

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

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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.

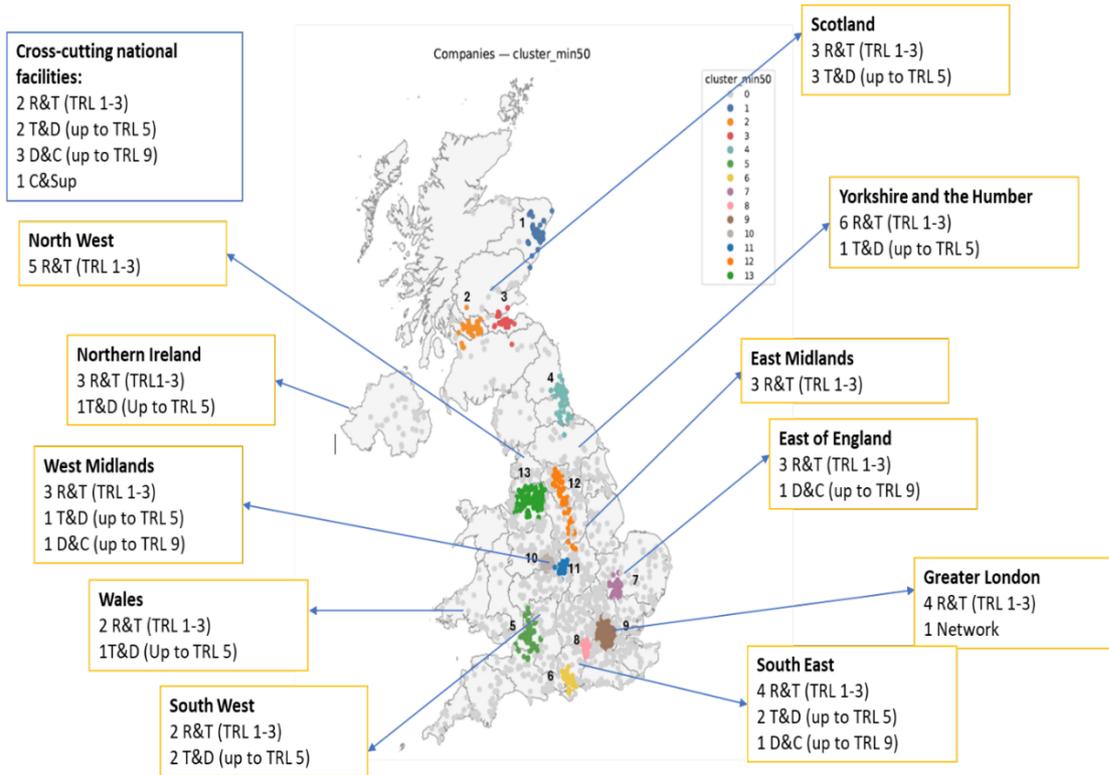
- » The geographical distribution of RAS firms is multi-centred. While London and the South East remain important hubs, distinct regional profiles are evident, including high private investment intensity in Cambridge and clear sectoral specialisation in clusters, which tends to align with their regional 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.

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

Thank you

The Innovation & Research Caucus

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