



Research  
England



## Research England (UKRI) and WMREDI expert evidence forum: Informing Development of the UK Place-based R&D Strategy

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The West-Midlands Regional Economic Development Institute (WMREDI) at the University of Birmingham hosted a closed-forum for Research England (UKRI) to examine the evidence base for a place-based R&D strategy. This involved some leading academics from a variety of disciplines (listed below). Key questions included:

- What evidence is available (or is needed) to show that different kinds of regional impact result from different kinds of R&D investments / interventions?
- What should the research and innovation system – universities, businesses, research organisation and other intermediaries - do more of to support economic growth in their region?
- Is there evidence to show which different levers, incentives, mechanisms and critical dependencies make a difference to scale of impact and/or outcomes at local or national levels?
- What does UKRI, government and local leadership need to do to ensure research and innovation can play a powerful role in levelling up the country?

### Key Conclusions

#### 1. R&D Investments have a Positive (but mixed) Regional Impact

R&D investment in regions can increase innovative capacity and capability which can give rise to productivity improvements, greater levels of firm competitiveness and/or high concentrations of higher-skilled, higher-income workers. Further positive clustering or agglomeration effects can also be generated.

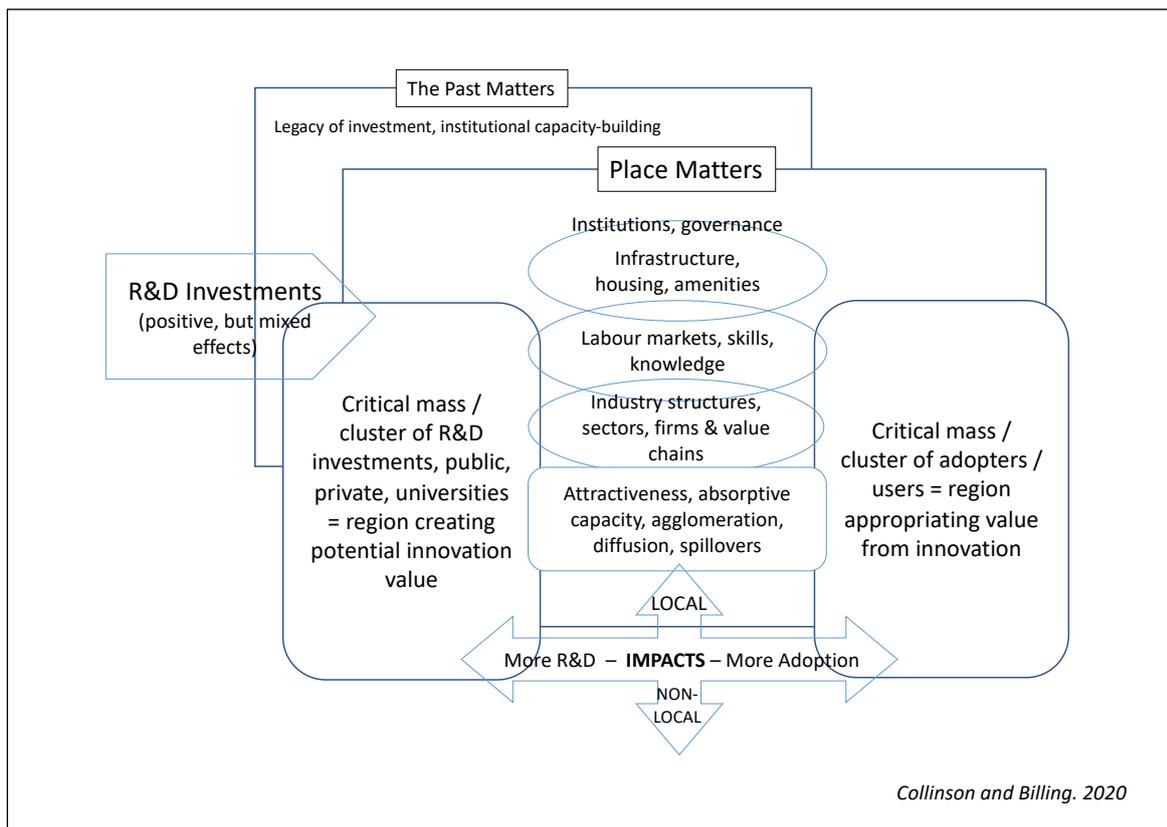
But there are very mixed effects when we analyse the spatial impacts, effects on industry sectors or consequences for patterns of employment and relative inequality. New R&D investment will tend to advantage some skill sets or socio-economic groups and disadvantaging others. These impacts are complex and context specific. They depend on the local characteristics of the region hosting the investment (see Figure 1), i.e. place matters. Previous development trajectories and the current structure of a local economy shape and are shaped by the impacts of R&D investments and other interventions. Standardised, national policies have limited effect and customising interventions more precisely to fit with local endowments is important to achieve wider and/or longer-term impacts at local level.

## 2. Place Matters – But Why and How?

Firms select to invest R&D facilities in places where local endowments, including high levels of related skills, technology producers, infrastructure, supporting firms and universities, provide the necessary inputs (Figure 1). This often drives clustering and agglomeration effects. These same characteristics, alongside others, also influence the evolving impact of these investments on other aspects of the regional economy.

Research that examines the links between R&D investment and structural changes in employment provides some good insights into local impacts. R&D investments tend to change the composition of employment in the regional economy, rather than increasing overall employment. This is important because an increase in high-skill, high-income employees can benefit a region’s growth profile in employment, income, innovation or productivity (GVA) terms, but may displace low-skill, low-income employment and thereby increase inequality. This is one of a number of policy trade-offs between, for example productivity, inclusivity or sustainability. Again, a better understanding of the fit between specific investments and the local economy helps shape positive impacts across more than one of these dimensions of growth.

**Figure 1. Place Matters When Targeting R&D Investment for Regional Growth Outcomes**



## 3. Targeted and Connected Innovation Policies Matter

R&D investments need to be connected to the wider components of an innovation policy. This directly relates to the place dimension, but it is also relevant when the spatial impacts are not the primary concern. This includes simultaneously considering both the supply (input)-side and demand (output / adoption)-side of an innovation pathway. Investment in the supply-side without considering, and investing in, structures for local commercialisation, adoption, diffusion, and the

realisation of benefits reduces the extent to which new technologies, processes, knowledge or expertise are combined and applied to add value. There is evidence to show that this imbalance is more characteristic of the UK innovation system than for other countries.

Alignment with local firms and their innovation and investment strategies, as well as with the regional skills base are key. Matching the pipeline of potential innovations with the changing demand of firms is challenging, particularly in turbulent and competitive market environments. R&D investment can involve either increased investment in new technology (capital) and / or more training and upskilling. The balance of these across many firms can significantly influence the region-level trade-off between productivity and inclusivity or promote both.

Skills, as a location endowment attracting investment and as an outcome of R&D investment, are a critical complementarity. Investments that help regions attract, retain or develop higher-level skills create both direct and indirect effects on productivity and other economic performance measures. But skills, or a lack of skills, in firms which represent potential innovation adopters in a region also strongly influence the indirect productivity effects from diffusion and spill-overs in regional clusters.

Also, to improve the targeting of interventions at the regional level, more analytical capacity and capability needs to be developed in regions to better-understand how certain investments align (or do not align) with local strengths and weaknesses. This is noted by the OECD and other organisations as a particular limitation in the UK given the highly centralised nature of its political economy.

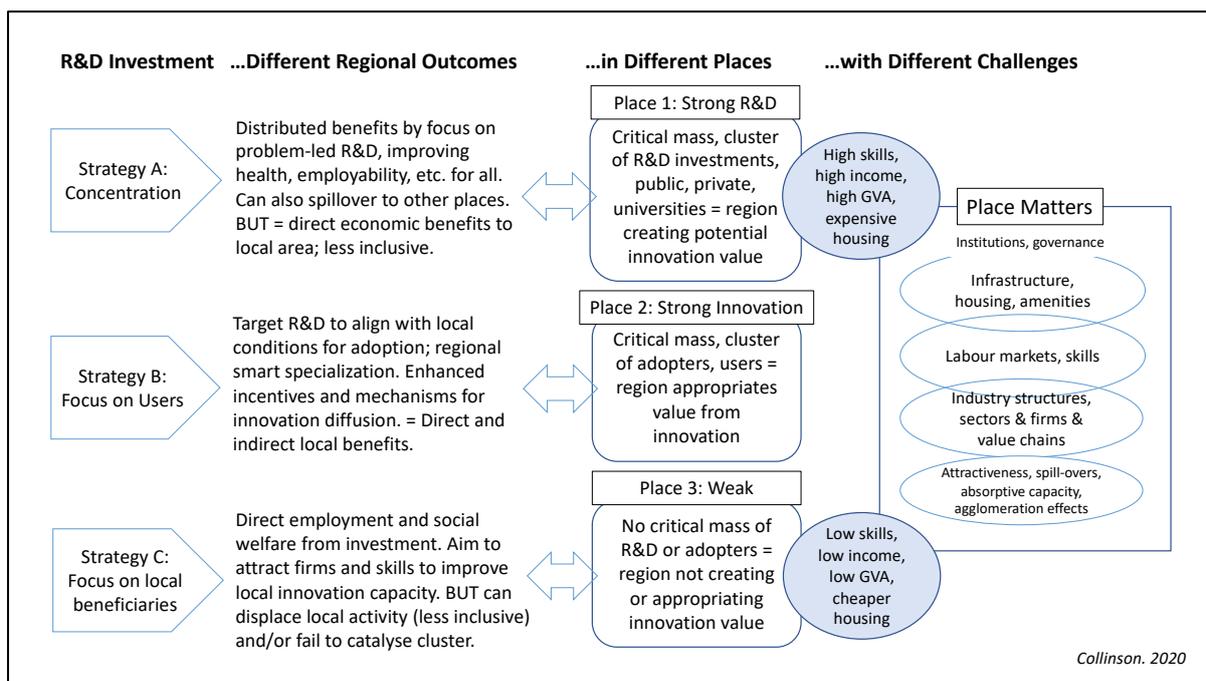
#### 4. Concentration and Agglomeration Effects... Multipliers, Spillovers and Diffusion Effects

The what, where and how to invest are innately linked to the why; what specific outcomes do we want to see, including who benefits from investments, directly and indirectly? Promoting supply-side clustering can reap economies of scale and leading-edge R&D at the international frontier. But a growing counterview with a wider set of outcomes in mind is that investment should be targeted at catalysing new types of growth and/or growth in other places. (See Figure 2).

Figure 2 provides a simplified outline for some of these options and trade-offs. It shows three general archetypes for intervention strategies: (A) concentrate R&D investments in existing, high-performing clusters (input, or supply-side orientation); (B) focus on regions where strong absorptive capacity exists and align investment to regional economic growth potential (demand-side orientation); (C) focus on weaker, lagging regions in an aim to catalyse new growth clusters.

In all three cases there would be direct local impacts, including employment and GVA effects from inward investment, some multipliers and spillovers. These may make less difference in (A) than in (B) and (C) although in (C) it is likely that displacement effects make these interventions less inclusive than many believe. In all cases, increased funding or structural incentives and mechanisms for more knowledge exchange, commercialisation, innovation and diffusion is likely to be needed.

#### **Figure 2. R&D Investment for Regional Growth: Different Strategies, Places, Challenges and Outcomes**



## 5. Absorptive Capacity and Human Capital

Absorptive capacity partly determines the degree to which local firms can adopt and leverage the benefits of R&D. This can be from R&D conducted elsewhere but for many kinds of innovation, physical proximity helps adoption and diffusion. Improving absorptive capacity includes attracting and retaining skilled people, relevant technology-related expertise and innovation management capabilities. Human capital, aligned with sector or technology specialisation in a region, relative to other regions, enhances absorptive capacity, the appropriation of value from R&D and improved greater levels of growth, productivity or competitiveness. But the benefits are not necessarily equally distributed.

Absorptive capacity is determined by the incentives, capabilities and 'fit' between both the supply-side (R&D, technology, processes, knowledge etc.) and demand-side (intermediaries, adopters or users) to appropriate or unlock the latent value in innovation. Evidence highlights the need for stronger incentives to collaborate, translate and co-produce in UK regions. The effects of R&D spending in universities is also much stronger in areas where there is stronger collaboration, more absorptive capacity and better relatedness between University specialisms and industry in the area.

## 6. The Role of Universities

The relative focus on R rather than D in UK spending is well-evidenced. The UK R&D Roadmap (p.13) shows comparative data of R&D spending against other major economies illustrating not just the lower level of overall spending but also the relative focus on basic vs. applied R&D spending. University-firm barriers to collaboration and knowledge exchange have also been studied extensively. Additional funding and better mechanisms, drawing on better practices already in existence in pockets of excellence, should be used to increase the focus on commercialisation, appropriation, adoption and diffusion.

This debate also consistently points to the critical role of the social sciences; science and technology alone are not innovation and have no impact until they leave the lab. We know innovation dynamics,

adoption, diffusion and subsequent benefits are as much driven by the behaviours of managers, employees, consumers and other adopters, but still overwhelmingly fund engineers and scientists to take responsibility for the entire innovation chain.

## Key Recommendations: How to Invest Better?

Once there is clarity regarding the targeted outcomes, R&D investments can catalyse not just local growth, but a range of positive effects (improved inclusivity, sustainability as well as productivity and competitiveness). Improving the complementary incentives and structures relating to both inputs (supply-related clusters) and outputs (adoption, value-appropriation and diffusion) as well as the targeting process itself can enable multiple aims, rather than individual trade-offs, to be achieved.

### a. University Engagement in Downstream Activities; Structures and Incentives

The UK R&D Roadmap acknowledges the need to improve university commercialisation to ‘capture the economic benefit from our research through innovation’ (p.31). There are various exemplars of both funding schemes and collaborative partnerships that illustrate better practices that should be scaled up.

- Promotion of more cross-campus interaction and joint-proposals from STEM and non-STEM faculty.
- Stronger focus on innovation and conditions placed on universities to work in collaboration with local partners, on outcomes, rather than outputs.
- The application of evaluation, monitoring and measurement, of local outcomes, required as part of the funding process.

Alongside this, investment in:

- Applied research skills, secondments and other collaboration / co-creation mechanisms
- Targeted schemes extending beyond start-ups and spin-outs, focused on scale-ups and/or sectors and firms that are strategically important to a region’s growth profile and/or local multiplier effects.
- Approaches that target and build on existing, strong engagement between University TTOs, student entrepreneurship centres and business schools, with local firms.

### b. R&D Investments as Part of an Integrated Innovation System / Strategy

The need for a ‘whole-systems approach’ has been noted elsewhere and prompts a number of recommendations.

- Improve the precision targeting of investments by identifying impacts and outcomes for host locations. This should be a key factor in funding selection processes.
- Increase the sophistication and application of evaluation approaches, impact analyses, logic chains and related data analytics used to assess funding applications and monitor funded programmes.
- Avoid creating ‘islands of excellence’ by combining and sequencing interventions and initiatives and providing complementary support. For example, schemes to promote student entrepreneurship in projects with local firms alongside skills development and business support schemes focused on the adoption of new technologies for improved productivity.
- Promote a wider interpretation (in research commissioning processes and applied policies) of commercialisation, innovation and impact to encompass non-tradeable services, KIBs and other sectors which are important to the economy, or to future growth, sustainability, inclusivity or wellbeing.

- Provide more funding for collaborations which combine universities, firms and regional bodies (combined authorities, LEPS, Chambers of Commerce etc.).
- Explore more experimental funding approaches 'skunk-works' or pilot innovation projects potentially combined with the development of soft-start-ups.
- Dedicate funding streams to identify and promote the *enabling* effects of particular technologies (digital), capabilities (management, design, creativity), processes and practices, which promote innovation across many types of firms and sectors.

c. Identify and Fill Important Research Gaps

There are significant gaps in our understanding of the growth dynamics of regional economic systems. To better understand the complex dynamics of local economic growth more interdisciplinary research is needed to connect micro-level interventions with aggregate effects across defined spatial geographies, over long periods of time. The full report includes a list of these gaps.

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