INNOVATION & RESEARCH CAUCUS

UNIVERSITY-DRIVEN INTERNATIONAL R&I GENERATING ECONOMIC VALUE TO THE UK

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About the Innovation and Research Caucus

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EXECUTIVE SUMMARY

International Research and Innovation (R&I) give access to complementary international expertise, methods, networks, infrastructure, and datasets unavailable domestically, enabling globally distinctive economic value that national R&I alone cannot achieve. This globally distinctive economic value arises specifically because R&I spans national boundaries, creating outcomes that are qualitatively different through cross-border combinations of knowledge, talent, markets, networks and resources.

Commissioned by the Department for Science, Innovation and Technology (DSIT) and UK Research and Innovation (UKRI), this report examines how UK university-driven international R&I generate distinct economic value for the UK.

This report follows the Phase 1 report, which mapped the literature and identified evidence gaps on UK-exclusive benefits, value-generation pathways, enablers and challenges for UK value capture, and the policy interventions most likely to maximise UK returns from international R&I. In response to these gaps, this report synthesises lessons from 20 successful cases that have generated economic value spanning low-to-high TRLs, disciplines, funders and partner types (university-university and university-business collaborations), with thematic analysis used to extract pathways, enablers and challenges.

» Pathways to UK economic value from university-driven international R&I

Our analysis of evidence from 20 international R&I case studies identifies five distinct pathways through which economic value is created for the UK:

- **Producing globally distinctive, economically valuable knowledge:** International R&I brings together diverse insights, datasets, infrastructures and problem framings to produce original, generalisable knowledge and adoption-ready artefacts (methods, toolkits, standards), generating distinctive, economically valuable outcomes for the UK that domestic-only R&I cannot produce.
- **Developing world-class talent through global exposure:** International R&I equip UK researchers, businesses and students with frontier methods, regulatory literacy and intercultural leadership, which return to UK labs, firms and classrooms, raising employability and innovation readiness.
- **Creating jobs in globally demanding, future-facing sectors:** International R&I align UK capabilities with worldwide demand, catalysing jobs in spin-outs, UK roles in Multinational Corporations (MNC)' UK sites, and project-linked employment that often seeds longer-term growth.
- **Improving UK industry and policy operations:** Comparative datasets and co-developed solutions deliver sharper analytics, leaner processes and better operations in UK organisations, especially when underpinned by credible international benchmarks.

- **Accelerating commercialisation using global resources:** Access to international customers, resources, supply chains, testbeds and regulators shortens the path to product–market fit, increases licensing options and supports UK-anchored spin-outs and sales.

» What not to assume about university-driven international R&I

Drawing on our analysis of evidence from 20 cases, we identify several common misconceptions about university-driven international R&I that should be avoided:

- **"University–university" international R&I collaborations are rarely universities-only.** Even where partnerships are formally framed as university–university, collaborations that generate economic value typically engage non-academic actors—such as businesses, policymakers, and end users—who shape problem definitions, provide data and testbeds, and enable diffusion.
- **University-driven international R&I pathways are iterative, not linear.** Rather than progressing through a stage-gated sequence, teams move back and forth across Technology Readiness Levels (TRLs). Insights from users, markets, and regulation frequently prompt refinements to the underlying science or design, increasing the likelihood of achieving fit-for-purpose economic impacts in the UK.
- **International R&I cannot be replicated through UK-only activity.** It provides access to complementary overseas expertise, facilities, datasets, and real-world contexts, which together unlock forms of economic value that would not otherwise be attainable.
- **International collaboration does not slow adoption.** Multi-country datasets and trials enhance robustness and external validity, build confidence for scaling across markets, and can accelerate diffusion through earlier piloting, improved market access, and regulatory alignment—thereby strengthening export readiness and uptake.
- **Cross-border collaboration does not simply add risk or cost**. While international R&I can involve higher direct and transaction costs and risks—driven by travel, multi-jurisdictional coordination, and legal or contracting complexities—in practice, consortia share costs and risks, reduce delivery expenses through digital collaboration, and unlock access to overseas or multilateral funding sources that would otherwise remain unavailable. When well-designed, these factors enable the returns to outweigh the additional costs and risks.

» Enablers (positive moderators) of university-driven International R&I generating economic value to the UK

Our analysis of evidence from the 20 cases highlights the key enablers for creating economic impacts in the UK:

- **Anchor international R&I in UK needs and value-capture pathways:** Projects generated stronger UK economic value when they were framed around UK industry, policy or operational problems, involved UK practitioners, businesses and UK-based sites of multinationals, and were supported to adapt, demonstrate and embed internationally generated innovations in UK organisations.
- **Fund the full pathway from discovery to scale-up:** Continuity of funding across TRLs, including translation grants, venture/spin-out finance, first-production support and sequential multi-year rounds, helps prevent drop-offs between discovery, validation, commercialisation and UK job formation. This enables the UK entities to move from proof of concept developed internationally to commercialisation and sales benefiting the UK.
- **Strengthen leadership and institutional support:** Economic value was enabled when experienced researchers and Principal Investigators could secure funding, align incentives and manage international partnerships, while drawing on strong Technology Transfer Offices (TTO) and enterprise support (IP, licensing, spin out formation, contracts) to convert internationally generated outputs into UK revenue and jobs.
- **Configure partnerships around purpose, mission and stage of development:** Successful collaborations aligned partners around shared long-term missions [e.g. to addressing global challenges], used broad open networks at lower TRLs and more focused trusted partnerships nearer commercialisation/high TRLs, and combined interdisciplinary perspectives to produce solutions that were both distinctive and adoptable in UK contexts.
- **Support open diffusion and globally exposed UK talent pipelines:** Open and accessible outputs generated through international R&I — including publications, data, code, toolkits and protocols — helped accelerate uptake and recombination of ideas, while international exposure for early-career researchers, co-supervised PhDs and targeted training enabled globally benchmarked skills to return to and circulate within the UK system.
- **Design international R&I to be cost-effective while maintaining quality:** Successful projects used secure digital platforms, electronic lab notebooks, version control, remote access to infrastructure and travel-lite working to reduce delivery costs, while retaining targeted face-to-face engagement where needed for trust, quality or problem-solving.

» Challenges (Negative Moderators) of university-driven International R&I generating economic value to the UK

Drawing on 20 cases, our analysis reveals the following key challenges in achieving economic impact in the UK from university-led international R&I.

- **Cross-border partner asymmetries**: Differences in culture, pace, incentives and scientific literacy that slow joint work and complicate translation into UK-ready outputs.
- **Multi-jurisdictional regulation and standards hurdle**: Stacked ethics, data, biosafety and regulatory requirements across countries that delay comparative, adoption-ready evidence.

- **Transnational impact pathways that diffuse UK value capture**: Benefits spread internationally unless UK-anchoring mechanisms (IP and licensing arrangements, trials, UK business, adopter, MNE and subsidiary involvement, UK demonstrations) are built in from the start.
- **Gaps in capacity, incentives and support for translation**: Limited specialist support, weak incentives, and insufficient capabilities in cross-border IP, data sharing, standards, commercialisation, and business development can leave international R&I of value to the UK underexploited.
- **Funding restrictions for international talent partnerships**: Policy and funding barriers to co-funding/co-supervising with overseas partners that weaken high-value training routes for UK talent.
- **Discontinuous "bridge" finance**: Funding gaps between discovery, development and scale-up (from both government and industry) that prevent promising international results from becoming UK products and services at pace, stall job formation and slow the path to domestic revenues.
- **Slow, complex contracting for non-academic partners**: Difficult and complex onboarding agreements and payment delays for UK SMEs/creatives/individual specialists that erode time-critical windows and deter their participation in translating value to the UK.
- **Adoption frictions inside UK organisations**: "Not-invented-here" attitudes, path dependency, complex partnership mechanics, and limited implementation capacity in UK organisations impeding the uptake of international R&I outputs and diminishing the benefits to UK businesses.
- **Risk-averse entrepreneurial environment**: Conservative attitudes and thin local entrepreneurialism in some regions that slow spin-outs and early scaling of internationally produced output.

» Key Recommendations: UK government funding strategy

- **Funding international R&I where it adds unique UK value:** The findings demonstrate that international R&I generates globally distinctive economic value for the UK when the case for additionality is clear. This underlines the importance of funding international R&I, where it demonstrably unlocks capabilities, opportunities, resources, infrastructure, datasets, testbeds, standards pathways, or market access that are unavailable domestically. Grant applications could therefore include a short case for "International Additionality", alongside strategies to minimise costs, such as using remote collaboration where appropriate while retaining essential international travel.
- **Securing UK value capture by design:** The evidence showed that teams with pathways for translating the value of international R&I into UK benefits have generated globally distinctive economic value for the UK. This highlights the need for applicants to demonstrate how international R&I outputs will be translated into UK value. To support this, applications could be required to include a scored "UK Value Capture Plan"; grant agreements embedding obligations relating to UK value capture and diffusion; and post-

award requirements incorporating a UK diffusion plan and UK-based demonstrations following international pilots [Box 1 provides further detail on the mechanisms through which UK value can be captured from university-driven international R&I].

- **Funding the UK scaling and value capture of international R&I outputs**: Fund the UK scaling and value capture of international R&I outputs by (a) launching new funding calls that support adopting in the UK after international pilots; (b) offering support and funding that provide equipment, validation batches, certifications, and go-to-market support; and (c) using pre-commercial/pathfinder procurement—time-limited public contracts that pay UK organisations to trial first deployments, generate independent performance evidence, and serve as early reference customers—to shorten time-to-market and anchor revenues, jobs, and exports in the UK.
- **Funding the whole (iterative) pipeline:** Fund the full, iterative pipeline by sequencing awards from discovery→translation→demonstration/validation→scale-up, using milestone-based tranches with payments tied to specified deliverables, and allowing back-loops so teams can return to earlier phases to resolve issues or incorporate new findings without penalty. Support multi-jurisdictional testbeds and approvals by providing access to test environments and coordinating regulatory submissions in the UK and relevant overseas markets to generate credible, mutually recognised evidence.
- **Building UK talent through global exposure**. Enable co-funding and co-supervision with international partners, scale Early Career Researcher (ECR) placements and industry-linked studentships, and support knowledge-mobilisation fellowships so globally benchmarked skills and methods return to and diffuse across UK labs, firms and public bodies.
- **Build UK capability to capture value from international R&I:** UK value creation depends on a broader bundle of organisational, relational, and implementation capabilities. Therefore, policy should go beyond funding international collaboration itself and invest in the resources, capacity, and capabilities that enable UK organisations to translate international R&I into domestic economic impact [Box 2 outlines the capabilities and capacities required to generate value for the UK from university-driven international R&I].

Box 1: UK Value Capture Pathways from University-driven International R&I Collaborations

Our case studies show that successful international R&I projects do not generate value for the UK automatically. UK value capture needs to be deliberately designed into collaborations from the outset, so that international activity translates into clear economic, industrial, policy, and societal benefits for the UK:

- **UK problem ownership** - Projects were more likely to generate UK value when they were framed around a clearly defined UK industry, policy, or societal need. This ensured that the collaboration addressed a problem that mattered to the UK and that the resulting knowledge, technologies, or solutions had a clear domestic destination from the outset.
- **UK practitioner translation** - Successful projects kept UK practitioners visibly involved throughout the collaboration to help interpret findings for UK conditions. Their role was not simply to receive outputs at the end, but to ensure that international learning was translated into UK-relevant insights, tools, processes, standards, practices, or policy options.
- **UK adopter, beneficiary, and business pathways** - Projects generated stronger UK value when UK adopters, users, beneficiaries, and firms were built into the collaboration from the start. This created clearer routes for domestic uptake, enabled outputs to be tested and refined with potential users, and allowed UK businesses to shape, commercialise, scale, or supply resulting innovations.
- **UK-based multinationals and subsidiaries as bridging actors** - UK-based multinational enterprises and their subsidiaries played an important bridging role between international R&I activity and the UK commercial environment. They helped connect global knowledge networks with UK-based capabilities, supply chains, markets, investment opportunities, and routes to scale.
- **Clear IP and licensing arrangements** - Value capture was strengthened when intellectual property, licensing, ownership, and exploitation rights were addressed early. This helped prevent commercial value from defaulting to overseas partners and ensured that UK organisations retained credible routes to benefit from project outcomes.
- **UK trials, demonstrations, and diffusion activity** - International pilots created important learning, but UK value was amplified when projects included UK-based trials, demonstrations, or diffusion activity. These activities helped test what had worked overseas in a UK context, build confidence among domestic stakeholders, and showcase the relevance of the innovation to UK markets, institutions, users, and policy environments.
- **Contractual and post-award mechanisms for UK value capture** - The strongest projects did not leave UK value capture to goodwill or informal expectations. They used grant agreements, collaboration agreements, and post-award requirements to keep UK value pathways open. This included obligations relating to UK diffusion, UK-based demonstrations following international pilots, UK business engagement, domestic adoption, IP and licensing arrangements, and clear plans for translating project outcomes into UK economic, industrial, policy, or societal value.

Box 2: Capabilities UK actors need to generate economic value to the UK from international R&I

Our case studies show that in order to enable more UK organisations to benefit from university-driven international R&I, policy should support the development of the following capabilities and capacities:

- **Absorptive capacity -** The ability to identify, understand, and use knowledge generated through international R&I collaborations.
- **Co-creation capability -** The ability to work actively and continuously with international partners by integrating resources, networks, knowledge and skills to define problems, shape research agendas, and develop solutions, rather than simply receiving outputs at the end.
- **Interdisciplinary capability -** The ability to combine technical, social, creative, commercial, and policy expertise so that international R&I outputs are both original and implementable in a UK context.
- **Implementation capacity -** The organisational bandwidth, resources, operational systems, and practical know-how needed to adopt and embed internationally generated outputs into UK products, services, systems, processes, or policies.
- **Institutional translation capability-** The presence of capable people, teams, and support structures, such as technology transfer offices, innovation intermediaries, commercialisation units, or policy translation teams, that can interpret, package, broker, and convert international R&I outcomes into UK economic, commercial, or policy value.
- **Practitioner and academic visibility and networking -** The networks, reputation, and connectivity that allow UK actors to understand real-world UK problems and make relevant organisations aware of university-driven international R&I outputs and their potential value.
- **Value capture readiness -** The ability and openness of UK organisations to adopt externally generated solutions, rather than defaulting to a “not invented here” mindset. This requires the capacity and capability of UK organisations to recognise, plan for, and act on opportunities to generate UK economic value from university-driven international R&I, including through adoption, diffusion, commercialisation, licensing, scaling, and policy uptake.

1. Introduction

International Research and Innovation (R&I) can offer access to diverse international expertise, methodologies, opportunities and technologies that are not available or as richly developed within their domestic context. International research collaborations, therefore, enable the development of unique, economically valuable output that are often unattainable through domestic research alone (Ozusaglam et al 2024).

This report examines how UK university-driven international R&I generate distinct economic value for the UK. It was commissioned by the Department for Science, Innovation and Technology (DSIT) and UK Research and Innovation (UKRI), as a follow-up to the Phase 1 evidence review (Ozusaglam et al 2024), which mapped the literature on international R&I. This Phase 2 report, by focusing on university-driven international R&I, intends to respond to four key evidence gaps outlined in the Phase 1 report: (1) the need to identify and evidence UK-exclusive benefits; (2) to test the mechanisms through which international collaboration translates into economic outcomes for the UK; (3) to further our understanding of how to enable UK value capture; and (4) to indicate policy interventions most likely to maximise UK economic returns from university-driven international R&I.

1.1 Purpose and scope

Our purpose is twofold. First, we explain where and why university-driven international R&I add UK value beyond domestic-only routes. Second, we show how to design, fund, and govern university-driven international R&I collaborations so that economic benefits are anchored in the UK. Although the study focused on two types, namely, international university–university and university–business collaborations that had generated economic value, the evidence shows that such collaborations, including those that appear on paper to be university–university, routinely involve non-academic partners such as businesses, policymakers, and end users, who help shape problems, provide data and testbeds, and support diffusion. Therefore, the lessons generalise to university-driven international consortia involving academic and non-academic partners across low-to-high TRLs and multiple disciplines.

1.2 Evidence base and approach

The findings are derived from our analysis of evidence gathered from 20 successful UK university-led international R&I collaborations that span disciplines, TRL stages, funders and partner types [Please see Appendix 1 for information on these cases]. We gathered case-level qualitative evidence via semi-structured interviews with initiative leaders covering each collaboration's participants and roles, TRL stage, funding sources, and evolution, with the distinct economic value generated for the UK and how. Our analysis of evidence also captured the mechanisms of international additionality (why impacts required cross-border

partners rather than domestic routes), the enablers and barriers, and the policy/infrastructure conditions and scaling potential needed to anchor benefits in the UK.

Although the qualitative methodology used in this study provides rich, in-depth insights from 20 successful cases, the findings should be interpreted as mechanism-focused rather than statistically generalisable across all university-led international R&I collaborations. The study focuses on successful cases, which means it does not systematically capture the barriers that may emerge in unsuccessful collaborations, although such cases are difficult to identify and interpret without evidence of subsequent corrective action. In addition, the international partners in the cases were predominantly from developed countries, limiting the extent to which the findings can be extended to collaborations involving developing-country partners. Future research could therefore use large-scale quantitative surveys to assess the generalisability of the findings, examine whether these value capture mechanisms operate differently across country contexts, and study unsuccessful collaborations to identify additional barriers to UK value capture.

Appendix B presents a comparison between the moderators—defined as factors that shape the extent to which international R&I generates economic impacts—identified in the Phase 1 literature review and those identified in this qualitative evidence report.

1.3 How the report is organised

Section 2: Nature of International R&I

(1) How cross-border, multi-actor collaborations iterate across TRLs
(2) Why they have decided to engage in international R&I
(3) Why international R&I activities are often more cost-effective than assumed when designed digital-first

Section 3: Pathways to UK Economic Value

(1) Generating globally distinctive, economically valuable knowledge
(2) Developing world class talent through global exposure
(3) Creating jobs for the UK in globally demanding, future facing sectors
(4) Improving UK industry and policy operations with global insights
(5) Accelerating commercialisation leveraging global resources

Section 4: Policy Implications

(1) Translate the findings of the report into policy implications and delivery instruments
(2) Illustrate how to evaluate, encourage, and support the generation of distinctive economic value to the UK

2. Nature of UK University-Driven International R&I Generating Economic Impacts

2.1. Nature of UK university-driven international R&I

Our findings suggest that UK university-led international R&I collaborations that have successfully generated economic value routinely involve non-academic (business and policy) partners—regardless of whether the formal collaboration is university–university (U–U) or university–business (U–B). In practice, most cases include some level of participation from businesses, policymakers, government bodies, freelancers, and end-users/beneficiaries. This is because these actors shape problems, provide data and testbeds, and enable diffusion and impact. Consequently, the headline distinction between U–U and U–B partnerships often matters less than the functions played by non-academic partners within the project. For example, Case C, which on paper appears as a university–university collaboration focused on improving regulatory frameworks and policy processes, in practice informally engaged several UK government agencies. These actors were involved both in the co-design phase and, most notably, during the implementation of the frameworks and tools developed through the international collaboration. Alongside generating economic impact for the UK, such engagement also shaped the evolution of the research. In particular, it enabled low-TRL, social science-based international R&I to move beyond a purely academic orientation towards a more applied, policy-relevant approach.

Why business partners are involved at both low and high TRL—albeit differently:

Low TRL (Research; more exploratory): At discovery-oriented stages, business and other non-academic partners frequently help co-define research questions and ensure that business needs, and policy and funding priorities are reflected in the research trajectory. Even when impact is not the explicit aim, the *nature of some disciplines* (e.g., materials/computer sciences, economics/innovation) and the *presence of non-academic partners* can embed an inherent policy or business relevance from the outset. Partner networks at this stage are typically more open, drawing on trusted research ties and emerging synergies.

> *Developing **an application** with an industry partner **from day one**, that whole process shaped a lot of the questions we asked and what we did. (Case A)*

High TRL (Development; more applied): As projects move toward application, business partners' roles become more selective and strategic, often building on prior low-TRL collaborations. Firms and other non-academic actors contribute by specifying industry needs, providing access to real-world environments for prototype testing, supporting commercial

application and diffusion, and co-developing business models around specific use-cases. Partner selection here is more deliberate, reflecting commitments to scale, market access, and risk management.

> *The first [group of industry partners] was very much like* ***an early technological proof-of-concept-type*** *validation. […] The* ***second wave is much more refinement, refining the market need.*** *What do people actually use this for? What difference does it make to them? What decision processes are changing in pharma with the use of this sort of technology? Trying to get the value proposition much clearer through those. (Case N)*

Iterative (not linear) TRL progression in international R&I:

Our analysis of qualitative evidence suggests that university-driven international R&I rarely proceeds in a straight line from low to high TRLs. Instead, teams iterate: as prototypes mature, new technical, user, regulatory, or market insights—amplified by cross-border differences in users, standards and approvals—send the collaboration back to earlier TRLs to refine the underlying science, adjust architectures, or explore alternative approaches. This back-and-forth is a feature of successful international projects and increases the likelihood of generating significant economic benefits to the UK by improving fit-for-purpose solutions before large-scale deployment.

This iterative process was found to be particularly important in the context of international R&I, as internationally developed outputs often need to be adapted, refined, or re-configured to meet the specific needs, standards, and priorities of the UK. This adaptation is crucial for ensuring that globally generated knowledge or innovation can be effectively translated into economic value for the UK. In other words, the iterative movement between global collaboration and UK-specific application enables universities and partners to tailor solutions, overcome institutional or regulatory differences, and maximise the domestic impact of internationally developed output.

2.2. Why UK universities engage with international partners for R&I: learning from success

As reflected by successful cases that we have gathered evidence from, international collaboration is pursued when it enables outcomes that cannot be achieved at home with comparable quality, speed, or scale; when it opens credible pathways to global markets and investment; and when it amplifies economic and societal impact for the UK. The distinctive motivations for engaging in international R&I discussed below were often complemented by practical factors—such as existing contacts or previously successful collaborations—as well

as the need to advance scientific knowledge and technologies, which in turn contributes to academic career progression.

Access to international capabilities and complementary assets: Access to specialised expertise, facilities, datasets, and real-world settings located overseas—especially at low TRLs—provides capabilities (e.g. methodological innovations, process innovations and capabilities to liaise with international parties and recombine their disciplinary knowledge, resources and networks) that are scarce or unavailable domestically and enables higher-quality, frontier research.

> *"I've enjoyed it being a two-way street of academia pushing things to the companies, but then the [international] company is providing us with interesting **international problems**, bigger and **country specific data sets and associated analyzing capacities** than we'd be able to get …They've also got more resources to screen 100 compounds." (Case I)*

International scale, diversity, and robustness of evidence: Cross-country variation and multi-jurisdictional data increase representativeness, generalisability, and external validity (e.g., comparative studies, multi-site trials), raising confidence in results and de-risking adoption across markets.

> *"There is a **paucity of data from African Studies or, in general, Global South, African, Asian, South American** etc. studies. So, for example, we've worked with collaborators to define single cell responses in HIV or TB in African populations, bearing in mind there's limited data in any populations, but it's predominantly not in the populations that are overwhelmingly represented with HIV and TB. In another case, we've looked at studies of how the respiratory tract microbiota may impact responses to vaccines, particularly bearing in mind that people living in **Sub-Saharan Africa may have different composition** of the microbiota with different effects than **European population**. So, it's this sort of level of granular detail that requires **population specific analysis**. This knowledge increases our ability to **tailor treatments** to specific populations" (Case J)*

International funding and policy incentives: Access to competitive overseas and multilateral programmes—many of which prioritise or require international consortia—unlocks resources and opportunities that would otherwise be inaccessible domestically.

> *"**EU has these flagship programmes** that put significant research funding into particular areas, and they have a quantum computing programme, for example, at the level of **a billion euros** in specific research challenges. So, they have vehicles to do that and then bring the European research community together around these challenges. **The UK** has had similar efforts […] the UK has had a programme in quantum computing. But, the **funding is smaller** because it's just one country." (Case D)*

Pathways to international markets and associated commercialisation: International engagement systematically generates insight into international customers and users (segmentation, demand, willingness-to-pay), supports multi-country pilots and channel partnerships, and aligns regulatory, reimbursement, and procurement requirements across priority geographies—accelerating export readiness, market entry, and scaling.

> *"The UK was able to generate enormous amounts of **data of commercial value** by having a big collaborative **international platform** that everybody was working on together, it just gave you **scale and it gave you a huge ability to generate [international] evidence very rapidly.** […] In order to build the required UK national network [capabilities and infrastructure required for commercialisation], collaborating with the international partners are critical, particularly for **attracting additional UK commercial partners** and capabilities – the idea there is that we had kind of visibility globally to again attract international companies to the UK [in addition to data] to invest in the project or supporting infrastructure – **This attracts UK companies, required to accelerate [international and national] commercialisation**" (Case J)*
>
> *"We do mathematical modelling [for predicting side effects of new potential drug compounds] and streamlining internal safety testing. Accessing international data is extremely important for **international market testing."** (Case I)*

International intellectual property positioning: Building international patent families and securing freedom-to-operate in priority jurisdictions enhances valuation, licensing options, and confidence among prospective customers, suppliers, and investors; strong cross-border IP de-risks integration into global value chains.

> *"**Non-UK organisations** were really critical to kind of cementing the collaboration and allowing us to make significant **progress in cross-border IP.** We now have a **joint patent** on a licenced product which is available in the NHS […] a clinical trial has just finished and our second clinical trial and the results of that are about to be released and we hope that that will lead to a wider [international] adoption of this device" (Case Q)*

International talent, training, and reputational capital: Joint supervision, exchanges, and high-visibility cross-border partnerships help attract and retain global talent and signal internationally recognised quality to funders and industry.

> *""In the UK, due to extensive international projects, we have traditionally been very good at thinking about **a global perspective**, attracting **global talent**, and working with **international partners**. One of the reasons some of the European partners are based in the UK working in UK institutions is because they couldn't experience that **global reach** from their countries." (Case J)*

International risk diversification and system resilience: Cross-border consortia share costs and distribute technical, regulatory, and market risks across geographies, making ambitious projects feasible and more resilient to country-specific shocks.

> *"So, getting these **big international players on board,** at least some of the groups within them, is a way of really **stress testing** what we've got and getting **validation** data out there to the rest of the global market that this is safe to use and it's a good idea because the big names in the industry are already doing it [...]. They **share the cost and risks**. They wouldn't invest unless what we are doing is of value" (Case N)*

Influence on international standards and regulation: Active participation in global standards bodies, international testbeds, and regulatory dialogues increases interoperability and exportability of UK-developed solutions and shapes rules in ways conducive to UK strengths.

> *"By partnering with an **MNC** [Multi-nation Corporation], our kit is developed with **international standards built-in,** it is **ready for the global market** – this **saves** an enormous amount of time and money later on […] in a sense, the MNC signals to international **regulatory bodies** that it [the kit] meets **international requirements**." (Case N)*

To address global challenges of economic and societal significance: As global challenges—whether economic or social—demand international collaboration and coordinated effort, university-driven international R&I has frequently been oriented towards addressing them collectively, often aligning with the broader missions of global economies.

> *"I gave this example of **long-term energy storage challenge** [i.e. a global challenge] ... They [i.e. EU] have a quantum computing programme [i.e. as a solution to the grand challenge], for example, at the level of a billion euros in particular research challenges, so they have vehicles to do that and then bring the **European research community together around these challenges**... they have more impact if they're done on at international scale. **So, Europe** has more effective approach at dealing with these challenges than the UK has where it's necessarily smaller efforts." (Case D)*

The Figure 1 below illustrates how the decision to engage in international R&I varies depending on the low and high TRLS.

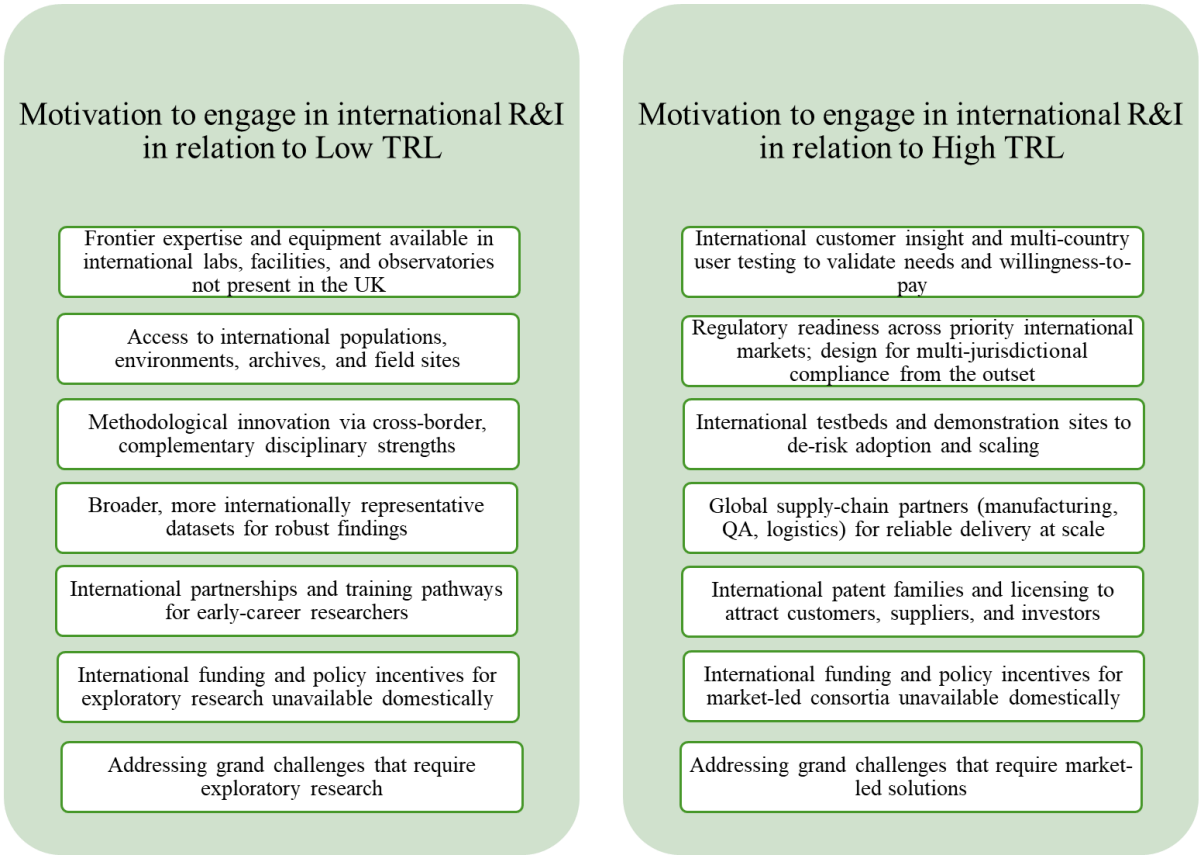

Figure 1: Reasons for engaging in international R&I: Low vs High TRLs

2.3. How successful international R&I projects have increased return on investment

Our analysis of case studies recognises that international R&I typically carries higher direct and transaction costs than domestic-only activity—driven by travel, multi-jurisdictional coordination, and legal/contracting overheads. Yet across successful cases, three choices consistently lift return on investment (ROI), resulting in return outweighing the cost: operating digital-first to cut delivery costs, hard-wiring UK value capture into design so more benefits accrue domestically, and exercising disciplined portfolio governance to reduce waste and risk.

Design for cost efficiency: digital-first and remote by default.

Successful international R&I collaborations can reduce costs by making digital collaboration the default mode of delivery, while reserving travel for activities where face-to-face interaction is essential. This involves using secure digital platforms for coordination, data sharing, analysis, training, supervision, and stakeholder engagement, and designing travel around small delegations, bundled objectives, regional hubs, and train-the-trainer models. Case D shows how this approach can support high-quality international research while reducing travel, relocation, and infrastructure costs.

Case D: Remote International Collaboration as a Cost-Efficient Research Model

In case D, an international STEM research collaboration adapted to pandemic-related disruptions by shifting to a modular, remote mode of working, enabling continuity of high-quality research while face-to-face interactions were not possible. The learnings from this experience also highlight a mechanism for international collaboration at significantly reduced costs. The approach demonstrated how distributed collaboration can maintain scientific rigor while offering long-term cost savings through reduced travel, relocation, and infrastructure expenses.

Context: A research collaboration led by a UK university and involved multiple international universities in a lab-intensive STEM field relied on remote working practices to ensure close coordination across research groups.

Challenge: When the COVID-19 pandemic made face-to-face interactions, traditional in-person laboratory work, and international travel impossible, the research partners were required to restructure their usual ways of working to avoid major disruptions. Sustaining research continuity, coordination, and scientific quality under these conditions posed a substantial challenge—particularly as the work depended on the exchange of physical

samples, iterative testing, and the integration of outputs across multiple institutions. These constraints demanded new operational routines and a high degree of adaptability to ensure that collaboration remained productive despite the sudden shift to remote and distributed working environments.

How they addressed the challenge through digitalisation: The international collaboration approached the project in modular sub-units, where each sub-unit operated semi-independently, benefitting from the team's interdisciplinarity for division of labour and asynchronous work. Physical samples and test materials were exchanged across different research groups in the international collaboration via postal or courier services, ensuring the input and contributions of each participating university to the research. For further discussion and coordination, the international partners utilised online meetings. These virtual integration sessions enabled the researchers to combine outputs, align objectives and methodologies, and plan further steps, which enabled scientifically robust, economically impactful, high-quality research even without in-person contact. In the end, the collaboration produced rigorous, peer-reviewed results, demonstrating that remotely conducted international research collaborations can maintain high scientific standards even in a lab-intensive STEM field.

Implications: This experience shows that such a model can serve as a long-term, cost-efficient, flexible international research collaborations. A broader adoption of such collaboration structures can offer substantial benefits. Reducing cost of travel could offer opportunities to spend limited resources for other research activities, such as expanding data collection, accessing more/better resources, and improving research support (e.g., by hiring more PhDs and postdocs). The interdisciplinary composition of the team combines expertise from diverse disciplines more effectively than a single-site group might, enabling a more modular approach for international collaborative research, increasing the quality, effectiveness, and efficiency of research projects. Via the distribution of tasks and asynchronous working arrangements, international research projects may become more resilient to external shocks (such as the lockdowns during the Covid pandemic) as well as other coordination challenges, such as scheduling constraints due to different time zones.

Build UK value capture into design.

High-performing projects make UK value capture clear from the proposal stage. A UK Value Capture Plan – whether it is explicitly defined or implicitly understood – sets (i) an IP strategy with priority jurisdictions [when feasible], freedom-to-operate milestones, and foreground IP positioned for UK exploitation; (ii) commercial pathways that preference UK-hosted licensing and sales, and—where appropriate—UK-incorporated spin-outs and UK manufacturing/service anchors; (iii) roles in standards and regulatory working groups so that UK teams help codify learning into global standards; and (iv) a skills pipeline of placements and co-supervision that returns expertise to UK labs and firms. Contracts then repatriate benefits—clarifying foreground IP ownership and revenue sharing in favour of UK exploitation, requiring UK mirrors of datasets/models, and embedding step-in rights for critical deliverables. After international pilots, teams run UK demonstrations and diffusion activities (e.g., procurement pilots or regulatory submissions with NHS, Catapult centres, and UK city regions) to anchor domestic benefit. Customer discovery is integrated across markets, but licensing and sales enablement are deliberately channelled through UK entities.

> *"In terms of international collaboration, the project was designed to meet a **funding requirement** that **a substantial number of UK companies and organisations** be involved as partners or participants **from the beginning**. So, the project had **strong UK participation** along with a smaller number (2 to 3) **international participant (MNCs).** This mix really helped build complementary capabilities, really strengthening the UK participants and **translate benefits to the UK**." (Case Q)*

Reduce unit costs and financing risks.

Cost discipline is matched by smarter financing and delivery mechanics. Programmes cost-share and co-fund with international agencies or industry and tranche funds against technical milestones to mitigate risk. They favour lean experimentation—simulation, digital twins, and rapid virtual prototyping—to eliminate unproductive options before expensive physical trials. They adopt open standards and interoperable Application Programming Interfaces (APIs) to avoid vendor lock-in and reduce duplication across sites. Common functions—legal, export control, ethics, and data protection—run as shared services using reusable sub-award templates, with pooled cloud/compute procurement to lower unit prices.

Taken together, these practices lower the denominator (through digital-first delivery and shared risk, costs and services) and lift the numerator (by generating distinctive economic benefits). The result is a clearer, more reliable path to higher ROI from international R&I while safeguarding UK value capture.

> *"Small UK firms [e.g. university spinouts] often lack the **manufacturing scale, regulatory capacity, and global distribution channels** needed to commercialise advanced medical devices **cost-effectively**. Even with automated machinery, their **unit costs** remain significantly higher, and the capital required to **build international regulatory and marketing infrastructure** creates substantial financial risk. In practice, **international, large established manufacturers**, who already produce millions of similar products and have **FDA pathways, global logistics, and shared service functions in place**, can integrate innovations far more efficiently. Clinical trial data typically prompts these major players to **acquire smaller innovators**, allowing scale-up within existing systems, reducing duplication, lowering per-unit costs, and spreading financial and operational risk across a much broader base." (Case M)*

3. Pathways for Generating Economic Value Through International R&I

3.1. Types of Globally Distinctive Economic Value Generated through University-driven International R&I

Our analysis suggests five distinctive economic impacts to the UK generated by university-driven international R&I. The globally distinctive economic value arises specifically because R&I spans national boundaries, creating outcomes that are qualitatively different through cross-border combinations of knowledge, talent, markets, networks and resources. The globally distinctive economic value generated through university-driven international R&I are summarised in this introduction, with the subsequent sections presenting each impact in detail alongside the supporting qualitative evidence:

Economic Value 1: Globally distinctive, economically valuable knowledge

International R&I of UK universities—working with leading teams of universities and businesses, infrastructures, datasets and problem contexts (i.e. refers to the specific societal, scientific, industrial, or technological challenges being addressed in different countries) overseas—enables economically valuable knowledge creation that is genuinely globally distinctive. By combining heterogeneous scientific traditions and multi-country evidence, international R&I produce economically valuable knowledge that are more generalisable and exportable. When UK teams work with counterparts abroad, they can test across multiple markets, infrastructures, and user environments, generating new knowledge that maps to the requirements of international standards. That makes downstream adoption and procurement faster in export markets. Working with international partners generates knowledge on where the markets are, which prior patents are relevant in those countries, and what design choices or filing routes will best secure protection and clearance. Due to the stated reasons, our respondents stated that such economically valuable international knowledge is unlikely to deliver through domestic-only programmes with the same rigor or reach. **Case** N illustrates this clearly: by engaging major international industry players, UK-developed knowledge on the feasibility of commercialisation of a technology in wider global market, strengthening credibility and accelerating uptake—thereby developing new knowledge with improved commercial prospects of value to the UK. This commercially valuable knowledge subsequently informed the commercialisation of the technology, leading to the creation of a UK-based spin-out company. The company was incorporated in 2009, secured its first investment in early 2010, and went on to attract further funding rounds as both the technology and its market proposition matured.

Economic Value 2: World-class talent through global exposure

Direct international experience turns UK researchers and students into *internationally ready and competitive* talent: by collaborating with overseas universities and companies, they gain hands-on access to frontier methods and instruments, operate to international standards and regulatory norms, and learn how products and services must evolve to meet real customer, channel, and procurement expectations in priority markets. They also build intercultural leadership—coordinating multi-time-zone teams, negotiating roles and IP sensibly, and delivering reliably in complex, cross-organisational settings. Respondents emphasised that these capabilities translate into stronger leadership, greater grant-winning power, and enhanced innovation readiness that flow back into UK labs, classrooms, spinouts, and partner firms—benefits that domestic-only activity is unable to replicate with comparable breadth, speed, or credibility. For instance, in **Case** A international R&I has given academics "authentic" market insight that strengthens teaching and career guidance, and—critically—has improved PhD students, who were involved in the project,' employability in industry, reinforcing the UK's talent pipeline for globally operating firms.

Economic Value 3: Jobs in globally demanding, future-facing sectors

It is the mapping of UK capabilities to worldwide demand—made possible by international R&I —that creates jobs resilient to domestic market cycles. International engagement stimulates employment beyond research posts into commercial, regulatory, manufacturing, and customer-facing roles tied to export growth, while positioning UK institutions and firms within global value chains and attracting foreign direct investment to UK clusters—advantages, as specified by our respondents, that are difficult to unlock through national R&I alone. For instance, in **Case** Q international R&I generated new approaches to infrastructure performance and safety monitoring and translated into over 25 new UK jobs through the creation of three spin-out companies, anchoring employment in a globally relevant, future-facing sector in engineering.

Economic Value 4: Better operations for UK industry and policy

It is access to global benchmarks and evidence—secured through international R&I—that allows UK firms and policymakers to adopt proven practices sooner, avoid costly missteps, and design interoperable regulation for major markets. Tools, data architectures, and operational playbooks validated across multiple countries can be transferred back into the UK system, raising productivity and enabling smoother cross-border delivery—benefits that are inherently limited when operating only within national boundaries. Translating such value to the UK becomes possible when UK organisations are both willing to adapt internationally generated learning to domestic priorities and have the absorptive capacity to recognise, assimilate, and apply that knowledge effectively. **Case** A provides a good example: insights and comparative evidence generated through international collaboration were taken up by

UK regulators and used in policy and regulatory development, with an evidenced audit trail—showing direct operational and governance improvements flowing back into the UK system.

Economic Value 5: Faster commercialisation via global resources

International networks orchestrated by UK universities—linking customers, testbeds, regulators, suppliers, and investors in priority markets— compress time-to-product-market fit and de-risk adoption at scale. This produces IP that maps to international standards and regulatory expectations, so products arrive "export-ready." International collaboration allows UK university teams to shape IP strategies to target markets, creating international patent families and clarifying freedom-to-operate where customers actually are. That, in turn, increases licensing options (territory-specific or global), supports co-development and co-ownership with overseas firms where appropriate, and builds confidence among customers and suppliers considering integration. The result is a larger, more defensible licensing and spin-out opportunity set than would typically be available from domestic-only research, because the IP is already aligned to multi-jurisdictional demand and legal realities. When UK universities orchestrate international R&I—actively brokering partners, pilots, IP, and channels across borders—the commercial outputs (patents and other IP, spinouts, licensing revenues, supplier contracts, and export sales) are larger, faster, and more defensible than those typically produced by domestic-only pathways. For instance, **Case K,** with partners across Europe and the United States, accelerated the translation of research into commercially viable digital technologies, including patented systems, mobile applications, and spinout activity. The UK businesses developed and scaled innovative products by adopting these technologies in sectors such as architectural visualisation, energy management, and tourism, generating revenue growth, cost savings, and access to international markets.

3.2. Common Conditions Shaping the Generation of Economic Value through University-driven International R&I

Our analysis of evidence indicates that university-driven international R&I generates globally distinctive economic value for the UK when three cross-cutting conditions are in place: strong UK anchoring, high-quality international collaboration capability, and sustained funding and institutional support across the pathway from research to impact. These conditions should not be understood only as enablers. Where they are weak, absent, or fragmented, they become barriers that slow translation, reduce the visibility of UK benefits, or allow economic value to diffuse across international networks without being fully captured in the UK.

Across the five economic value pathways, these conditions shape whether international R&I produces knowledge that is distinctive, talent that strengthens UK capability, employment and industrial opportunities that are retained domestically, operational improvements that are

adopted by UK organisations, and commercialisation outcomes that generate value for UK firms and markets.

The translation of international value into UK benefits through UK value capture mechanisms, capabilities and capacities

UK problem ownership - International R&I generates stronger and more visible economic value for the UK when projects are anchored from the outset in clearly defined UK problems, users, practitioners, firms, policy priorities, or market needs. The evidence indicates that UK value capture does not happen automatically simply because UK universities participate in international collaborations. Rather, it needs to be deliberately designed into projects so that international activity translates into clear economic, industrial, policy, and societal benefits for the UK. Across the five economic value pathways, this anchoring mechanism ensures that the outputs of international collaboration do not remain globally diffuse but are translated into forms of value that are relevant, usable, and capturable within the UK.

UK value capture mechanisms - In practice, UK anchoring involves more than identifying a UK-relevant topic. It requires the active involvement of UK practitioners, adopters, beneficiaries, businesses, and, in some cases, UK-based multinationals or subsidiaries throughout the collaboration. UK practitioners play an important translational role by helping to interpret international findings in relation to UK conditions, regulatory settings, operational constraints, professional practices, and policy needs. Their role is therefore not simply to receive outputs at the end of a project, but to help shape whether international learning becomes UK-relevant insights, tools, processes, standards, practices, or policy options. Universities collaborating with them from the beginning of the project created clearer pathways for domestic uptake, enabled outputs to be tested and refined with potential users, and allowed UK businesses to shape, commercialise, scale, or supply resulting innovations.

UK-based multinational enterprises and subsidiaries can act as important bridging actors between international R&I activity and the UK commercial environment. Where such organisations are involved, they can connect global knowledge networks with UK-based capabilities, supply chains, markets, investment opportunities, and routes to scale. This is particularly important in cases where international collaboration produces knowledge or technologies with global relevance but where the UK needs specific mechanisms to retain economic value domestically. In these cases, UK value capture mechanisms help ensure that international R&I strengthens UK firms, institutions, skills, infrastructure, and industrial capacity rather than allowing benefits to diffuse primarily across other jurisdictions.

UK value capture capabilities and capacities - The evidence indicates that UK economic value depends not only on the use of specific mechanisms but also on the capabilities of UK actors to absorb, shape, translate, and capture the value generated through them. This includes absorptive capacity, meaning the ability to identify, understand, and use

knowledge generated through international R&I; co-creation capability, meaning the ability to work continuously with partners to define problems, shape research agendas, and develop solutions; and interdisciplinary capability, meaning the ability to combine technical, social, creative, commercial, and policy expertise so that outputs are both original and implementable in a UK context. It also includes implementation capacity, where UK organisations have the resources, systems, and practical know-how needed to embed internationally generated outputs into products, services, processes, policies, or standards.

Institutional translation and value-capture readiness- Institutional translation capability is also critical. Technology transfer offices, innovation intermediaries, commercialisation units, business development teams, legal specialists, and policy translation teams help interpret, package, broker, and convert international R&I outcomes into UK economic, commercial, industrial, or policy value. Practitioner and academic visibility and networking further strengthen this process by connecting university-generated international R&I with real-world UK problems, adopters, beneficiaries, and users. Finally, UK organisations need value-capture readiness: the openness and capability to adopt, diffuse, commercialise, license, scale, or implement externally generated knowledge, rather than defaulting to a “not invented here” mindset.

The case evidence illustrates this mechanism clearly. In **Case C**, the project’s value to the UK was strengthened because the research problem and data were derived from a UK context. This enabled internationally generated methodological advances to inform UK policymaking and improve the evidence base used by the UK’s national statistical authority. In **Case A**, internationally developed methods and software were subsequently applied to UK policy and regulatory questions as the universities from outset worked with UK organisations to address domestic operational problems. In **Case Q**, UK businesses worked with UK university and international partners from the beginning of the project. Co-creation throughout the project from outset meant that the research was shaped around the needs, capabilities, and commercial priorities of UK firms, creating a direct mechanism through which international collaboration could generate benefits for the UK. Rather than treating UK firms as downstream recipients, the project positioned them as active participants in defining, testing, and translating the innovation pathway.

Where UK anchoring is weak, internationally generated value can be difficult to translate and retain domestically. Knowledge may become internationally visible but remain weakly connected to UK adoption. Talent may circulate globally without being absorbed into UK institutions or firms. Jobs may be created within international value chains without being anchored in UK sites or capabilities. Operational improvements may be recognised internationally but not taken up by UK organisations. Commercial returns may accrue through international partners, markets, or investors without being captured by UK firms or institutions. The evidence therefore suggests that UK anchoring is not simply a matter of

geographical relevance. It is a foundational condition for ensuring that international R&I generates economic value that is retained, used, and scaled within the UK economy.

International partnership quality to navigate cross-border collaboration

A second cross-cutting condition is the quality of international partnerships and the capability of UK university-led teams to build, manage, and evolve those relationships effectively over time. International R&I produces distinctive economic value when UK teams can access complementary expertise, specialist facilities, proprietary datasets, real-world testbeds, international markets, and diverse scientific and industrial perspectives that are unavailable domestically. However, these benefits do not arise simply because international partners are involved. They depend on the quality of partner selection, the strategic fit between collaborators, the trust and incentives that underpin the relationship, and the ability of UK leads to coordinate activity across borders, disciplines, sectors, and organisational cultures.

When collaboration is strong, it enables UK teams to make the most of international partnerships and to navigate the frictions that are inherent in cross-border work. **In Case B**, diplomatic channels and high-level bilateral relationships helped reduce coordination barriers, improve visibility, and open access to senior international stakeholders. This strengthened the project's ability to move research towards standards, adoption pathways, and wider implementation. In **Case I**, participation in a collaboration involving a uniquely equipped overseas laboratory enabled the UK team to access specialist data-processing capabilities and machinery unavailable in the UK, strengthening both research quality and downstream economic opportunity. In **Case Q**, the partnership structure combined strong UK participation with a smaller number of carefully selected international multinational partners. This created a complementary model in which international reach strengthened UK capability while also supporting the translation of benefits back into the UK.

At the same time, the evidence shows that cross-border collaboration can create significant barriers where the collaboration is weak or where institutional systems are not designed to support international work. International R&I often requires UK teams to navigate differences in legal expectations, ethics requirements, data-sharing rules, regulatory settings, approval processes, funding conditions, contractual norms, and organisational cultures. These frictions can delay evidence generation, increase transaction costs, create uncertainty for partners, and slow the movement of outputs towards UK-relevant adoption or commercial use. In regulated sectors in particular, the need to work across stacked approvals and divergent standards across countries can delay the production of comparative, adoption-ready evidence. This suggests that partnership strength is not simply a background condition for collaboration. It is a core aspect that determines whether international R&I can move efficiently from knowledge creation to adoption, implementation, and commercialisation.

Funding, institutional support, and progression mechanisms across the pathway

A third cross-cutting condition is the availability of funding, institutional support, and progression mechanisms across the full pathway from discovery to translation, implementation, commercialisation, and scale-up. Our analysis of evidence shows that international R&I generates economic value most effectively when projects are supported not only at the point of initial research, but also through the stages required to convert internationally generated insights into UK-relevant outcomes. Across the five pathways, this includes continuity of funding across technology readiness levels, implementation support for operational uptake, commercialisation and scale-up finance, support for early-career researcher development, and institutional capabilities such as technology transfer, business development, legal support, translational infrastructure, and partnership management.

When these mechanisms are in place, internationally generated knowledge can be converted into tangible economic outcomes. **Case L** illustrates how sustained progression from early-stage laboratory research to clinical trials, manufacturing capability, infrastructure development, and spinout activity generated jobs, commercial outputs, and wider UK capability in advanced therapies. **Case A** similarly shows that operational and policy impacts required not only core research funding, but also follow-on support across multiple stages to develop tools and infrastructure to a point where they could be used in practice. More broadly, the cases show that institutional support from technology transfer offices and enterprise functions, combined with sequential rounds of funding over several years, was essential for preparing technologies for translation and generating wider economic returns.

Where such support is fragmented, however, promising international R&I can struggle to mature into economic value. Funding gaps between discovery and demonstration, between pilot and implementation, between prototype and scale-up, or between researcher training and institutional uptake can interrupt otherwise promising trajectories. In some cases, internationally generated knowledge may be scientifically strong but lack the financial, institutional, or translational support required to reach users, firms, markets, or public-sector adopters. The evidence therefore suggests that the mere existence of internationally distinctive knowledge is insufficient. Economic value depends on whether the UK system provides the continuity, capacity, and institutional support needed to move that knowledge along the pathway to application, uptake, and impact.

3.4. PATHWAY 1: Generating Globally Distinctive, Economically Valuable Knowledge

Our analysis of evidence shows how international research and innovation (R&I) activities generate globally distinctive, economically valuable knowledge for the UK. The distinctive advantage of international engagement across these knowledge generation pathways lies in exposure to complementary capabilities, diverse datasets, and lead-market conditions

overseas; participation in global standards fora; and access to international testbeds and early customers—each of which can accelerate knowledge production, signal UK's quality internationally, and translate globally distinctive, economically valuable knowledge back to the UK in ways that domestic activity alone cannot. Crucially, this translation is not automatic: a set of translation-enabling factors – in the form of enablers and challenges - determine whether—and how—international R&I turns into nationally relevant economic value. What is distinctive here is the *international* character of these enablers: they must bridge jurisdictions, standards, languages, and organisational cultures—features rarely present, or far less complex, in purely domestic settings—which both raises the coordination threshold and increases the potential for globally differentiated outcomes (Figure 2).

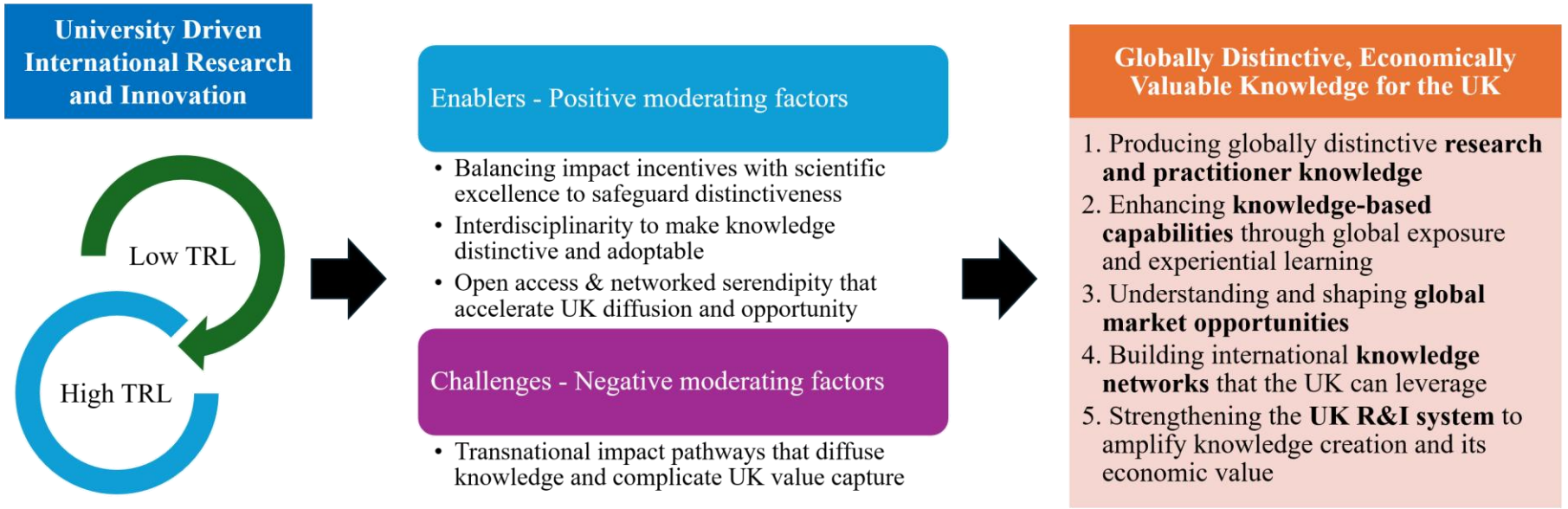

Figure 2: Pathways for generating globally distinctive, economically valuable knowledge to the UK through university driven international R&I

3.4.1 How university-driven international R&I generates globally distinctive, economically valuable knowledge for the UK

Knowledge creation is one of the core objectives of international R&I collaborations. This step is the antecedent for the other types and mechanisms of economic impact to the UK, such as commercialisation, talent development, employment opportunities and operational improvements, which we discuss in more detail in the following sections.

> *They [Economic value] are all kind of **interlinked**, aren't they? The things I've been talking about, successful **papers** and embedding of simulations into companies generates more **interest f**rom other companies in doing the same, this creates more **commercialisation opportunities** […] We could secure more **funding for research** to improve those simulations and tailor them to company needs to improve **their operations**. We develop **talent** through such engagements […] They [economic value] are all very interrelated…" (Case I)*

Although knowledge-related outputs from international collaborations are typically available globally due to the international and open access nature of science and scientific progress, the first-hand knowledge, R&I experience, and academia and practice-related networks and capabilities developed as well as relevant indirect economic impacts, along with intangibles such as prestige and reputation, remain with the UK-based actors.

Producing globally distinctive research and practitioner knowledge

Our analysis of evidence indicates that international collaborations combine theories, data, infrastructures, and problem framings that are dispersed across borders, producing original scientific insights and practitioner-ready methods whose distinctiveness and transferability exceed what national-only projects typically yield. This mix yields higher originality in publications, more generalisable insights, and practitioner-ready methods and tools that travel across sectors and geographies—advantages that compound the UK's visibility and reputation for excellence. This distinctiveness translates into economic value for the UK by elevating reputational capital, informing better practice, and opening routes for high-value applications.

At low TRLs, the mechanism generates frontier ideas, open methods, and novel datasets that shape research agendas the UK can lead, laying intellectual foundations for downstream value. At high TRLs, the same international mix yields validated protocols, demonstrators, and comparative evidence of performance in real-world contexts—knowledge assets that shorten time-to-solution and improve adoption prospects, thereby anchoring economic returns to the UK.

*"[**International partner** selection] was through identification of **key research skills and capabilities** which would complement the skills that we had within the group, but not available in the UK, and would add value to help address the **problem** we wanted to address" (Case J)*

*"If you make **breakthroughs** at the fundamental science level [referring to a breakthrough – e.g., chemistry and physics of conjugated coordination nanosheets and two-dimensional conjugated polymers – the development of which requires international R&I] that are **published** in well recognised scientific journals, there is clearly a connection to **potential commercial impacts** because if the quality of your science is high, you're making breakthroughs that could potentially deliver solutions to technological problems where you could **commercialise technology**. So, I think there is a correlation between the quality of the science and the potential economic impact in a field like this. [...] Also in terms of **skills training**, if the quality of the science is high, then you can train people much more effectively" (Case D)*

Enhancing knowledge-based capabilities through global exposure and experiential learning

Immersion in diverse scientific norms, regulatory systems and operational practices, produces comparative, experiential learning that UK researchers, students, and firms bring home and codify, generating use-tested knowledge about rigorous methods, reliable evidence, and scalable solutions. Exposure to different standards, and failure and success cases equips UK teams with knowledge to design more robust studies, navigate uncertainty, and embed best practice faster back home. This knowledge is economically valuable because it raises the quality and applicability of subsequent UK research and innovation beyond what domestically bounded experience can typically achieve.

At low TRLs, international exposure upgrades methodological sophistication and trains people who diffuse advanced techniques across UK labs, agencies, and sectors, multiplying knowledge creation. At high TRLs, hands-on practice with IP, spin-outs, regulation, and scale-up across jurisdictions creates tacit and codified know-how that improves UK translational design and standards—knowledge that directly supports faster, de-risked paths to economic value.

> *"International R&I was about **developing the techniques further** and then using them to address **policy-related questions in the UK**. … Once the project got up and running, several other UK organisations contacted us. Their work built on a core set of methods and software we **internationally developed**—then we applied those skills to different UK **operational problems and datasets**.*
> *(Case A)*
>
> *"This work is still ongoing, but the international collaboration triggered further academic work on **how to improve the models, build confidence in them, and make them more reliable for the kinds of operational decisions and safety predictions we need in the UK.**" (Case R)*

Understanding and shaping global market opportunities

Direct engagement with overseas users, value chains, and regulators yields granular foreign market intelligence that feeds back into research design, creating new knowledge about problem framing, design requirements, and adoption barriers that national-only projects seldom surface at comparable speed and fidelity. This knowledge and understanding helps UK firms sport and shape opportunities, tailor offerings, anticipate regulatory shifts, halt failing projects, and de-risk entry strategies. This knowledge lets UK actors prioritise, design, and sequence innovation more effectively, generating competitive advantage and economic returns.

At low TRLs, insight into international bottlenecks and trends redirects UK inquiry toward questions with broader global relevance, enhancing the distinctiveness of UK knowledge outputs. At high TRLs, pilots and user validation across jurisdictions generate comparative effectiveness data, knowledge, and evidence of fitness for purpose, reducing perceived risk for adopters and investors, and strengthening business cases and investment readiness for UK ventures.

> *"Based on our project [International R&I] we had a **conference in the UK** about [the foreign country's] market reform, and we were trying to create interest in the **UK stakeholders** in what was happening [there]. [...] You're actually getting access to the **[international] market**, that's quite hard in terms of anything other than expertise." (Case B)*
>
> *"So, getting these big **international players** on board [i.e. in the international R&I] is a way of getting what we have developed validated and **signalling to the rest of the global market** that it is safe to use and it's a good idea because the big names in the industry are already doing it." (Case N)*

Building international knowledge networks that the UK can leverage

Cross-border collaborations create knowledge networks that repeatedly co-produce shared artefacts (datasets, methods, software, standards) and tacit know-how the UK can codify and redeploy. These networks accelerate the rate and scope of knowledge generation well beyond what nationally bounded networks can typically achieve [i.e. due to the international nature of knowledge], and they convert that knowledge into economic value through faster recombination, diffusion, and application across UK sectors. The knowledge of these networks is uniquely valuable for the UK's research and industrial ecosystems: who to call, where to test, how to partner, and which platforms or consortia matter in each domain. This results in faster coalition-building for grants, easier identification of best-fit partners for piloting and scale-up, and a thicker pipeline of opportunities for UK spinouts and firms. Such networks minimise duplication in knowledge production and leverage the expertise embedded within them.

At low TRLs, networks consolidate around intellectual leadership and shared methods, enabling UK teams to originate and curate widely adopted approaches that attract talent, students, collaborators, and resources. At high TRLs, the same networks connect UK actors to international testbeds, supply chains, and consortia where comparative evidence is generated under varied conditions—knowledge that underpins standards, procurement criteria, and scale-up pathways with direct economic implications for the UK.

*"A successful **[international] network** like this, people need to be motivated to work with each other, and usually the motivation comes from being able to do good, high quality science together [...] due to the **specific nature of knowledge,** these international networks are essential. So those networks work much better, and generate **output faster** if we actually have exciting **science and applications** to work together." (Case L)*

*"Another lab i**n Y [a foreign country] is in the X [a** research institute], they are quite well resourced, and they've got one of these high throughput machines that the companies use. There're a very few academic labs that have access to these, and I'm not sure there's **even one in the UK.** Being part of the collaboration that can access the Lab and its **unique network** was extremely useful. It has been useful because we can get on to the real detail of how the machines are working and the **best way to process the data**, and the very, very fine stuff that the **companies have not really got the resources or networks"** (Case I)*

Strengthening the UK R&I system to amplify knowledge creation and its economic value

Our analysis shows that success in international arenas acts as a knowledge flywheel for the UK system: distinctive knowledge outputs validated against global benchmarks attract top talent, partners, and funding, expanding the UK's capacity to originate the next round of globally relevant knowledge. Because distinctive knowledge produced through international R&I validates UK excellence against global comparators, they boost credibility with funders and policy-makers beyond what national-only R&I can typically achieve. This cumulative mechanism is economically valuable because it broadens and deepens the UK's pipeline from discovery to application faster than national-only efforts typically can.

At low TRLs, repeat grants, visiting scholars, and expanded programmes keep the UK at the scientific frontier, continuously generating new intellectual assets. At high TRLs, international credibility unlocks translational finance and multinational pilots that produce comparative, adoption ready evidence, increasing the value of UK generated knowledge in regulation, procurement, and market entry—thereby reinforcing the UK's economic returns from knowledge creation.

> *"I think [international co-authors] sort* ***of find me****, I think people keep replying because we've got this international renowned* ***research group****, we've got visiting scholar programme, got visiting PhD programme, people have been coming for 10 years [global reputation due to past track record]. They tell* ***their friends, more people come*** *and it's a* ***pretty high bar*** *[of evaluation] before we let anyone in so that... that's a pretty good screening and reduces the numbers to a handful of people who can actually collaborate as a co-author and who understand the [research topic]. (Case B)*
>
> *"Successful papers [from international R&I] and commercialisation of knowledge in companies generates* ***more interest from other international and national companies*** *and more funding" (Case I)*

3.4.2. Enablers of generating globally distinctive, economically valuable knowledge through UK university-led international R&I

Balancing impact incentives with scientific excellence to safeguard distinctiveness: Our findings highlight that policy and institutional incentives which recognise impact shift behaviour upstream—encouraging researchers to plan for codified, reusable outputs (datasets, software, protocols) that UK actors can adopt—while a conscious commitment to scientific excellence safeguards the originality on which distinctiveness depends. This balance is reinforced by portfolio-level support for exploratory and foundational science, which accepts that economic value often accrues through cumulative, diversified pathways and that learning from failure is a system asset. When impact expectations and discovery funding are balanced, international collaborations generate knowledge that is both globally relevant and configured for UK uptake across different time horizons; at low TRLs, maintaining freedom to collaborate with whoever holds critical expertise is particularly important to future distinctiveness, while at high TRLs, impact-aware design with trusted and selected parters, especially based on the UK project lead's evaluation of partner engagement during early TRL levels and through other previous interactions, accelerates translation without sacrificing quality.

Interdisciplinarity to make knowledge distinctive and adoptable: It was evident that purposeful interdisciplinarity injects new combinations of concepts and methods, often including creative disciplines that improve sense-making and stakeholder engagement. This not only enhances originality but also improves adoptability, because solutions are designed with multiple user logics in mind. These teams frequently generate shared artefacts—datasets, software, methodological toolkits, and sometimes standards—that carry high reuse value for UK actors across sectors, strengthening both the distinctiveness of the knowledge and its pathway to economic impact. The table describing each case in the Appendix (pp.

84–87) briefly illustrates—specifically in the "Interdisciplinary Aspects of the Project" column—how each case engages across multiple sectors and adopts an interdisciplinary approach, thereby enhancing cross-disciplinary impacts.

Open access & networked serendipity that accelerate UK diffusion and opportunity: Our analysis indicates that open access knowledge outputs increase discoverability and enable practitioners and policymakers to trial, adapt, and scale UK-led methods and tools in unforeseen applications, accelerating diffusion through UK innovation systems. Openness also compounds the benefits of networked serendipity: conferences and informal connections reveal unexpected complementarities—new data sources, testbeds, and co-development partners—that reframe problems and unlock insights unattainable through planned pathways alone. Together, openness and serendipity broaden the UK's opportunity set and improve the odds that globally distinctive knowledge becomes economically valuable through timely adoption and scale.

3.4.3. Challenges of generating globally distinctive, economically valuable knowledge through UK university-led international R&I

Transnational impact pathways that diffuse knowledge and complicate UK value capture: Many UK-led international projects—across both low TRLs (for example, fundamental science and climate-related inquiry) and high TRLs (for example, drug discovery and sustainability solutions)—are designed to generate knowledge with international reach, whether through new scientific insights, methods, datasets, technologies, standards contributions, or problem-solving capabilities. As a result, the first and often most visible impacts are knowledge impacts: globally distinctive knowledge is produced, validated, and diffused through international research networks, publications, joint supervision, talent mobility, standards activity, and uptake by overseas firms, governments, and research communities. These pathways can significantly advance the global knowledge frontier, but they also mean that benefits often spread across borders before they are anchored economically in the UK. Without explicit UK-focused strategies—such as early engagement with UK regulators, standards bodies, testbeds, firms, public agencies, and potential adopters—knowledge generated through international collaboration may circulate strongly internationally while UK economic returns emerge more slowly, more indirectly, or with weaker visibility. The challenge is therefore not that UK value is absent, but that in transnational pipelines involving multinational partners, supply chains, and end users, knowledge impacts are often immediate and international, whereas UK-specific economic capture requires deliberate design, follow-on investment, and domestic absorption pathways.

Case C below provides a detailed account of how university-driven international R&I generates globally distinctive, economically valuable knowledge for the UK, together with the associated enablers and challenges. This case also demonstrates how multiple economic value pathways can be generated within a single case.

Case C: New Globally Distinctive Knowledge Informing UK Policymaking

Overview: This project addressed a fundamental limitation in how income inequality is measured in the UK. Developed by a UK university in collaboration with international partners, the project proposed methods to combine different types of national and international data and official records to improve accuracy in capturing top incomes.

Knowledge Creation: This case's main economic contribution lies in high-value knowledge outputs (e.g., publications and methodologies). The scientific outputs (with high economic impact potential) strengthened the knowledge base and analytical capacity that underpin economic decision-making as well as the training of future researchers.

Interconnected Economic Impact Pathways: The research provided the internationally developed distinct intellectual foundation that directly informed methodological changes adopted by the UK's national statistical authority and reshaped the evidence base used in policymaking. It contributed to resource allocation and strategic planning across sectors as well as enhanced the information infrastructure that businesses rely on for market analysis and forecasting, leading to system-wide improvements in the UK economy. In addition, it also contributed to talent development for the researchers and statistics professional.

Enablers: For this case, having data and a research problem derived from the UK context, having strategic international partners and funding opportunities (e.g., a major overseas grant), a balanced focus on scientific quality and real-world economic impact, the leadership and funding capability of the UK researcher, interdisciplinarity, and accessible outputs were key enablers of economic impact creation for the UK.

Challenges: The limitations in funding support (especially after Covid) and reduced staff capacity were the main challenges for economic impact creation for this case.

3.5. PATHWAY 2: Developing World-class Talent through Global Exposure

Our evidence shows that university-driven international R&I develops world-class talent for the UK by immersing researchers and students in diverse scientific, regulatory, and commercial contexts and then translating that learning back through teaching, structured knowledge mobilisation, multinational partnerships, and a compounding talent pipeline. The distinctive advantage of global exposure lies in learning-by-doing across different innovation systems, access to international datasets, testbeds and standards routes, and direct connectivity to global employers and markets—benefits that domestically bounded activity cannot replicate. Crucially, turning this exposure into UK advantage is not automatic; specific mechanisms—leadership of cross-border collaborations, curriculum renewal, and ecosystem immersion—need to be intentionally activated and supported so that capability is anchored and scaled in the UK.

International collaboration creates a funding flywheel effect: researchers with global experience go on to win more competitive grants, assemble stronger partnerships, and train subsequent cohorts who inherit cutting-edge practices and international mindsets. Graduates and early-career researchers then carry these capabilities into UK industry, the public sector, and entrepreneurship, where they apply and extend them—feeding back demand for new projects and skills. This is a distinctive mechanism of global exposure: by continuously renewing talent and networks with internationally benchmarked experience, the UK sustains a pipeline of people able to originate, translate, and scale ideas that compete world-wide while delivering value at home. At low TRLs, the effect renews scientific and analytical depth; at high TRLs, it renews translational and market-facing expertise (Figure 3).

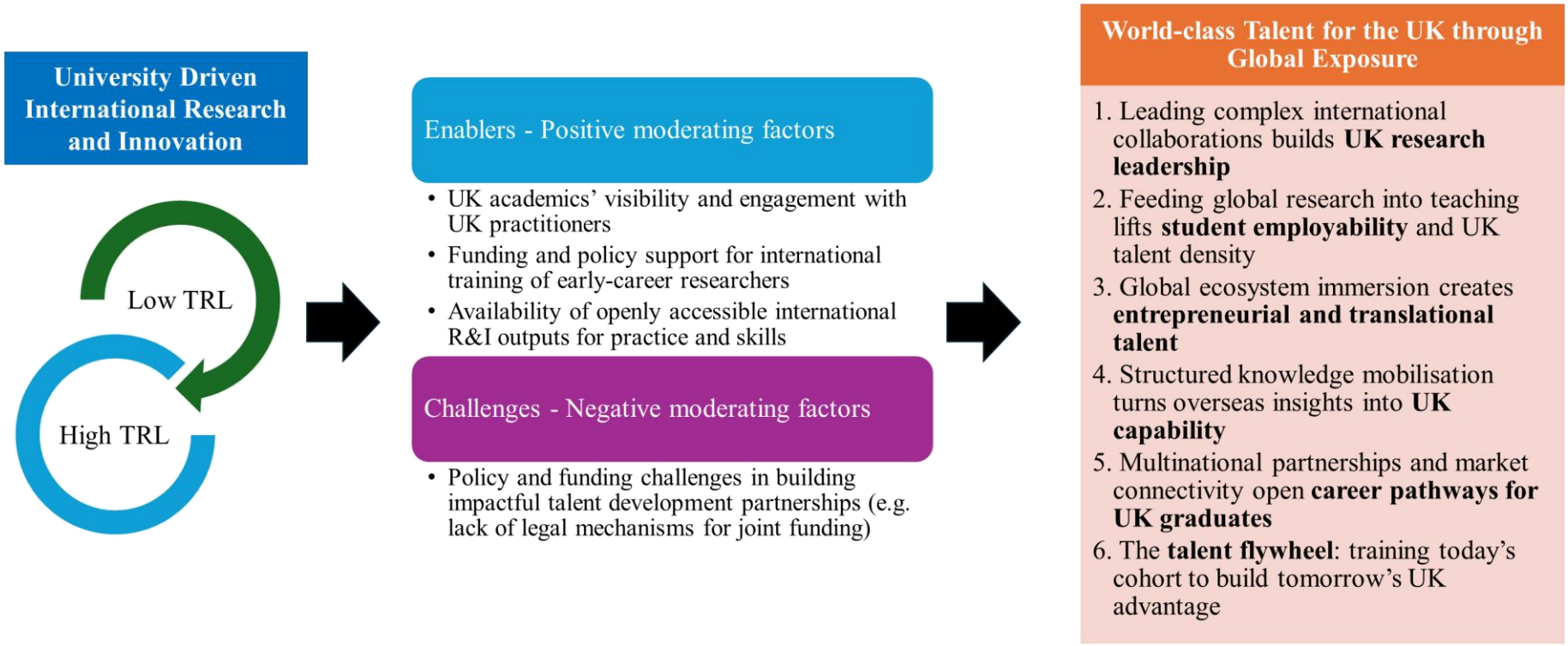

Figure 3: Pathways for developing world-class talent for the UK through university driven international R&I

3.5.1 How university-driven international R&I develops world-class talent for the UK through global exposure

University-driven international R&I equips UK researchers, students and partnering businesses with capabilities formed in diverse scientific, regulatory, and commercial contexts, and then translates that learning back into the UK through teaching, structured mobilisation, partnerships with multinationals, and a cumulative talent pipeline. Therefore, these pathways develop world-class talent—benchmarked globally, valued by employers—and deliver economic benefit to the UK beyond what nationally bounded R&I alone can generate.

Leading complex international collaborations builds UK research leadership

Our analysis of evidence shows that when UK researchers lead or co-lead cross-border R&I projects, they acquire hard-to-replicate capabilities in designing, funding, and managing international collaboration at scale, such as grantcraft (i.e. designing, positioning, and securing funding strategically) across multiple funders, partner selection, delivery governance, and navigating cultural and organisational differences. These skills compound over time, increasing the success rate and impact potential of future projects and enabling UK teams to access the right resources and partners faster. This leadership learning is intrinsically international: the exposure to diverse infrastructures, expectations, and delivery norms cannot be reproduced through national-only projects and directly contributes to world-class capability within UK institutions. At low TRLs, such global exposure—and the development of strategies for engaging effectively with stakeholders across diverse cultural, economic, and regulatory contexts—strengthens international research design, methodology, and comparative inquiry. At high TRLs, it strengthens translational programme management, IP and partnership structuring, and time-to-deployment discipline.

> *"Engaging in international projects enable us to develop several **world-leading skills, capabilities and networks**. International projects are different from national projects. Therefore, these skills are **unique and useful for future** [...] [based on this exposure] We've been very picky about adding others to the group in order not to destroy the dynamics at the core of the group. [...] We are very slow to **integrate partners** because we want to maintain the dynamics that have been successful. [...] We made an effort to find someone who had the right expertise, but also who would fit in terms of the way we work." (Case G)*

Global ecosystem immersion creates entrepreneurial and translational talent

High-quality international collaborations expose UK researchers and students to global best practices in commercialisation, spin-out formation, knowledge transfer, and scale-up across different innovation systems—experience that domestic-only pathways rarely provide. Working alongside international companies, funders, and intermediaries cultivates "learning by doing" in product development, regulatory navigation, and growth, producing UK talent ready to lead in globally competitive sectors. While the applied emphasis is strongest at high TRLs (e.g., prototyping, pilots, and market testing), low-TRL projects also contribute by building the habits of comparative inquiry, interdisciplinary teaming, and problem framing that underpin later entrepreneurial performance. This immersion is what makes the talent world-class: it is trained against international benchmarks and practices, not solely UK norms.

> *"There's a lot to be **learned from the international project** in aerospace industry and partners. They have interesting **business models and technologies"** (Case Q)*
>
> *"Through our projects we learn about technologies and associated guidelines. We **train people on the guidelines** so they know what to do and we can support and do some of that through our projects" (Case P)*

Feeding global research into university curricular teaching lifts student employability and UK talent density

International R&I continuously refreshes curricula, supervision, and skills training in UK universities. Faculty translate frontier, globally relevant research into teaching and project-based learning, so undergraduates, postgraduates, and early-career researchers gain exposure to international datasets, methods, and industry practices. Employers—especially multinationals and organisations operating across borders—value this global orientation; our analysis suggests that companies fund PhDs involving international R&I and actively recruit UK graduates with global talent precisely because they "think differently," integrate technology and context, have absorptive capacity, and work across cultures. The outcome is a larger pool of UK-based talent with portable skills (e.g., problem-solving, strategic thinking, cross-cutting analysis) that align with global markets and, in turn, strengthen the UK's economic base. At low TRLs, this mechanism deepens analytical and methodological sophistication; at high TRLs, it adds applied, market-aware skills that are directly relevant to commercial environments.

> *"If the quality of the **science [developed through international projects]** is high, then you can train people much more effectively [...]. They need to have experience in sophisticated techniques. [...] There is quite **a strong correlation between the quality of the science and training** and potential economic opportunities." (Case D)*
>
> *"[Doing impactful international research] certainly I think provides **a level of authenticity when you're in the classroom**, because you can tell students about some of the things you've seen [through international R&I] and give them insight **that is not just from the textbook**. It is quite a lot of added value, and then of course that leads into understanding **career opportunities** for students and being able to advise and being able to offer career support as a result, because you **understand more about the market and have international network [**...] when PhD students are involved in these projects, their **employability in industry** increases" (Case A)*

Structured extra-curricular, broader knowledge mobilisation turns overseas insights into UK capability

UK teams frequently bring back and codify the insights, methods, and "what works" learning from international collaborations through extra-curricular seminars, workshops, and trainings for practitioners, and policymakers. This organised broader knowledge-sharing diffuses globally distinctive know-how into UK organisations, improving analytical practice, evidence standards, absorptive capacity and solution design. Over time, this creates a capability cascade: today's internationally experienced researchers train professionals in UK business, government, and the third sector. At low TRLs, this takes the form of university-led events and methodological workshops; at high TRLs, mobilisation focuses on translational toolkits, standards, and adoption playbooks that UK actors can implement that could either be led by universities or businesses.

> *"[A UK business partner] sponsored me to go and **talk to the industry** [to share learning from the **international project**], [...] we [academics] also did a **series of talks at vet schools** to educate the young vets so that facilitated the acceptance of the actual [**solution** we developed through international R&I project]." (Case E)*

Multinational partnerships and market connectivity open career pathways for UK graduates

By collaborating with multinationals with significant UK footprints, programmes create direct lines from research to placements, PhD sponsorships, and employment—including roles headquartered in the UK but operating globally. Because these firms value talent that is comfortable in international contexts and attuned to varied user needs, UK graduates emerging from internationally embedded projects are actively sought after. This demand signals that international R&I does more than enrich learning; it converts global exposure into labour-market advantage, anchoring high-value jobs and career trajectories in the UK and reinforcing the UK's attractiveness to both firms and future students. At low TRLs, the value often manifests as reputational pull and method-led distinctiveness; at high TRLs, it stems from directly demonstrable experience in venture building, product and process innovation, and cross-border collaboration.

> *"They [MNC] approached my group and said we'd like to do some research with you, they went on to **fund some PhDs** actually, which was brilliant, had a long relationship and they're in a competitive market, and they were genuinely interested in in how the **workplace was changing,** and how digital technology could enhance it." (Case T)*
>
> *"When PhD students are involved in these projects [international R&I], their **employability in industry** increases" (Case A)*
>
> *"Often we have **PhD students** who are affiliated with the [international] programme, so we had funding for a **postdoctoral researcher** [involved in the international project] **who supervised a number of affiliated PhD students** on this [international] project. Additional there were two PhD students I supervised and involved in the [international] project, one of them has **graduated and is working in the UK** and the other one is about to graduate, so that will probably be mainly **national impact on the national skills training [through international R&I]**." (Case D)*

3.5.2. Enablers of developing world-class talent through UK university-led international R&I

UK academic's visibility and engagement with UK practitioners: Across both low- and high-TRL projects, strong relationships between UK universities, businesses, and policymakers ensure that international collaborations are consistently oriented towards challenges of strategic importance to the UK. This alignment is central not only to impact generation but also to talent development pathways. Regular engagement with UK non-academic partners—through co-design of projects, iterative feedback, joint reviews of

technical progress, and exposure to wider practitioner networks—shapes the skills, mindsets, and professional capabilities that UK researchers and students develop during international R&I work. Because UK partners bring real-world constraints, regulatory expectations, commercial priorities, and systems-level insights into the collaboration, the resulting talent is trained in ways that map directly onto UK labour-market needs. Being visible to broader UK practitioner communities beyond the immediate project partners enlarges the diffusion of insights and fosters connections that support future placements, secondments, and recruitment pipelines. This strengthens the domestic talent base with individuals who are internationally experienced but nationally relevant.

Funding and policy support for international training of early-career researchers: Having mechanisms for international businesses to fund UK PhD students as well as for UK universities to co-supervise PhD students with international universities are highlighted in our data as effective mechanisms to train skilled early-career researchers. Unique resources and expertise available via international businesses and universities improve development of research talent in the UK, which underlines future research quality, knowledge creation, and other associated economic benefits.

Availability of openly accessible international R&I outputs for practice and skills: Making research outputs from international R&I open and accessible to non-academic communities in a more user-friendly manner (i.e., with minimal academic jargon) supports individuals and organisations in developing practice-relevant skills and enables wider learning of best practice. While the primary audience for academic publications is academics—who benefit from deeper scholarly insights that advance distinct knowledge—other mechanisms that make this knowledge available to practitioners in a user-friendly way were identified as facilitating cross-sector talent development through international R&I engagement.

3.5.3. Challenges of developing world-class talent through UK university-led international R&I

Policy and funding challenges in building impactful talent development partnerships: UK researchers at both the low and high TRL face practical barriers to international research collaborations due to funding restrictions that limit support for non-UK institutions and partners. This creates a two-fold challenge: securing overseas partners' willingness to co-fund UK PhD students engaged in international R&I and finding UK mechanisms that allow funding to flow to overseas partners and their doctoral researchers. Countries appear to take an overly narrow view of how funding benefits the investing country, which shapes how funding mechanisms are structured. As this report has highlighted, the adoption of country specific value-capture mechanisms can enable investing countries to realise significant economic benefits from international research and innovation collaborations. Consequently, policymakers may wish to take a more supportive approach to co-funding PhD students engaged in international R&I projects, recognising their potential contribution to long-term

economic value creation Providing co-funding for PhD students in partner countries could deliver at least two key benefits. First, PhD candidates based in other countries often possess unique, context-specific knowledge and skills. Engaging them in collaborative R&I can enhance the development of joint outputs that, when supported by appropriate mechanisms, can create globally distinctive economic value for the investing country. Second, through sustained interaction with investing country's academics and doctoral researchers, the students from partner countries may subsequently join the UK workforce or continue long-term collaboration with investing country's institutions. Such spillover effects strengthen the rationale for co-funding international PhD students, as they contribute to both immediate research outcomes and longer-term economic and knowledge gains.

The absence of clear mechanisms for joint funding to train PhDs, early-career researchers, researcher exchanges, and project agreements often leads to delays and missed opportunities for collaboration and associated talent development opportunities. As the **Case I** explained, their collaborations with international laboratories are typically only eligible for European funding because UK funders are usually restricted to supporting UK universities; attempts to set up joint PhD or postdoctoral exchanges frequently stall for months in legal negotiations due to the lack of established mechanisms to fund international partners or allow them to fund UK PhDs or researchers. Opportunities for co-funded postdoctoral exchanges—readily supported by industry—are therefore lost simply because no operational route exists to deliver them. These constraints limit the UK's ability to create frictionless international training pathways, constraining the depth and pace of talent development that could otherwise emerge from global R&I partnerships.

Case J below provides a detailed illustration of how university-driven international R&I develops world-class talent for the UK through global exposure, together with the associated enablers and challenges. This case also demonstrates how multiple economic value pathways can be generated within a single case.

Case J: Building UK Talent in Infection Science with Global Connections

Overview: The UK university-led research team and a network of international and domestic partners came together to address a major scientific and societal challenge in infectious diseases. Although driven by the goal to generate new knowledge to underpin improved treatments, the project also aimed to build long-term research capacity in the UK. The initiative explicitly incorporated training and skills development as a core component.

Talent Development: The project contributed to talent development in the UK by establishing international doctoral and research training pathways, including collaborative training programmes with European partners and co-supervision arrangements. These initiatives supported the development of PhD students, postdoctoral researchers, and clinician-scientists, creating a pipeline of highly trained individuals entering the UK. The project also enabled skills exchange across regions, particularly by enabling UK-based researchers to work in diverse global contexts and establishing research networks. This translated into concrete outcomes for the UK such as enhanced scientific careers, improved clinical research expertise, and a more globally connected workforce.

Interconnected Economic Impact Pathways: Beyond creating knowledge for new treatments and building UK talent, the project led to other economic impacts, such as improving confidence in early-stage therapeutic discovery and reducing costs of developing treatment pathways (i.e., operational improvements). Importantly, these impacts were not immediate but rather enabled downstream economic value. For example, the researchers and clinicians involved and trained in the project also contributed to urgent national needs during Covid 19 pandemic by pivoting their expertise to respond to the emerging challenge, showcasing the transferability of strong scientific expertise across contexts and how it translates into broader economic resilience within the UK.

Enablers: Funding and policy support that created training opportunities for UK researchers, both through international collaborations and national initiatives supporting skills development and access to international funding for PhD training, were key enablers of talent development in the UK. These mechanisms helped build research capacity, strengthen international networks, and enhance the UK skills base.

Challenges: Despite these benefits, limitations and structural fragmentation in funding arrangements for international collaborators posed significant challenges. In particular, the lack of flexible funding mechanisms to enable experienced scientists to rapidly redirect their expertise towards emerging challenges, while maintaining continuity in their existing projects, constrained opportunities for impact. Difficulties in identifying, sharing, and coordinating funding across national and international partners further limited the efficient mobilisation of expertise and resources, thereby reducing the potential for generating economic impacts for the UK.

3.6. PATHWAY 3: Creating Jobs for UK in Globally Demanding, Future-facing Sectors

Our analysis of evidence shows that UK university-driven international R&I creates jobs in globally demanding, future-facing sectors by linking UK research and talent directly to global partners, markets, standards and testbeds, so that ventures form, firms adopt new innovations, and project teams build transferable capabilities in the UK. The distinctive advantage of international engagement across these job-creation pathways lies in access to multinational collaborators and channels, multi-market validation, and co-development opportunities that domestic activity alone rarely matches. Crucially, conversion to UK jobs is not automatic: specific enablers and challenges determine whether—and how—international R&I translates into sustained UK employment growth (Figure 4).

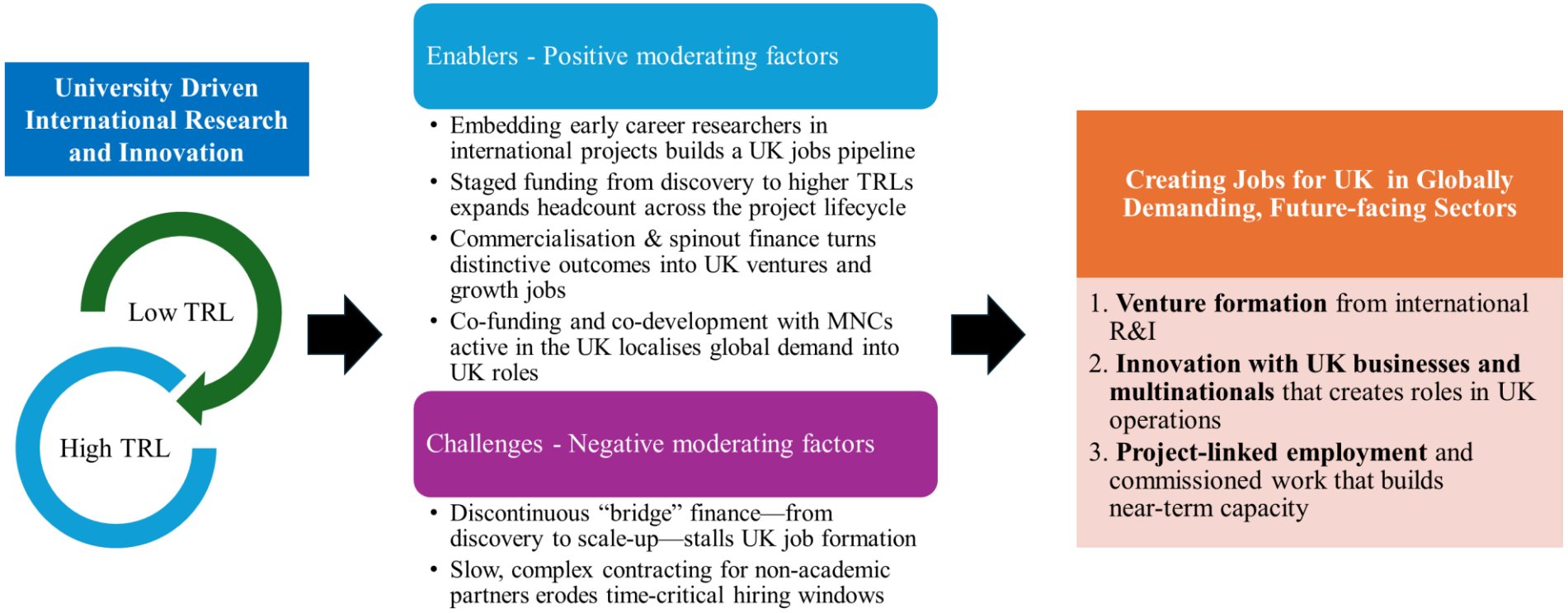

Figure 4: Pathways creating UK jobs in globally demanding, future-facing sectors through university driven international R&I

3.6.1 How university-driven international R&I creates jobs for UK in globally demanding, future-facing sectors

Venture formation from international R&I

Our analysis shows that international R&I generates UK jobs through the formation and growth of UK spinouts, including cases where the main external partner of UK universities is an international company, which anchors commercial activity in globally demanding markets while locating hiring in the UK. This is mainly because of the UK's reputation and closeness of these new employees to UK universities, which such international partners found critical for success. At low TRLs, international research produces proto-ventures (i.e. first version or early-stage, de-risked version of a company that is being nurtured within the university, similar to a "prototype" of a business) and proof-of-concept teams that hire a small core of researchers and operators; at high TRLs, spinout activity is more common and can scale employment if longer-term investment and favourable UK entrepreneurial and policy conditions are present.

*Our international research led to **new approaches to the performance and safety monitoring of infrastructure assets** during both construction and operation. We created **over 25 new jobs**, through the creation of **three spin-out companies** (Case Q)*

***Four of the five major UK** ceramic tableware manufacturers have all approached us for 3D printed ceramic prototypes for new ceramic tableware designs or setters for commercial use. As a result, we are in the process of **creating a spin-out company and associated jobs** [based on international R&I project] to service these requests [...]. This contributes to the UK's economic competitiveness by reducing their turnaround time for development to less than a week (Case O)*

*The **collaborating companies** were multinationals. X was the spin out of the university, and we supplied nearly every fire service in the UK is using technology that we developed […] The spin-out makes a positive contribution to the local economy training **computer science students as interns, employing 12 people** (Case R)*

Innovation with UK businesses and multinationals that creates roles in UK operations

We find that when UK universities collaborate internationally with UK firms and MNCs, co-developed products, services, or processes lead to new roles inside UK operations, particularly in sectors facing global demand. At low TRLs, firms tend to add limited, project-bound roles as new methods or insights are tested; at high TRLs, the introduction of commercial innovations can create a sizable number of UK jobs, especially in R&D and marketing functions tied to product launch and growth. However, because integration into business systems takes time, long-term employment effects generally emerge slowly, and even at high TRLs substantial job creation can take five to ten years to materialise depending on scope and sector.

> *"One of the first PhD students I had with **X MNC** actually got to the end of a PhD and then went to visit the MNC, as part of **a postdoc**, for a year or two [a new job role], and that set off a lot of work on that experimental design angle [further development of the project]." (Case I)*
>
> *"**A lot of jobs** have come out of it [international R&I] for the Y company [partner **UK company**]. They built an **SME** out of [our collaboration where] we did some of the first **research** and after we did some of the **protocol, the prototype testing etc**" (Case E)*

Project-linked employment and commissioned work that builds near-term capacity

Our analysis of evidence finds that international research projects themselves create short-term UK employment—for example, hiring new PhDs and postdocs on globally oriented research tasks, or commissioning UK-based non-academic partners (such as creative or technical specialists) to deliver distinctive contributions that internationalise the project's outputs. At low TRLs, these jobs are typically fixed-term and tied to project lifecycles, but they seed capabilities and sector-relevant experience that can later transfer into longer-term roles; at high TRLs, project staffing increasingly overlaps with translational workstreams, providing stepping-stones into commercial teams as pilots and prototypes move forward. While these roles are time-limited, they are often launchpads for employment in future-facing sectors because the experience is formed in an international collaboration context.

*"We run a **team where we empower the individuals** and I think that we've been very fortunate having a wonderful team of **basic scientists, clinicians and nurses and data managers and clinical trial manager** [project linked employment] that's put this all together and the result of this has been that of the 108 patients that are in this trial, they've had no less than, I think, 69 visits" (Case S)*

*"You know, companies like A have **offices all over the world,** but they're a British company, so you know. My research group had many, many **international people -** postdocs PhD students [project linked employment]" (Case Q)*

*"I had probably about **five postdocs on that project** and maybe something like **seven or eight PhDs,** mostly funded by either external funding, EPSRC, or by partner companies" (Case H)*

3.6.2. Enablers of creating jobs for UK in globally demanding, future-facing sectors through university-led international R&I

Embedding early-career researchers in international projects builds a UK jobs pipeline: Our analysis of evidence shows that funding which places PhDs and postdocs inside cross-border collaborations creates immediate UK roles on projects and develops a cohort with internationally benchmarked skills that UK employers subsequently recruit into R&D and innovation functions. At low TRLs, Early Career Research funding supports research posts on globally oriented work packages; at high TRLs, it equips researchers with translational experience (e.g., validation, user testing) that is directly employable in UK firms and spinouts, widening near-term and follow-on hiring.

Staged funding from discovery to higher TRLs expands headcount across the project lifecycle: When programmes resource both early-stage discovery and progression to higher TRLs, UK teams can move from findings to demonstrators and prototypes, which requires building out multidisciplinary teams and thus adds UK jobs across research, engineering, regulatory, and project delivery roles. At low TRLs, funding underwrites research assistants and associate posts tied to international data collection and analysis; as projects move up the TRL scale, it sustains additional technical and coordination roles that persist through pilots and trials—strengthening the bridge to longer-term employment in the UK.

Commercialisation & spinout finance turns distinctive outcomes into UK ventures and growth jobs: Targeted support for spinout formation and growth converts internationally generated insights into products and services, creating near-term UK hires (research, product, commercial) and—if growth capital is available—scaling domestic headcount over time. At low TRLs, proof-of-concept and pre-seed support professionalise discovery outputs

and create initial roles; at high TRLs, follow-on and scale-up funding enable market entry and expansion, increasing UK employment as ventures grow. The ultimate job impact depends on the availability of scale-up finance and a conducive UK policy environment, which can otherwise constrain headcount growth.

Co-funding and co-development with MNCs active in the UK localises global demand into UK roles: Partnerships with multinational companies with UK facilities allow R&D, testing, and pilot deployment to occur on UK sites, producing adoption-ready evidence and triggering new roles inside UK operations when solutions are adopted (e.g., in R&D, design, marketing, and sales). At low TRLs, MNC projects create project-bound roles linked to method development and small-scale pilots; at high TRLs, successful pilots in UK facilities frequently precede broader adoption, leading to sustained hiring as innovations are integrated into UK business lines. Our cases include lab equipment developed by UK researchers and tested at a multinational's Scottish lab (**Case N**), and an office design scheme piloted at a company's London HQ, each followed by new UK hires once adopted (**Case T**).

3.6.3. Challenges of creating jobs for UK in globally demanding, future-facing sectors through university-led international R&I

Discontinuous "bridge" finance—from discovery to scale-up—stalls UK job formation: Our analysis shows persistent gaps in follow-on and integrated funding after initial research awards, affecting both research progression and commercially oriented projects. Without timely finance to move from early success to the next stage—business development, demonstration, regulatory steps, or production scale-up—UK teams cannot expand work packages or retain hires, so new posts are delayed or forgone. The problem is most acute at high TRLs, where a severe lack of scale-up funding limits the ability to build operations and manufacturing in the UK, constraining longer-term job creation even when the underlying innovation is sound. At low TRLs, the absence of follow-on support curtails project continuity, preventing short-term research roles from evolving into durable UK positions and slowing the pipeline of talent feeding future-facing sectors. In both cases, funding discontinuity reduces the probability that internationally catalysed R&I translates into on-shore employment growth at the pace global markets demand.

Slow, complex contracting for non-academic partners erodes time-critical hiring windows: Where international projects intend to commission UK non-academic specialists—such as creative practitioners, technical consultants, or engineering partners—our analysis shows that complex university contracting and rigid funding mechanisms remain a material barrier. Multi-party agreements routinely take months to conclude, shrinking or eliminating UK roles that were originally planned. Even after onboarding, payment delays and administrative uncertainty—often driven by unfamiliarity with small or atypical suppliers—discourage future participation, weakening a hiring channel that should expand UK capability in globally oriented work.

Case evidence shows that these barriers are not limited to technical contractors. For example, in one project (Case F) exploring responsible AI practices across international organisations, the team sought to hire a UK-based artist as a research and dissemination partner. Despite the partner's centrality to the project's methodology, the collaboration stalled because funding mechanisms could not easily accommodate small, creative suppliers. The absence of established routes for engaging non-traditional partners meant that negotiations had to be improvised, consuming significant Principal Investigator and university administrative time, slowing the research, and risking delivery quality. While some funders—such as Innovate UK—are comparatively flexible, most processes remain geared toward medium or large enterprises, offering little guidance on how to onboard smaller organisations effectively.

These delays have cross-TRL impacts: they are most visible at low TRLs, where short projects simply miss the window to hire; and most consequential at high TRLs, where misalignment with partners' product cycles or pilot schedules can defer adoption and the associated UK operational hires. As one researcher explained, in a six-month project requiring multiple external contracts, *"we weren't able to hire [the non-academic employee] until three months into the project… a significant barrier for us."* The cumulative effect is fewer UK contracts let, fewer specialists engaged in globally relevant work, and fewer UK jobs created during and after the project—even when the international collaboration itself generates strong demand for UK-based talent.

Case L below provides a detailed illustration of how university-driven international R&I creates jobs for UK in globally demanding, future-facing sectors, together with the associated enablers and challenges. The case also demonstrates how multiple economic value pathways can emerge within a single instance.

Case L: Expanding UK Jobs in Cancer Treatment Ecosystem

Overview: A long-term UK research programme with international collaborators in cellular immunotherapy developed novel adoptive cell therapies (ACT) for cancer. Progressing from early-stage laboratory work to clinical trials and routine healthcare delivery, this translational pathway ultimately contributed to the approval and roll-out of commercial ACT treatments in the UK health system. Alongside scientific development, the project addressed systemic bottlenecks (e.g., manufacturing capability and clinical delivery) by establishing production facilities and coordinating clinical infrastructure.

Job Creation: One concrete economic output of the project was job creation and workforce expansion in the UK. The programme directly generated new employment across research, clinical trials, and manufacturing functions as well as high-skilled roles in advanced therapies. This project created new jobs enabled by a university spinout (grew to 40 employees before a merger) and employments tied to clinical trials and infrastructure programmes.

Interconnected Economic Impact Pathways: The project supported talent development via training and education programmes. Importantly, improved patient outcomes (e.g. curative treatments enabling return to work) translated indirectly into economic gains through operational efficiencies (e.g., increased productivity, reduced long-term healthcare costs). Establishing a UK-based innovation and delivery ecosystem for cell and gene therapies, the project enabled both direct commercialisation and indirect economic benefits through infrastructure and investment attraction. A university spinout company scaled manufacturing and development capabilities (later merging with an international biotechnology firm) and programme-level infrastructure initiatives created new commercial products and R&D investment.

Enablers: This project created new jobs enabled by a university spinout (grew to 40 employees before a merger) and employments tied to clinical trials and infrastructure programmes. Early interactions with industry, institutional support to form the spinout, and building international knowledge networks that the UK can leverage

Challenges: The challenges arising from funding gaps between innovations' discovery to scale up as well as their inefficient integration across stages negatively affected the materialization of job-related economic impacts in the UK; Extensive red tape associated with government grants, university investment processes, and early-stage financing. It has been highlighted that as the central value proposition of a spin-out lies in rapidly bringing innovation to market; when company formation, access to finance, and operational resourcing move too slowly, opportunities can be lost to faster-moving competitors.

3.7. PATHWAY 4: Improving UK Industry and Policy Operations with Global Insights

Our analysis of evidence shows that university-driven international R&I improves UK business operations and policymaking by importing comparative methods and datasets, co-developing and piloting solutions with world-leading partners, and leveraging global credibility and benchmarking to de-risk adoption and speed scale-up—globally distinctive benefits that are hard to replicate through domestic-only efforts. In practice, this translates into internationally informed sharper analytics, leaner processes, and stronger service delivery in UK organisations, supported by industry co-funding that tailors and embeds operational improvements. Crucially, turning global insight into operational gain is not automatic: specific enablers and challenges determine whether—and how—international R&I improves UK industry and policy operations (Figure 5).

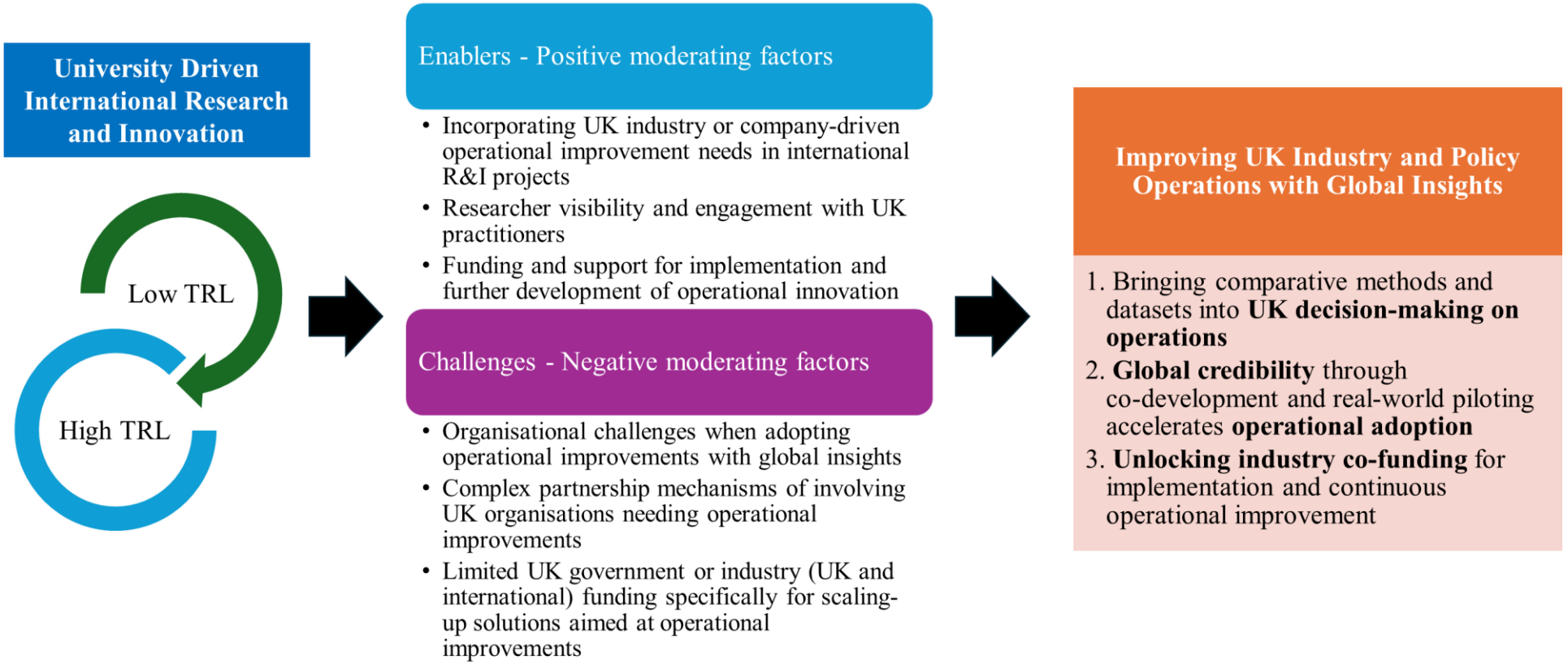

Figure 5: Pathways improving UK industry and policy operations with global insights through university driven international R&I

3.7.1. How university-driven international R&I improves UK Industry and policy operations with global insights

Bringing comparative methods and datasets into UK decision-making on operations

Our analysis of evidence shows that international collaborations expose UK teams to diverse expertise, comparative datasets, and complementary technological capabilities that are rarely available domestically. This breadth strengthens evaluation techniques, modelling, and evidence standards inside UK organisations, leading to more accurate diagnoses, better policy design, and operational choices that travel across settings, rather than solutions tuned only to UK-specific assumptions. For UK businesses, this means sharper performance analytics and leaner processes; for UK policymakers, it improves appraisal, targeting, and regulatory design. At low TRLs, the gains show up as new methods, toolkits, and analytical frameworks that raise the quality of internal analysis; at high TRLs, validated approaches translate more quickly into changes in workflows, systems, and service delivery.

> *"We've given quite a lot of insight [from the **international collaboration**] to the Y [a UK **regulator]** and quite a lot of insight to the Z [another UK **regulator**]. And that work has definitely been used in **policy development** and the development of **regulations**, we've got an audit trail on that." (Case A)*
>
> *"There's also the greater **reliability** of the measurement data as a consequence of the calibration techniques that we [internationally] developed, so there's **more confidence i**n the data, which is important to improve the **operations of UK organisations**." (Case G)*

Global credibility through co-development and real-world piloting accelerates operational adoption

International R&I enables UK organisations to co-develop and test solutions in realistic operational settings—often with world-leading partners—which helps translate early ideas into adoption-ready improvements. By trialling process innovations, productivity tools, and redesigned workplaces across multiple jurisdictions, teams obtain practical insights into what works (and what does not) under varied conditions. This produces solutions that are not only technically sound but also operationally validated.

When these solutions carry international provenance and are benchmarked against global best practice, they deliver powerful signals of quality that reduce adoption risk for UK firms and policymakers. Credible evidence from multiple countries strengthens leadership confidence, improves procurement cases, and makes replication across UK sites easier because operational approaches have already been tested at scale. Benchmarking also

sharpens vendor selection, process redesign, and policy instrumentation by drawing on comparative evidence from other systems.

At low TRLs, international pilots justify experimentation, guide iterative adaptation, and focus development effort on the most promising routes. At high TRLs, where innovations are more mature, the combination of global credibility and real-world testing enables faster, more visible gains once deployed—shortening time-to-implementation on the factory floor or in service operations. Our evidence illustrates this pathway, including a UK university partnering with a global office-design leader to re-engineer workplace layouts, and a UK university–multinational partnership deploying a bioscience monitoring system that improved day-to-day operations. Together, co-development and global benchmarking provide a de-risked route to scalable operational improvements for the UK

*"Funding enabled **two parallel PhDs** that built the core knowledge for the project, while international conference engagement helped us form links with **leading global collaborators**. Through these partnerships we **collaborated with** Canada, the US, and Europe, generating strong **cross-country evidence that accelerated market acceptance. This global validation** supported widespread **adoption** of the steaming technology across equestrian disciplines, improving animal welfare, reducing veterinary costs, and contributing to the product's commercial success. We **engaged with businesses** for adoption and marketing of the technique (Case E).*

*"X [the International partner] was **involved** from the start, but then when they saw the good stuff [i.e. more validation], from their point of view, coming out of interactions with Y [the **UK business partnerships**] they [X, international partner] got more involved in by **funding PhD projects**...This further strengthen the collaboration and follow-up additional opportunities for **UK adoption**" (Case I).*

*"We were trying to do it with very early data [with the **international business partner**] and we evolved to trying to predict some of the **internal safety tests** with [the **UK business partner**] as the next thing. [...] We benchmarked all the mathematical models to see how well they agree with that new database." (Case I).*

Unlocking industry co-funding for implementation and continuous operational improvement

As UK organisations gain confidence in operational solutions developed through international R&I, they often commission implementation support and follow-on work from the research teams. This creates a virtuous cycle: industry funding underwrites the tailoring, integration, and training needed to make improvements stick, while continued contact with global partners keeps practices aligned with international benchmarks. For UK businesses, this means funding targeted change projects and workforce upskilling to embed gains. At low TRLs, co-funding supports the extra development effort to turn promising methods into deployable tools; at high TRLs, it sustains iterative optimisation, wider roll-out, and benchmarking against leading markets.

> *"Eventually X [asset management company based in the UK]* ***recruited two of our PhD students*** *to do each a 12-month* ***internship working*** *with [them] using these techniques [developed internationally] to develop, essentially, investment signals in house […] they used* ***our model*** *[developed internationally] because they wanted to* ***scale it globally*** *[…] it was like snowballing, through word of mouth we* ***collaborated with*** *asset managers and quantitative analysts in* ***UK and Europe****" (Case A)*

3.7.2. Enablers of improving UK industry and policy operations with global insights through university-led international R&I

Incorporating UK industry or company-driven operational improvement needs in international R&I projects: Respondents—particularly those involved in higher-TRL collaborations—emphasised that operationally meaningful innovations for the UK are most likely to emerge when international R&I projects are anchored in clearly defined UK organisational challenges. When UK firms, UK-based divisions of multinationals, or public sector bodies articulate specific operational bottlenecks, university teams are able to design projects that directly target these needs while drawing on global expertise, comparative datasets, and diverse technological approaches sourced through international partnerships. By exposing UK teams to alternative design philosophies, engineering constraints, and implementation pathways in overseas research groups and industry counterparts, these collaborations sharpen the development of operational solutions and increase their robustness.

Incorporating UK industry or company-driven operational improvement needs in international R&I projects

Context: Case N, the Scottish Enterprise funded the commercialisation of university research, required the alignment of the academic research activity with crucial business and staff development processes.

Interactions with UK industry: As part of the commercialisation process, the team sought the advice of directors from major UK pharmaceutical companies and recruited business development advisers for guidance. This enabled researchers to integrate UK needs and operational requirements in the project.

Engagement with international partners: As this process was underway, a multinational company approached the UK university team with a specific equipment need relating to laboratory operations.

Combining UK and MNC engagement: Because the UK team did not have an existing solution, they engaged in a co-development process that combined the research with operational requirements and technical insight drawn from their international research partners. Through iterative design and consultation—supported by comparative knowledge from overseas collaborators—the team was able to design and build a bespoke piece of equipment tailored to the company's needs.

From low TRL to high TRLs: This work ultimately led to the creation of a UK based spinout from the university, which now provides advanced behavioural analytics software to research laboratories. By reducing reliance on animal testing and improving the accuracy of laboratory workflows through automated video-based monitoring, the spin-out strengthened the UK's operational capability in a globally competitive field.

Conclusion: The example demonstrates how integrating UK operational problems into international R&I collaborations, and then enhancing solutions with global expertise, can accelerate the development of technologies that deliver direct value to UK industry, research operations, and the wider innovation ecosystem.

Researcher visibility and engagement with UK practitioners: Operational improvements in the UK depend on ensuring that internationally generated insights are translated into tools that address UK-specific organisational processes, regulatory environments, and workflow constraints. When UK research teams remain visible and actively engaged with practitioner communities, they are better positioned to identify where international R&I outputs (e.g., new

operational models, validated methods, or policy frameworks) can solve concrete operational issues in UK businesses and public agencies. Engagement therefore becomes a mechanism through which international operational excellence is transferred into UK practice, raising the performance baseline across UK industries and policy systems.

Funding and support for implementation and further development of operational innovation: Operational improvements—and the economic value they generate for the UK—materialise only when UK organisations have the resources and capacity to adopt and implement solutions emerging from international R&I. Because tools and methods developed through global collaboration often require adaptation to UK operational environments, dedicated funding for implementation is a critical enabler. Support for early-career researchers to work directly with UK organisations also accelerates the embedding of internationally derived methods into day-to-day operations, ensuring that insights generated overseas translate into practical gains within UK systems.

Impact-focused funding mechanisms are particularly important for helping organisations move innovations up the TRL scale. They allow teams to take interventions that have been validated in international or experimental contexts and work with UK partners to refine, test, and operationalise them. Several respondents noted that when funding is available for this transitional stage, UK organisations are better able to experiment with new approaches without absorbing the full financial risk, increasing the likelihood of long-term adoption.

3.7.3. Challenges of improving UK Industry and policy operations with global insights through university-led international R&I

Organisational challenges when adopting operational improvements with global insights: Even when international R&I projects generate high-quality tools, methods, or technologies with clear potential to improve UK organisational operations, the characteristics and routines of UK implementing organisations can significantly limit the realisation of these benefits. Across both low- and high-TRL projects, researchers reported encountering the “not-invented-here” syndrome, where UK organisations resist adopting externally developed—particularly internationally developed—solutions. This reluctance is often reinforced by entrenched organisational routines, path dependency, lack of absorptive capacity, and broader organisational inertia, all of which slow or prevent the integration of new operational practices.

Complex partnership mechanisms of involving UK organisations needing operational improvements: While greater involvement of UK businesses in international R&I collaborations generally strengthens the likelihood of operational improvements being adopted in the UK, the practicalities of forming and managing such partnerships can be prohibitive. Contracting processes are often lengthy and administratively complex, and these challenges are amplified when international partners bring different legal frameworks, procurement rules, or institutional procedures.

These complexities can discourage UK organisations—especially SMEs or resource-constrained public bodies—from participating in international collaborations. Reduced participation, in turn, limits their exposure to globally developed operational innovations and diminishes the UK's ability to translate international research outputs into domestic operational gains.

Limited UK government or industry (UK and international) funding specifically for scaling-up solutions aimed at operational improvements: Both high-TRL and many low-TRL respondents identified a lack of follow-on funding in the UK targeted for organisational adoption and adaptation of research outputs (e.g., scaling up operations, adapting prototypes, or supporting implementation within UK organisations). Without such dedicated funding, innovations emerging from international R&I often stall at the proof-of-concept without moving to the implementation stage. This funding gap restricts the UK's ability to convert internationally generated knowledge into operational improvements. The limited financial capacity of many UK-based businesses and public bodies negatively affects their ability to adapt, implement, or scale these solutions, even when international collaborations produce tools enhancing operational efficiency, accuracy, or productivity. In such cases, promising innovations remain underutilised in the UK or are acquired and commercialised exclusively by foreign companies, resulting in lost economic and operational value for the UK. This challenge is not unique to international collaborations—it reflects a broader structural issue affecting UK start-ups and innovation ecosystems—but it is particularly detrimental when the UK seeks to benefit from globally developed solutions.

Need for Scale-up Funding in the UK

Context: Case F noted that the AHRC had previously offered a funding stream designed to support the operational implementation of research outputs. However, this scheme was subsequently paused, leaving a critical gap in support for translating internationally developed interventions into UK organisational settings.

Challenge: The team had created an engagement tool that had already shown strong potential to shift thinking and influence behavioural or operational practices across several international contexts. However, without access to the type of modest, impact-oriented funding that AHRC had once provided, they were unable to work with UK partners to embed the tool within organisational processes, run co-design workshops, or carry out the iterative development needed to tailor the intervention to UK operational environments.

The role of dedicated funding: They emphasised that even relatively small amounts—approximately £20,000 to £50,000—would have enabled them to build on the international research foundation and convert the intervention into a practical, organisationally embedded innovation for the UK. The absence of this enabling funding meant that a promising, globally informed tool with demonstrable potential for operational improvement remained under-utilised in UK practice.

Case A below provides a detailed illustration of how university-driven international R&I improves UK Industry and policy operations with global insights, together with the associated enablers and challenges. The case also demonstrates how multiple economic value pathways can emerge within a single instance.

Case A: Intelligent Data Analysis for Improved Governance of Financial Markets

Overview: This research project developed the operational capability to analyse qualitative corporate disclosures, which constitute the vast majority of financial data but are traditionally difficult to analyse at scale. The project, which started as a publicly funded interdisciplinary research collaboration and expanded through subsequent projects that increasingly incorporated practitioner engagement, leveraged international collaborations (particularly with partners in North America and Europe) and built AI- and NLP-based tools to extract, classify, and evaluate large volumes of unstructured corporate reporting data accurately.

Operational Improvements: The main economic contribution of the project lies in improving the efficiency, transparency, and governance quality of UK financial markets, leading to improved financial products, enhanced risk assessment tools, and more efficient capital allocation. These tools enabled financial stakeholders to systematically process significantly larger volumes of corporate data at no additional cost. This enhanced analytical capability and capacity improved decision-making for investors, regulatory oversight, and evidence-based policy development. The research was also directly embedded into industry practices (e.g., investment firms used the datasets and models to develop internal analytics capabilities, pension funds incorporated text-based signals into investment strategies).

Interconnected Economic Impact Pathways: The project also generated significant talent development outcomes by training professionals through industry programmes, enhancing capabilities in AI-driven financial analysis. Collaboration with industry partners also resulted in the placement of doctoral researchers into internships, supporting both high-skilled employment pathways and knowledge transfer into the industry.

Enablers: Incorporating UK industry needs and demand for automated solutions to shape the research problem, active engagement with stakeholders in practice, and funding support for both research and practitioner applications catalysed the economic impacts in the UK.

Challenges: Due to high development costs of the resulting tools and infrastructure, the project required sustainable funding. However, due to lack of integrated funding through all stages, they had to cumulatively develop their outputs through several funding phases, utilising multiple grants and practitioner funding.

3.8. PATHWAY 5: Accelerating Commercialisation Leveraging Global Resources

Our analysis of evidence shows that university-driven international R&I accelerates commercialisation in and from the UK by turning research outputs into marketable assets (via spinouts, licensing, and co-development) and by reaching product–market fit faster through access to global partners, testbeds, customers, and regulatory regimes. The distinctive advantage lies in multi-market validation and market intelligence, partner channels for route-to-market, and international credibility that de-risks procurement and scale—benefits domestic-only activity rarely matches. Crucially, this conversion is not automatic: specific enablers and challenges determine whether internationally generated innovations commercialise through UK vehicles and value chains. These dynamics are inherently international—spanning jurisdictions, standards and IP regimes, languages, and organisational cultures—which raises the coordination threshold but also increases the potential for globally differentiated outcomes (Figure 6).

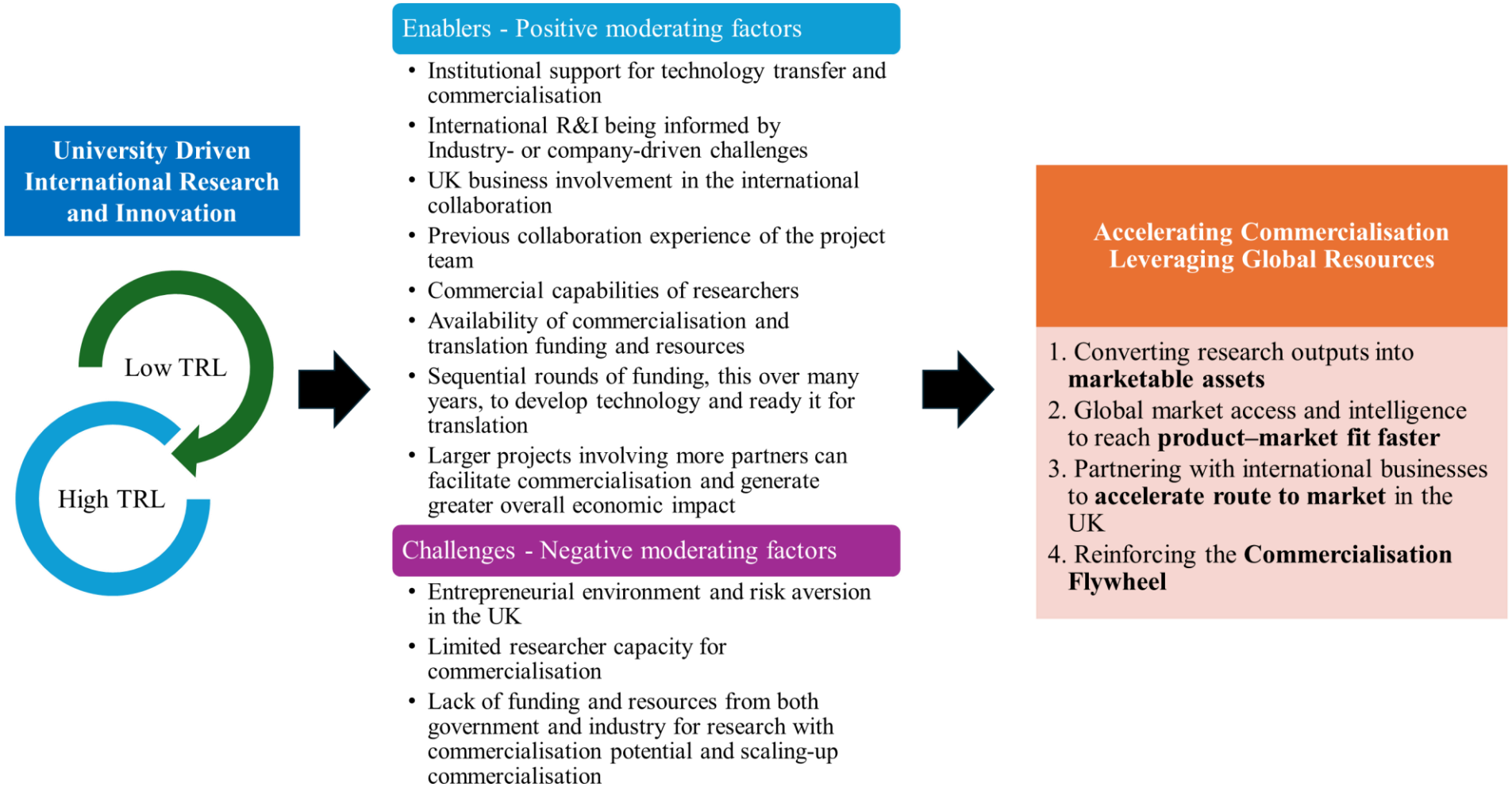

Figure 6: Pathways accelerating commercialisation in the UK through university driven international R&I

3.8.1 How university-driven international R&I accelerates commercialisation in the UK leveraging global resources

Converting research outputs into marketable assets

Our evidence shows that international collaborations enable UK teams to turn research outputs—such as early-stage software, prototype designs, and IP—into commercial assets through spinout formation, licensing, or joint commercialisation with business partners. At low TRLs, this often means codifying discoveries as software or algorithmic models that can be licensed or piloted quickly; at high TRLs, co-developed products, processes, or services move toward launch via spinouts or partner-led routes. In both cases, the international dimension widens options for how the asset is commercialised and where first customers are found.

> *"I have started **two companies** before [to commercialise output stemming from international R&I], but in this, we are at the very early stage of discussion. There were some interesting **application opportunities** where these materials [developed through **international R&I]** might fit, so we're exploring that at the moment. Those economic impacts usually don't materialise during the time scale of the project. [...] So it's quite possible that it will take a bit more follow-on work before we are ready to commercialise the technology." (Case D)*

Global market access and intelligence to reach product–market fit faster

Our results indicate that cross-border collaboration gives UK teams access to international customers, testbeds, and regulatory regimes and first-hand market intelligence about structures, user needs, and competitive landscapes, allowing them to test propositions under varied conditions and shape offerings for international sales. This combination shortens the path to adoption-ready IP, products and services and increases potential profitability versus domestic-only routes. At low TRLs, diverse user feedback and exposure to international market insight refine prototypes, strengthen evidence claims, and steer research questions toward needs with clearer commercial potential; at high TRLs, multi-country pilots and demonstrations validate performance for procurement while market intelligence informs pricing, positioning, and go-to-market choices that improve competitiveness.

> *"It's tricky because the big pharma companies are quite heavily regulated at an **international level**. [...] So pharmaceutical companies go through a series of agreed tests and steps that will **satisfy all these major international regulators**. [...] Each individual regulator will check, and you should be able to satisfy them all with one set of rules, so the **later work** is built up to make sure those rules make sense and that everyone can agree on what a good simulation study looks like. [interpretation – as the initial work has already addressed and built knowledge of regulatory requirements, the subsequent commercialisation phase could be accelerated.]" (Case I)*

Partnering with international businesses to accelerate route-to-market in the UK

Our evidence highlights that collaborating with international companies equips UK projects with partner channels, integration support, and co-marketing that can speed launch and scale. At low TRLs, firms help stress-test early designs and define requirements that make solutions commercially legible; at high TRLs, partners co-develop or adopt improved products and processes, creating near-term revenue for UK spinouts or university-originated IP. This partnership-led route is distinctively international because it aligns development with global demand from day one while anchoring commercial activity in the UK.

> *"[Before our simulation model], lots of drugs were being have to be pulled off the market because they were interfering with Z's [a specific human organ's] activity and sometimes causing potentially fatal side effects [...]. [With our model developed **through international R&I],** just by looking at the simulation outputs, you got a much cleaner correlation with risk for these marketed compounds than people had seen previously [...] This that captures international intelligence is extremely useful for our **UK partners** [...] we also collaboratively engage in market launches" (Case I)*

Reinforcing the Commercialisation Flywheel

Our analysis finds that successful international commercialisation increases profitability for UK spinouts and partner companies, which in turn funds further innovation, company growth, and potential job creation in the UK. At low TRLs, early wins (e.g., licensing software) can finance additional development or proof-of-concept work; at high TRLs, revenues from launched products and services support scale-up and portfolio expansion. This flywheel is accelerated by global exposure because larger, multi-market revenues provide more headroom for reinvestment

> *"Open-source tools have been **funded by** [impact acceleration awards] and that's **attracted attention in the UK and worldwide companies**. And getting other companies interested [through that] has then led to [new interest]. It is really important because you build **the prototype**, everyone can see the prototype, which they find useful, and then they approach you to improve on and adapt the prototype, involved in joint PhD supervision, offer post-doctoral opportunities to work on some sub-problem [e.g. to further improve the prototype for specific markets/ company needs]." (Case I)*

3.8.2. Enablers of accelerating commercialisation through university-led international R&I

Institutional support for technology transfer and commercialisation: Almost all high TRL respondents and some low TRL respondents spoke of having strong institutional support within UK universities—particularly from departments, research offices, and technology transfer offices (TTOs)—as playing a critical role in international R&I aimed at commercialisation and also in enabling the UK to commercialise innovations that emerge from international R&I. These structures provide expertise in technology transfer, IP protection, spinout formation, and international contracting and legal processes. TTOs with international industry networks and cross-border commercialisation expertise, enabling UK teams to access global markets, global investors, and global supply chains, were found to play a significant role in enabling international R&I. The institutional support, in particular in exploring opportunities to generate value to the UK, also increases the likelihood that innovations developed collaboratively abroad can be commercialised through UK spinouts, UK licensing agreements, or UK-based production, ensuring that commercial value flows back into the UK economy.

International R&I being informed by Industry- or company-driven challenges: Commercialisation is more effective when international R&I projects are anchored in real-world industry challenges. When UK researchers work with international companies or global industry partners, they gain insight into global market needs, international technical standards, and emerging commercial opportunities. This exposure allows UK teams to design solutions with broader commercial relevance and higher scalability.

UK business involvement in the international collaboration accelerating commercialisation routes: When UK businesses participate directly in international R&I collaborations, they become co-creators of the resulting technologies, tools, or products. This involvement gives UK firms and researchers access to international markets and customers and positions them as the most likely commercialisers of the innovation, ensuring that economic value—revenues, IP ownership, manufacturing activity, and skilled jobs—flows back to the UK. International collaborations therefore act as a mechanism for the UK to

leverage global demand and global problem-framing to generate commercial value domestically. The distinct international advantage is that UK businesses gain early access to global expertise, global testing environments, and global market insights, which strengthens their ability to commercialise innovations competitively. Their presence in the collaboration increases the likelihood that commercialisation pathways—whether licensing, product development, or scale-up—are anchored in the UK rather than abroad.

Previous collaboration experience of the project team: Long-standing international partnerships give UK researchers a unique advantage in commercialisation. When international collaborations are built and sustained over many years, UK research teams gain access to trusted global partners, established trial sites, longitudinal and diverse datasets, and complementary technical expertise. These durable relationships reduce friction in moving early-stage research to higher TRLs, support large-scale validation, and create a pipeline of successive projects that continue to generate commercial and research value for the UK. Crucially, such partnerships allow UK researchers to commercialise innovations from a position of international credibility, attracting investment, funders, and collaborators who recognise the strength of the global network while locating commercial leadership and coordination within the UK.

Case P illustrates how this dynamic unfolds over time. An initial PhD-level collaboration in South Africa evolved into a long-term research partnership that extended over two decades and expanded to include collaborators in Malawi and Uganda. These trusted relationships provided the foundation for a sequence of UK-funded phase-two clinical trials, supported by the Medical Research Council (MRC) and the Wellcome Trust, which in turn enabled progression to a large, multi-country phase-three randomised controlled trial funded through the Joint Global Health Trials scheme. The subsequent project did not emerge as a disconnected initiative developed solely within the UK; rather, it was the direct outcome of cumulative learning, trust, and infrastructure built through sustained international collaboration. This continuity enabled the UK-based team to lead the conception, funding, and coordination of increasingly complex trials, while drawing on international sites and expertise to deliver robust evidence at scale—demonstrating how long-term global partnerships actively de-risk development, accelerate translational progress, and strengthen the UK's position as the focal point for commercialisation and leadership.

Commercial capabilities of researchers: International R&I often requires navigating complex negotiations around intellectual property, ownership structures, and commercialisation pathways. When UK researchers possess strong commercial skills they are better able to ensure that IP ownership, licensing rights, and commercial returns remain anchored in the UK, even when innovations are co-developed with global partners.

The international dimension makes this particularly important: partners may operate under different IP norms, legal frameworks, or expectations of benefit-sharing. UK researchers who understand these complexities can leverage global resources while still securing UK-based

spinouts, UK-held patents, and UK-centred revenue streams. This capability is essential for ensuring that commercial value generated through international R&I flows back into the UK economy. This capability also improves “grantcraft”, so that they could efficiently source funding for commercialisation.

Availability of sustained commercialisation and translation funding and resources: Impact-focused, translational, and sequential funding is essential for converting internationally developed research outputs into UK commercial and societal value. International R&I can generate globally competitive technologies, but these often require further development, market adaptation, regulatory alignment, and commercial support before they can deliver benefits in the UK. Sustained funding enables researchers to move innovations up the TRL scale, from proof-of-concept through market validation and technical refinement to commercial deployment.

This continuity is particularly important in areas such as life sciences, engineering biology, and advanced materials, where development timelines are long and technologies mature through iterative stages. When funding and expert commercialisation support are available over time, UK researchers are better positioned to anchor global innovation pipelines in the UK, supporting spin-outs, IP capture, inward investment, skilled employment, and commercial leadership. Case evidence illustrates how this sustained approach operates in practice (Case N below). Rather than requiring researchers to piece together multiple sources of funding, there is a need for continuity of funding that supports iterative development across TRL levels, with progression linked to the achievement of specific milestones.

Case N: Availability of sustained commercialisation and translation funding and resources

Initial Phase of Development and Funding: Case N described how early support from Scottish Enterprise provided the initial impetus to engage a deliberately diverse set of international and non-traditional collaborators. Rather than relying solely on close academic partners, the team sought advice from industry-adjacent groups at some distance from the core research, enabling early and realistic assessment of market potential and commercial relevance. This initial phase focused on technical feasibility and proof-of-concept validation, helping the team test whether the envisioned commercial impact was credible.

Subsequent Phase of Commercialisation and Funding: Subsequent rounds of funding (e.g. EPSRC, Wellcome Trust) supported a second phase of development oriented around market refinement—identifying concrete use cases, understanding how the technology altered existing industry practices, and responding to broader sectoral shifts that made the innovation timely. Engagement with large international industry players during this stage served as a form of stress-testing, generating validation data that increased confidence among investors and future customers. This staged progression ultimately enabled the creation of a UK-based spin-out company, incorporated in 2009 and securing its first investment funding in early 2010, followed by further funding rounds as the technology and its market proposition matured.

Key message: The example demonstrates how long-term, sequential funding—anchored in the UK but informed by global engagement—reduces the risk that promising innovations drift offshore at the point of commercial viability. Sustained investment allows UK teams to capture value from international R&I ecosystems by retaining control over commercialisation pathways, building credibility with global partners, and positioning the UK as the focal point for investment, scale-up, and market entry.

Larger projects involving more partners can facilitate commercialisation and generate greater overall economic impact: Several high-TRL respondents emphasised that in domains such as engineering biology and drug development, the scale of collaboration is a critical determinant of successful translation and commercialisation. Large, multi-partner international projects bring together levels of expertise, infrastructure, data, and investment that individual UK institutions or small consortia cannot realistically assemble alone. By pooling capabilities across many organisations and countries, these projects accelerate

problem-solving, enable rapid validation at scale, and provide early access to global markets and regulatory pathways.

For the UK, the benefits of participation in such large-scale collaborations are at least twofold. First, UK organisations gain direct exposure to cutting-edge global capabilities, strengthening their own technical and commercial readiness. Second, the UK becomes embedded within international consortia that generate the volume, quality, and credibility of evidence needed to influence standards, guidelines, and market adoption—an essential precondition for commercialisation at scale.

The key consideration in outlining larger partnerships is their capacity to engage in mid- to high-TRL work at scale. However, the appropriate number of partners will depend on several factors, including the nature of the objective, the sector involved, and the strategies adopted to translate benefits to the UK. Importantly, the emphasis should not be placed solely on the number of partners. Instead, attention should be given to whether the partnerships are strategic, supported by a clear and compelling rationale for involving a larger consortium, and structured in a non-exploitative manner—particularly given the demands and implications of high-TRL activities.

One respondent (**Case L**) highlighted how this model proved particularly effective during the COVID-19 pandemic. Rather than fragmented efforts across many small, disconnected research groups, the UK coordinated participation in large collaborative platforms that enabled researchers to work together on shared protocols and datasets. This approach generated unprecedented volumes of high-quality data in a short period, allowing evidence to be translated rapidly into changes in clinical practice and national and international guidelines. The scale of collaboration made it possible to test interventions robustly, compare findings across multiple settings, and build confidence among regulators and policymakers.

The same respondent noted that such outcomes depend heavily on adequate and sustained funding. Large consortia require significant upfront investment to assemble teams, align methodologies, and build the shared infrastructure needed to generate large datasets. Once established, however, these platforms become highly efficient engines of innovation and evidence generation. Abruptly discontinuing funding after teams and systems have been built was seen as particularly inefficient, as it risks losing expertise and momentum and forces subsequent initiatives to start again from scratch.

Overall, the evidence suggests that properly funded, large-scale international collaborations allow the UK to generate world-leading evidence, accelerate commercial pathways, and position itself as both a scientific and commercial leader—illustrating how scale, coordination, and sustainability are central to translating global R&I into UK economic and societal value.

3.8.3. Challenges of accelerating commercialisation through university-led international R&I

Entrepreneurial environment and risk aversion in the UK: When it comes to creating spin-outs for commercialisation, our data highlights persistent structural barriers within the UK's entrepreneurial environment. Researchers repeatedly pointed to a dominantly risk-averse culture around spin-outs, coupled with complex administrative processes and lengthy funding timelines, as major obstacles to translating research into economic impact. These constraints were seen as particularly damaging in fast-moving technology areas, where speed to market is critical.

Several respondents contrasted their experiences in the UK with international contexts, particularly the United States, noting that UK spin-outs tend to progress far more slowly. Case L described managing multiple active spin-outs that were struggling to gain momentum due to extensive red tape associated with government grants, university investment processes, and early-stage financing. The cumulative effect of these delays was that promising innovations risked losing their first-mover advantage. Respondents stressed that the central value proposition of a spin-out lies in rapidly bringing innovation to market; when company formation, access to finance, and operational resourcing move too slowly, opportunities can be lost to faster-moving competitors.

The Case N outlined that the challenge is compounded in sectors such as pharmaceuticals and life sciences, where respondents described industry cultures as inherently cautious. While these sectors are often portrayed as innovation-driven, participants emphasised that the high cost of failure leads firms to be highly conservative in adopting new technologies. This environment further amplifies the difficulty for academic spin-outs, which must not only navigate complex institutional processes but also convince risk-averse industry partners to engage at an early stage.

Limited researcher capacity for commercialisation: Lack of interest and/or expertise by UK academics in commercial processes and activities emerge as a significant barrier in commercialisation and acquiring associated economic benefits. For example, finding product-market fit may pose a significant challenge for researchers who are not necessarily knowledgeable in business practices to realise the full potential of their projects' commercial impact. Although this tends to be a more common problem at low TRLs, a few high TRL respondents also commented that the success of their respective spinouts was enabled by recognising early on that researchers lacked the skills to lead and run a business, although having expertise in technology transfer. Thus, early on, they appointed an external person with commercial and business development expertise to run the spinout, where forgoing such a move can cause issues and delays in commercialisation, and, at times, lead to spinout failure.

Lack of funding and resources from both government and industry for research with commercialisation potential and scaling-up commercialisation: Our data illustrates that a lack of industry interest in low-TRL outputs that are not immediately market-ready and the lack of public funding available to make such research output market ready present significant

barriers for researchers seeking to develop solutions with commercial potential. Several respondents noted that industry engagement tends to occur only once a product has reached a clear development or near-commercial phase, limiting opportunities for earlier-stage collaboration and investment. For example, Case H states, "*the industry is not really interested in something which isn't development phase, they want the product.*", reinforcing a disconnect between exploratory research and downstream commercial pathways.

At higher TRLs, respondents consistently identified a substantial gap in follow-on funding, both from government and industry, to support scale-up of production and operations, which constrained achieving economic impact in the UK. Without adequate scale-up funding, innovations that have successfully passed proof-of-concept often remain under-utilised, stalled at pilot stage, or become acquisition targets for foreign companies that are better positioned to fund large-scale manufacturing and market entry.

Case N illustrates this challenge in detail. While the respondent described strong capability in delivering proof-of-concept work and validating the underlying science, progressing beyond this stage required resources to manufacture at scale and establish a viable route to market. The absence of sufficient budget for production created a "chicken-and-egg" problem, whereby sales were needed to fund manufacturing, but manufacturing capacity was required before sales could be secured. This gap between technical validation and scalable production was identified as one of the most difficult hurdles to overcome, despite the innovation itself being technically successful.

A related and compounding barrier concerns access to appropriate investment for spin-outs, particularly outside major economic hubs. Respondents highlighted regional disparities in venture capital availability, noting that private investment was scarce in some parts of the UK. As described in Case G, venture capital funding was characterised as limited in the Northwest, with only modest local initiatives—such as consortia formed by regional universities—attempting to fill the gap. While there were signs of public-sector efforts to stimulate innovation through contracts or proposed government-backed funds via regional mayoral leadership, the overall environment was described as one marked by a "dearth of cash." This shortage was seen as slowing not only university spin-outs but the wider regional start-up ecosystem.

Taken together, these findings suggest that barriers to commercialisation operate across the full innovation pipeline: from limited industry engagement at low TRLs, to insufficient scale-up funding at high TRLs, and structural weaknesses in regional investment ecosystems. Addressing these interconnected challenges is critical if the UK is to realise the economic potential of research-driven innovation and prevent promising technologies from stagnating or being commercialised elsewhere

Case K below offers a detailed illustration of how university-driven international R&I accelerates commercialisation in the UK by leveraging global resources, along with the

associated enablers and challenges. It also highlights how multiple economic value pathways can be generated within a single case.

Case K: Designing Digital Experiences with Cross-sector Commercial Impact

Overview: This project, focused on improving how digital technologies are designed and experienced within real-world environments, developed a framework for integrating physical and digital interaction. From the outset, international collaboration formed part of the research development stage, particularly through international academic networks spanning Europe and the United States, enabling the refinement of concepts and their application across varied contexts as well as creating economic impact via commercialisation.

Commercialisation: Creating patented digital interaction systems, mobile applications, spinouts, and expanding new products into global markets, this collaboration generated significant commercial impact and economic benefits to the UK. The applications by collaborators spread across multiple sectors. The development of an immersive product in architectural visualisation with a UK-based SME partner generated revenue, with projections of multi-million-pound annual growth. In the energy sector, an energy management system that achieved around 20% reductions in energy consumption and large cost savings was deployed with a UK technology company. In tourism, digital applications showcasing UK attractions reached global audiences.

Interconnected Economic Impact Pathways: Beyond immediate commercial outcomes, this project also created broader, longer-term and less direct economic impacts through talent development and job creation. International networks facilitated student mobility, joint teaching, and exposure to international innovation ecosystems, described by the researchers as “transformative” for participants, contributing to UK talent development.

Enablers: This project’s economic impacts for the UK via commercialisation were catalysed by a cross-sector research problem, a large number of UK industry collaborators, prior commercial experience and capacity of the leading UK researcher, and the availability of funding for commercialisation.

Challenges: As an exploratory and experimental project, this case’s main challenge in creating economic impact for the UK was acquiring funding without clear and predefined outputs and visible, immediate commercial results. Even when the impact potential got stronger, funding decisions were inconsistent, making the move from early-stage research to larger-scale development and implementation difficult.

4. Policy Implications

Policy implications are derived from the report's qualitative findings on pathways for generating economic value, and what enables—or constrains— the UK benefiting from university-driven international R&I. Across the cases, UK economic benefits were strongest when projects were designed to anchor value in the UK (e.g., IP positioning, UK adopters, UK diffusion) and when funding and governance mechanisms reduced predictable frictions (e.g., TRL "bridge" gaps, contracting delays, multi-jurisdictional approvals, and barriers to international training). Across the five pathways, the main funding barriers are not only shortages of funding overall, but also fragmented, inflexible, and poorly sequenced funding across TRLs. At low TRLs, the most common barriers concern insufficient support for translation, international partner engagement, and market-readiness; at high TRLs, the main barriers relate to implementation, scale-up, manufacturing, adoption, and sustained commercialisation finance. The recommendations below therefore translate the report's observed enablers and barriers into practical interventions that strengthen UK generating globally distinctive value from university-driven international R&I.

1. Securing UK value capture by design

Key findings underpinning the recommendation:

- All cases—formally or informally—featured **mechanisms that generated distinctive economic value to the UK**, including UK spinouts, training for UK firms, and collaborations with UK companies.
- UK value capture is stronger when international R&I is anchored in **UK problem ownership** and **UK practitioner/business engagement**, and when UK businesses (including UK sites of MNCs) participate as co-developers and early adopters—tightening pathways for domestic adoption, supply chain anchoring, and job creation.
- International impact pathways may **diffuse benefits away from the UK** unless UK anchoring is built in early (e.g., IP positioning, UK adopters, UK business involvement, and UK demonstrations etc).
- There are **translation capacity gaps** (cross-border IP, standards, business development) that slow conversion of international outputs into UK assets.

To ensure that international R&I delivers distinctive economic benefits for the UK, it is important that projects consider from the outset how value will be translated back into the UK practice and innovation system—rather than assuming benefits will return automatically. Deepening UK business involvement in university-led international R&I strengthens the channels through which benefits flow back to the UK. When UK-based firms participate, they

are better positioned to absorb and implement outputs, accelerating domestic adoption, anchoring supply-chain activity, and strengthening regional innovation ecosystems—while still preserving the advantages of global collaboration.

One practical way to support this is to encourage applicants to set out, in proportionate terms, their approach to UK value translation—for example by clarifying where and how UK uptake is expected, which UK actors are likely adopters, and what steps will be taken to support diffusion and implementation. Where appropriate, this approach can include outlining how intellectual property (IP) will be owned and used, and confirming freedom to operate in the UK (i.e., no IP or regulatory barriers to domestic use). It can also include identifying UK routes to market (such as UK-based licensing and sales, UK-incorporated spin-outs, and—where relevant—UK manufacturing or service hubs) and signalling intended engagement with standards and regulatory pathways that shape market access. Training, awareness-raising, and capability-building can be equally important mechanisms—particularly in lower-TRL projects where commercial pathways are uncertain. For instance, projects can build UK value by ensuring that internationally generated methods and tools are actively transferred into UK organisations through targeted training for practitioners, dissemination workshops, and guidance that helps UK firms and public bodies absorb and apply new approaches.

It is important to encourage and support funding applicants to consider these routes at the application stage, to implement them during project delivery, and to report clearly on the value generated for the UK when documenting outcomes and impacts. Publishing strong examples as case studies, sharing good practice, and providing training that builds the skills of UK academic and non-academic collaborators in translating R&I into UK economic value would further strengthen the generation of economic value from university-led international R&I.

2. Promoting cost - effective international R&I with additionality

Key findings underpinning the recommendation:

- Successful projects engaged in international R&I when these offer **distinctive economic value** that is often difficult to be generated through domestic R&I alone.
- International projects can carry **higher transaction and coordination costs**, amplified by **cross-border partner asymmetries** (pace, incentives, culture) and international travel unless appropriate measures are taken to manage them.
- The report identifies **a cost-discipline pathway**—digital-first delivery, shared digital environments, travel-lite rules—showing how cost can be controlled without degrading quality.

Asking applicants to explain why cross-border collaboration is essential—for example, to access unique expertise, infrastructure, datasets, or markets—would target funding where international engagement adds the greatest value. Where appropriate, digital collaboration modes could be used to manage cost without degrading effectiveness, ensuring resources are directed to the activities that matter most. Enabling shared digital R&I environments—secure cloud, electronic lab notebooks, and version-controlled registries—together with follow-the-sun workflows and remote access to infrastructure (such as queued instrument time or couriered samples) would reduce delivery costs while maintaining quality. Travel would be reserved for critical-path activities, and carbon budgets could serve as a practical proxy for travel discipline.

3. Closing the implementation & scale-up gap

Key findings underpinning the recommendation:

- Economic value materialises only when UK organisations can **adopt, implement, and scale** internationally developed solutions.
- Yet the report identifies **discontinuous "bridge" finance** and limited scale-up funding as major constraints.
- There are also **adoption frictions inside UK organisations** and a **risk-averse entrepreneurial environment** that slows spinouts and scaling.

Creating targeted instruments to bridge from internationally validated prototypes to UK deployment would translate international R&I into on-shore revenue, jobs, and exports more reliably. This could include introducing grant calls that anchor benefits in the UK by co-funding (from public and private sources) UK-based adoption and demonstration trials following successful international pilots, thereby supporting the conversion of internationally validated results into domestic uptake, revenues, jobs, and exports.

Another mechanism could be introducing a bridging fund that helps teams move from an internationally validated prototype to initial production and market launch. Typical eligible items include pilot equipment, validation batches, quality/regulatory steps (e.g., certifications), forming spinouts and early go-to-market costs. Additionally, complementary measures that create UK-anchor customer routes—for example, pre-procurement pilots (small-scale trials with public bodies before a formal tender, used to test solutions and generate evidence) and pathfinder procurement (limited early purchases by public bodies that serve as a reference customer and de-risk wider rollout)—together with deeper regional entrepreneurship and streamlined university-to-market processes (stronger Technology Transfer Office capacity, template term sheets, fast-track Non-Disclosure Agreements/

Material Transfer Agreements), can shorten time-to-market while anchoring manufacturing or service delivery and sales/licensing in the UK, ensuring that economic value from international collaboration is captured domestically.

4. Funding the whole international pipeline—and its iteration

Key findings underpinning the recommendation:

- Successful international R&I **progresses iteratively (not linearly) across TRLs**, often needing "back-loops" to earlier stages as new market, technical, or regulatory information emerges.
- UK **adoption** of outputs from international R&I often requires returning to earlier TRLs to **tailor solutions to UK conditions**.
- **Multi-jurisdictional regulation/standards** hurdles delay comparative evidence and adoption-readiness.

Recognising that international R&I progresses iteratively rather than linearly, funding should be sequenced across discovery, translation, demonstration/validation, and scale-up, with tranche releases tied to clearly defined technical and market-evidence milestones. This approach would allow teams to loop back to earlier TRLs when new insights emerge—an adjustment that is often necessary in international projects where outputs must be adapted to UK contexts, standards, or implementation conditions before they can progress further.

In parallel, sustaining open, low-barrier foundational science is essential to build the knowledge base on which later commercial outcomes depend. This balance reflects the reality that discovery frequently seeds future market-ready innovation and that effective innovation policy must support both early exploration and later translation.

To enable this iterative pipeline in practice, programmes should also provide explicit resourcing for multi-jurisdictional pilots and testbeds, as well as for the ethics, data, and biosafety approvals required across countries. Such support would reduce friction, improve the robustness of evidence generated across contexts, and ultimately strengthen the quality and UK relevance of outcomes.

5. Enabling cross-border co-funding, co-supervision, and international talent pipelines

Key findings underpinning the recommendation:

- Current policy and funding rules create **practical barriers to joint training routes**, including restrictions on funding flows to essential non-UK partners and the absence of clear mechanisms for co-funding/co-supervision—limiting talent development that would otherwise strengthen UK capability.
- Internationally embedded projects develop **globally benchmarked skills** and create a "talent pipeline" when ECR placements, joint supervision, and structured knowledge mobilisation are supported.

Enabling co-funding to flow to essential international partners and supporting joint PhD co-supervision would reduce cross-border asymmetries that can otherwise weaken collaboration quality. This would deepen knowledge exchange and help develop globally experienced UK talent. Cross-border co-funding can enhance UK economic value by drawing on the context-specific unique expertise, knowledge, resources and networks of overseas partners, thereby improving the quality and distinctiveness of joint research outputs. It can also generate longer-term benefits for the UK by fostering sustained collaboration pathways and attracting internationally trained researchers into the UK research system and workforce.

To strengthen this pipeline in practice, funders could scale Early Career Researcher (ECR) placements and expand joint PhD arrangements with international labs and firms—including industry-funded studentships—alongside knowledge-mobilisation fellowships that translate overseas methods into UK practice. Partnerships with multinationals that have a UK footprint can further convert international project experience into UK-based internships and jobs, improving employability and reinforcing UK capability over time.

6. Reducing frictions in onboarding and working with partners in international R&I collaborations

Key findings underpinning the recommendation:

- **Slow, complex contracting and onboarding**—especially for non-traditional partners (SMEs, creatives, specialists)—erodes time-critical windows and discourages participation.
- Standard contracting templates and clearer guidance can reduce recurring legal/administrative delays occurred due to **cross-border partner asymmetries**.

To ensure UK researchers can bring in the international and national partners they find most suited for R&I goals, there is a need for clearer support structures and guidance that help universities navigate collaborations with non-traditional as well as cross border partners. Such non-traditional partners can include small businesses or individuals from the gig economy. These partners often bring valuable perspectives and capabilities but may face struggles due to contracting terms and/or times, which makes it difficult for them to engage with academic systems under current processes.

In case of international partnerships, providing standardised tools (e.g., contract templates tailored to actors in different countries), required guidance, institutional support (e.g. IP protection, spinout formation, and international contracting and legal processes) and incentives can help reduce legal and administrative barriers. Such mechanisms would streamline collaboration, reduce negotiation delays, and give researchers and institutions more confidence when engaging with organisations across borders, ultimately enabling more effective and inclusive international R&I with economic benefits to the UK.

7. Align missions and build resilient international R&I delivery for global challenges

Key findings underpinning the recommendation:

- Globally distinctive value often relies on **coordination across nations** especially when responding to **global challenges**.
- Cross-border shocks risk delivery continuity in **complex international environments**

Solutions to global challenges typically require international R&I collaboration, not least to pool complementary capabilities, generate evidence across diverse contexts, and support legitimacy and uptake across jurisdictions. Addressing these challenges requires sustained national alignment and long-term coordination across government, academia, business, and other stakeholders, thereby improving the likelihood that university-driven international R&I delivers distinctive economic value to the UK. A shared long-term vision helps focus resources, align priorities, and maintain collaboration over time, enabling research efforts to contribute more effectively to systemic solutions. To protect delivery and preserve access to critical global capabilities, programmes should also be designed for resilience. This includes flexibility to respond to changes in international environments and proactive steps to reduce practical collaboration barriers in key jurisdictions, while remaining compliant. Together, these measures ensure that globally oriented R&I remains both strategically aligned and operationally robust, safeguarding continuity when international conditions change.

Appendix A: Methodology

1. Evidence base and period of data collection

This report draws on qualitative evidence collected between June 2025 and September 2025. The purpose of the study was to identify how university-driven international R&I collaborations generate distinctive economic value for the UK, and to surface the enablers and barriers that shape whether (and how) value is translated back into UK organisations and the UK economy.

2. Developing a typology to guide case selection

Following a review of relevant academic and industry publications, we developed an initial typology of the types of economic impact that university-driven international R&I collaborations can generate for the UK (see the Table below). We used this typology to systematically select cases that collectively represent different impact types and collaboration configurations.

To ensure coverage across different innovative stages and partnership forms, two criteria are used to define the typology, namely:

(a) the composition of the partnership (i.e. university vs non-university) -

- ***UK University-International University Partnership*** - driven by a UK university with international universities. There might be other UK universities involved in the partnership.

- ***UK University-International Non-University Partnership*** - driven by a UK university with international non-university/business partners. There might be other UK and international universities, and non-university partners involved in the collaboration.

(b) the nature of the collaboration (research vs development) – While the boundaries between research vs development might be blurred, the extreme ends of the spectrum may result in different pathways for economic impacts.

- ***Research*** (Low to mid TRL- e.g. 1-6) – Research is the systematic investigation aimed at discovering new knowledge, understanding phenomena, and establishing facts. It often involves activities like experiments, surveys, and theoretical analyses. Research ranges from basic research and concept formulation as well as validation and demonstration of components and systems in relevant environments.

- ***Development*** (High TRL – e.g. 7-9) – Development is the process of applying research findings to create new products, processes, or technologies. It focuses on

practical implementation and improvement. Involves prototype testing and operational deployment

These types may involve different collaborations and associated economic impact pathways. When selecting cases for each type, we consider the current characteristics of each initiative. However, during interviews, we gathered data on their past to better understand the evolution of collaborations and the associated economic impacts across different types, when relevant.

This typology provided a structured sampling frame while still allowing for refinement as patterns emerged from the evidence.

3. Desk-based research and identification of candidate cases

We began with extensive desk-based research to identify international collaborations that had demonstrably generated economic benefits for the UK. This stage served two purposes: (i) identifying candidate cases aligned with the typology, and (ii) assembling contextual evidence to support triangulation during analysis as data from interviews are likely to be interviewees' self-reflection.

To locate relevant collaborations, we conducted systematic searches of UK-facing evidence sources, including:

- REF Impact Case Studies
- UKRI Gateway to Research
- Publicly available material such as news articles, organisational announcements, and UK university webpages describing international collaborations

The resulting archival dataset supported case verification and provided contextual detail that complemented the interview evidence.

4. Primary data collection: semi-structured interviews

We conducted 20 semi-structured interviews with UK-based academics who led the economically impactful international R&I collaborations identified during desk research. Interviews typically lasted around 60 minutes, were conducted via Microsoft Teams, and were recorded with participant consent.

To encourage candour and protect participants, both interviewees and cases were anonymised. A summary overview of cases is provided in the table below.

Interviews explored:

- The origins and evolution of the collaboration
- The specific forms of economic value generated

- How international engagement contributed additionality (i.e., why value depended on cross-border collaboration)
- The mechanisms, enabling conditions, and barriers that shaped UK value capture

We addressed potential informant bias in several ways. We conducted desk-based research and utilised archival data to triangulate our interview data. We designed and conducted our interviews in a way that ensures robust empirical data. During interviews, we used several interview techniques (such as courtroom questioning, event tracking, and nondirective questioning) that yield accurate information from informants. For example, we ensured the use of non-leading questions, asked for concrete examples when relevant, and promised our informants anonymity to encourage candor.

5. Data analysis and coding approach

Interview data were analysed using NVivo, applying an inductive qualitative approach that prioritised concepts and themes evident in participants' accounts, consistent with established case-study methods. We coded for:

- Distinctive forms of UK economic value
- Motivations for engaging internationally
- Mechanisms through which international collaboration generated outcomes
- Enablers and barriers affecting translation, scaling, and UK value capture

6. Cross-case synthesis and iterative refinement

After initial coding, the research team conducted a second stage of analysis focused on synthesis and comparison across cases. We used structured comparison tools (tables and cross-case matrices) to identify recurring mechanisms across contexts, similarities and differences by TRL and domain, and the conditions under which international collaboration strengthened (or weakened) UK value capture.

This cross-case work also refined our initial typology. For example, although some collaborations were formally framed as university–university, the evidence showed that economically impactful cases typically involved non-academic partners (such as businesses, policymakers, or users) in practice—even when these partners were not formally labelled as core partners. This meant that the U–U versus U–B distinction was less analytically informative than expected for explaining how economic value was generated and anchored in the UK.

Where findings were TRL-specific, discipline-specific, or context-dependent, these boundaries are stated explicitly in the report to avoid overgeneralisation.

7. Scope, interpretation, limitations and future research

The cases examined in this study were relatively successful in generating globally distinctive economic value for the UK. As a result, the report primarily documents pathways to success and the types of barriers that successful projects had to overcome and/or were aware of.

This design strengthens understanding of enabling conditions and practical mechanisms, but it also limits what can be inferred about why some international collaborations fail to generate UK economic value, or whether the same mechanisms would hold across the full population of international collaborations.

We did not include ‘failure cases’, partly because they are difficult to identify systematically and because learning from failure cannot always be meaningfully interpreted unless subsequent corrective actions are tested and shown to work in later attempts. Accordingly, the findings should be read as mechanism-focused insights grounded in successful cases, rather than prevailing across all university-led international R&I collaborations. It should also be noted that the international partners in these cases were predominantly based in developed countries. Future research could therefore examine whether and how these value capture mechanisms differ when collaborations involve partners from developing countries. Given the qualitative nature of these case studies, future research could also use a large-scale quantitative survey to assess the generalisability of the findings. In addition, studies of unsuccessful or less successful collaborations could help identify further barriers to UK value capture.

Development (High TRL – e.g. 7-9)	TYPE 2 *Nature of Economic Impacts:* Spinouts with International partners benefiting the UK economy International IP/Patents generating income to the UK Economy Development of closer to market technologies by accessing international strengths* generating value to the UK Economy	TYPE 4 *Nature of Economic Impacts:* International patents with businesses generating income to the UK Economy [i.e. generating value from IP] Joint ventures between UK universities and international businesses benefiting the UK economy Product/service/process innovation by accessing international strengths*, generating economic value to the UK Economy Access to new international markets
Research (Low to mid TRL- e.g. 1-6)	TYPE 1 *Nature of Economic Impacts:* Creating advanced up to date knowledge (e.g. publications), required to generate economic impacts, by accessing international strengths* (e.g. technological advancements, knowledge on new business models or diagnostic methods) Local UK economic benefits through international research collaborations, including spillover benefits from collaborating universities	TYPE 3 *Nature of Economic Impacts:* Resolving UK business/economic challenges by universities accessing international strengths* Early stages of product/service/process innovations (e.g. renewable energy) by accessing international strengths* involving registering of IP [e.g. patents, publications]
	UK University-International University Partnership [driven by a UK university with international universities. There might be other UK universities involved in the partnership]	**UK University-International Business or Non-University Partnership [driven by a UK university with international non-university partners. There might be UK and international universities and non-university partners involved in the collaboration]**

Case Number	Initial Categorisation	TRL	Research Field	Interdisciplinary Aspects of the Project	Partner Countries	Funders (non-exhaustive)	Economic Impact to the UK
Case A	U-U	Low	Social Sciences	Foundational utilisation of additional disciplines and methodologies from social sciences, life sciences, and engineering	Canada, USA, Portugal	ESRC, UK professional organisations and industry associations, UK pension provider.	**Knowledge:** publications, support for prototype design, new tools for better predictions, new datasets, foundation for future research **Talent Development:** Higher quality of teaching, training for industry and academia **Operations:** Industry adoption of research outputs, improved regulation and policy, increased efficiency and capacity
Case B	U-U	Low	Social Sciences	Foundational utilisation of additional disciplines from social sciences and engineering	China	EPSRC	**Knowledge:** Publications, knowledge about international markets, foundation for future research **Talent Development:** Training and workshops to transfer knowledge **Operations:** Policy improvements
Case C	U-U	Low	Social Sciences	Foundational utilisation of additional disciplines and methodologies from social sciences	Australia, USA	ESRC, Australian Research Council Discovery Grant	**Knowledge:** Publications, new approaches to policymaking, foundation for future research **Operations:** Improved regulation and policy
Case D	U-U	Low	Science	Foundational utilisation of additional disciplines from physical sciences	Japan, Germany, China	EPSRC	**Knowledge:** Publications, IP, foundation for future research **Talent:** National skills training **Commercialisation:** Spinouts, scientific progress leading to commercial impact
Case E	U-U	Low	Science	Foundational utilisation of additional disciplines from life sciences, engineering, and social sciences	France, USA, Switzerland, Canada	UK business	**Knowledge:** Publications, IP, development of new capabilities **Talent:** National skills training, workshops **Job creation:** New jobs via spinouts **Commercialisation:** Commercial products by UK partner, development of a dominant design
Case F	U-B	Low	Science	Foundational utilisation of disciplines from science, social sciences, and	France (MNC)	AHRC, British Academy, internal university funding	**Knowledge:** Publications, knowledge supporting organisations' technology adoption, development of new capabilities, development of innovative knowledge diffusion

Case Number	Initial Categorisation	TRL	Research Field	Interdisciplinary Aspects of the Project	Partner Countries	Funders (non-exhaustive)	Economic Impact to the UK
				arts and humanities			mechanisms, identification of best practices, foundation for future research **Talent:** Trainings and workshops to transfer knowledge **Job creation:** Commissioning freelancers **Operations:** Organisational technology adoption
Case G	U-B	Low	Engineering	Foundational utilisation of additional disciplines from science and engineering Application of research outputs across different sectors and disciplines	Switzerland	EU funding, UK businesses, Greek research institute, German business, Swiss research institute	**Knowledge:** Publications, support for prototype design, new tools for better decision-making, new tools to improve reliability of data, standards development **Operations:** Organisational technology adoption, improved speed-to-market for new solutions **Commercialisation:** Spinouts
Case H	U-B	Low	Science	Foundational utilisation of methodologies and techniques from several science and engineering disciplines	Germany	EPSRC, EC Industrial and Academic Partnership & Pathways, German business	**Knowledge:** Publications, new insights obtained through technology, development of new capabilities, new tools for better decision-making, early-stage technology development
Case I	U-B	Low	Science	Foundational utilisation of disciplines from science, life sciences, and engineering	Switzerland, France	EPSRC, Wellcome Trust, UK businesses	**Knowledge:** Publications, tools for better decision-making, new tools to improve reliability of data, foundation for future research **Talent:** National skills development **Operations:** Cost reductions, industry adoption of research outputs
Case J	U-B	Low	Science	Foundational utilisation of several disciplines from life sciences, science, and social sciences	France, Holland	Medical Research Council, Antibiotic Research UK, Fleming Fund, Wellcome Trust, Sir Halley Stewart Trust	**Knowledge:** Publications, highly robust research findings, new tools for better decision-making, new tools for better predictions, new product development, foundation for future research **Talent:** National skills training **Operations:** Cost reductions

Case Number	Initial Categorisation	TRL	Research Field	Interdisciplinary Aspects of the Project	Partner Countries	Funders (non-exhaustive)	Economic Impact to the UK
Case K	U-U	High	Science	Foundational utilisation of additional technical and design disciplines Application of research outputs across different sectors and disciplines	USA	Innovate UK, EPSRC	**Knowledge:** Publications, urban and 'space' design techniques, new uses and functions for digital apps **Talent:** Developing undergraduate skill sets, hiring of students **Commercial:** New urban spaces built, museum and gallery space
Case L	U-U	High	Science	Foundational utilisation of life sciences, engineering, and social sciences	EU, USA	European Commission, Cancer Research UK, MRC	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, scientists, technologists, managers, admin **Operations:** Infrastructure, operational scaling **Commercialisation:** New products, new product discovery, spinout
Case M	U-B	High	Science	Foundational utilisation of life sciences, physical sciences, and engineering disciplines	Australia	Wellcome Trust, EPSRC	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Post docs, scientists, technologists, managers, admin **Commercialisation:** Spinout, new product
Case N	U-B	High	Science	Foundational utilisation of life sciences disciplines	Germany	Scottish Enterprise, EPSRC, Wellcome Trust	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, scientists, technologists, managers, admin **Commercialisation:** Spinout, new product
Case O	U-U	High	Arts	Foundational utilisation of several science and engineering disciplines	USA	SRI Fund, knowledge transfer partnership with UK business, funding from USA business, Research Councils UK Rapid Prototyping Fellowship	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, admin **Commercialisation:** Spinout, new product
Case P	U-U	High	Science	Foundational utilisation of several	USA	N/A	**Knowledge:** Publications, new techniques, skills, and equipment

Case Number	Initial Categorisation	TRL	Research Field	Interdisciplinary Aspects of the Project	Partner Countries	Funders (non-exhaustive)	Economic Impact to the UK
				disciplines from life sciences and social sciences			**Talent:** PhD and postdoc development, up-skill of scientist and practitioners **Job creation:** Postdocs, scientists, technologists, managers, admin **Operations:** Infrastructure expansion **Commercialisation:** Spinout, new product, new product discovery
Case Q	U-U	High	Engineering	Foundational utilisation of several disciplines from engineering	USA	EPSRC, Innovate UK	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, scientists, technologists, managers, admin **Operations:** Infrastructure expansion **Commercialisation:** Spinouts, new products, new product development
Case R	U-B	High	Science	Foundational utilisation of techniques and additional disciplines from foundational sciences and engineering	Germany, Finland, Austria, Brazil	EU funding, private funders	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, technologists, managers, admin **Operations:** Efficiency and safety **Commercialisation:** Spinout, new product
Case S	U-B	High	Science	Foundational utilisation of techniques and additional disciplines from life sciences and social sciences	USA, Denmark	MRC, Asthma UK	**Knowledge:** Publications, new techniques, skills, and technologies **Talent:** PhD and postdoc development **Job creation:** Postdocs, scientists, technologists, managers, admin **Commercialisation:** Spinout, new product, new product discovery
Case T	U-U	High	Arts	Foundational utilisation of additional disciplines from arts, social sciences, and engineering	USA	AHRC	**Knowledge:** Publications, new techniques, skills, applications **Talent:** PhD and postdoc development **Job creation:** Postdocs, designers **Operations:** Efficiency and safety **Commercialisation:** New product, applications, approaches

Appendix B: Comparison of Moderators: Phase 1 Literature Review Literature Review and Phase 2 Qualitative Evidence Report

This report extends the moderators identified in the Phase 1 literature review by moving from broad collaboration conditions to more specific translation and UK value-capture mechanisms. In particular, Phase 2 Qualitative Evidence Report shows that moderators operate differently across TRLs and across five economic value pathways, and it identifies additional enablers such as UK anchoring, staged funding, institutional translation support, interdisciplinarity, open diffusion, digital-first delivery and several different capabilities. It also identifies a clearer set of additional negative moderators, including regulatory complexity, value diffusion away from the UK, adoption frictions, discontinuous bridge finance and slow contracting mechanisms.

How Phase 2 Qualitative Evidence Report extends Phase 1 Literature Review moderators

Phase 1 Literature Review moderator	Phase 1 Literature Review summary	How Phase 2 Qualitative Evidence Report extends/refines it
Previous collaborative experiences	Previous collaboration builds trust, routines and protocols, making future collaboration more likely to succeed.	Phase 2 Qualitative Evidence Report supports this moderator but adds an important qualification: previous experience matters differently across the pathway. It is particularly important when collaborations move towards application and commercialisation, because prior trust and working routines reduce coordination frictions and support delivery. However, Phase 2 Qualitative Evidence Report also shows that low-TRL collaborations remain relatively open to forming new partnerships when new partners bring critical expertise, resources or data.
Non-spatial proximity	Cognitive, social and institutional proximity can substitute for geographical proximity and improve collaboration.	Phase 2 Qualitative Evidence Report refines this substantially. Our analysis of evidence suggests that projects do not usually seek international collaboration primarily for proximity or diversity in itself, but for expertise, capabilities, resources, datasets, infrastructure and access to markets. The Report suggests that interdisciplinarity and resource complementarity may be more important than non-spatial proximity alone. It also shows that digital collaboration can often compensate for distance at lower cost, although not in every setting.
Breadth of international partners	The number of international partners matters, but the benefits are non-	Phase 2 Qualitative Evidence Report confirms the non-linear logic, but sharpens it by showing that breadth versus depth depends on TRL, sector, funder requirements and project objectives. It is therefore less helpful to think in

Phase 1 Literature Review moderator	Phase 1 Literature Review summary	How Phase 2 Qualitative Evidence Report extends/refines it
	linear and there may be an optimal number.	terms of a generic "optimal number" and more helpful to think in terms of the right configuration of partners for the purpose of the collaboration.
Strong record of research capability	Research capability helps institutions leverage combined expertise and resources effectively.	Phase 2 Qualitative Evidence Report supports this moderator but broadens what counts as capability. It is not only scientific excellence; it also includes leadership, grantcraft, partnership management, interdisciplinary working, translation capability, regulatory navigation and commercial skills. Strong capability matters most when it enables international outputs to be converted into UK economic value.
High absorptive capacity of businesses	Absorptive capacity helps businesses recognise, assimilate and apply new knowledge.	The Phase 2 Qualitative Evidence Report reframes this issue as involving not only absorptive capacity, but also collaboration/co-creation capacity and implementation capacity. Non-academic partners in these collaborations are not simply absorbing externally generated knowledge or technology; they are actively involved in co-creating the research and shaping its direction. The Report also distinguishes between partner firms—those directly collaborating with universities—and wider beneficiaries and UK adopters beyond the immediate partnership. In this framing, absorptive capacity becomes particularly important for those wider beneficiaries and adopters seeking to implement outputs, especially at higher TRL levels. However, UK value capture could be accelerated where such adopters are better connected to, or able to collaborate with, those involved in the original development process.
Longer collaboration duration	Longer duration can mitigate the difficulties created by institutional diversity and differing organisational priorities.	Phase 2 Qualitative Evidence Report qualifies this argument. Our analysis of evidence suggests that duration in itself is not always the key issue; what matters more is whether projects are supported through iterative and sequential funding opportunities across the full pathway. Time pressures often arise not only from short duration, but from contracting delays, approval processes and fragmented funding across stages. Low TRL: short projects can still work if follow-on and iterative funding routes exist. High TRL: longer horizons become more important because development, validation and scale-up require continuity, adaptation and repeated back-and-forth movement across TRLs.
Breadth of business networks	Businesses need more than a few	Phase 2 Qualitative Evidence Report extends this by showing that the most important issue is not breadth alone,

Phase 1 Literature Review moderator	Phase 1 Literature Review summary	How Phase 2 Qualitative Evidence Report extends/refines it
	international partners, but too many can hinder innovation.	but whether UK businesses and UK-based sites of multinational firms are involved in ways that help anchor value in the UK. Business networks matter most when they create routes for UK testing, adoption, implementation and commercialisation. Low TRL: business engagement helps shape relevance and future pathways. High TRL: strategically embedded UK firms or UK-based MNC sites become especially important for implementation, job creation and commercialisation in the UK.
Effective IP protection mechanisms	IP protection reduces opportunistic behaviour and protects value.	Phase 2 Qualitative Evidence Report adds a more nuanced view. IP protection appears most relevant at high TRLs and in particular sectors such as biosciences, but it is not universally necessary for economic impact. Many cases commercialised successfully through routes other than patents. The Report therefore treats IP as part of a broader value-capture and translation system rather than as a universally decisive moderator.
Geographical diversity / collaborations across diverse locations	Geographical diversity boosts novelty and encourages more cutting-edge outcomes.	Phase 2 Qualitative Evidence Report partly supports this but reframes the motivation. The evidence suggests that teams usually pursue international collaboration for access to expertise, resources, data, infrastructures, problem contexts, regulation or markets rather than diversity for its own sake. Nevertheless, collaboration across diverse contexts still increases robustness, external validity, benchmarking quality and sometimes novelty. Low TRL: diversity of contexts and datasets can improve robustness and distinctiveness of knowledge production. High TRL: international diversity helps with validation across markets, regulatory alignment, standards readiness and export-oriented commercialisation.

Moderators that emerge in Phase 2 Qualitative Evidence Report but were not explicitly identified in Phase 1 Literature Review

Phase 2 Qualitative Evidence Report moderator	Type	Why it matters in Phase 2 Qualitative Evidence Report
Complementarity of partner resources	Positive moderator / enabler	International partners create more value when they bring distinctive expertise, capabilities, infrastructure, funding, datasets, testbeds or market access that are not readily available in the UK.
UK value-capture orientation	Positive moderator / enabler	Projects that consider economic impact to the UK early and throughout the collaboration are more likely to design pathways for adoption, implementation, diffusion and commercialisation. Projects generate stronger UK economic value when the research problem, use case, dataset, adopter group or implementation pathway is clearly tied to UK needs from the outset.
Commitment to scientific progress	Positive moderator / enabler	A strong commitment to foundational and frontier science supports originality and long-term breakthrough potential, even where economic benefits take longer to materialise.
Involvement of early-career researchers	Positive moderator / enabler	PhDs, postdocs, co-supervision arrangements, internships and international exposure strengthen UK talent development, create jobs and deepen capability pipelines.
Grant application experience and availability of funding	Positive moderator / enabler	Grantcraft and access to integrated funding shape whether projects can start, continue and progress from research through implementation and commercial development.
Researcher and research visibility	Positive moderator / enabler	Visibility and engagement with practitioner communities, combined with open access outputs, improve diffusion, awareness and translation into economic value.
Digital-first / modular remote collaboration	Positive moderator / enabler	Where appropriate, digital collaboration lowers costs and allows geographically dispersed partners to collaborate effectively without sacrificing quality.
Limited researcher capacity and expert support	Negative moderator / barrier	Researchers face tensions between publication and impact and may lack specialist support in commercialisation, IP, business development or implementation.
Lack of entrepreneurial environment	Negative moderator / barrier	Risk aversion, red tape, ownership complexity and uneven availability of venture capital can slow spinout formation, scaling and commercialisation.

Phase 2 Qualitative Evidence Report moderator	Type	Why it matters in Phase 2 Qualitative Evidence Report
Slow and complex contracting / approval processes	Negative moderator / barrier	Administrative and legal frictions delay collaboration, onboarding, formal partnerships and translation.
Restrictions on international talent partnerships	Negative moderator / barrier	Limited mechanisms for co-funding, co-supervision and exchanges with international partners constrain talent development pathways.

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