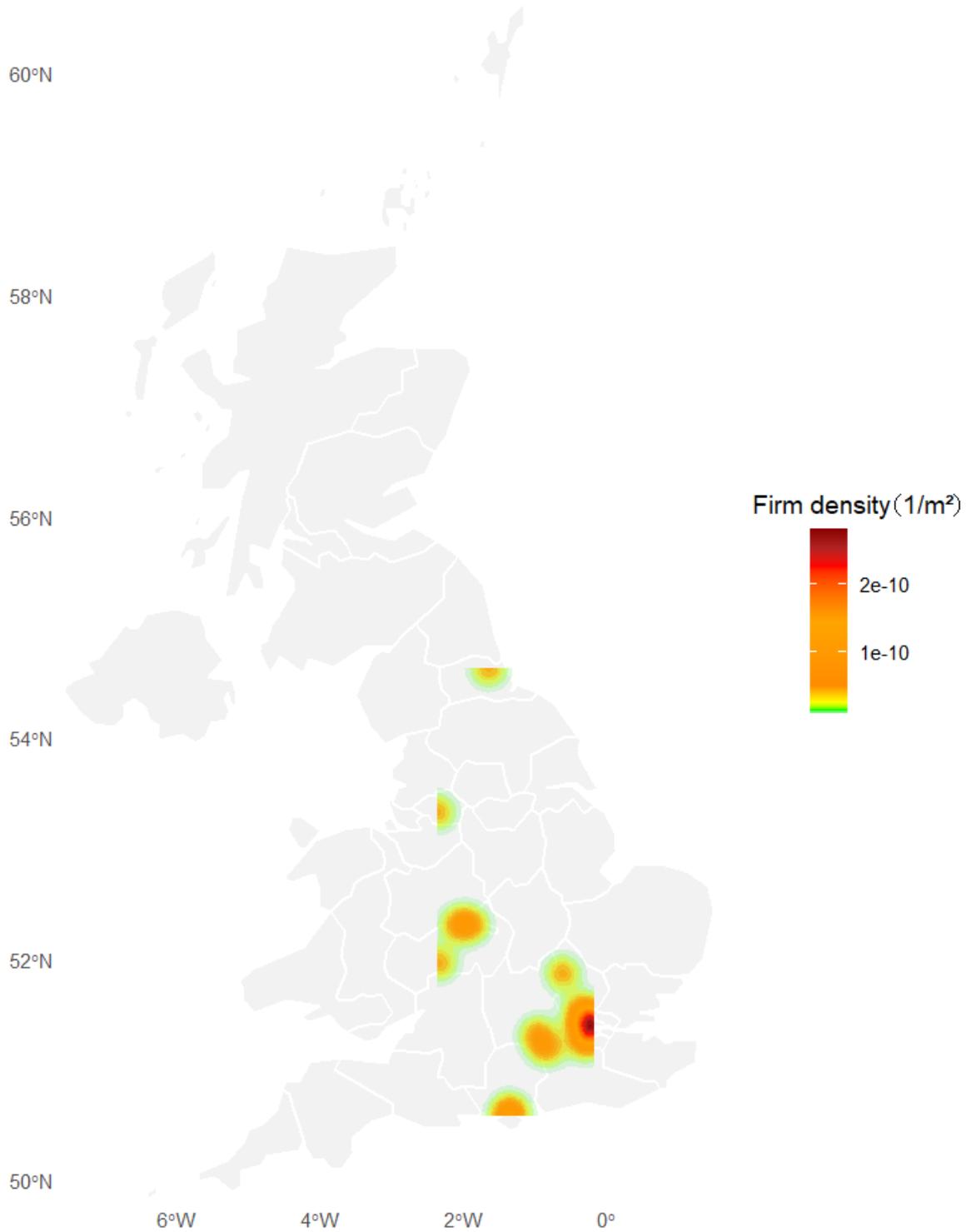
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## Appendix 1

### Sub-sector cluster maps

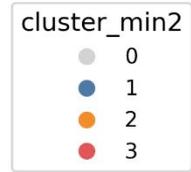
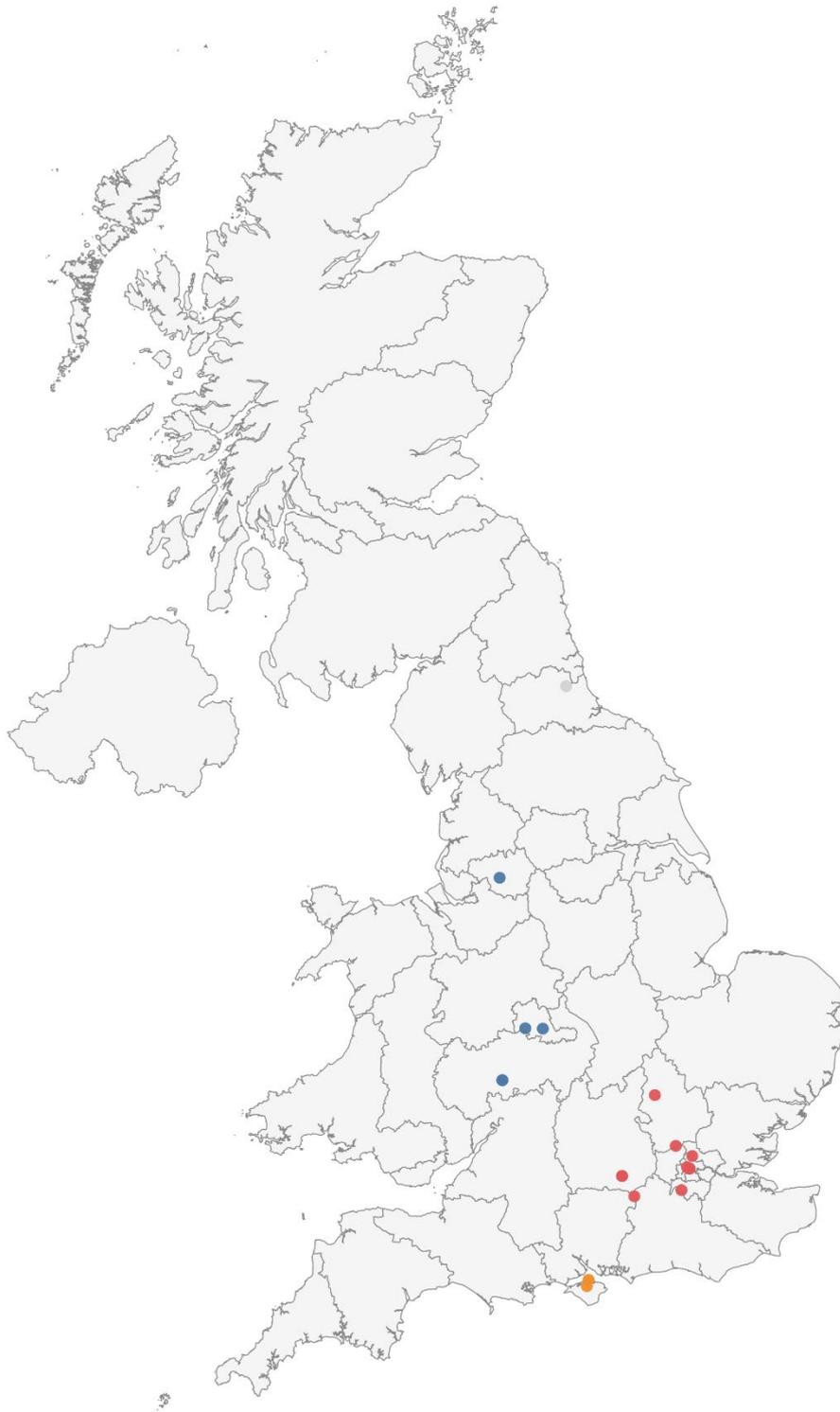
#### Consumer: Retail & Hospitality Firms (RTIC009108)

#### Consumer: Retail & Hospitality Firms Kernel density of firm locations

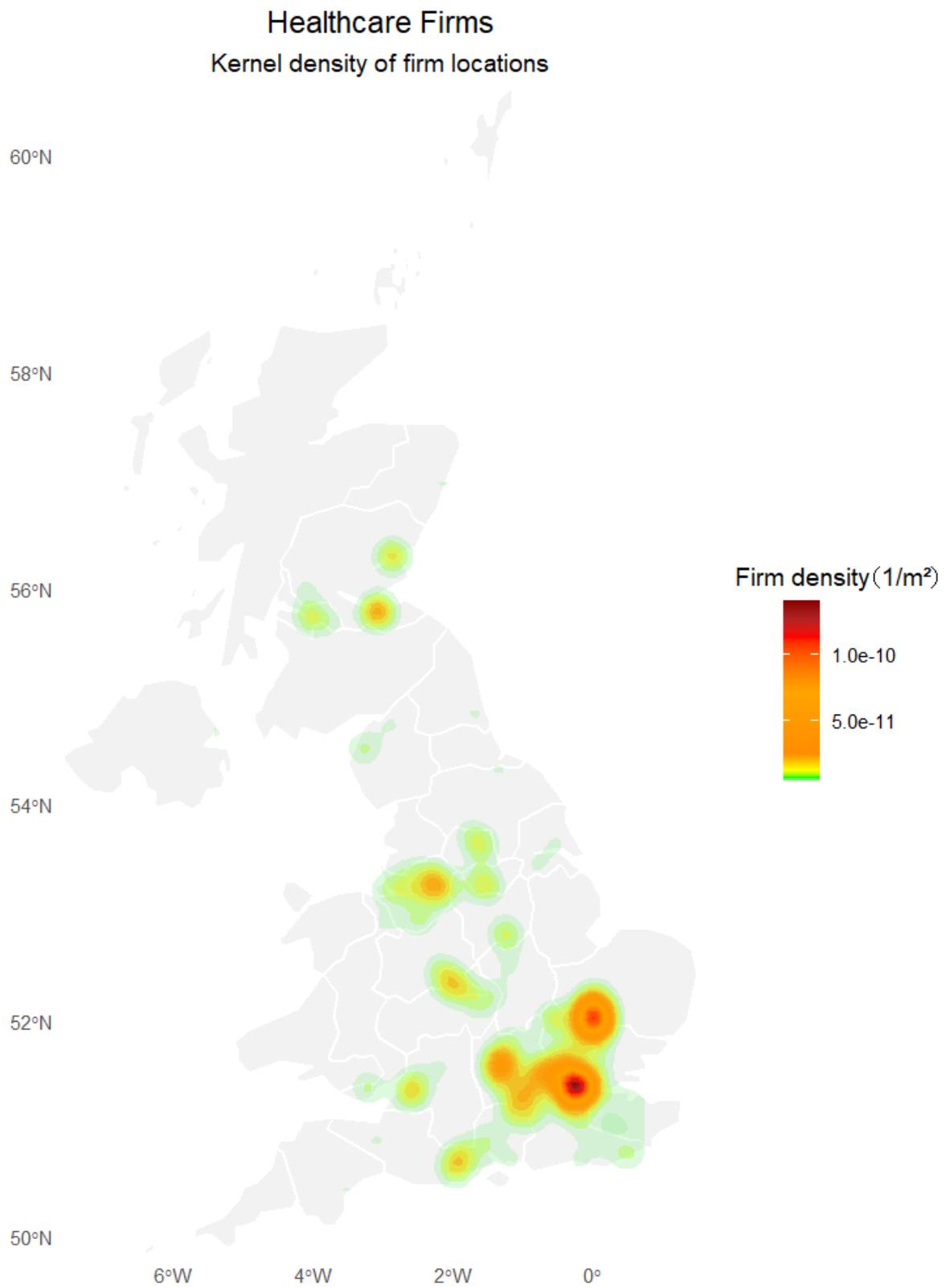


### Consumer: Retail & Hospitality Firms (RTIC009108)

Companies — cluster\_min2

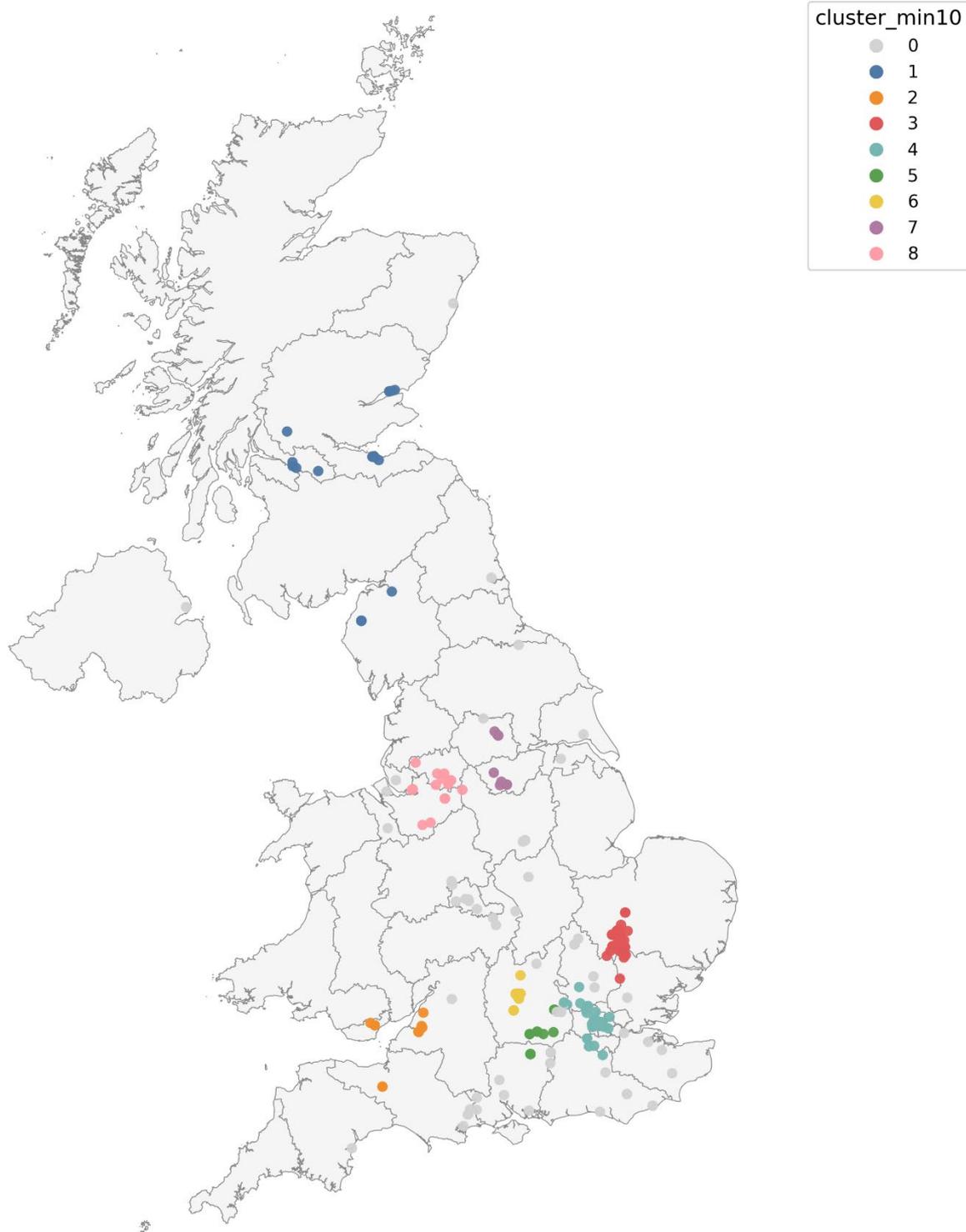


### Healthcare Firms (009114-009118)



### Healthcare Firms (009114-009118)

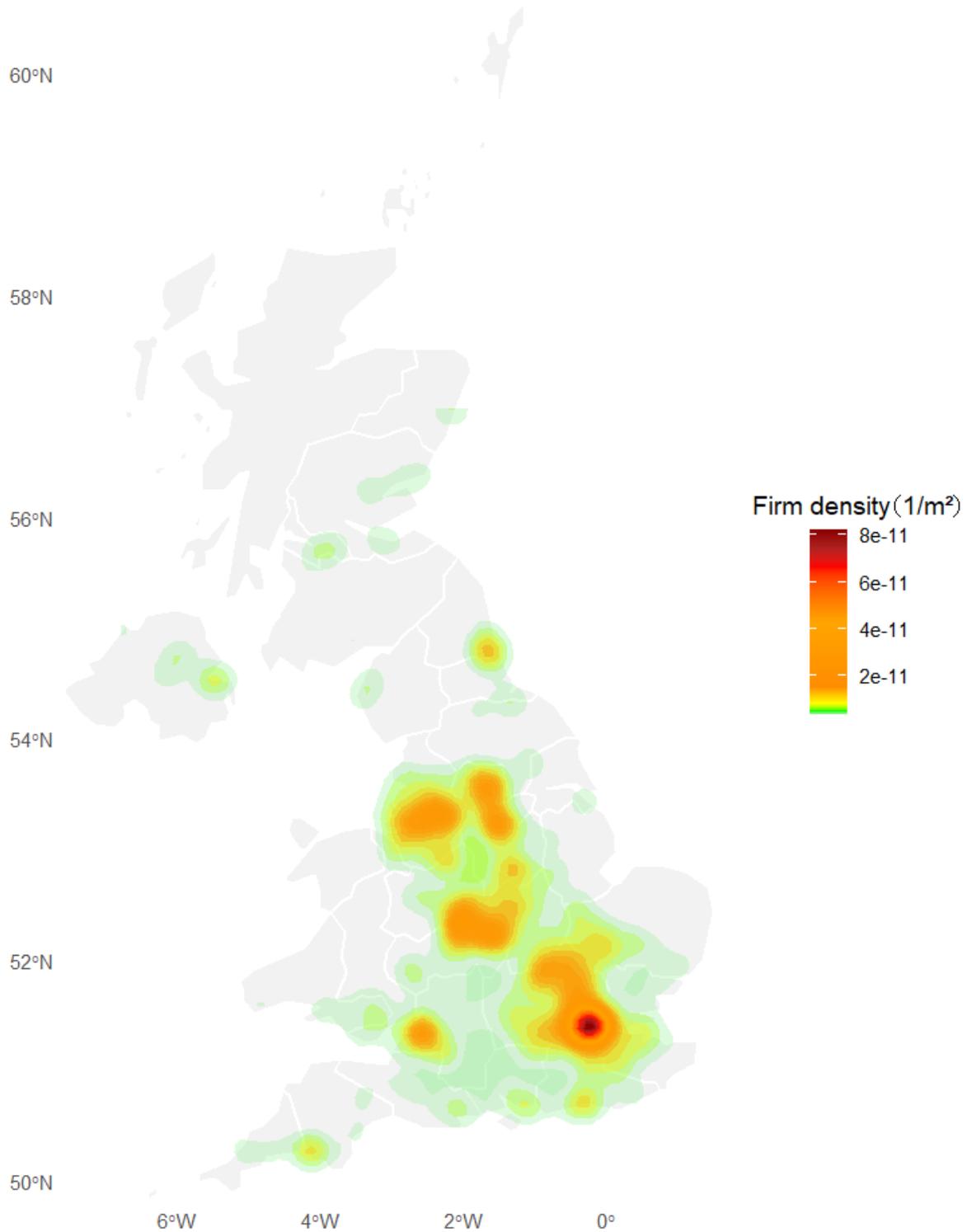
Companies — cluster\_min10



### Infrastructure: Construction and Manufacturing Firms (009119 and 009123)

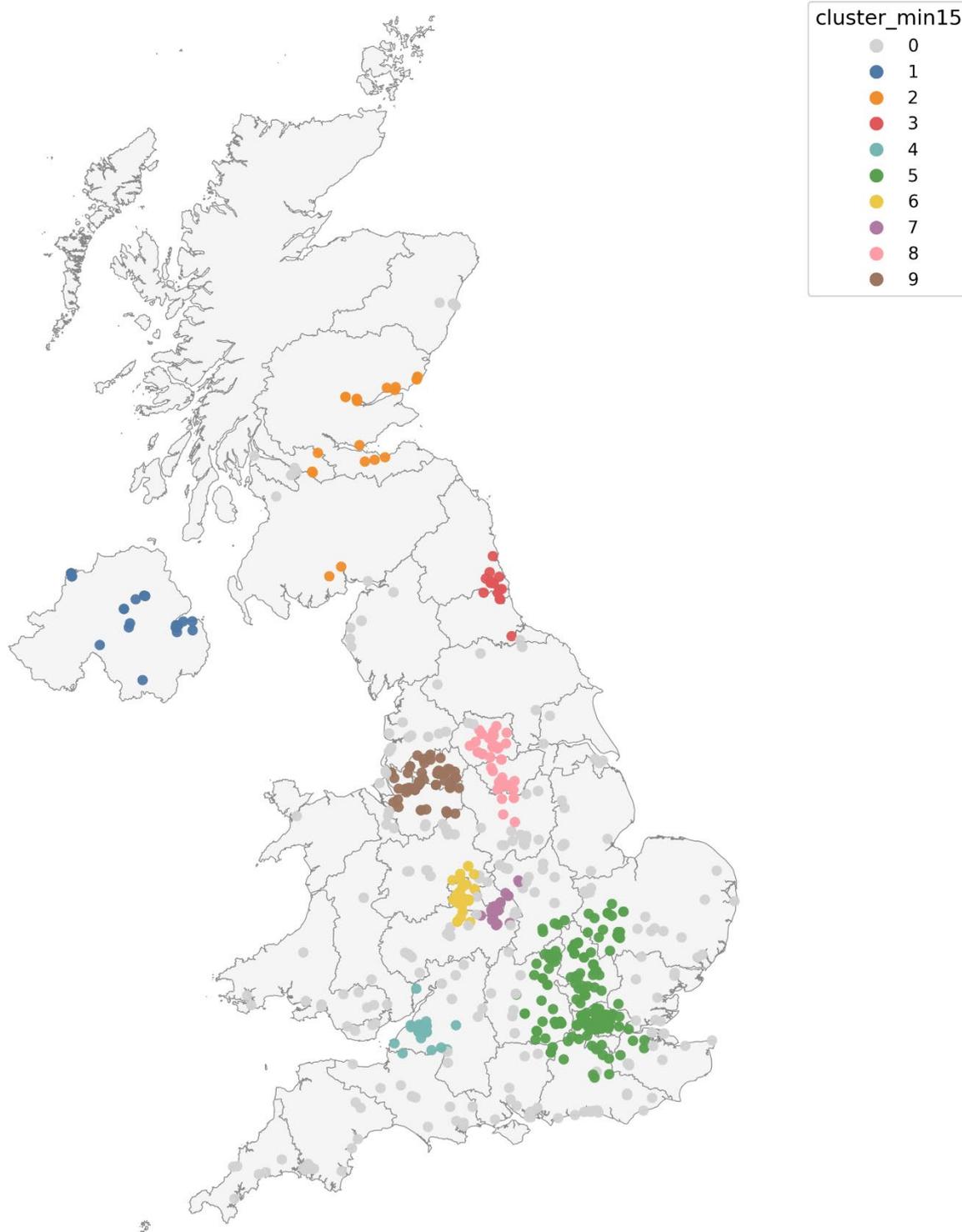
#### Infrastructure: Construction and Manufacturing Firms

Kernel density of firm locations



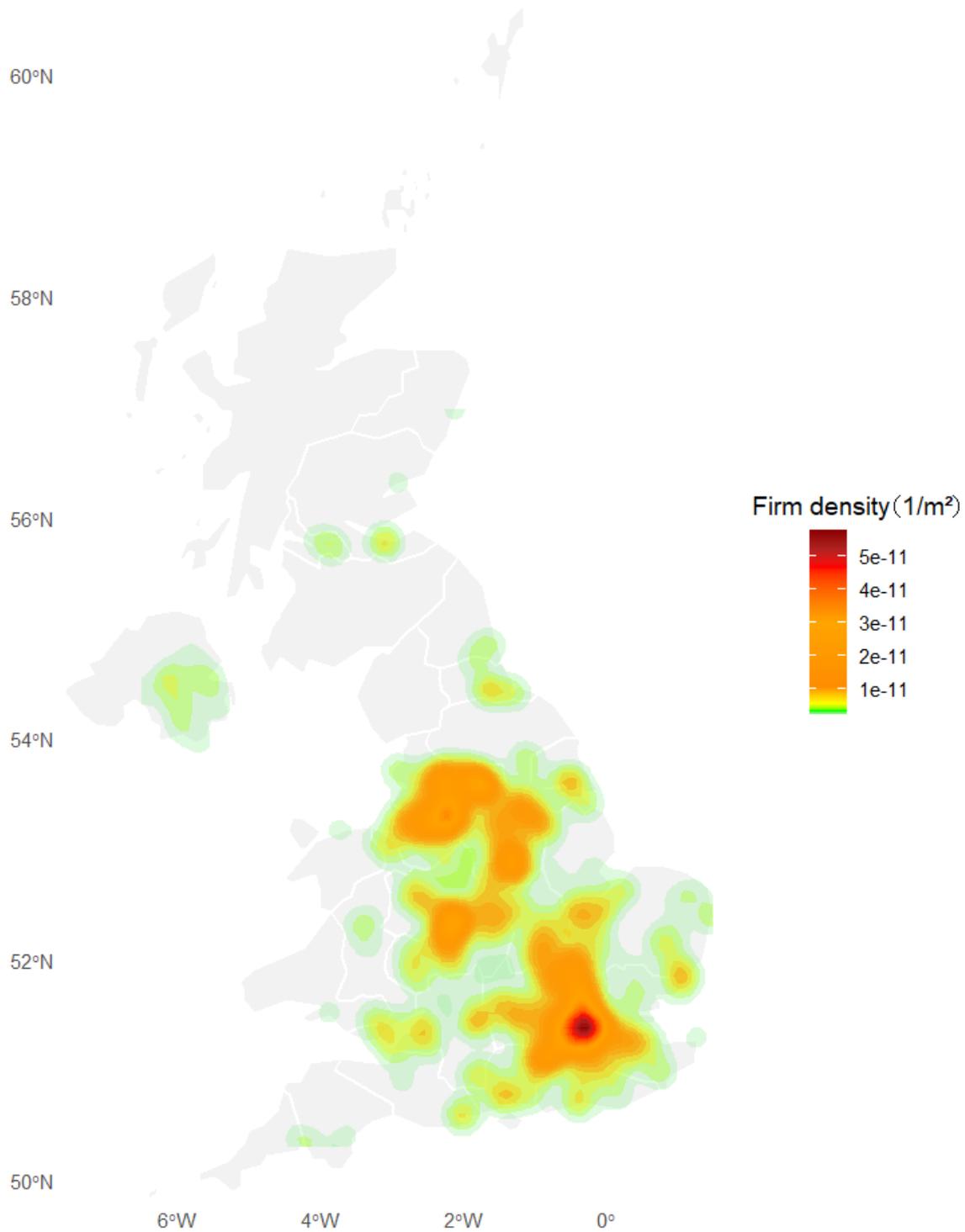
### Infrastructure: Construction and Manufacturing Firms (009119 and 009123)

Companies — cluster\_min15



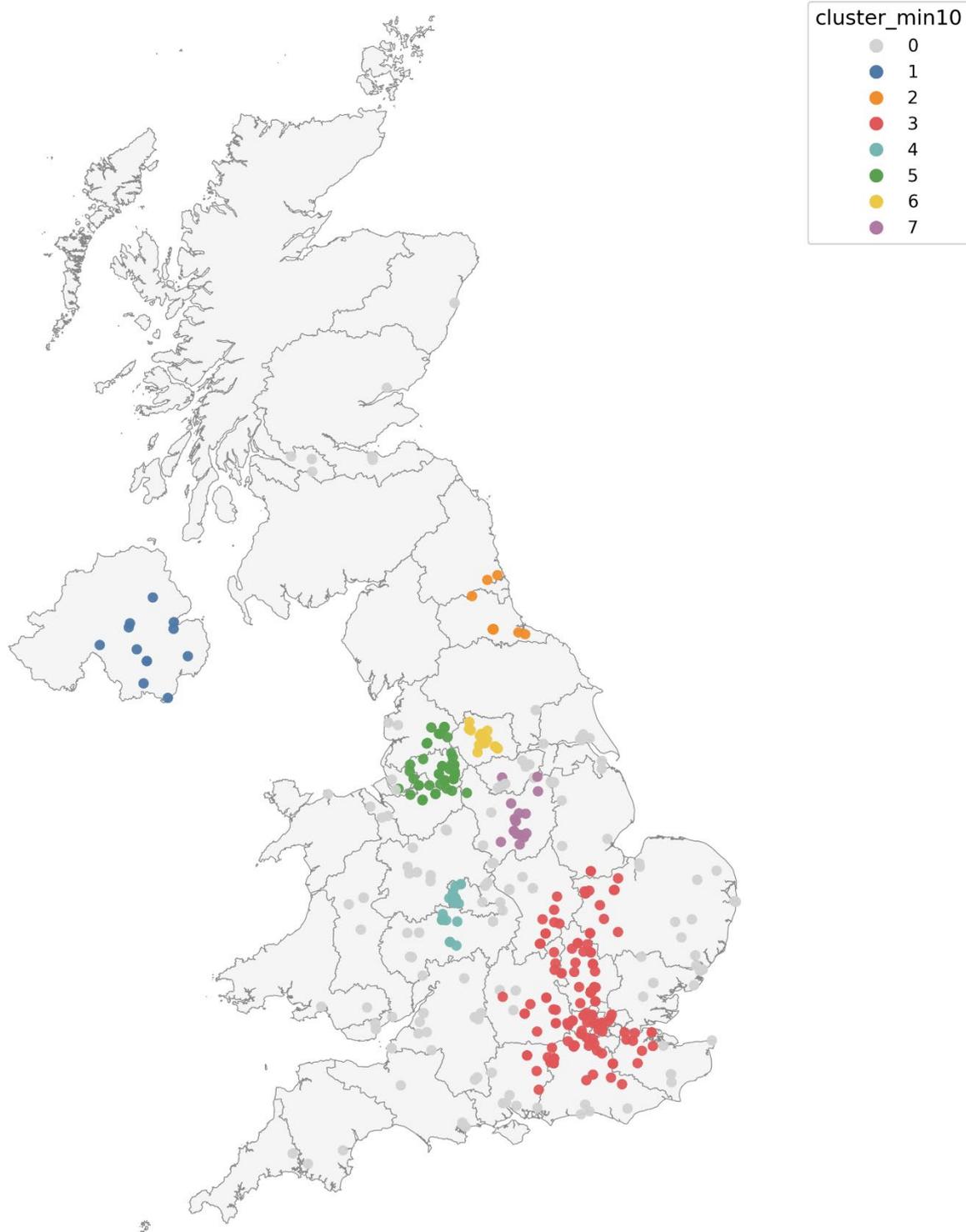
### Logistics / Warehousing and Packaging Firms (009122 and 009127)

#### Logistics / warehousing and Packaging Firms Kernel density of firm locations



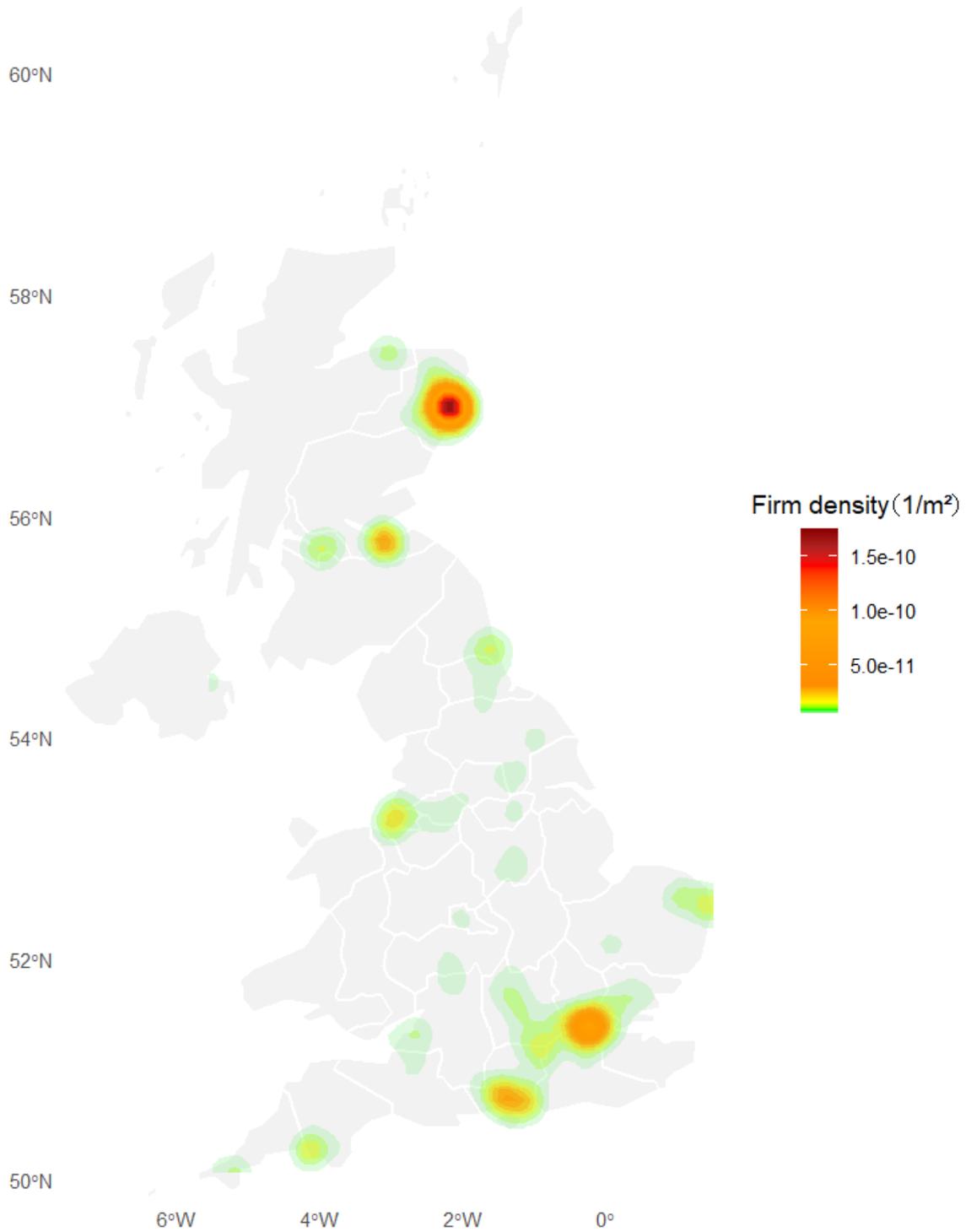
## Logistics / Warehousing and Packaging Firms (009122 and 009127)

Companies — cluster\_min10



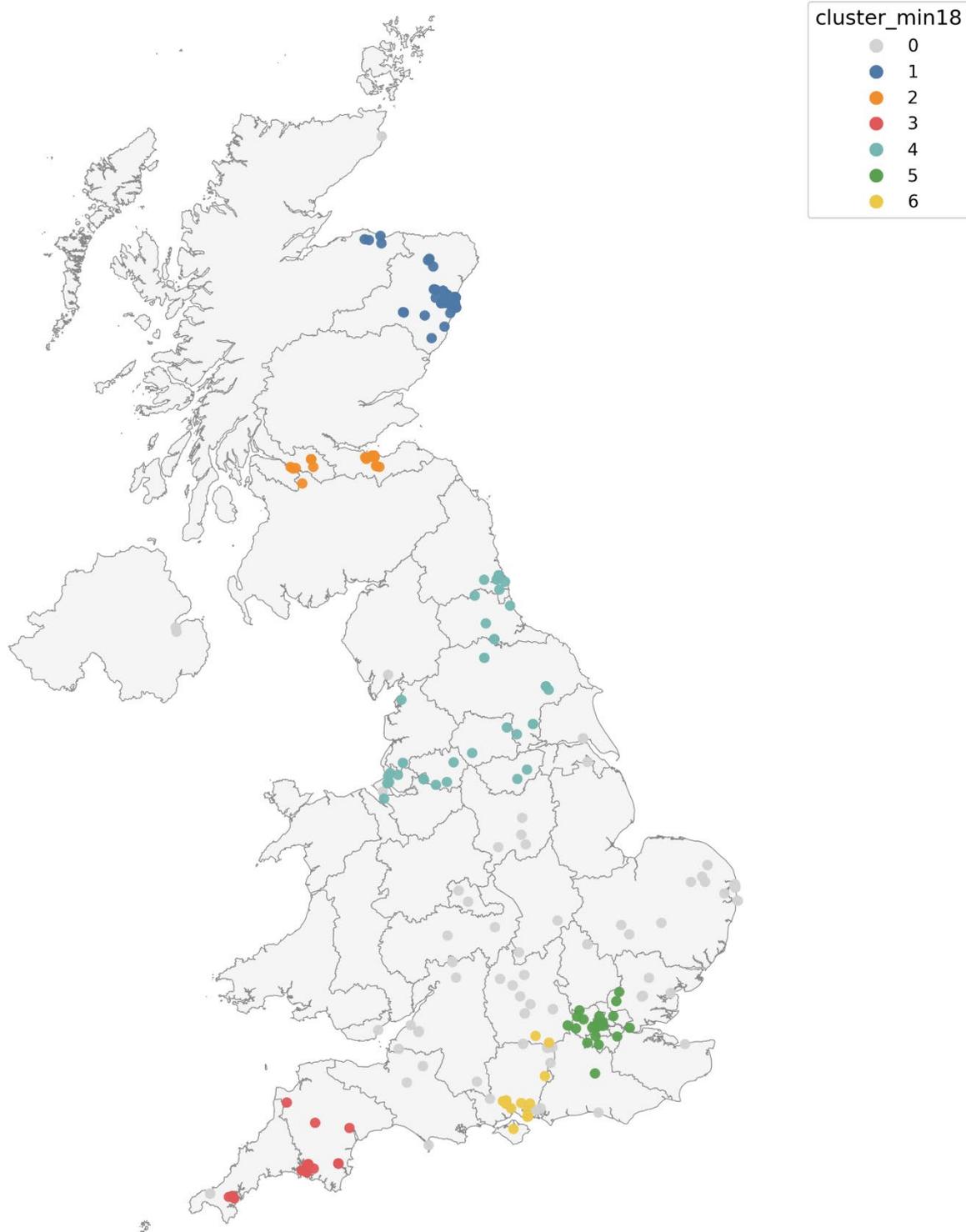
### Mobility: Maritime Firms (009125)

Mobility: Maritime Firms  
Kernel density of firm locations



### Mobility: Maritime Firms (009125)

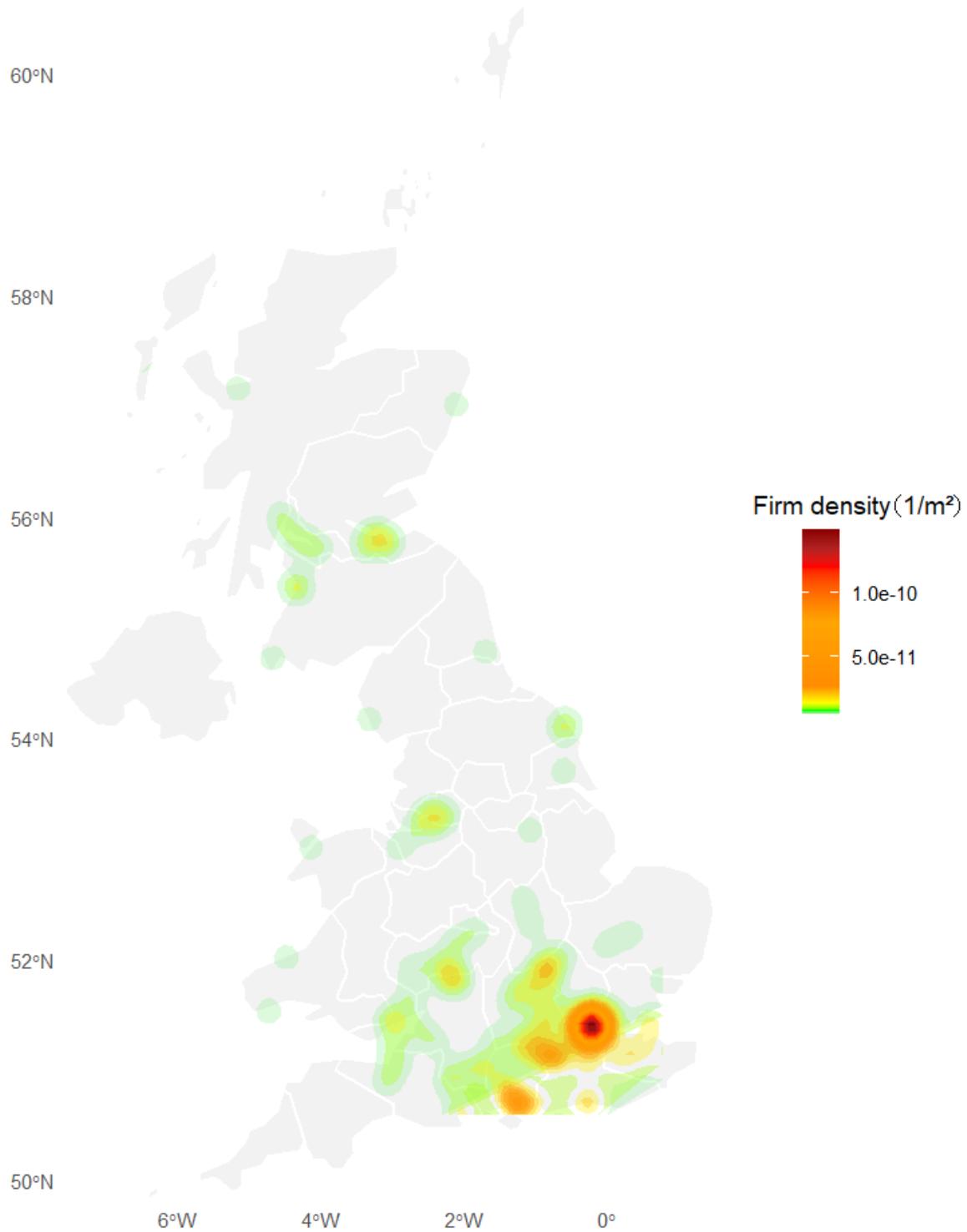
Companies — cluster\_min18



### Defence Firms (009129)

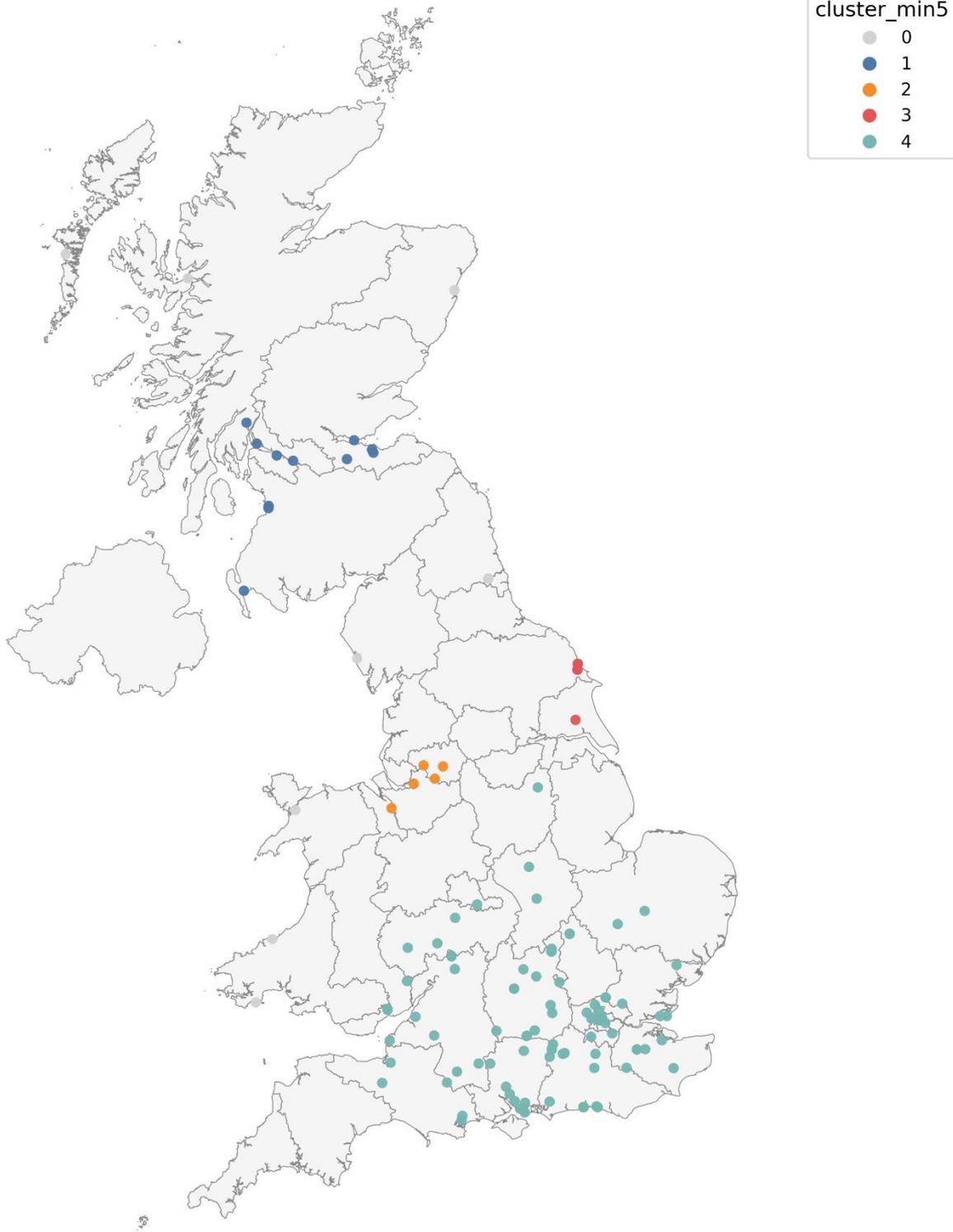
#### Defence Firms

Kernel density of firm locations



## Defence Firms (009129)

Companies — cluster\_min5



## Appendix 2

### RAS Infrastructure List

- » Research Only infrastructure and Research and Translation infrastructure (TRL 1- 3)
- » Translation and Demonstration infrastructure (up to TRL 5)
- » Demonstration and Commercialisation infrastructure (up to TRL 9)
- » Commercialisation and scale up infrastructure (TRL9 +)

**Table A: RAS Infrastructure List**

Infrastructure	Framework position/TRL	Publicly funded? Yes (Y), No (N), Unknown (U)	Location	Region	
<b>Soft Infrastructure</b>					
<b>Ecosystem Enabling Organisations (EEOs)</b>					
1.	EPSRC	EEO	Y	Cross cutting	Cross cutting
2.	UKRI	EEO	Y	Cross cutting	Cross cutting
3.	Defence Science and Technology Laboratory	EEO	Y	Cross cutting	Cross cutting
4.	DSIT	EEO	Y	Cross cutting	Cross cutting
5.	Innovate UK	EEO	Y	Cross cutting	Cross cutting
6.	Department of International Trade (DIT)	EEO	Y	Cross cutting	Cross cutting
7.	Royal Academy of Engineering	EEO	Y	Cross cutting	Cross cutting
<b>Strategic Coordinating Organisations (SCOs)</b>					
8.	IUK Business Connect	SCO	Y	Cross cutting	Cross cutting
9.	The National Robotarium	SCO	Y	Cross cutting	Cross cutting
<b>Research and Industry Networks</b>					

10.	UK-RAS Network	Network	Y	Cross cutting	Cross cutting
11.	Robotics Forum	Network	N	Cross cutting	Cross cutting
12.	Automate UK	Network	N	Surrey	Cross cutting
13.	BARA (British Automation & Robot Association)	Network	N	Cross cutting	Cross cutting
14.	UKIVA (UK Industrial Vision Association)	Network	N	Cross cutting	Cross cutting
15.	UK Automation Forum	Network	N	Cross cutting	Cross cutting
16.	ISA UK Section (International Society of Automation UK)	Network	N	London	Greater London

### Physical infrastructure

### Research only facilities

17.	Centre for Automation and Robotics Research (CARR)	Research only	Y	Sheffield Hallam University	Yorkshire and the Humber
18.	Digital Innovation Network	Research only	Y	University of Sheffield/Sheffield Hallam University	Yorkshire and the Humber
19.	Sheffield Robotics	Research only	Y	University of Sheffield	Yorkshire and the Humber
20.	The Autonomy USRG	Research only	Y	University of Southampton	South East
21.	The Robotics and Mechatronic Systems Research group (RMSR)	Research only	Y	University of Sussex.	South East
22.	The UCL EPSRC RAS capital facility	Research only	Y	University College London	Greater London
23.	YorRobots	Research only	Y	University of York	Yorkshire/North
24.	Centre for Autonomous	Research only	Y	University of Bath	South West

	Robotics (CENTAUR)				
25.	The Intelligent Robotics Group	Research only		Aberystwyth University, UCL, Swansea University etc	Cross cutting
26.	The Intelligent Robotics Laboratory	Research only		University of Birmingham	West Midlands

**Research and Translation (R&T) facilities**

27.	Bristol Robotics Laboratory (BRL)	R&T	Y	Bristol	South West
28.	Oxford Robotics Institute	R&T	Y	Oxford	Oxfordshire / South East
29.	The Northern Engineering and Robotics Innovation Centre (NERIC)	R&T	Y	Salford	North West
30.	Advanced Manufacturing Research Centre (AMRC) - The University of Sheffield	R&T	Y	Sheffield	Yorkshire and the Humber
31.	Edinburgh Centre for Robotics (ECR)	R&T	Y	Edinburgh	Scotland
32.	National Centre for Nuclear Robotics (NCNR)	R&T	Y	Led by University of Birmingham	Crosscutting
33.	Centre for Robotics & AI (University of Manchester) / CRADLE	R&T	Y	University of Manchester	Greater Manchester/ North West England
34.	STAR LAB at Surrey University	R&T	Y	Guildford	South East of England
35.	The Machine Intelligence Laboratory	R&T	Y	University of Cambridge	Cambridgeshire/East of England
36.	EUREKA Robotics Centre	R&T	Y	Cardiff Metropolitan University	Wales

37.	The Essex Robotics group	R&T	Y	University of Essex	East of England
38.	The Centre for Autonomous Systems Technology (CAST)	R&T	Y	University of Liverpool	North West of England
39.	Communications, Sensing, and Imaging (CSI) group	R&T	Y	University of Glasgow	Scotland
40.	The Edinburgh Centre for Robotics	R&T	Y	A joint venture between University of Edinburgh and Heriot-Watt University	Scotland
41.	The Adaptive Systems Research Group	R&T	Y	University of Hertfordshire	East of England
42.	The National Centre for Precision Farming	R&T	Y	Harper Adams University	West Midlands
43.	The Micro-Engineering Facility for Medical Robotics	R&T	Y	Imperial College London	Greater London
44.	The Centre for Robotics Research (CORE)	R&T	Y	King's College London	Greater London
45.	The Lincoln Centre for Autonomous Systems (L-CAS)	R&T	Y	University of Lincoln	East Midlands
46.	The Intelligent Automation Centre	R&T	Y	Loughborough University.	East Midlands
47.	The Lancaster Intelligent, Robotic & Autonomous Systems Centre (LIRA)	R&T	Y	Lancaster University	North West of England
48.	The Robotics at Leeds	R&T	Y	University of Leeds	Yorkshire and the Humber
49.	The Rolls-Royce University	R&T	Y	University of Nottingham	East Midlands

	Technology Centre (UTC)				
50.	The Centre for Advanced Robotics at Queen Mary (ARQ)	R&T	Y	Queen Mary University of London	Greater London
51.	The Centre for Intelligent Autonomous Manufacturing Systems (i-AMS)	R&T	Y	Queen's University of Belfast	Northern Ireland
52.	The Autonomous Systems and Robotics (ASAR)	R&T	Y	University of Salford, Manchester	Greater Manchester/North West of England
53.	The Robotics and Autonomous Systems: The Smart and Connected Vehicle	R&T	Y	University of Warwick	West Midlands
54.	Centre for Industrial Digitalisation, Robotics and Automation (CIDRA)	R&T	Y	Ulster University	Northern Ireland
55.	Cognitive Analytics and Digital Robotics Innovation Centre (CADRIC)	R&T	Y	Ulster University	Northern Ireland
56.	Centre for Artificial Intelligence, Robotics and Human-Machine Systems	R&T	Y	Cardiff University	Wales

**Translation and Demonstration (T&D) facilities**

57.	The National Robotarium	T&D	Y	Edinburgh	Scotland
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58.	Advanced Manufacturing Research Centre	T&D	Y	Sheffield	Yorkshire and the Humber
59.	Satellite Applications Catapult	T&D	Y	Oxfordshire	Oxfordshire/South East Region of England
60.	Built Environment - Smarter Transformation (BE-ST) (formerly CSIC)	T&D	Y	Scotland	Scotland
61.	Edinburgh Centre for Robotics	T&D	Y	Edinburgh	Scotland
62.	InnoTech Centre, South West College	T&D	Y	Cookstown	Northern Ireland
63.	Oxford Robotics Institute (ORI), University of Oxford	T&D	Y	Oxford	Oxfordshire
64.	NNUF (National Nuclear User Facility for Hot Robotics)	T&D	Y	Culham, Workington, Manchester	Cross cutting
65.	Autonomous systems and robotics laboratory	T&D	Y	Cardiff University	Wales
66.	Hot Robotics	T&D	Y	Bristol	South West
67.	Birmingham Extreme Robotics Lab (ERL)	T&D	Y	University of Birmingham	Midlands
68.	Smart Sound Plymouth	T&D	N	Plymouth	South West England
69.	Robotics Proving Ground	T&D	Y	Cross cutting	Cross cutting

### Demonstration and Commercialisation (D&C) facilities

70.	Satellite Applications Catapult	D&C	Y	Cross cutting	East of England
71.	HVM Catapult	D&C	Y	Cross cutting	Cross cutting

72.	Offshore Renewable Energy Catapult (ORE Catapult)	D&C	Y	Blyth (North East England), Grimsby (Lincolnshire)	Cross cutting
73.	Manufacturing Technology Centre	D&C	N	Cross cutting	Cross cutting
74.	Warwick Manufacturing Group (WMG)	D&C	Y	Cross cutting	
75.	RACE (Remote Applications in Challenging Environments) UKAEA	D&C	Y	Culham (near Abingdon)	Oxfordshire.

### Commercialisation and Scale-up (C&S-up) facilities and organisations

76.	Made Smarter?	C&S-up	Y		Cross cutting
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### Main RAS Sub-Sectors Supported by Physical Facilities

Multi-sector collaboration is most common in early-stage TRLs (1–5), dominated by combinations involving Manufacturing and Advanced Manufacturing with Healthcare, Defence, or Marine sectors. At higher TRLs (7–9), combinations appear to become rarer and more specialised.

Sectors are identified based on what an organisation’s website suggests is a main activity.

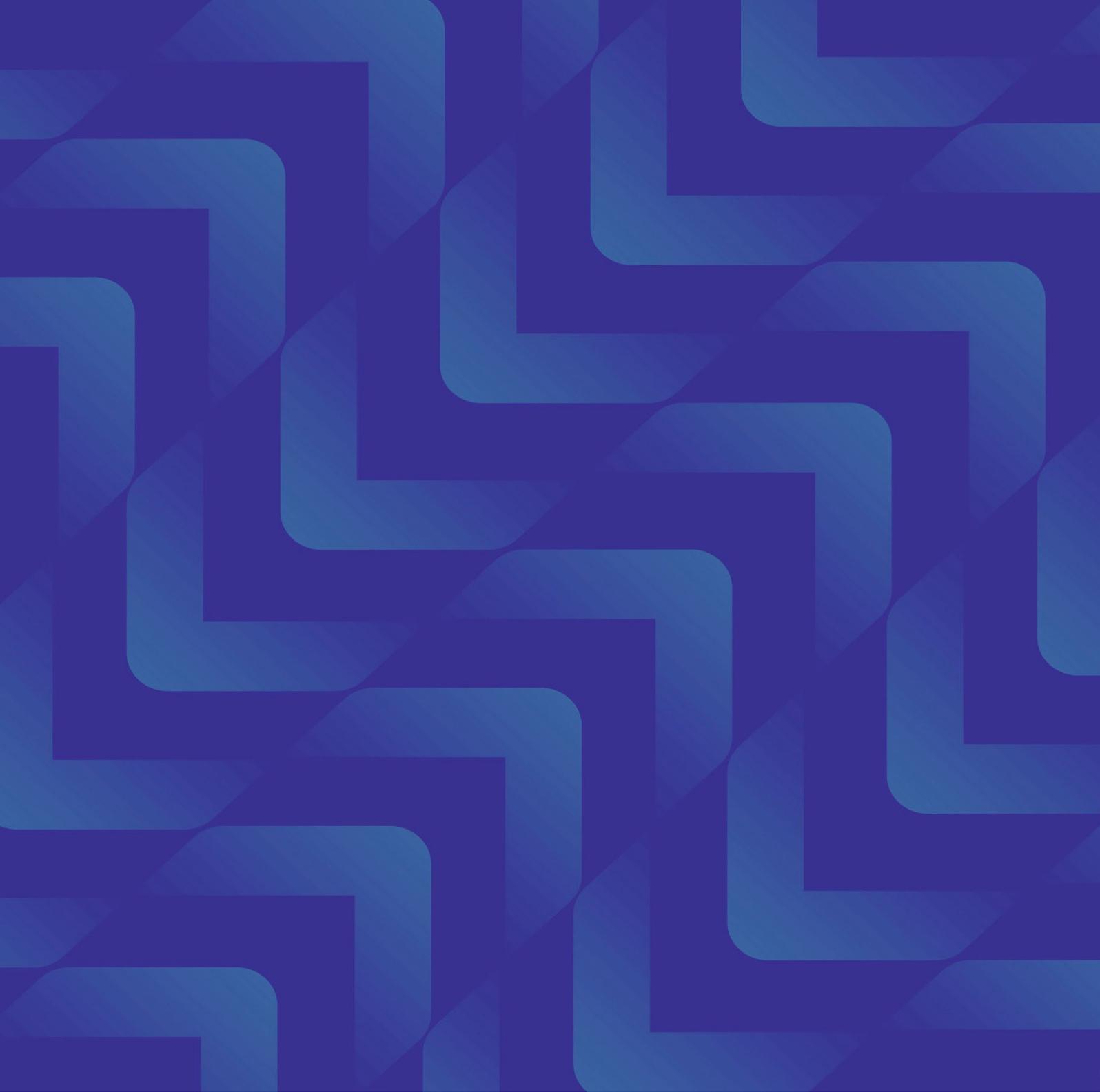
**Table B: UK Physical Infrastructure and their capabilities in supporting the 6 target RAS sub-sectors.**

Name of Facility	TRL Category	Main Sectors / Applications Supported
Centre for Automation and Robotics Research (CARR)	Research Only	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals
Sheffield Robotics	Research Only	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals
The Autonomy USRG	Research Only	Defence and Security; Logistics and Warehousing

Name of Facility	TRL Category	Main Sectors / Applications Supported
Robotics and Mechatronic Systems Research group (RMSR)	Research Only	Manufacturing and Advanced Manufacturing
UCL EPSRC RAS capital facility	Research Only	Healthcare and Pharmaceuticals
YorRobots	Research Only	Defence and Security; Manufacturing and Advanced Manufacturing
Centre for Autonomous Robotics (CENTAUR)	Research Only	Defence and Security; Marine and Maritime
Intelligent Robotics Group	Research Only	Healthcare and Pharmaceuticals; Manufacturing and Advanced Manufacturing
Intelligent Robotics Laboratory	Research Only	Healthcare and Pharmaceuticals
Bristol Robotics Laboratory (BRL)	Research & Translation	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals; Marine and Maritime
Oxford Robotics Institute	Research & Translation	Logistics and Warehousing; Defence and Security
Northern Engineering and Robotics Innovation Centre (NERIC)	Research & Translation	Manufacturing and Advanced Manufacturing
Advanced Manufacturing Research Centre (AMRC) - The University of Sheffield	Research & Translation	Manufacturing and Advanced Manufacturing
Edinburgh Centre for Robotics (ECR)	Research & Translation	Defence and Security; Marine and Maritime
National Centre for Nuclear Robotics (NCNR)	Research & Translation	Other: Nuclear / Decommissioning
Centre for Robotics & AI (University of Manchester) / CRADLE	Research & Translation	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals
STAR LAB at Surrey University	Research & Translation	Defence and Security; Manufacturing and Advanced Manufacturing
Machine Intelligence Laboratory	Research & Translation	Manufacturing and Advanced Manufacturing
EUREKA Robotics Centre	Research & Translation	Healthcare and Pharmaceuticals; Manufacturing and Advanced Manufacturing
Lincoln Centre for Autonomous Systems (L-CAS)	Research & Translation	Manufacturing and Advanced Manufacturing; Logistics and Warehousing

Name of Facility	TRL Category	Main Sectors / Applications Supported
Intelligent Automation Centre (Loughborough)	Research & Translation	Manufacturing and Advanced Manufacturing
Lancaster Intelligent, Robotic & Autonomous Systems Centre (LIRA)	Research & Translation	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals
Robotics at Leeds	Research & Translation	Healthcare and Pharmaceuticals
Rolls-Royce University Technology Centre (UTC)	Research & Translation	Manufacturing and Advanced Manufacturing
Centre for Advanced Robotics at Queen Mary (ARQ)	Research & Translation	Healthcare and Pharmaceuticals
Centre for Intelligent Autonomous Manufacturing Systems (i-AMS) - QUB	Research & Translation	Manufacturing and Advanced Manufacturing
Autonomous Systems & Advanced Robotics (ASAR) - University of Salford	Research & Translation	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals; Other: Nuclear; Other: Agriculture
Robotics and Autonomous Systems: The Smart and Connected Vehicle (EPSRC RAS capital facility)	Research & Translation	Logistics and Warehousing
The National Robotarium	T&D	Manufacturing and Advanced Manufacturing; Healthcare and Pharmaceuticals
Advanced Manufacturing Research Centre (AMRC) - Sheffield	T&D	Manufacturing and Advanced Manufacturing
Built Environment - Smarter Transformation (BE-ST)	T&D	Manufacturing and Advanced Manufacturing
Edinburgh Centre for Robotics (ECR)	T&D	Marine and Maritime; Defence and Security
Oxford Robotics Institute (ORI) - University of Oxford (T&D entry)	T&D	Logistics and Warehousing
NNUF (National Nuclear User Facility for Hot Robotics)	T&D	Nuclear
Birmingham Extreme Robotics Lab (ERL)	T&D	Defence and Security
Smart Sound Plymouth	T&D	Marine and Maritime

Name of Facility	TRL Category	Main Sectors / Applications Supported
Robotics Proving Ground (network)	T&D	Cross cutting
Satellite Applications Catapult (D&C entry)	D&C	Space
High Value Manufacturing (HVM) Catapult	D&C	Manufacturing and Advanced Manufacturing
Offshore Renewable Energy (ORE) Catapult	D&C	Marine and Maritime
Manufacturing Technology Centre (MTC)	D&C	Manufacturing and Advanced Manufacturing
Warwick Manufacturing Group (WMG)	D&C	Manufacturing and Advanced Manufacturing; Other: Automotive / Mobility
RACE (Remote Applications in Challenging Environments) - UKAEA	D&C	Nuclear
Made Smarter	C&S-up	Manufacturing and Advanced Manufacturing



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