June 2022

# Research and Innovation (R&I) and Place

## Final Report to UKRI

SQW

# Contents



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Date: 01/06/2022

# List of acronyms

| Acronyms | Description |
|---|---|
| AHRC | Arts and Humanities Research Council |
| AMRC | Advanced Manufacturing Research Centre |
| BBSRC | Biotechnology and Biological Sciences Research Council |
| BERD | Business Enterprise Research and Development |
| BEIS | (Department for) Business, Energy and Industrial Strategy |
| BIS | (Department for) Business, Innovation & Skills |
| C&W | Cheshire and Warrington |
| CCF | Connecting Capability Fund |
| CICP | Creative Industries Clusters Programme |
| CR&D | Creative Research and Development |
| CRDP | Creative Research and Development Partnership |
| CSIT | Centre for Secure Information Technologies |
| DDI | Data Driven Innovation |
| EPSRC | Engineering and Physical Sciences Research Council |
| ERDF | European Regional Development Fund |
| ESRC | Economic and Social Research Council |
| EU | European Union |
| GDP | Gross Domestic Product |
| GVA | Gross Value Added |
| HEIs | Higher Education Institutions |
| IBERS | Institute of Biological, Environmental & Rural Sciences |
| ISCF | Industrial Strategy Challenge Fund |
| ITL | International Territorial Levels |
| KEF | Knowledge Exchange Framework |
| KPI | Key Performance Indicators |
| KTAs | Knowledge Transfer Advisors |
| KTPs | Knowledge Transfer Partnerships |
| LEP | Local Enterprise Partnership |
| MCA | Mayoral Combined Authorities |
| MDC | Medicines Discovery Catapult |
| MRC | Medical Research Council |
| NERC | Natural Environment Research Council |
| NCC | National Composites Centre |

| Acronyms | Description |
|---|---|
| OWASP | Open Web Application Security Project |
| PEC | Policy and Evidence Centre |
| R&D | Research and Development |
| R&I | Research and Innovation |
| RISE | Regional Impact from Science of the Environment |
| RTOs | Research and Technology Organisations |
| SCR | Sheffield City Region |
| SiPF | Strength in Places Fund |
| SME | Small to Medium-Sized Enterprise |
| STFC | Science and Technology Facilities Council |
| ToR | Terms of Reference |
| UK | United Kingdom |
| UKRI | UK Research and Innovation |
| UKSPF | UK Shared Prosperity Fund |
| WMRedi | West Midlands Regional Economic Development Institute |

*Source: SQW*

# Executive Summary

**Aims & approach**

*This study has considered:*

- *how and why the characteristics of areas affect the success of UKRI's 'levers' in supporting and stimulating research and innovation (R&I) – and vice versa*
- *what might be done to help investment in R&I contribute to better place-based outcomes*

## Aims and approach

UKRI commissioned SQW, in partnership with Professor Philip McCann from the University of Sheffield, to examine the relationship between investment in research and innovation (R&I) and place, and to consider what might be done to help investment in R&I contribute to better place-based outcomes.

These are hugely complex questions. There are no straightforward answers. The study was designed to build on existing evidence, distil thinking and develop thought-provoking frameworks. It was intended to prompt debate, including within UKRI itself. Whilst the brief was not to provide specific recommendations to UKRI, the study was designed and steered to generate discussion and reflection. This in turn meant that a largely technical study assumed a process dimension as it was being delivered over the course of a year. It was therefore both evidence-based and iterative. Within this context, it sought both to report accurately the evidence that was gathered during different phases of work, and to provide some sense of the reflection that was prompted by this evidence.

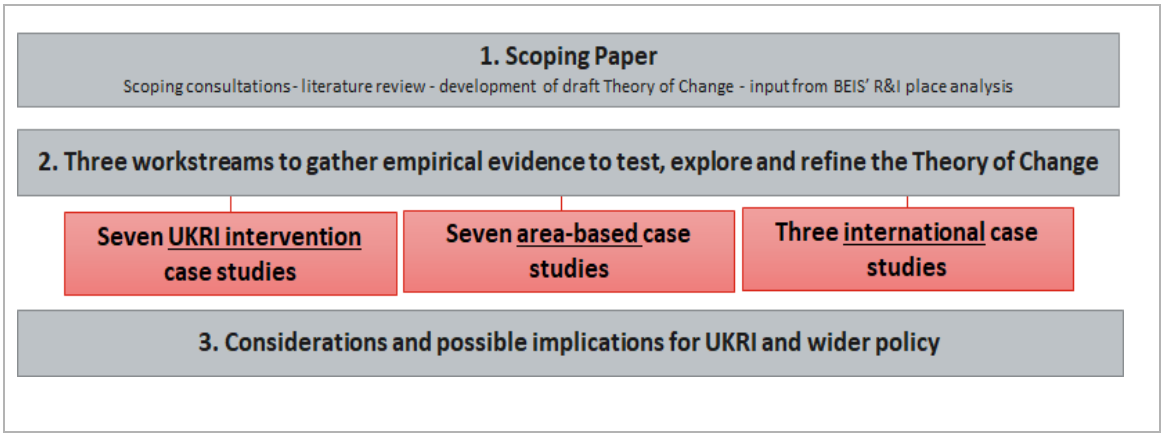
The policy context for the study was important. It also evolved whilst the study was being delivered. UK government has committed to investing 2.4% of GDP in R&D. The commissioning of this study followed the publication of both the *UK R&D Roadmap* (which sought to "*take greater account of place-based outcomes in how we make decisions on R&D in the UK*") and UKRI's own early place-based commitments ("*to support all parts of the UK in building their R&I strengths"* and "*to understand how every region might benefit from national investment in R&I*"). It was conducted in anticipation of the *Levelling Up White Paper* which was published as the study was concluding. A new UKRI strategy (*UKRI Strategy 2022-2027*) – which included a specific place objective – was published in March 2022 as our research was being completed.

In practice, places are shaped by a cocktail of R&I investment from different sources. These include businesses, major charities and many different parts of UK government and the devolved administrations, as well as UKRI. Whilst the role of UKRI – as a major UK government-funded player – was the main focus of this study, UKRI's investment must be understood as part of this wider R&I system. Many of the lessons identified in this report are relevant system-wide.

The study used a predominantly qualitative approach (see Figure 1). Following a scoping exercise, SQW completed three strands of case-based research. In total, 52 interviews were

conducted. SQW worked closely with a Working Group from UKRI throughout. The scope of the study, and the emerging findings, were also discussed with a wider UKRI Advisory Group.

**Figure 1: Approach**




**Theory of Change**

*Using a Theory of Change allows us to move from a place-less framing and narrative around R&I investment to place as both backdrop and process.*

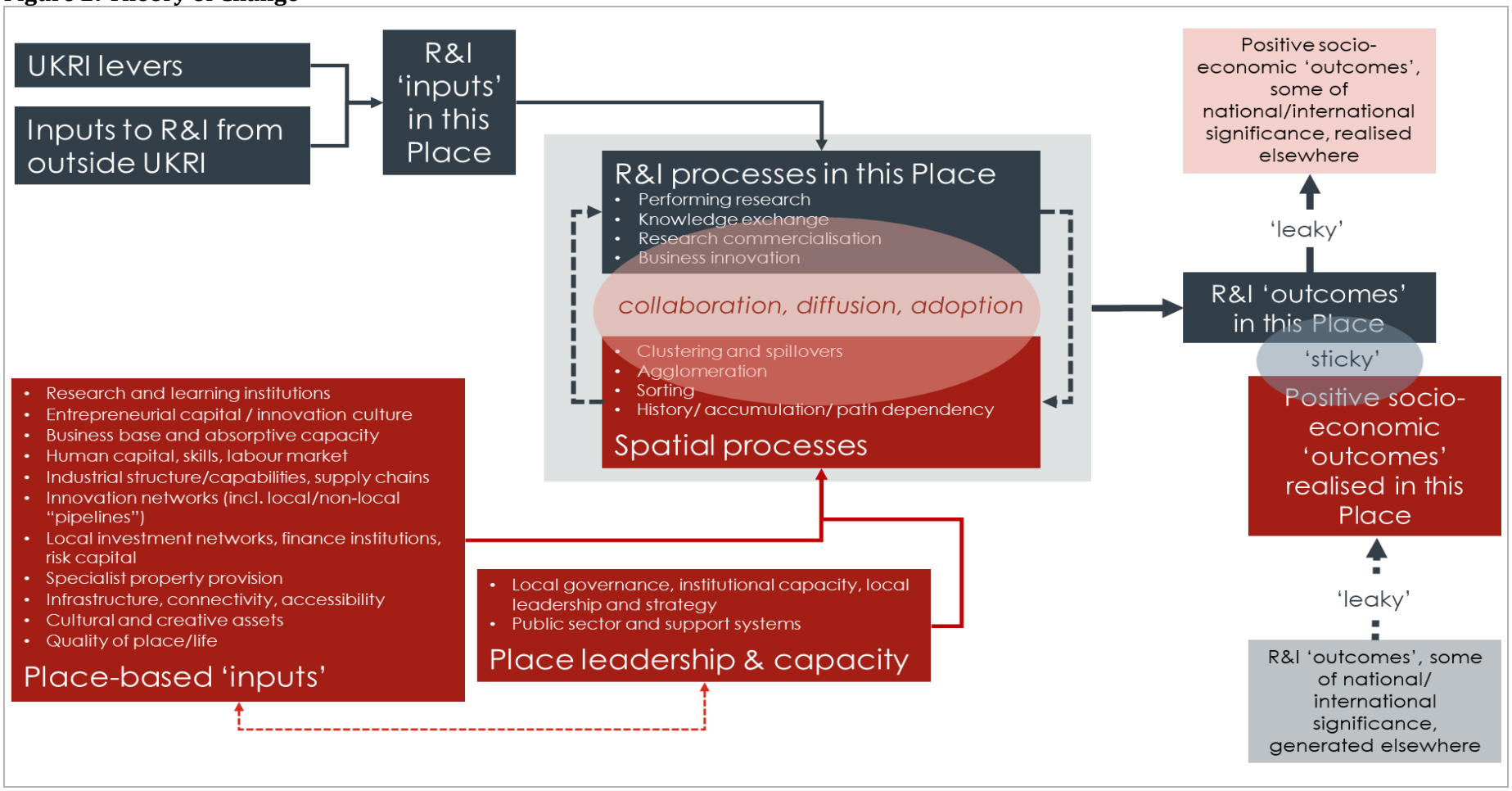
*Our Theory of Change can be applied in different contexts to understand where and how R&I investment is generating place-based outcomes and, crucially, where and why the chain of transmission is breaking down.*

## Theory of Change

The overarching relationship between R&I investment and economic growth is relatively well-evidenced nationally. The same is true of the 'pre-requisites' for an effective innovation ecosystem. There is also a growing body of evidence on R&I capacity and intensity across the UK. However, there is limited consideration of how these 'pre-requisites' interact in a place-based context; how they influence the relationship between R&I investment and place outcomes locally (and their relative importance in this context); and how this might vary in different places. Debates around R&I and place have typically focused on the spatial distribution of R&I *inputs*, with implicit assumptions and leaps of logic in how these inputs translate into *outcomes* in a place.

Informed by an early literature review – and then tested and refined through case-based work – SQW developed an overarching Theory of Change (Figure 2). This set out how R&I inputs lead to place-based outcomes, and the factors that influence where and how value is extracted from R&I, particularly in terms of the relationships between R&I processes and a raft of spatial processes.

**Figure 2: Theory of Change**




*Source: SQW*

The research suggested that concepts of 'stickiness' and 'leakiness' are useful in understanding how R&I outcomes might benefit a place. Some localities are better placed than others to generate benefit from R&I and to cause it to 'stick' locally. Localities may be 'leaky' in both directions: a locality may benefit from investment in R&I which actually occurs elsewhere; and investment in R&I within a locality may generate economic and social benefits that are enjoyed elsewhere. 'Stickiness' and 'leakiness' are not precise economic terms but they are intended to be graphic ones that capture local complexities in a simple way and help inform a wider narrative around the links between investment in R&I and local outcomes.

The Theory of Change provides a useful framework through which to explore why R&I investment may – or may not – lead to benefits for a place, depending on the characteristics of the place, the nature of R&I levers, and the interaction between the two. In doing so, it helps move from a place-less framing and narrative around R&I investment to *place as both backdrop and process*. It highlights the need for greater – and more intentional – recognition of place and the context into which R&I investment is being made. It also helps to pinpoint where and why routes to impact might break down in particular local circumstances, and key pinch points in the system that might require intervention to facilitate better place-based outcomes.

**Place scenarios**

*How the Theory of Change works in particular places depends on:*

- ⇨ *the presence and behaviours of the basic components of an innovation ecosystem*
- ⇨ *the links between those components, and how effectively R&I and spatial processes operate*
- ⇨ *the creativity and capacity of local leadership*

*High level place scenarios can be defined around these three attributes.*

*Although useful, these scenarios simplify local circumstances: local intelligence and a textured understanding of place is, in practice, critical.*

## Place scenarios

In practice, the Theory of Change works in different ways in different places. Based on a literature review and consultations, the extent to which R&I investment leads to positive local socio-economic outcomes seems to depend on localities' attributes with regard to:

(i) the presence and behaviours of the components of an innovation ecosystem

(ii) the links between those components

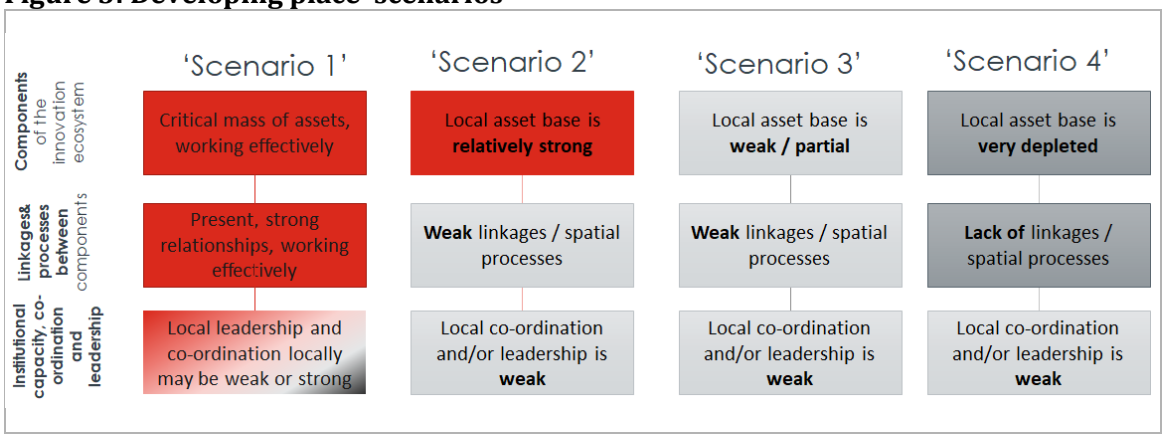
(iii) the creativity/capacity of local leadership, as well as the scale and nature of the R&I investment itself.

These factors are inter-related. Where all three are strong, R&I outcomes tend to be locally 'sticky' and translate into strong local socio-economic outcomes. They may be enhanced or eroded depending on localities' roles in wider national/international innovation ecosystems.

The area-based case studies highlighted further that processes are cumulative in their effects and can lead to virtuous or vicious circles at a sub-regional level. Scale and density also really matter, both to place-based inputs and the efficacy of R&I/spatial processes at the heart of the Theory of Change. They explain why 'average' national patterns may be unrecognisable at local scales.

These arguments provided the basis for developing place-based scenarios (Figure 3). Areas with strong components of an innovation ecosystem but with underdeveloped or weak links between components and/or weak local leadership ('Scenario 2') tend to underperform relative to those that are strong on all three ('Scenario 1'). However this scenario is different from one where the basic components of an innovation ecosystem are limited ('Scenario 3 and 4').

**Figure 3: Developing place 'scenarios'**




These scenarios are clearly very high level and conceptual – and any typology is a simplifying device. In reality, there could be multiple permutations in different places, and different scenarios could occur in a place at any one time (for example, across different sectors). They do, however, provide a framework to inform thinking about how R&I investment could be targeted in order to deliver better place outcomes.

**What helps in realising place-based outcomes?**

*In realising place-based outcomes, there may be a need to strengthen the components of an innovation ecosystem; and/or build links between those components; and/or invest in local leadership and capacity.*

*The balance between these varies from place to place.*

*A wide range of specific interventions can help – from investing in flagship assets, to incentivising collaboration, to providing a shared evidence base. But recognising that interventions 'land' differently in different types and scales of place is important throughout.*

## What helps in realising place-based outcomes?

Through the case-based research, SQW explored what facilitates (or hinders) R&I activities leading to place-based outcomes from a policy perspective. The research focused on what appeared to help in:

(i) building the components, either by strengthening (or evolving) existing components, or creating new components (and breaking path dependency)

(ii) building the links

(iii) building capacity and leadership.

Within the context of the wider R&I system, the focus was primarily on lessons from UKRI's levers, reflecting the remit and approach of the study. Many of the lessons identified were relevant both to UKRI and the wider R&I system.

The study found that strategic partnership working and sustained integration/alignment of investment appeared to be important, especially in places that are looking to strengthen existing components of an innovation ecosystem. Funding metrics and incentives also influence the behaviours and engagement of key actors with local economic development agendas. Where R&I assets are thin, investment in flagship assets and/or anchor institutions can provide a catalyst for clustering and a visible statement of local areas' potentials/ambitions in relation to R&I, although their success depends on how effectively the wider ecosystem functions.

The study also found that levers which support and incentivise relationship building, networks and collaboration are critical – both within and between local areas. These allow, fundamentally, for scale and critical mass (including through association, not necessarily co-location, for places with 'thin' assets) and the scope for wider adoption and diffusion. Sustained investment in human capital, capacity- and network-building is particularly important in places where links between components of the ecosystem are sub-optimal and/or local leadership is weak or nascent – both to maximise outcomes from existing R&I investments and create strong foundations for future R&I investment.

Whilst dedicated place and 'hybrid'[1] interventions play an important role, the accessibility and value of place agnostic programmes in some places (for example, in building capacity and relationships) should not be underestimated.

**Implications**

*Different responses are needed across different parts of the R&I system in different spatial contexts. In developing these responses, many different actors across the R&I system have a role to play (locally and nationally).*

*Within this context, there could be an opportunity for UKRI to deliver broader outcomes through marginal but 'place aware' adjustments – i.e. flexing existing systems and processes in an incremental way, alongside its place-specific interventions, and working in tandem with other parts of the system.*

## Implications

### System-wide implications

Understanding how the Theory of Change works in different places highlights how the effectiveness of policy interventions might also differ, depending on the local context. For example, in places where the basic components are in place but the 'joins' between those components are weak, the policy response may need to focus on incentivising key innovation actors to take a more prominent role in co-ordinating the landscape and/or programmes that instigate collaboration and relationship building. Plugging this gap in the Theory of Change might then enable other parts of the system to work more effectively. In places where the R&I asset base is very thin, intervention to build local capacity, facilitate collaboration with partners elsewhere and stimulate 'in-bound leakiness' might be the priority.

These findings have implications for actors across the system, locally and nationally. They are important for those involved with the demand as well as supply side of the R&I system. Within this system-wide context, all local areas should be encouraged to think specifically about possibilities and priorities in terms of R&I. At the very least, this would ensure that an R&I narrative exists across all parts of the UK which in turn should enable a dialogue with national organisations, including UKRI. The forthcoming UK Shared Prosperity Fund will be important given its remit to support local businesses to innovate, as part of wider public support for R&I. More broadly, in areas with a limited asset base there is a need for basic economic development and regeneration interventions at a local level accompanied by systematic attempts to encourage the diffusion and adoption of innovative practices (which define the core of the Theory of Change).

### Implications for UKRI

Given the purposes of UKRI – and the heightened importance of place in major policy statements – there is scope to move from a place-less framing and narrative around R&I

[1] i.e. potentially but not necessarily spatial, such as the Connecting Capability Fund and Creative Industries Clusters Programme

investment to *place as both backdrop and process*, consistent with the overall Theory of Change. This is not about redefining UKRI. Instead it is about unlocking Strategic Added Value – in other words, delivering broader outcomes through marginal but 'place aware' adjustments to the operation of UKRI's four levers (convene and catalyse; incentivise; invest; and conduct). Alongside UKRI's place-specific interventions, this means identifying the smallest changes that could make the biggest difference to place-based outcomes and flexing existing systems and processes in an incremental way.

UKRI might consider, for example, providing more consistent evidence on how its R&I investments and outcomes vary spatially; strengthening alignment between R&I investments (cross-council, and aligning D with R locally); designing and appraising all interventions with place-awareness (with greater recognition of the importance of later stages in the Theory of Change for place-based outcomes); rethinking some performance metrics to incentivise changes in behaviours; and facilitating inter- and intra-area knowledge exchange.

More generally, UKRI could recognise more explicitly that investment in different places could achieve different things in different ways. Taking this argument further – and given the cumulative and path-dependent nature of the relationship between investment in R&I and socio-economic outcomes in particular places – there may be a case for developing different investment rationales in different types of place. There should also be scope for piloting and experimentation as part of UKRI's response to the place agenda; this would allow for trial and error and, crucially, for learning.

In some circumstances, UKRI intervention through a place lens may not be appropriate or meaningful, and not every UKRI intervention can or should be directed to place priorities. The full breadth of UKRI's mission needs to be recognised (whilst acknowledging the importance of being 'place aware'). Our research suggests that where UKRI's role is prominent at a local level, its Strategic Added Value in relation to place-aware outcomes should be tangible; but equally, there are times when its role will, in practice, be smaller, given its own particular remit, and its finite capacities and resources. In all cases, UKRI's levers ought to be working in tandem with other parts of the system whilst recognising that relative roles will vary from place to place.

# 1. Introduction

**1.1** SQW, in partnership with Professor Philip McCann from the University of Sheffield, was commissioned by UKRI in 2021 to examine how and why the characteristics of areas affect the success of UKRI's levers in supporting and stimulating research and innovation (R&I), and *vice versa*. In light of this, we also considered what might be done to help investment in R&I contribute to better place-based outcomes. The study was designed to build on existing evidence and help UKRI operate more effectively as it evolves as an organisation. It was also intended to prompt further debate and research looking forward.

## Policy context

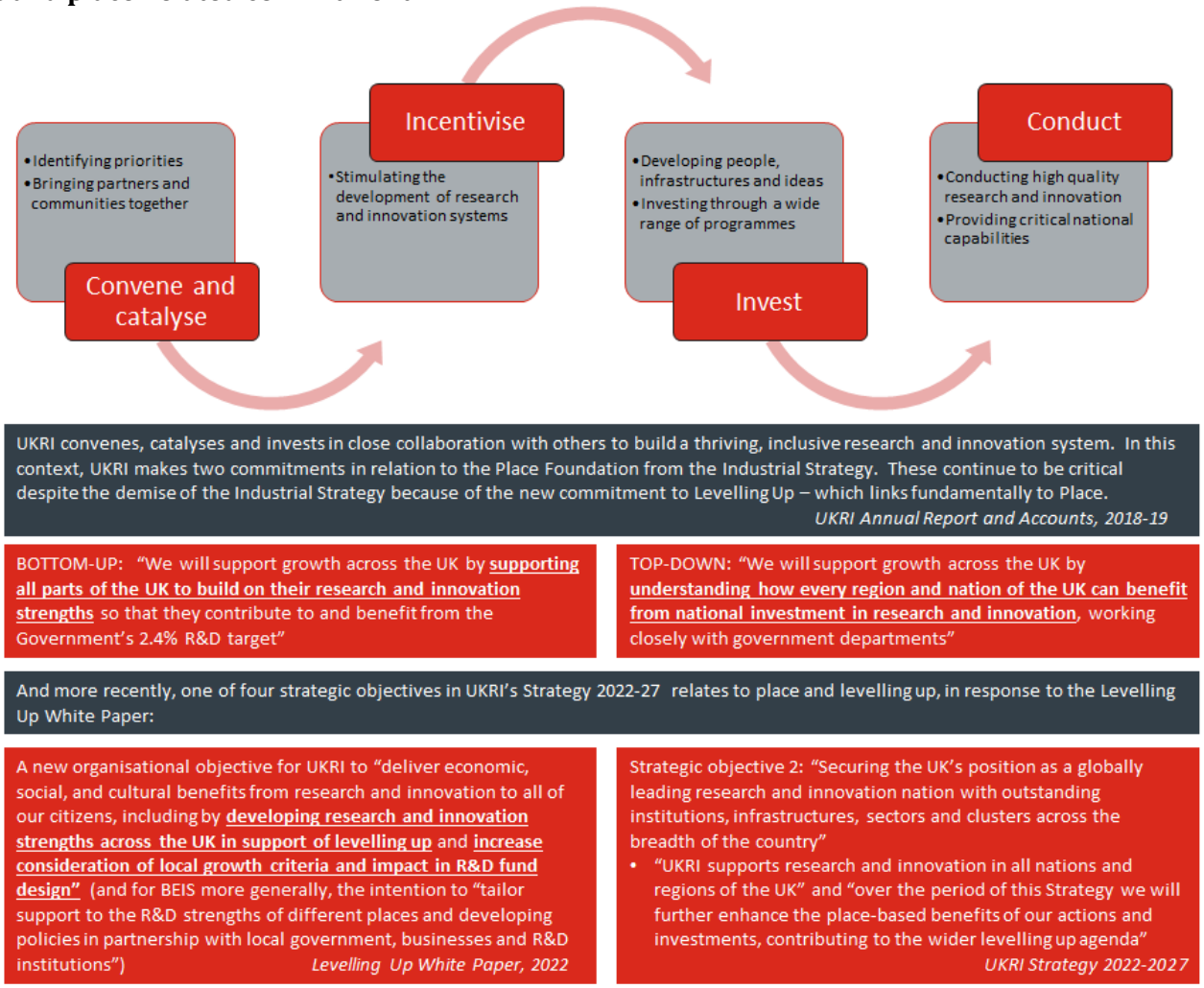
**1.2** The policy context for this study is important. It also evolved as the study was being delivered. UK government is committed to increasing UK investment in R&D to 2.4% of GDP by 2027. This commitment is coupled with a growing recognition of the links between R&I investment and economic growth, and the uneven spatial consequences. Our research was commissioned after the publication of both the UK R&D Roadmap (2020) – which sought to "*take greater account of place-based outcomes in how we make decisions on R&D in the UK, ensuring that our R&D systems make their fullest contribution to our levelling up agenda*" – and the Spending Review (SR20) which committed to "*change how the government invests in places to put levelling up at the heart of policy making*".

**1.3** The study was conducted in anticipation of the Levelling Up White Paper (LUWP). This was published as the work was concluding. It included proposals for a new organisational objective for UKRI to *"deliver economic, social and cultural benefits from research and innovation to all of our citizens, including by developing R&I strengths across the UK in support of levelling up and increase consideration of local growth criteria and impact in R&D fund design*"[2]. In response, UKRI has committed to supporting *"R&I in all nations and regions of the UK*" and "*will further enhance the place-based benefits of our actions and investments*", as set out in the new UKRI Strategy 2022-2027 (published in March 2022).

**1.4** As an organisation, UKRI is committed to supporting all parts of the UK to build their R&I strengths, and to understanding how every region might benefit from national investment in R&I. Its principal mechanisms for effecting change are defined through four levers. These are illustrated in Figure 1-1.

[2] The LUWP also set out plans for UKRI and Innovate UK to deliver Innovation Accelerators, designed to empower local areas to develop innovation clusters that will lead to economic growth.

**Figure 1-1: UKRI levers and place-related commitment**




*Source: UKRI extracts taken from "UKRI Annual Report and Accounts, 2018-19"*

## Study objectives and scope

**1.5** In policy statements, the spatial dimensions of R&I are broadly recognised but they are highly complex. There is some evidence available on the spatial distribution of *inputs*, but a very limited understanding of how *outcomes* might vary depending on spatial context. The need to understand better the spatial dimensions of R&I prompted UKRI to commission this study.

**1.6** Our initial Terms of Reference (ToR) therefore focused on three very broad and high level questions:

1. How might areas be characterised in terms of current and future potential R&I capacity and intensity?
2. **How and why do the characteristics of areas affect the success of UKRI's levers in supporting and stimulating R&I, and *vice versa*?**
3. In the light of this assessment:
   - What are the pre-requisites for R&I policies/strategies to successfully deliver place outcomes?
   - How might differences in the effectiveness of R&I levers be mitigated (i.e. how might interventions be adjusted to reflect different area characteristics)?
   - What else could be done to help R&I contribute to improved place-based outcomes (i.e. by helping to establish the pre-requisites)?

**1.7** Once the study had been commissioned, it became clear that analysis undertaken by BEIS to characterise R&I capacity had progressed the evidence underpinning Question 1 considerably[3]. In agreement with UKRI, the emphasis of our study therefore shifted to the second and third research questions.

**1.8** **Our focus has been on the relationship between R&I and place, and specifically on the *role of UKRI* – albeit in the context of wider R&I investment – to inform UKRI's own decision-making**. UKRI is one element of the wider system and, reflecting UKRI's overarching mission, its role/scope for impact varies across different aspects of the system. In this context, there is a need to be realistic about what UKRI's levers can (and cannot) plausibly contribute to place-based agendas, and to be cognisant of other policy priorities for UKRI. The study has been undertaken in collaboration with UKRI, and has sought to provide practical suggestions that UKRI could take forward as well as wider considerations for policy-makers and funders. That said, **many of the lessons identified in this report are relevant to other funders and stakeholders involved in the wider R&I system**.

[3] This was based on a thorough review of evidence and literature, with inputs from academics and the main stakeholder community, to identify key characteristics of effective regional R&D systems, against which metrics (in some cases proxies) were assigned and performance measured using data at ITL2 level.

1.9 **Our study has not been a retrospective critique of UKRI's investments against place-based objectives; the majority of these were simply not designed with place-based objectives in mind. Nor has it been an evaluation**.

1.10 It is also important to recognise this study has been **a relatively small piece of work which has sought to explore three big and highly complex questions** to which there are no straightforward answers. It attempts to provide some insight, analysis and frameworks to prompt thinking and move the debate forward, but further research will be required. Furthermore, whilst the report identifies points that UKRI and other stakeholders might want to consider in relation to place-based agendas, it was not intended to provide specific recommendations for URKI. Moving from a 'place agnostic' position to more 'place aware' approaches will take time and require experimentation, reflection and evaluation. It will also need further research and co-development with stakeholders across the R&I system.

## Study approach

1.11 In addressing the research questions, **we used a predominantly qualitative research methodology** (Figure 1-2). The study commenced with a scoping phase, which involved interviews with representatives from UKRI and its Councils and the Devolved Administrations, dialogue with BEIS in relation to its analysis of R&I capabilities and capacity across the UK, and a high-level review of existing literature. In addition to informing/refining the research questions and helping to identify case study candidates, the **scoping phase involved developing a Theory of Change which set out how R&I investment is expected to influence place-based outcomes at a generic/high level**.

1.12 **To explore our Research Questions, the Theory of Change was then tested, refined and developed further through the main research phase**. Our research design was developed collaboratively with UKRI and it focused on:

- **seven UKRI interventions.** Some had an explicit spatial remit (e.g. Strength in Places Fund (SiPF) and Regional Impact from Science of the Environment (RISE)); some were hybrid (meaning potentially but not necessarily spatial (e.g. Connecting Capability Fund (CCF) and Creative Industries Clusters Programme (CICP)); and others were competitive grants with no spatial underpinnings in their design (Smart and ESRC Standard Grants)
- **seven local areas across the UK**. These were sampled from internal working typologies of place which had been developed by BEIS on the basis of its analysis of R&I capabilities and capacity[4]. The seven areas were selected to reflect varying local conditions

[4] The BEIS analysis was undertaken primarily using ITL2 level data (i.e. the spatial footprint at which relevant data were available), and focused on performance against 14 key factors deemed to be important features of regional R&D systems. However, in most instances, our case studies focused on a smaller spatial footprint than ITL2 areas, more akin to functional economic geographies (e.g. City Regions)

- **innovation ecosystems across three international comparators.** These were identified as countries/regions that have progressed well/adopted relevant approaches in relation to R&I investment and regional growth.

1.13 The international work relied on a review of available literature. The other strands involved, in addition, relevant data analyses and consultations with UKRI programme managers (intervention cases) and local stakeholders (area cases, including local economic development/innovation policy-makers and representatives from major innovation organisations in each area). In total, we completed interviews with 52 individuals during the assignment.

1.14 **Our methodology adopted a structured approach to the design of research tools and the analysis, using the research questions and Theory of Change as a common framework.** Evidence from different sources was analysed, synthesised and triangulated systematically. We produced evidence papers from each strand of case-based research to identify common themes, similarities and differences, before developing the overarching findings.

1.15 Throughout we worked closely with a Working Group from within UKRI and met a wider Advisory Group from UKRI on three occasions (including to agree the study scope, and to discuss emerging findings). The study prompted debate within UKRI. This meant that a largely technical study assumed a process dimension as it was being delivered over the course of a year. **It was therefore both evidence-based and iterative.** Within this context, we sought both to report accurately the evidence that was gathered during different phases of work, and to provide some sense of the reflection that was prompted by this evidence.

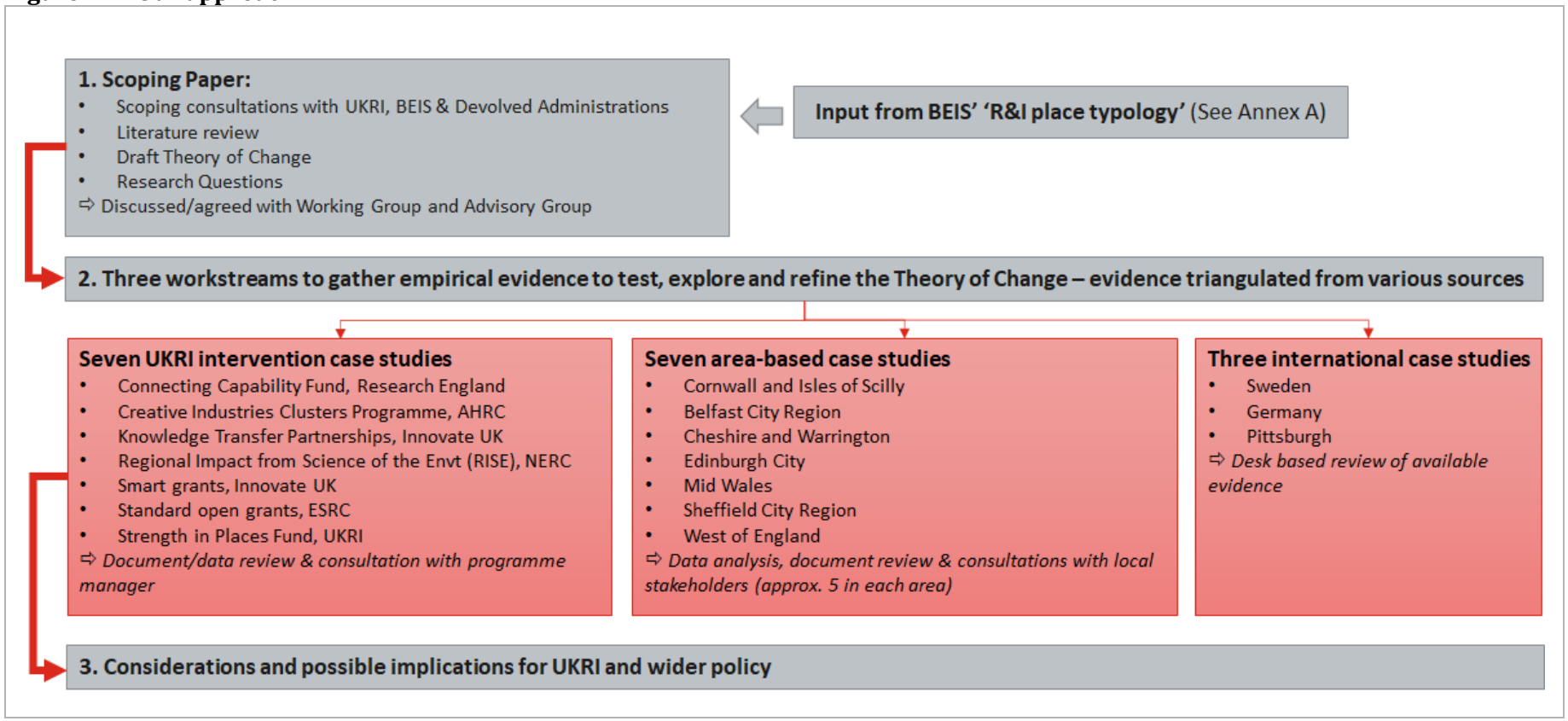
1.16 In conducting this study, there have been **challenges in terms of data availability** which should be taken into account when reading the report. Notably, data available at the time from UKRI on investment into a place provided a partial picture[5] and the availability of relevant evaluation evidence (i.e. that considers spatial context and/or outcomes) was very limited, in part reflecting the fact that place-based outcomes were not an original objective for most programmes[6],[7].

[5] For example, data on capital/infrastructure expenditure was partial and studentships data was not available; timeseries data on competitive grant funding were limited; and competitive grant funding from Research Councils/UKRI was limited to lead partners only (with the risk that investment is overstated in leads' localities and understated it in partner locations, although analysis by UKRI suggests that investment by lead is a reasonable indicator of where investment goes, particularly at the regional level).

[6] Either it was too early to assess in the programme's lifetime, or this was not covered by the evaluation evidence available

[7] As we discuss later in this report, in light of these evidence gaps, UKRI may want to consider strengthening the gathering/analysis of monitoring data and commissioning of evaluation evidence in future. We note this is a wider issue across UK Government, as highlighted in the Levelling Up White Paper, and plans are in place to improve data on sub-national R&D spending

**Figure 1-2: Our approach**



## Report structure

**1.17** The remainder of this report is structured as follows:

- Section 2 presents our Theory of Change
- Section 3 explores how the Theory of Change works in different places
- Section 4 presents place scenarios
- Section 5 discusses what seems to help from a policy perspective in different places
- Section 6 outlines potential responses in different places
- Section 7 outlines how the system could be improved, and how UKRI might play a role
- Section 8 reflects on overall findings from the study.

**1.18** The main report is supported by two annexes. Annex A provides further information on the BEIS analysis; and Annex B presents a bibliography.

**1.19** Note, throughout this report, UKRI refers to UKRI as a whole, including its component councils.

# 2. Developing the theory of change

## Key messages

- The overall relationship between R&I investment and economic growth is relatively well-evidenced nationally. The same is true of the pre-requisites for an effective innovation ecosystem. There is also a growing body of evidence on R&I capacity and intensity across the UK. However, there is limited consideration of how these pre-requisites interact in a place-based context; their relative importance in shaping place outcomes; or how this might vary in different places.
- To date, debates around R&I and place have typically focused on the spatial distribution of R&I *inputs*, with implicit assumptions and leaps of logic in how these inputs translate into *outcomes* in a place. There is little evidence on how the characteristics of a place (combined with the scale and nature of R&I inputs themselves) might influence the outcomes observed. The relationships between R&I investment and outcomes are very complicated locally, reflecting a myriad of different combinations of conditions and processes in different places that influence the scale and nature of outcomes arising from R&I.
- The Theory of Change provides a useful system level framework that can be applied in different contexts to understand where and how R&I investment is generating place-based outcomes and, crucially, where and why the chain of transmission is breaking down. It helps us move from a place-less framing and narrative around R&I investment to *place as both backdrop and process*, highlighting the need for greater recognition of the context into which R&I investment is being made. Concepts of stickiness (i.e. the ability of a place to anchor benefits and accrue value associated with R&I investments locally) and leakiness (i.e. the fact that R&I investment in one place might generate outcomes in another place) are important in this context.

**2.1** In this Section, we provide an overview of existing literature, including its coverage, limitations, and questions prompted for this study. We then present our Theory of Change, setting out the relationship between R&I investment and place at a high level. This was informed by the literature, and tested and refined through the main research phase.

## Existing literature

**2.2** **There is a wealth of academic and policy literature on R&I capacity[8] and what makes for effective regional innovation systems**. Key determinants include: the presence of high quality research institutions (e.g. universities) that help to connect science to innovation (via university-firm knowledge exchange activity)[9]; the presence of core competencies (i.e. an

[8] Typically defined as the underpinning factors that comprise the innovation system, and the strengths/effectiveness (or otherwise) of each component and linkages between them

[9] See for example: Hobbs et al (2018) The Regional Economic Impacts of University Research and Science Parks

area of absolute or comparative research strength) and collective/shared technological, commercial and strategic knowledge[10]; the composition of the business base (and the presence of multinational firms); business dynamism[11] and absorptive capacity to implement and exploit new technologies[12]; and the availability of private capital and appropriate physical space to facilitate scale-up. Networks and links between the different actors in the system who create, share and distribute knowledge are also important[13], ensuring that research that is generated is linked to the local economy (and *vice versa*)[14]. The literature also highlights the quality of formal and informal governance institutions in a region[15], the dynamism of the public sector, and strength of local leadership[16], alongside a supportive regulatory environment[17].

**2.3** More broadly, '**place fundamentals**' are often described as factors that make a place attractive to talent and private investment. These include high quality transportation and communication infrastructure[18]; skills and labour market composition; quality of life; housing; and wider amenities[19]. These factors are framed as the pre-requisites for an effective innovation ecosystem and have informed the place-based inputs box in our Theory of Change below (see Figure 2-1). That said, there is a gap in the literature around the interaction between these factors, or their relative importance in shaping place outcomes, from a place-based perspective, and how this might vary in different places.

**2.4** **There is a body of existing literature and analysis focused on R&I intensity[20,21] and the spatial distribution of R&I *inputs*, and factors that determine the ability of a place to attract R&I funding.** In the UK, public R&D funding is heavily focused on the golden triangle (Oxford, Cambridge and London)[22]. For example, as reported in Nesta's Missing 4 billion report (2020), "*the UK regions and subregions containing London, Oxford and Cambridge account for 46 per cent of public and charitable R&D in the UK, but just 31 per cent of business R&D and 21 per cent of the population*". As above, reasons cited in literature for this include existing capability to perform R&D, scale, innovative capacity, and organisational strength

[10] ERC and NICRE (2021) Exploring the micro-geography of innovation in England: Population density, accessibility and innovation revisited
[11] Mart Hart (2021) Levelling Up – an impossible task?
[12] See for example: Alan Hughes and Tomas C. Ulrichsen (2019) Value Chains, Systems Thinking and Science, Technology and Innovation Policy: Implications for place-based policy development in the UK - A Critical Assessment; Michael Kitson (2019) Innovation Policy and Place: A Critical Assessment; and Professor Michael H. Best and Dr John Bradley (2019) Industrial capabilities, innovation and place
[13] OECD (2020) Broad-based Innovation Policy for All Regions and Cities
[14] David W. Edgington (2008) The Kyoto Research Park and Innovation in Japanese Cities
[15] Robert Huggins (Date unknown) Innovation and Productivity: Towards a Research and Policy Agenda
[16] See for example: BEIS (2022) R&D Types - Segmentation of Places – Summary
[17] The Royal Society (2020) Research and innovation clusters report
[18] McCann (2019) A place-based shift
[19] See for example: BEIS (2022) R&D Types - Segmentation of Places – Summary
[20] Most commonly defined as the level of R&D investment or as a proportion of GDP, and occasionally metrics such as patents/trademarks are used.
[21] See for example: Nesta (2020) The Missing 4 Billion – Making RD work for the whole UK; and Cambridge Econometrics (2020) Research and Innovation in the North of England
[22] See for example: Kitson (2019) Innovation Policy and Place: A Critical Assessment; HM Treasury (2021) Build Back Better; ERC (2021) Levelling Up – an impossible task?; Ipsos Mori (2021) Innovation Finance - Private Funding for innovative firms during the COVID-19 pandemic

and leadership (recognising that R&I investment happens in people and institutions, not just in places)[23].

**2.5** **There is less evidence on whether/how R&I inputs translate into outcomes in different places**. In other words, the spread of R&I inputs and ensuring that places can access R&I funding is often the priority, with limited understanding of how the characteristics of a place (and spatial processes within it) might influence whether that R&I funding delivers socio-economic benefits for that place in practice. The ability of a place to compete effectively for R&I funding is obviously important, but so too is a place's ability to harness/maximise the socio-economic value from R&I investment effectively. **The scale/nature of outcomes arising from R&I investment are not necessarily equal in all places. Context therefore matters**. Some of the existing literature covers this, noting the importance of a place's sectoral and technological distinctiveness[24], complementary/reinforcing public and private sector spending[25], the strength of actors (such as businesses and universities) and infrastructure (as above), and the alignment of/long-term investment in collaborative partnerships in a place[26].

**2.6** From the perspective of interventions, an evaluation of Smart found greater *additional* effects outside of London/South East[27], and further research by Innovate UK looking at the impact of feasibility studies and CR&D grants between 2012 and 2016[28] found that "*past evaluations of Innovate UK programmes indicate funding for companies in lagging regions can have significant impacts*" both in terms of direct impacts and spillovers (e.g. net job creation, increase in wages, reductions in long-term unemployment)[29]. However, consideration of routes to impact and causal mechanisms is limited in the literature reviewed for this study; there are **some leaps of logic, generalisations and assumptions made around the relationship between R&I inputs and place-outcomes**. For example, it is often assumed that alignment between research and business strengths/capabilities in a place will naturally lead to socio-economic benefits for that place – we test this further in Section 3.

**2.7** **There is limited evidence on the relationships *between* places,** and the role this plays in generating place-based benefits from R&I investment**,** i.e. how R&I inputs in one place might benefit other places. The geography of R&I inputs may differ from the geography of outcomes from those inputs. The extent to which it differs depends on collaboration/diffusion mechanisms working effectively between places. Recent research by UKRI and WMRedi also

[23] See for example: BEIS (2022) R&D Types - Segmentation of Places – Summary; CaSE (2020) The Power of Place
[24] Kitson (2019) Innovation Policy and Place: "A Critical Assessment
[25] Nesta (2020) The Missing 4 Billion - Making RD work for the whole UK
[26] See for example: UKRI and WMRedi (2020) Informing Development of the UK Place-based R&D Strategy Appendices; and Fehler-Cabral, G., James, J., Preskill, H., & Long, M (2016) The Art and Science of Place-Based Philanthropy: Themes From a National Convening
[27] SQW, Cambridge Econometrics and BMG Research (2019) Evaluation of Smart - On-going evaluation - Final report
[28] Ipsos Mori (2021) Innovation Finance. The study covered 1,026 projects that were awarded funding through 155 competitions administered by Innovate UK between 2012 and 2016. Note, this excluded Smart.
[29] The report found that impacts of the grants were negligible in high productivity areas, with the conclusion drawn that in these areas either grants largely crowd out parallel activity, or that the regional innovation systems are sufficiently developed that public funding may not be needed to support R&D.

highlights the importance of absorptive capacity in determining "*the degree to which local firms adopt and leverage the benefits of R&D, appropriating the latent value from R&D conducted elsewhere*"[30]. Whilst spillovers, diffusion and adoption are recognised in the literature as being critical in order to realise socio-economic benefits from R&I at a national level – and a key area of weakness for the UK – there is little discussion about their role in the context of place (both in terms of generating economic value within and between places). Research by Kitson (2019) reinforces the point that R&I policy itself has focused on the generation of innovations and not enough on the diffusion and adoption of innovation throughout the economy, and that innovation policy at the local level needs greater focus on diffusion. Evidence on what works in terms of diffusion is also limited, especially from the perspective of places that might benefit. In some local areas, the capacity to *absorb* R&I generated elsewhere may be as (if not more) important than its capacity to *attract* R&I investment.

**2.8** Another important factor to consider is **the nature and scale of R&I intervention and which part(s) of the research/innovation process (i.e. the R, D and/or I) occurs in different places**, and the implications for the type/scale of socio-economic outcomes that occur in a place as a consequence. The literature covers a variety of different forms of R&D/R&I interventions, including innovation and business support programmes, capital investment in actors and the public sector more broadly, the engagement of universities in regional development, and sectoral or place-based targeted funding[31], in addition to fiscal instruments including R&D tax reliefs and tax incentives[32]. In understanding how R&I investment leads to place-based outcomes, we need to understand how and where economic value accrues from different stages of the process. Routes to impact might vary for different places – i.e. primarily through research generation for some places, or via generating and adopting locally, or by adopting locally (but generating elsewhere). This has implications for policy.

**2.9** Finally, **systems thinking has growing prominence in the literature**[33]. This recognises the many interdependencies, routes to impact and feedback loops (positive and negative) that influence the effectiveness of an R&I system. Much of the existing research has been undertaken at a national level, but systems thinking is equally important and – potentially even more complicated – at a local level (recognising that places do not operate in a closed system, and boundaries are porous).

[30] Simon Collinson, UKRI and WMRedi (2020) UKRI and WMRedi Informing Development of the UK Place-based R&D Strategy FULL PAPER
[31] See for example: OECD (2020) Broad-Based Innovation Policy for All Regions and Cities; and Onward (n.d.) Levelling up Innovation
[32] HM Treasury (2021) Build Back Better; Nesta (2020) The Missing 4 Billion - Making RD work for the whole UK; Ipsos Mori (2021) Innovation Finance - Private Funding for innovative firms during the COVID-19 pandemic
[33] Hughes & Ulrichsen (2019) Value Chains, Systems Thinking and Science, Technology and Innovation Policy: Implications for place-based policy development in the UK A Critical Assessment

## The Theory of Change

**2.10** Logic models and Theories of Change are typically used in policy development to understand how interventions lead to change. In this context, our Theory of Change sets out how R&I inputs lead to place-based outcomes, and factors that influence where and how value is extracted from R&I, particularly in terms of the relationships between R&I processes and a raft of spatial processes.

**2.11** Our Theory of Change helps us to **move from a place-less framing and narrative around R&I investment to *place as both backdrop and process***. It provides a framework through which we can understand why R&I investment may – or may not – lead to benefits for a place, depending on the characteristics of the place, the nature of R&I levers, and the interaction between the two. It helps to pinpoint where and why routes to impact might break down in particular local circumstances (which we explore in more detail in Section 3), and key pinch points in the system that might require intervention to increase the scope for place-based socio-economic outcomes arising from R&I investments (discussed in Section 4). It also highlights the need for greater – and more deliberate or intentional – recognition of the context into which R&I investment is being made and factors that might influence links between investment in R&I and local socio-economic outcomes.

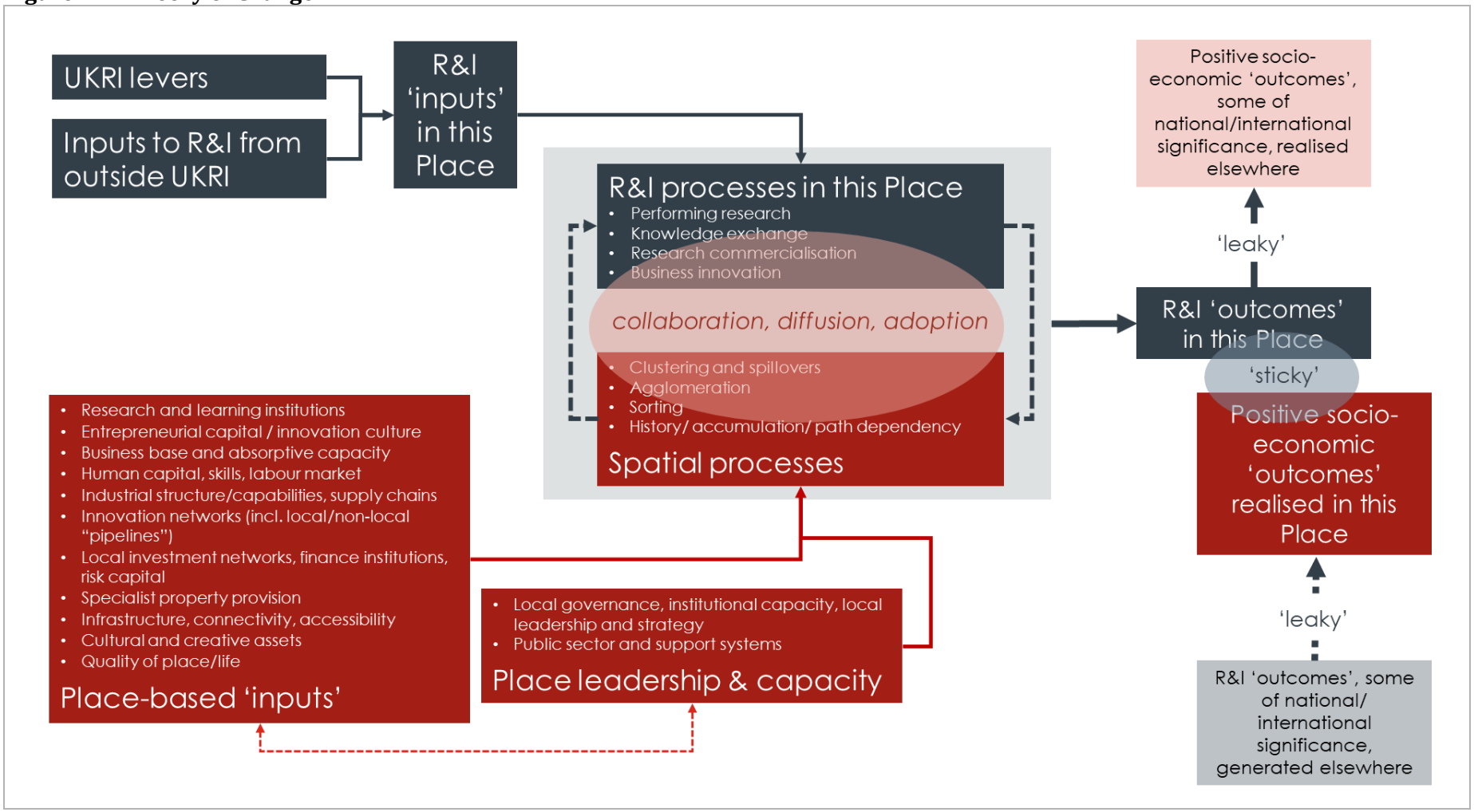
**2.12** Our Theory of Change is presented in Figure 2-1. This was developed iteratively, informed by a review of existing literature, refined through the main research undertaken for this study and discussed with our Working and Advisory Groups at UKRI:

- on the left, it includes R&I inputs into a place (i.e. UKRI's levers, along with wider R&I investment from others), place-based inputs (i.e. the attributes or components of the local innovation system) and wider leadership, governance and institutional capacity in a place
- in the centre, it highlights key spatial processes and R&I processes, plus collaboration, diffusion and adoption which link the two
- on the right, it shows the consequential R&I outcomes, leading to positive social/economic outcomes which can occur (a) within a place, i.e. value that is accrued locally, and/or (b) benefits of national/global significance. It also demonstrates how the benefits arising from R&I outcomes generated elsewhere may flow into – and generate social/economic benefits for – a place.

**2.13** The Theory of Change is, in practice, complicated. The overall relationship between investment in R&I and growth is relatively well-evidenced *at a national level*. For example, at a UK level, there is a relationship between investment in R&I and the outcomes (e.g. GVA per job) which are associated with levelling up. This reflects the economic consequences of market-defining research and technology, and the overall consequence of more incremental innovation and the diffusion and adoption of innovative products and processes. However, the relationships between R&I and outcomes are very complicated (and sometimes inconsistent) *at a local level*.

**2.14** Our research suggests **the concepts of leakiness and stickiness are particularly useful in seeking to understand how R&I might benefit a place**. They relate to the relationship between R&I outcomes and socio-economic outcomes and, crucially, *where* R&I takes place – i.e. how this relationship plays out across space/place. Routes to impact have a spatial dimension. A locality may benefit from investment in R&I which actually occurs elsewhere; and, investment in R&I within a locality may generate economic and social benefits that are enjoyed elsewhere. The extent to which this flow occurs can depend on the leakiness of a place. Both inbound and outbound leakiness can generate positive economic outcomes for places. Moreover, some localities are better placed than others to generate benefit from R&I and to cause it to stick locally. 'Stickiness' and 'leakiness' are not precise economic terms but they are intended to be graphic ones that capture local complexities in a simple way and help inform a wider narrative around the links between investment in R&I and local outcomes.

**Figure 2-1: Theory of Change**




*Source: SQW. Notes: as set out above, leakiness refers to (i) outbound leakiness - benefits arising from R&I that flow to and benefit other locations, and (ii) inbound leakiness – benefits arising from R&I taking place elsewhere. Stickiness refers to the ability of a place to benefit from R&I that takes place locally*

# 3. How the Theory of Change plays out in different places

## Key messages

- Our case-based evidence demonstrates that the Theory of Change works in different ways in different places. It also shows that local narratives are nuanced and multi-layered.
- At a local level, investment in R&I comes from a range of sources. The scale of UKRI investment varies considerably across our case studies, both in an absolute sense and relative to other sources of R&I investment in a place.
- Within this context, many different factors influence outcomes. These include: the diversity and innovativeness of the business base; the strength of collaborative networks (including with other places); the thickness of R&I infrastructure; the capacities/behaviours of key research assets; and workforce skills. Factors which hinder innovation ecosystems from working effectively include: poor co-ordination, weak local leadership and talent sorting. By looking at this through a place-based lens, we can see how dynamically inter-related these features are.
- Two issues that are prominent across our area-based case studies are path dependency and scale/density. Processes are cumulative in their effects and can lead to virtuous or vicious circles at a sub-regional level. Scale and density also really matter, both to place-based inputs and the efficacy of R&I/spatial processes at the centre of the Theory of Change.

**3.1** The Theory of Change described in Section 2 creates a conceptual basis for understanding why R&I investment may – or may not – lead to benefits for particular places. In theoretical terms, it also helps to pinpoint why routes to impact might break down. In this Section, we turn to empirical evidence and data to explore the range of local circumstances that exist across the UK and – drawing particularly on evidence from our area case studies – the specific factors that appear to be at play in relation to chains of transmission.

### R&I investment – and its links to our Theory of Change

**3.2** Different local areas are shaped by R&I investment from a range of different sources. This includes investment from business, from major charities and from many different parts of UK government (e.g. Department of Health, Ministry of Defence and Devolved Administrations), as well as from UKRI. A full analysis of R&I investment sources has not been part of this study, but our area cases (see below) provide local insights; these confirm both that UKRI is *not the only source* of R&I investment and in some local areas, it is *not the major source*. **The inference is that UKRI investment must be understood as part of a wider R&I system. At the same time though, it must be recognised as the major UK government-funded**

**player within the R&I system. Its investments and levers also provide a particular focus for this study.** For all these reasons, it is helpful to understand the geography of its investments in contextualising the analysis that follows.

### UKRI investment…

**3.3** UKRI investment is unevenly distributed across the UK. Fundamentally, this arises because UKRI (including the Councils within it[34]) does not, in the main, invest in 'places'; instead, it invests in institutions and researchers/innovators linked to those institutions, whether universities, businesses, or Research and Technology Organisations (RTOs). These institutions are themselves variable in terms of their scale, longevity and quality; and they are unevenly distributed.

**3.4** We have analysed data from UKRI on the distribution of its R&I investment over the period 2015/16 to 2020/21[35]. The data are available by lead institution. In the main, institutions are based somewhere, and by aggregating the data for lead institutions within particular geographical areas, it is possible to derive a proxy spatial distribution. This method is not flawless. It overstates the nominal allocation to the geographical area associated with the lead for two main reasons: some awards are made to groupings of institutions from different areas; and some lead institutions themselves may operate from multiple sites. Nevertheless, it provides some insight into the geography of recent investment.

**3.5** We have analysed the data at ITL2 level[36]. Over the period 2015/16 to 2020/21, the average investment from UKRI was £445m per ITL2 area, but this ranged from £2,702m in *Inner London – West* to £12m in *Cornwall and the Isles of Scilly*. On a per capita basis, the average was £280 per person across the UK, but within ITL2 areas, the range was from £2,269 in *Inner London – West* to £21 in *Outer London – East and North East* (so London had both the highest and the lowest figures on this metric). On another measure, UKRI's investment was equivalent to £6.6k per business across the UK; within ITL2 areas, it ranged from £18.5k in *West Midlands* to £481 in *Outer London – South.*

### …and other R&I investment…

**3.6** Although a detailed examination of the full range of R&I investment was well beyond the scope of this study, we have considered data relating to business enterprise expenditure on

[34] i.e. the Seven Research Councils (AHRC, BBSRC, ESRC, EPSRC, MRC, NERC, STFC), Innovate UK and Research England.

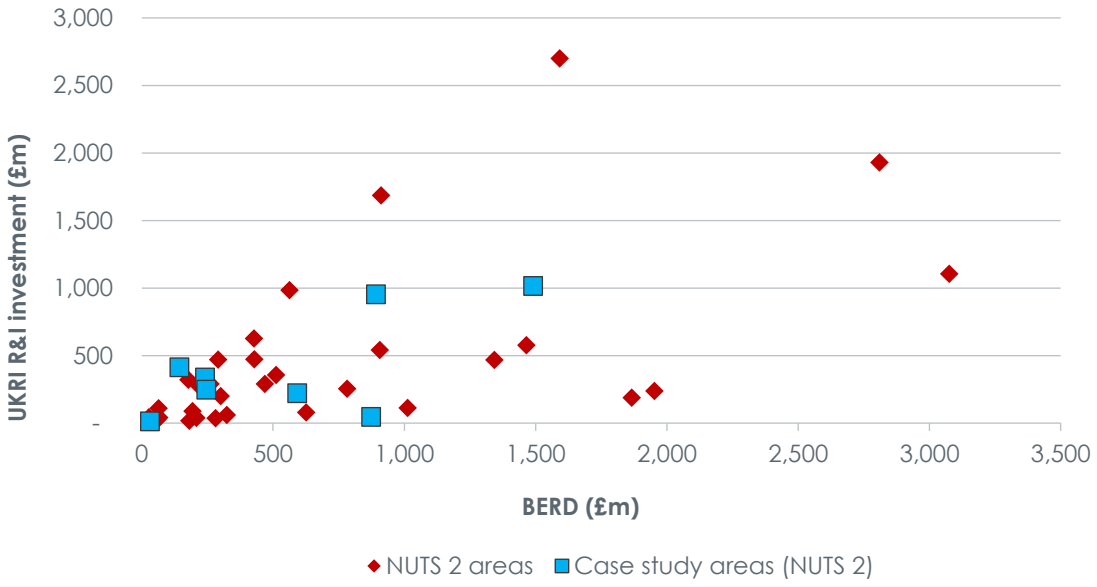
[35] Competitive Funding and Innovate UK funding is allocated to the financial year in which it was awarded (not profiled over time according to expected year of spend). Competitive Funding data from UKRI includes research grants and fellowships (i.e., excludes capital/infrastructure expenditure and studentships) while Innovate UK data covers more than research grants and fellowships (i.e., includes loans etc.) HESA data for Research England QR and QR related funding is recorded by institutions in the academic year in which they receive money (i.e., different to year it was awarded). This covers QR equivalent in the Devolved Administrations. HESA data includes (i) general fund research and knowledge exchange, (ii) QR and PGR funding, (iii) Recurrent (research), and (iv) Research England research grants.

[36] This reflects the scale at which relevant data is available. Note, ONS now use International Territorial Levels (ITLs) instead of NUTS levels.

R&D (BERD). Again, there are challenges with these data, but they allow us to consider the overall relationship between private sector R&I investment and that directed through UKRI.

**3.7** The chart below shows UKRI's R&I investment (as defined above) alongside overall business enterprise expenditure on R&D across ITL2 areas. In statistical terms, it suggests an overall relationship between the two, but not a strong one. While there are a few areas that have significant BERD but relatively little investment from UKRI, there are none where the reverse is true – suggesting, perhaps, that UKRI's R&I investment crowds in a private sector response. Beyond that, what is striking is simply the range of local circumstances, both absolutely and relatively.

**Figure 3-1: R&I investment by UKRI (2015/16 to 2020/21) and Business enterprise expenditure on Research and Development (2016)**




*Source: SQW analysis of UKRI and ONS data. Note, Innovate UK expenditure is included within BERD, although it is a small proportion of the overall business expenditure*

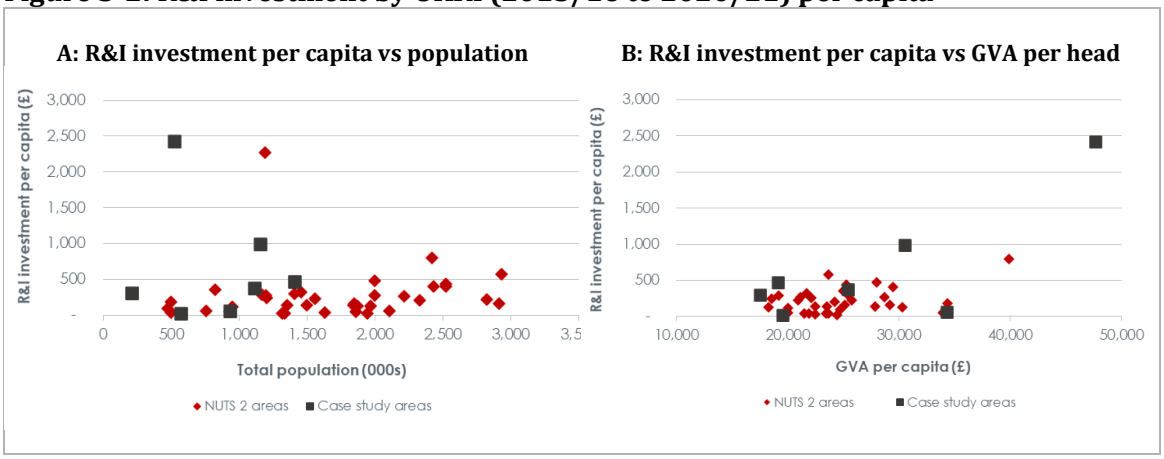
### …and links to routes to impact defined through our Theory of Change

**3.8** Through secondary data, it is possible to push the analysis further, providing some empirical insight into the routes to impact defined through our Theory of Change. The two charts in Figure 3-2 below are instructive in this context. Note that here, case study areas have different spatial definitions – some are ITL2 areas but others relate to different (smaller) spatial constructs.

**3.9** The first chart considers the **effect of scale** – and whether it is the case that the areas which perform best on per capita measures of UKRI R&I investment are simply bigger areas (i.e. typically cities or large polycentric areas, rather than smaller and/or more sparsely populated geographies). Scale is intrinsic both to *place-based inputs* and *spatial processes* from our

Theory of Change. From our chart ((A) within Figure 3-2), there are a couple of outliers, one of which is among our area case studies. Putting these to one side, the data suggest that ITL2 areas with larger populations seem to benefit from slightly more UKRI R&I investment: there is a positive relationship but not a very strong one.

**Figure 3-2: R&I investment by UKRI (2015/16 to 2020/21) per capita**




*Source: SQW analysis of UKRI and ONS data. Population data is 2019, and GVA per head data is 2018. Data limitations - location not available for some R&I awards; total award is allocated to lead partners, competitive funding and Innovate UK funding is allocated to the financial year in which it was awarded not incurred; and HESA data for Research England QR and QR funding is recorded by institutions in the academic year in which they receive money. Note GVA per capita graphic excludes outlier (Inner London – West). Note also that case study areas shown on the chart may not be ITL2 areas; some are smaller geographies*

**3.10** GVA per capita is effectively an **outcome/impact measure** from our Theory of Change. The second chart within Figure 3-2 plots GVA per capita outcomes against UKRI R&I investment per capita inputs. The outlier on the chart is the Edinburgh City-Region, one of our case studies (another outlier, *Inner London – West*, is not shown on the chart). Across other areas, the data suggest a largely inconsistent relationship. This is important because it suggests that UKRI R&I investment per capita is one factor among many that affects GVA per capita outcomes.

## Insights from our case-based research

**3.11** Available data shed some light on the nature and extent of local variation, but there is a need to dig deeper. In this context, the evidence gathered through our case-based research[37] provides important insights into how the general Theory of Change (articulated in Section 2) is working in different places (how it might be made to work better is the focus for Section 5).

**3.12** In relation to **R&I investment inputs** (top left of the Theory of Change), the main headline – of substantial local variation – is evidenced in high level terms through the data above. Across our seven area case studies, similar variations are apparent. Three of our case study areas – **Edinburgh, Sheffield City-Region** and **West of England** – together account for 85% of the total UKRI investment into the seven case study geographies. They also saw the greatest

[37] As noted in Section 1, this draws on a review of place-based and programme literature, and consultations with place-based stakeholders (including key individuals involved in economic development and innovation locally) and programme leads.

investment on both per capita and per business measures. On these normalised metrics, **Belfast City-Region** was not far behind. **Cheshire and Warrington**, **Mid Wales** and **Cornwall and the Isles of Scilly** however saw substantially less, both absolutely and in normalised terms.

**3.13** Our case studies provide a contextual narrative in relation to the causes and consequences of these differences. They therefore provide a real insight into the on the ground machinations of our Theory of Change and the effectiveness of the transmission mechanisms within it. We provide some high level observations in the paragraphs below; further detail will follow later in the report (but note that our aim is to explore the Theory of Change, not to provide a detailed account of each local area).

**3.14** For **Cheshire and Warrington**, although UKRI investment is relatively limited and the area lacks a large research-led university within its patch, there has been significant R&I investment from other sources, particularly the private sector. In part, this is simply a boundary issue: Sci-Tech Daresbury (a Joint Venture involving STFC) is close to, but outside, the boundary. Within the case study area, the Cheshire Science Corridor Enterprise Zone is considered important and indicative of UKRI funding in adjacent geographies supporting the growth of R&I activity locally. In fact, Cheshire and Warrington is one of the best performing of our case study areas on key outcome measures like GVA per job. It is close to Greater Manchester and Liverpool; it has a strong workforce skills profile; it has a diverse, innovative and well-networked business community; and it has specialist provision for R&D. The **place-based inputs** it is able to provide are therefore relatively strong and its proximity to major conurbations creates real strengths. **The inference is that it benefits from the range of both spatial processes and R&I processes at the heart of our Theory of Change even though some of its key assets are outside its boundaries**. In relation to the Theory of Change we might consider that **Cheshire and Warrington has benefited from the leakiness of adjacent areas**.

**3.15** Just by virtue of its geography, **Belfast City-Region** is less likely to experience leakiness in either direction. Belfast is a relatively self-contained city-region, albeit a small one, and densities are below the UK average in relation to both people and businesses. These contextual observations are important in understanding how the Theory of Change works locally. In relation to R&I, Belfast's assets include one well-embedded Russell Group university (with strong commercialisation pedigree), one civic university and a regional centre of the Digital Catapult. Its business base is distinctive; Short Brothers plc (aerospace) is a major player (including in relation to UKRI investment) and there appear to be emerging clusters linked to film production and cyber-security, but beyond that its business base is small relative to other city-regions. Overall, the R&I infrastructure is considered to be relatively limited, but the importance of innovation has been increasingly recognised and prioritised at the city-region level. As a capital city-region, it has a full range of devolved government functions and the funding associated with those functions. This has been important. It has meant that **devolved monies have been used to invest in an R&I model that seems attuned to the scale of the city-region**. Belfast City-Region's R&I narrative owes

much to Invest NI. Partly as a result, its relationship to UKRI is complex. There have been some major co-investments. Equally, though, local bids for UKRI competitive funding have had limited success. For some consultees, this was explained by local funding sources displacing national ones and therefore a limited appetite to engage in bidding processes. The more localised model is important in relation to our overall Theory of Change. However GVA per capita is low, and there are deep-seated productivity challenges.

3.16 **City of Edinburgh** is at the heart of another capital city-region and in that sense, there are parallels with Belfast. However there are differences too – most notably scale. Edinburgh (and its city-region) is simply much bigger. It has a large and diverse business base. It is also characterised by higher business and population densities. This is important in terms of the spatial processes we identify. Its R&I asset base is strong with three universities (University of Edinburgh, Heriot Watt University, and Edinburgh Napier University); a commercialisation infrastructure linked to them; and strong collaborative networks with the business community. **In the context of growing markets, two of its key sectors – financial services and technology/software – have grown in part because of its capital city function; in part because of its underlying R&I assets; and in part because local investment has complemented investment from UKRI and helped accelerate growth processes**. City of Edinburgh has benefited from significant R&I investment from UKRI but – through for example the Edinburgh and South East Scotland City Region Deal – it has been able to bring further R&I investment to bear. City of Edinburgh is also 'sticky' and it does well in retaining assets (including people) that could be mobile (linked also to quality of life). **All of these processes are cumulative in their effects** and they help explain the area's strong performance on outcome measures (like GVA per head and GVA per filled job) identified through our Theory of Change.

3.17 Although not a capital city-region, **West of England** (including Bristol and Bath) shares a similar narrative. It has scale; it has density; and it has significant R&I assets with four universities (two of which are Russell Group and three are sizeable) and some major businesses. **It also – like Edinburgh – has a sectoral make-up that aligns with its R&I specialisms. These are increasingly interconnected in part because local investment has dovetailed with UKRI priorities (notably in relation to aerospace/engineering and National Composites Centre, linked especially to University of Bristol, and increasingly in the creative industries).** Coupled with a high quality of life and relatively strong workforce skills, this has led to stickiness at the sub-regional level. There are certainly challenges in the West of England: intra-area inequality is a continuing concern and, until recently, partnership arrangements across the West of England have been relatively weak. However, there are examples of strengthening partnerships – both at the West of England level (where, for example, a Local Industrial Strategy was one of the first to be developed) and in relation to particular sectors/clusters (e.g. in the creative industries, including through a successful bid to Creative Industries Cluster Programme, the formation of an effective Creative Research and Development Partnership, and subsequently, a successful bid to the Strength in Places Fund). Transmission mechanisms within the Theory of Change have

arguably become more effective, and **outcome measures are relatively strong**. Again this points to a series of virtuous circles at a sub-regional scale. West of England's strong performance in respect of R&I investment – both from UKRI and from the private sector – is both a cause and consequence with cumulative effects.

3.18 **Sheffield City-Region** is defined around a major core city with scale and density. It has strong knowledge assets with two large universities, one of which is Russell Group. However GVA per capita is very low (similar to Cornwall and the Isles of Scilly), and there are longstanding productivity challenges. The area has internationally leading expertise in high precision engineering/design and digital technologies. This has been driven by academic and business expertise, and supported by major and complementary investment – including from UKRI – in fundamental and translational research assets. The Advanced Manufacturing Research Centre (AMRC) on Sheffield City Region's (SCR) Advanced Manufacturing Park has been core to SCR's narrative over the last two decades. However, historically, partnership working has been fragmented; it has lacked strategic direction, ownership and leadership (especially in the context of economic development). Despite strong alignment between the R&I expertise and business base sectorally, the diffusion and adoption of R&I has been a challenge – attributed, in part, to polarisation between cutting-edge research expertise and the absorptive capacity and ambitions of the wider business base. Across the city-region as a whole, business investment in R&D is relatively low. Despite a strong university presence and talent pipeline, wider skills/education, health and deprivation issues are affecting the quality of life. **These factors are contributing to the Theory of Change breaking down, and a disconnect between R&I excellence and socio-economic outcomes on the ground. This case study also brings to the fore issues of path dependency and the time it takes to shift place-based economic narratives**.

3.19 Our final two area-based case studies are different from the others. **Cornwall and the Isles of Scilly** and **Mid Wales** both have relatively small R&I asset bases. As places, they are also characterised by sparsity – of both people and businesses – a predominance of small firms (with few large R&D active firms), limited private investment, thin networks/links between the research community and local businesses, and challenges in retaining talent. In relation to our Theory of Change, this appears to be significantly important in relation to chains of transmission. **The R&I processes are underpowered because of limited investment while spatial processes struggle to have real traction because they lack density and scale**. In combination this has contributed to poor outcomes. Indeed, in both cases, the outcomes have been so poor that EU Structural Funds have been an important factor over recent decades and insofar as there is an R&I asset base, its current form owes much to them (and, as in Belfast, this seems to have influenced the appetite and capacity of actors to apply/compete for UKRI funding effectively). Until recently, partnership arrangements have had more focus on the EU Structural Funds than wider R&I processes. In Mid Wales, the Institute of Biological, Environmental and Rural Sciences (IBERS) is one of BBSRC's eight strategic institutes in the UK, and potentially, this is important. But that aside, **in both local areas, UKRI has had relatively little traction and the machinery of UKRI – and in some**

**instances, other R&I funding – has struggled to engage**. There are some parallels here with Belfast – but arguably its capital city-region character (and the governance arrangements that come with it) has provided a stronger basis for developing and sustaining alternative solutions.

## Understanding the differences in local circumstances

**3.20** The accounts presented above simplify greatly local narratives which in practice are nuanced and multi-layered. But their purpose – for now – is only to explore our Theory of Change in holistic terms and, specifically, to try and understand why routes to impact either work or break down in particular local circumstances. The differences in local circumstances are explained, to some extent, by the data presented at the start of this Section: within the context of the wider R&I system, there is significant variation in the scale of UKRI R&I investment at a local level. However this really is only part of the story. There are many other factors at play. Other inputs are important – not least the raft of place attributes and the extent of other investment in R&I. Stickiness and leakiness also both play a role in determining the scale of local effects. The effectiveness of place leadership and governance can, at times, make a little go a long way and apparently make a discernible difference; conversely, the absence of leadership and governance (or at least leadership that recognises and prioritises the contribution of R&I to economic development) appears to mean that strong R&I assets may have little bearing on socio-economic outcomes.

**3.21** But if there is one group of factors that really appears to bite in explaining subnational variation then it appears to be those linked to scale, location/remoteness and density. These really matter because they determine the efficacy of both the R&I and spatial processes at the heart of our Theory of Change: these processes are, fundamentally, the transmission mechanisms at its core. In a policy setting, this argument is important but it is also very challenging. Scale, location/remoteness and density are essentially 'givens'; they are intrinsic to place(s); and they are very difficult to influence. Yet they are also the spatial characteristics that dictate how the Theory of Change works locally – and why average national patterns may simply be unrecognisable at local scales.

# 4. Developing place scenarios

## Key messages

- The three key features that appear to matter most in realising and anchoring place-based outcomes are: (i) the presence and, crucially, the nature, scale and effectiveness of key components of innovation ecosystem, (ii) the links and co-ordination between them, and effectiveness of spatial processes, and (iii) local capacity and leadership.
- Informed by data and local intelligence, it is possible to develop scenarios in relation to different places, reflecting how the Theory of Change is working in a place and where it is breaking down (in relation to the three key factors above). This includes scenarios where the components of an innovation ecosystem are present, but the links between them and/or local leadership is weak, through to places where the asset base is very thin but there may (or may not) be potential on which to build.
- These scenarios are clearly very high level and conceptual – in practice there could be a spectrum of multiple permutations, and different scenarios playing out within an area at any one time – but they can inform thinking about how R&I investment might be targeted in order to deliver better place outcomes.

**4.1** Together, the literature review in Section 2 and the high level analysis and narrative in Section 3 demonstrate how investment in R&I tends to generate socio-economic benefits within a place when there is a well-developed local R&I system. In the context of varying patterns of scale and density, the evidence points to **three key features of the system that may be especially important in realising and anchoring place-based outcomes**:

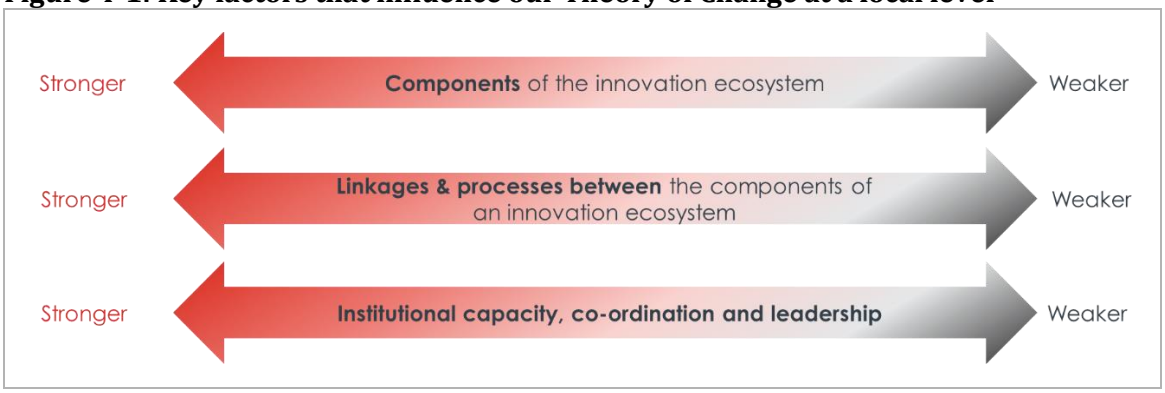
- the presence and, critically, the nature, scale and effectiveness of **key attributes**, i.e. the **components of an innovation ecosystem** such as institutional assets, workforce skills, etc.
- the **strength of spatial processes** (e.g. clustering, knowledge spillovers), which is influenced in part by the **links between the components of the ecosystem** and the effectiveness of those links. These processes really matter for value creation, and the extent to which stickiness is encouraged within a place/leakiness is harnessed from elsewhere
- the effectiveness, creativity and capacity of **local leadership**. This is often lost in the literature amongst many other necessary characteristics of an effective innovation ecosystem. However, the case study evidence demonstrates it is important but different from other characteristics.

**4.2** For individual local areas, there is – in principle – a spectrum of possibilities in relation to each of these three main elements. This is illustrated in the graphic below. Individual areas

can be plotted in relation to each of the three elements – creating many different permutations. But in broad terms, the evidence from both the literature and our case studies suggests that:

- local areas which are strong in relation to all three elements tend to perform well on key outcome measures like GVA per job
- local areas which are weak on all three elements tend to struggle in relation to key outcome measures
- many local areas occupy intermediate positions with both strengths and weaknesses across different elements.

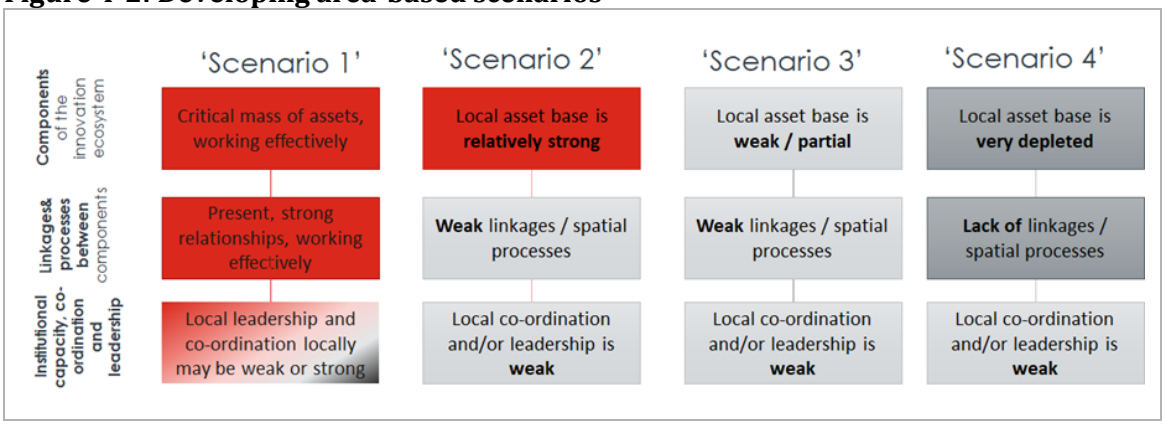
**Figure 4-1: Key factors that influence our Theory of Change at a local level**




*Source: SQW*

**4.3** On this basis, it is possible to define different scenarios in relation to different places. These are helpful when thinking about how investment in R&I (and/or UKRI's levers in respect of R&I) might deliver better, and more consistent, place outcomes. We have identified four illustrative scenarios. These are shown in the graphic below.

**Figure 4-2: Developing area-based scenarios**




*Source: SQW*

## Scenarios for levelling up

**4.4** Scenario 1 is characterised by strong assets which tend to drive virtuous circles of investment. Local leadership may or may not be strong – but the strength of the asset base is such that performance is good regardless (even if, in principle, it could be better still if local leadership was stronger).

**4.5** In understanding the relationship between place and investment in R&I in the wider context of priorities linked to levelling up, the other three scenarios are germane. These are particularly important and relevant in thinking through how R&I investment (and/or UKRI's levers in respect of R&I) might deliver better, and more consistent, place outcomes. Hence, our focus is on Scenarios 2, 3 and 4 hereafter.

**4.6** We have defined one scenario (Scenario 2) where institutional assets are present, but the local R&I system is underpowered (i.e. where the basic components are in place but the joins between those components may be weak). There are many situations where the asset base is reasonable or even strong, yet the local R&I *system* appears relatively weak and local place outcomes are compromised. The local system lacks stickiness (and/or it is characterised by outbound leakiness with little evidence of it benefitting from R&I investment elsewhere (inbound leakiness – or what we might describe as spill-ins)).

**4.7** This arises because one or more of the local system features outlined above is sub-optimal (even if institutional assets are strong). For example:

- linkages, collaboration or co-ordination between the assets may be weak
- a place's ability to benefit from spatial processes (i.e. clustering, knowledge spillovers) may be limited
- the calibre and effectiveness of place leadership (through which priorities are agreed and resources are galvanised) may be poor.

**4.8** There are other scenarios (Scenario 3 and 4) where institutional assets are simply very thin (i.e. where the basic components are lacking). This presents a different set of challenges. It means that intervening through local institutions may be very difficult and different policy responses will be needed – either in addition or instead.

## Why the scenarios matter

**4.9** **These scenarios are clearly very high level and conceptual. In reality, there could be multiple permutations in different places, and different scenarios could occur in a place at any one time (for example, across different sectors). They do, however, provide a framework to inform thinking about how R&I investment could be targeted in order to deliver better place outcomes.**

**4.10** The different scenarios present very different challenges in relation to policy intervention – both for UKRI and more generally. Interventions that could do well in a local area that has

some or all of the Scenario 2 attributes may struggle to be effective in a place which is more like Scenario 3. Fundamentally this is because the Theory of Change breaks down at different points and in different ways. Under Scenarios 3 and 4, the lack of components – particularly if combined with sparsity – means that the core of our Theory of Change may cease to function at all. Conversely, areas with the attributes of Scenario 2 may have basic strengths but still be influenced by a chain of transmission that falters. In principle, this ought to be easier to remedy – although the cumulative nature of many of the associated processes itself presents challenges.

**4.11** In the Section that follows we turn to consider the evidence in terms of how change might be made to happen at a local level and, more specifically, what helps (or not) in securing enhanced place-based outcomes.

# 5. What helps (or not) in realising place-based outcomes

## Key messages

- Through the case-based evidence, we have explored how UKRI levers contribute to place-based outcomes in different ways and in different contexts, highlighting other factors that have enabled (or hindered) levers from working effectively in different scenarios.
- Strategic partnership working and sustained integration/alignment of investment is important, especially in places that are looking to strengthen existing components of an innovation ecosystem. There is also scope to adjust funding metrics/incentives to influence the behaviours/engagement of key actors with local economic development agendas. Where R&I assets are thin, investment in flagship assets and/or anchor institutions can provide a catalyst for clustering and a visible statement of local areas' potentials/ambitions in relation to R&I, although their success depends on how effectively the wider ecosystem functions.
- Levers that support/incentivise relationship building, networks and collaboration is critical – both within and between local areas – allowing, fundamentally, for scale and critical mass (including through association, not necessarily co-location, for places with thin assets) and the scope for wider adoption and diffusion. Sustained investment in human capital, capacity- and network-building is particularly important in places where links between components of the ecosystem are sub-optimal and/or local leadership is weak or nascent – both to maximise outcomes from existing R&I investments and create strong foundations for future R&I investment.
- Whilst dedicated place/hybrid interventions play an important role, the value of place agnostic programmes in some locations (for example, in building capacity and relationships) should not be underestimated.

**5.1** In this Section, we summarise evidence on what facilitates (or hinders) R&I activities leading to place-based outcomes from a policy perspective, drawing on some of the area, programme and international case study research. Building on the arguments in Section 4, we focus on what appears to help in:

- **building the components**, either by strengthening (or evolving) existing components, or creating new components (and breaking path dependency)
- **building the links**
- **building capacity and leadership**.

5.2 **Within the context of the wider R&I system, our focus is on lessons from UKRI's levers and investment,** as explained in Section 1. **Many of the lessons identified are relevant both to UKRI and the wider R&I system.**

## (i) What helps to strengthen the components …

### … by building on (or evolving) existing components

5.3 Our research suggested that progress towards stronger economic outcomes can be achieved by building on, or evolving, existing components (for example, under Scenario 2 where the components of an innovation ecosystem are in place). Two factors – discussed below – seemed to be especially helpful in this context.

#### Strategic partnership working and co-investment

5.4 **Strategic partnership working and alignment of investment between national and local R&I (and wider) stakeholders** can help to establish key components of the ecosystem *and* strengthen links/synergies between them in a place. Our case-based research suggested this works best where national funders are effectively **co-investors and genuinely part of the investment process,** working closely with other key players (as illustrated by the Belfast, West of England and Edinburgh case studies). There was consistent evidence from the case studies and literature[38] that **longevity, continuity and consistency in R&I investment from various sources** helps build the asset base and realise local economic benefit. This is because it can crowd-in further private investment, particularly when there is a link to emerging/growing markets. In this context, the credibility of UKRI investment has been important in securing the engagement and buy-in of project partners, as well as building confidence with industry and wider stakeholders to invest.

5.5 In places where this has worked well, key factors seem to have been:

- a visible and engaged local UKRI presence (e.g. Innovate UK in Belfast City-Region – see Box 5-1)
- universities playing a key role with large sites/campuses and a desire to invest to be best in class (e.g. the role of University of Bristol in the West of England – see Box 5-2).

[38] For example, research from the UK's Industrial Strategy Council (2021) identified six "foundations" for levelling up, one of which related to the scale and longevity of public sector investments, and the role that played in increasing private investment

## Box 5-1: Case Study – Belfast City Region

UKRI (and predecessor) investment has been an important part of a broader effort to drive R&I, leading to positive economic benefits for Belfast City Region. An example of this is the development of the Belfast cyber security cluster.

The Centre for Secure Information Technologies (CSIT) was highlighted by consultees as a key factor in the growth of Belfast into a cluster recognised by The Royal Society.[39] Part of Queen's University Belfast, CSIT was founded in 2009 as one of seven Innovation and Knowledge Centres funded by EPSRC and the Technology Strategy Board (now Innovate UK). CSIT has also received two tranches of funding from Invest NI. It operates a membership model and also generates income through industrial projects.

Combining multiple sources of funding has allowed CSIT to operate across TRLs 3-7, with EPSRC supporting lower TRL activity and Innovate UK/Invest NI supporting industrial engagement at higher TRLs.

The sustained funding from multiple sources has enabled CSIT to grow over the long-term, attracting and retaining staff and engaging key partners. UKRI funding has also been important in building credibility with industry and wider stakeholders, providing an important demonstrator effect and mark of quality assurance.

Broader factors that have helped to facilitate the development of the cluster include access to graduates from the two universities as well as Belfast Metropolitan's cyber academy, and Open Web Application Security Project (OWASP) Belfast which is the largest OWASP chapter on the island of Ireland. CSIT has also drawn effectively on the wider commercialisation expertise at QUBIS, the commercialisation arm of Queen's University Belfast. The Centre also employed dedicated engineers to act as a bridge between academic research and cyber security companies.

## Box 5-2: Case Study – West of England

West of England has benefited from significant UKRI investment. One example has been investment in composites research. With its link to the wider aerospace sector, this demonstrates what can be achieved when there is a clear alignment between national and local priorities.

University of Bristol, University of Bath, University of the West of England and South Gloucestershire Council are all partners in Bristol and Bath Science Park. As a property scheme, its early development relied on funding from the-then RDA; resources from ERDF; and funding from then-BIS.

[39] https://royalsociety.org/-/media/policy/Publications/2020/2020-07-research-and-innovation-clusters-report.pdf

In 2009, UK government published a National Composites Strategy and in 2010, the Science Park was announced as the home for the new National Composites Centre (NCC). Its founding members were Airbus, AgustaWestland, GKN Aerospace, Rolls-Royce and Vestas – all of which have a significant local presence in the West of England.

University of Bristol also had (and has) outstanding credentials in relation to composites research and it was (and is) central to the NCC.

In 2013, NCC became part of the High Value Manufacturing Catapult. In 2018, NCC secured R&D investment of £36.7m in digital manufacturing technologies for composites. In 2019, it launched NCC Connect, a new business unit dedicated to supporting the needs of small to medium-sized enterprises.

NCC is now a core part of the aerospace sector in the West of England. Both major businesses and the universities in the West of England are central to its operations, and through Innovate UK, UKRI has been fully part of the investment process. Stakeholders consider that it is helping to secure the future of the aerospace sector which is nationally important and has a sizeable local footprint.

## International learning: Sweden

In Sweden, one of the regional policy programmes administered by Vinnova, Sweden's innovation agency, is Vinnväxt which has the tagline "regional growth through dynamic innovation systems"[40]. The Vinnväxt "innovation system" approach is specifically designed to **develop an institutional infrastructure that supports innovation** within a region, and promote sustainable regional growth by developing internationally competitive research and innovation environments in specific growth fields[41]. It is a competitive programme and in order to qualify as a Vinnväxt region, the region must propose a project based on an idea that is **anchored in renewing the traditional strengths and clusters** of the region. Regions that bid successfully **receive funding as well as different types of support services, such as seminars, training, exchange of experience, and knowledge and research activities**. Vinnova also facilitates the exchange of experience between regional initiatives, and the initiatives organise their own joint seminars.

Around 230 regional initiatives have applied for funding across five rounds of the programme with 18 regions (described as "functional" regions) being awarded funding. These 18 share various common features including the same strategic concept, a strong research and innovation milieu, strong regional leadership, active participation from the public, private and research sectors, and growth potential. The programme has secured buy-in from the highest levels in society and industry.

[40] Innovation as a regional development driver: Necessary shift or policy misdirection? (European Policies Research Centre and University of Strathclyde, 2018)
[41] Vinnova (2016) Vinnväxt: A programme renewing and moving Sweden ahead

The programme has a **long-term outlook providing funds of up to €1m per year for 10 years** and winning regions must contribute at least the same amount. According to the literature reviewed, the **matching of central agency funding with local funding builds in local engagement and empowerment**, which in turn ensures that the priorities for each initiative are well grounded in the local context[42]. Vinnova make a ten-year commitment in acknowledgement that economic development needs to have a long-term horizon. It has also meant that the regional initiatives can attract and retain management and professional staff. The programme is not seen as an add-on to the national portfolio of support programmes; rather it is central to how the innovation support system works.

Vinnväxt winners are evaluated every three years by international experts who consider how effectively the system is working, and these reports are reviewed at senior levels within Government. An early assessment reported the programme was already of "international standing" in terms of its performance[43]. Evaluation evidence suggests the programme has helped to **embed the Triple Helix model/working methods in the regions**, particularly by providing policymakers with "new tools for dialogue and collaboration", which has **strengthened collaboration and social capital** between actors in the region and stimulated further collaboration within the innovation system. It has also reportedly "put regions on the map", attracted leading researchers to Vinnväxt regions, contributed to the development of research centres, and helped to developed trust between the national and regional level[44]. Evaluation evidence also shows that firms participating in the Vinnväxt programme have enjoyed better growth (e.g. turnover, employment, productivity and exports) in comparison to a control group, and the programme has helped to **develop firms innovation capacity** through the links with academia and research that the initiative offers. Overall, it was concluded that Vinnväxt has succeeded in developing innovative environments that are internationally competitive and sustainable[45].

### Attitudes and behaviours of key actors – and the role of R&I interventions and performance metrics

**5.6** In seeking to build on existing components of an innovation ecosystem, a second key factor relates to key actors. As discussed in Section 3, it is not just the presence of high quality academic/research institutions that influences whether value accrues locally from R&I. Also important is:

- the capacity and capability of institutions in relation to commercialisation activities
- the extent to which they are genuinely open to local engagement and collaboration (strategically with local policy-makers, and with businesses).

[42] Vinnova (2010) From low hanging fruit to strategic growth: International evaluation of Robotdalen, Skåne Food Innovation Network and Uppsala BIO
[43] Ibid
[44] See for example: Technopolis group (2014) Regional Innovation Monitor Plus, West Sweden
[45] European Policies Research Centre and University of Strathclyde (2018) Innovation as a regional development driver: Necessary shift or policy misdirection?; Vinnova (2016) Vinnväxt: A programme renewing and moving Sweden ahead; and Peer Exchange Learning (2015) Monitoring Smart Specialisation Strategies

**5.7** In places where these elements are sub-optimal, R&I interventions can incentivise changes in behaviour. Our programme case studies provide examples of where UKRI levers have worked well in this context. For example, as part of programme design, **explicitly encouraging universities to co-design projects at a regional scale** has proved helpful in prompting them to look beyond their immediate context (e.g. CCF (Box 5-9) and RISE (Box 5-6)) and **explicitly focusing on collaboration *for commercialisation*** has focused partners' efforts on translational activities and realising economic value (e.g. CCF), linking to wider demand-side considerations. The area case studies also highlight the value of **explicit SME engagement metrics** in UKRI-funded research centres (e.g. the STFC-funded Hartree Centre[46] and AMRC in Sheffield City Region (Box 5-4)).

**5.8** However, there is also evidence that the role of key actors may be compromised by performance measures. Consultees frequently argued that metrics/KPIs for academic/ research partners are overly focused on academic outputs. They suggested that greater emphasis on measures of success/metrics associated with translation/value creation and local economic development (where relevant, including collaborative R&D[47]) could help. This may help to instigate a more genuine engagement with place, and a greater focus on industry-led challenges and research designed to improve the performance of businesses. Consultation feedback also suggested this may help some academics to justify and prioritise this type of activity internally within their institutions. Given the scale of R&I investments into places through universities, greater consideration of place-based outcomes is important. Consultees highlighted the role of the Knowledge Exchange Framework (KEF)[48] in raising the profile of business engagement amongst universities, but some suggested that UKRI could go further in the use of its incentivise and invest levers.

## … by creating new components (and breaking path dependency)

**5.9** From Section 4, the critical challenge in relation to areas with the attributes of Scenario 3 and Scenario 4 is creating new components of an innovation ecosystem. Even for those areas which are more like Scenario 2, new or improved components can also potentially change path dependent processes. Our research provided some useful insights in this context.

### Major capital investments

**5.10** There was consistent feedback across the area case studies on the contribution of **capital investment in flagship assets,** such as national institutes or major facilities, to place-based outcomes. In addition to creating high value jobs and research outputs, flagship assets also play an important role in strengthening the wider ecosystem – for example, by stimulating

[46] This is located at Sci-Tech Daresbury, which is just outside the Cheshire and Warrington boundary
[47] We recognise that for some UKRI funding, notably early stage/discovery research, this may not be appropriate
[48] The KEF was launched by Research England in March 2021. It is designed to provide comparable data on Higher Education Institutions' knowledge exchange activities and their wider economic and societal contributions. The KEF provides details on a wide range of HEI activities across seven 'perspectives' of knowledge exchange, including how they approach community engagement and contribute to local growth, and the volume of work undertaken with businesses.

clusters, providing a focal point for new ways of working/collaboration, attracting inward investment, and raising the national/international profile and visibility of an area. These assets can also help to raise aspirations and encourage a culture of innovation amongst local businesses, through a demonstration effect as well as providing direct support (for example, see the Sheffield City Region (Box 5-4)). We also observed how UKRI-backing for flagship assets may provide credibility and crowd-in wider investment, including from the private sector (for example, in Belfast (Box 5-1) and Edinburgh (Box 5-3)). Long-term commitment is important – economic impacts take a long time to work through – and the extent to which assets are integrated within a well-functioning wider ecosystem, plus the local capacity to facilitate this (this corroborates the literature[49], and is discussed further below).

## Box 5-3: Case Study – Edinburgh

UKRI has invested more than twice the value per capita in Edinburgh than in any of the other case study areas. Most of this has been channelled through the University of Edinburgh. It has had a major influence on the development of the university's strengths in informatics and the subsequent development of the Data Driven Innovation (DDI) focus that has been further supported through the City Deal. The important message is that the city has been very successful in building on its specialisms, engaging commercial interest and attracting further funding. This model has helped Edinburgh and Scotland to "punch above its weight". DDI also gives the city a focus that brings key partners together, including the Scottish Government, City Council, Scottish Enterprise and Scottish Funding Council. UKRI funding has supported the DDI theme, which enables business innovation, rather than by funding companies directly. The data indicate that Edinburgh (and Scotland) do well from research funding, but less well from direct Innovate UK grants.

The Strength in Places Fund award of £23 million (2020), to create the Smart Data Foundry in Edinburgh is a good example of how UKRI funding works with the DDI theme. The new Centre is a world-first collaboration between governments and regulators, the financial services industry and academia. The UKRI investment was seen as "a terrific example of an injection of UKRI money creating a different way of working (collaboration), and new types of enterprises working on the use of data". The fintech hub has built a community of SMEs from 26 to nearly 200. Many of these are new start ups and have benefited from UKRI funding in some form, illustrating the value of alignment between UKRI levers. It is also a good example of levering the informatics expertise in the City and building on core research funding that has supported the development of DDI.

The Centre also brings together finance and digital technology, such as Barclays, Virgin Money, JP Morgan, Bailey Gifford, IBM, Jujitsu, and BT – the presence of big financial firms was a key success factor, enabling the Centre to build momentum quickly.

[49] See for example: Crescenzi, R. (2020) R&D, innovative collaborations and the role of public policies, in UKRI et al (2020) Informing the Development of the UK Place-based R&D strategy (Annex)

The university has been critical in making the Centre happen and consultees considered that its breadth of strengths had helped make connections across areas of innovation, making the whole system work better (e.g. by co-locating it at the Bayes Centre, the University's innovation hub for Data Science and Artificial Intelligence, and connecting it with the Futures Institute, providing links to AI and other data driven activity). More broadly, the University plays an important convening and amplifying role in the City, bringing innovation actors together. The backing of key partners, including the Scottish Government, the City Council, Scottish Enterprise and the Scottish Funding Council, and substantial City Deal investment have also been key to success here.

## Box 5-4: Case Study – Sheffield City Region

The Advanced Manufacturing Research Centre (AMRC) was established by the University of Sheffield in 2001 (in collaboration with Boeing, and with funding from Yorkshire Forward and ERDF) and then became a UKRI-funded High Value Manufacturing Catapult in 2011. It works with major global firms (such as Rolls-Royce, BAE Systems and Airbus) and small companies/the wider supply chain from across the UK, through both specific research projects and long-term collaborations with industry. The relationship with the University of Sheffield is still very strong, but it also works with 33 other HEIs, mostly across the North of England. It has also established extensive global networks.

The AMRC has become a key flagship asset for regional growth in the area and is frequently cited in literature as good practice in this respect, *"demonstrate[ing] that what can be described as a "triple helix" set of interactions can be created in industrially depressed regions"*[50]. However, the scale of R&I investment and time required to establish such an asset – and for it to change the economic narrative of a place - should not be under-estimated. The AMRC received £70m of funding from national government and Yorkshire Forward, as well as £70m in European funding[51] (up to 2015), and taken two decades to reach its current position.

The AMRC was the anchor tenant on the Advanced Manufacturing Park (previously an opencast coal mine), which has since seen extensive growth, attracting inward investment from major firms (such as Rolls Royce and McLaren) as well as further R&I investment (e.g. the Nuclear AMRC and the AMRC Factory 2050[52]) and clustering of local firms. The AMRC is seen as a highly prestigious institution locally, and raised the profile of innovation in the local business base – according to consultees, this has led to

[50] Best & Bradley (2019) Industrial capabilities, innovation and place; KPMG (2021) UK regions a framework for growth
[51] Centre for Cities (2019): Parks and innovation
[52] The UK's first state of the art factory, entirely dedicated to conducting collaborative research into reconfigurable digitally assisted assembly, component manufacturing and machining technologies and is capable of rapidly switching production between different high-value components and one-off parts. The facility is supported by funding from the Research Partnership Investment Fund, managed by HEFCE.

greater levels of innovation in the city region. The AMRC has adopted a translational model of innovation[53] and engagement with local SMEs has always been a high priority for the Centre.

The AMRC has a dedicated Training Centre, which opened in 2014 and provides training from apprenticeship through to doctorate and MBA level to over 350 firms. It is perceived to play an important role in diffusing knowledge to local (and national) businesses, as well as reassuring prospective inward investors that SCR can provide a skilled labour. That said, there are ongoing challenges in terms of local diffusion, as noted in Section 3, regarding the absorptive capacity and ambitions of the wider business base - even where the R&I outcomes from AMRC are highly relevant sectorally. This is a long-term challenge for the City Region, and the AMRC is looking to increase the scale and intensity of its work with SMEs looking forward.

## International learning: Germany

A large proportion of the literature for Germany reflects on the variation between former East and West Germany, in particular in terms of eastern German companies lagging behind in initiating innovative projects and developing new products and services through to market maturity. Previous Government support programmes have focused on eastern Germany, with some funding programmes having **specific eligibility criteria that enables targeted support for structurally weak regions**[54].

A specific example of a programme implemented in structurally weak regions of Germany is the Innovation Competence Programme (INNO-KOM). The rationale for its development was that such regions tend to lack the companies with large R&D departments and expenditure, which can serve as "***crystallisation points for the innovative activities of SMEs***"[55]. As a result of the programme, **non-profit-making external industrial research facilities** which provide R&D services for SMEs have now been established in some of these areas. The research teams at these facilities take a forward-looking view of the challenges facing SMEs and develop the scientific basis for new products and processes, with the companies then building on these **application-oriented technical solutions** to bring new products and processes to market[56]. This programme provides a good example of a localised approach to ensuring the local area benefits from public investment in innovation.

[53] Best & Bradley (2019) Industrial capabilities, innovation and place; KPMG (2021) UK regions a framework for growth
[54] Federal Report on Research and Innovation 2020 (Short Version) (Federal Ministry of Education and Research, 2020)
[55] From the idea to market success (Federal Ministry of Economic Affairs and Energy, 2021)
[56] From the idea to market success (Federal Ministry of Economic Affairs and Energy, 2021)

### The scale and accessibility of R&I funding to build the R&I ecosystem

**5.11** Another observation from our research was that **the scale of R&I funding processes/competitions can be too big for small and thinly populated places.** It can therefore be poorly aligned with the aspirations/capacities of the business and research base. These comments are especially important in relation to areas with the attributes of Scenario 3 or Scenario 4.

**5.12** Consultees highlighted the difficulties in competing for UKRI funding when impacts cannot be demonstrated at scale, with implications for value-for-money judgements. Our case studies suggested that areas have to be of a certain scale/institutional richness to make that work for many programmes. This appeared to create particular challenges in some predominantly rural areas (for example, from among our case studies, Cornwall and the Isles of Scilly and Mid Wales). Moreover, there are parts of the UK that even the most place-based UKRI intervention (SiPF (Box 5-5)) has not reached, again illustrating the difficulties for places that lack the components of an innovation ecosystem on which to build (and critical mass in this respect), and have very little local institutional capacity to work with.

**5.13** Consultees flagged approaches that can help in thinly populated areas, particularly where there might be future potential but not yet an innovation system locally that can support it. This includes ensuring that **more accessible, smaller-scale starter products** are promoted in these places – such as Innovation Vouchers, Small Business Research Initiative (SBRI), Smart and Knowledge Transfer Partnerships (KTPs). For the larger-scale projects, **seedcorn funding to develop project ideas and two-stage application processes** have helped (for example, in the case of SiPF), enabling partners to test the feasibility of and secure partner buy-in to proposed investments before committing substantial resource/effort to a full application. The **intervention rate**[57] is also important, and the affordability of this for smaller/less research intensive universities or smaller businesses (and places that are home to these). We return to issues relating to the capacity of partners to bid for UKRI funding below.

#### Box 5-5: Case Study – Strength in Places Fund

SiPF was a product of the Industrial Strategy White Paper which was published in November 2017. In delivery, its two main aims have sought to bridge the gap between investing in R&I and supporting the growth of local clusters:

- supporting innovation-led relative regional growth by identifying and supporting areas of R&D strengths that are linked to actual or potential clusters
- enhancing local collaborations involving research and innovation.

SiPF involved a two-phase bidding process. This included an initial award of £50K to enable partners to co-develop proposals before applying for the full award. Seven

[57] i.e. the proportion of total project costs covered by URKI

Wave 1 projects went live in autumn 2020 and five Wave 2 bids went live between Autumn 2021 and Spring 2022. It is therefore early days in terms of results.

SiPF has drawn together HEIs and industry partners across local areas – and some local consortia have been sizeable. The ease with which this has happened has varied because of industrial structures and/or pre-existing relationships. The creative industry – with large numbers of microbusinesses – is cited as one sector that has been difficult to organise. SiPF should deliver significant leverage – although the scale of leverage varies between bids.

The geographies of successful SiPF bids also vary substantially – from urban areas to substantial pan-regional footprints. There have been no successful bids in the more peripheral/rural parts of the UK, an observation which applies across all four nations. An analysis of applications suggests, as one of our consultees said, "*nothing comes from nowhere*" – and in relation to areas with a weak or limited R&D infrastructure, there were challenges in relation to SiPF. From our area-based case studies, the same point was made. Despite its strengths, SiPF will not have traction if there is very little local institutional capacity to work with.

Overall, SiPF is high profile and is perceived to have made progress (which will be tested further in the forthcoming evaluation), but it is important to remember that it is a programme of modest scale when compared to the rest of UKRI's investment (and the wider R&I system as a whole). In total, just over £300m has been committed by UKRI through two Waves of SiPF across the whole of the UK. To put this in context, UKRI spent £8bn in the year to end March 2019.

**5.14** Also on a more practical level, the case study evidence illustrated the benefits of **working in partnership with other funders to support projects that are not directly fundable by UKRI** but important locally. For example, even though Smart is a place agnostic programme, it has worked with OGDs/Devolved Administrations to share lists of blue zone projects which have subsequently been supported by other funds (Box 5-12, below). This relies on the availability of other funding and effective engagement between partners, but illustrates the potential of UKRI's convene/catalyse and incentivise levers (defined in Figure 1-1), without necessarily the need for direct investment. There may be opportunities to apply this approach more broadly, particularly in places where UKRI and local priorities might differ.

## (ii) What helps build the links

**5.15** From Section 4, a major factor in terms of the effectiveness of local innovation ecosystems appeared to be the strength of links between different components. The challenges in this context may take different forms under Scenarios 2, 3 and 4. Both our area and programme case studies provide insights into what can help.

### Incentivising collaboration *within* a place

**5.16 R&I levers that incentivise place-based collaboration have a role to play in strengthening linkages**. Early evidence[58] from UKRI's place-based and hybrid programme case studies suggests these are incentivising and strengthening collaborative relationships (building longer-term capacity/connections in an area), changing organisational cultures and developing absorptive capacity locally (for example, see RISE (Box 5-6) and CCF (Box 5-9)). These approaches have worked well where the most appropriate spatial footprint is defined 'bottom up' to align with locally defined challenges (and providing flexibility in this context) and local partners/structures are involved in defining challenges and designing interventions – this was perceived to be critical to successfully realising outcomes in a region. These programmes have, however, relied on the presence of some pre-existing local networks/brokerage platforms/organisations that were able to successfully bring together partners to bid for funding. Some places will be starting from a much lower base in terms of networks/organisational capacity, etc., and may need additional support to form partnerships that can take projects forward.

**5.17** Our case studies also highlighted how place agnostic programmes can play a role in strengthening links between innovation actors (e.g. see KTP case study (Box 5-11)). The case studies showed how the bid development process can incentivise academic and industry partners to collaborate within/across places and deliver beneficial outcomes, even if the bid itself is unsuccessful (e.g. as noted in the Edinburgh (Box 5-3) and RISE (Box 5-6) case studies).

## Box 5-6: Case Study – RISE

The Regional Impact from Science of the Environment (RISE) initiative was launched by the Natural Environment Research Council (NERC) in response to the UK government's aspiration to address regional inequalities and harness research and innovation to unlock the full potential of different regions. Having relatively large and strategic research translation projects over a long period of time (i.e., £4-5m per project over five years) has worked well. It provided security of funding and visibility to the organisations involved which enabled them to successfully engage with local partners and leverage other funding. The RISE projects were encouraged to consider the characteristics of place and to engage with local partners to identify regional challenges and to take a flexible approach in translating research in order to deliver significant regional impact. As a result, the outcomes observed are specific to the local area/partners and are tailored to the regional challenges identified. This approach is seen to be critical in realising place-based outcomes.

Evaluation evidence suggests that projects have delivered benefits locally, and some projects have indicated that lessons learned could be applied to other geographies in order to generate benefits in other areas of the UK (or internationally). NERC recently

[58] From consultations and early evaluations

provided coordination funding to investigate how projects could apply their approach/findings to different parts of the UK and understand what changes might be needed to deliver the same benefits in different regions. This approach could be useful in other UKRI programmes, helping to facilitate leakiness in a positive way across the UK.

## International learning: Germany

Germany's Federal Government is supporting cluster funding in research and innovation through a regional approach[59]. The new High Tech Strategy aims to "*enable regional industrial structures to make better use of the innovation resources available at universities of applied sciences. Networking and strategic cooperation between such universities and companies, in joint areas of research and development, is to be efficiently promoted*". A flagship initiative under this strategy is Clusters4Future which adopts a regional approach to encourage **knowledge and technology transfer across actors in the knowledge and value chain** as a route to more rapidly developing emerging fields of innovation. It draws together top-level research, science and businesses (particularly SMEs) in the *"open innovation culture of a cluster"*.

Germany also operates Strong Universities for Applied Sciences programme, which aims to **support universities to provide *"fresh impetus"* for their regions**[60]. Universities of applied science initiate and coordinate a joint research environment, with the focus being on developing research and innovation partnerships between the universities and businesses (again, particularly SMEs). Through both of these initiatives the Government aims to provide funding and support for research, encouraging the assets in an area to collaborate in a joint research environment, and ultimately providing *"stimulus for innovation"*.

The German Federal Ministry of Education and Research also ran an InnoRegio programme, designed to support the development of networks and clusters and to trigger or enhance the long-term success of regions and clusters[61]. Prospective participants were invited to enter a competition for **funds to develop innovative regional joint ventures or associations**[62], and the programme supported 23 initiatives with a budget of €4-20m each. According to reviews of the programme, facilitating interactions between actors involved in the innovation process – and spatial proximity between them - was key to success in developing effective innovation ecosystems (although it was acknowledged that supra-regional cooperation is also important in facilitating the transfer of new knowledge into the network).

[59] Federal Report on Research and Innovation 2020 (Short Version) (Federal Ministry of Education and Research, 2020)
[60] Federal Report on Research and Innovation 2020 (Short Version) (Federal Ministry of Education and Research, 2020)
[61] Regional Effects of a Cluster-oriented policy measure. The Case of the InnoRegio program in Germany (Brenner et al, 2013)
[62] The InnoRegio-program: a new way to promote regional innovation networks - empirical results of the complementary research (Eickelpasch et al, 2002)

### Incentivising outward-facing collaboration *between* places

**5.18** **Our evidence suggested that through R&I investment, it is possible to facilitate/incentivise connections between different areas across the UK, effectively helping to harness leakiness in a positive way.** Developing outward-facing networks is particularly important for places that have a relatively thin R&I infrastructure themselves and lack some of the key components of an innovation ecosystem within their patch (e.g. a research-led academic institution). It can also be helpful in places where supply chains are weak/inward-looking and/or firms lack external relationships, which can result in a systematic lack of external catalysts for innovation. By building external links, places can build critical mass through association (rather than co-location) with complementary R&I strengths elsewhere, helping places to animate fragmented/poor local ecosystems and improve their own performance.

**5.19** **UKRI's place-based/hybrid programmes appear to work well in this respect.** Facilitating connections with partners from outside a core geography has enabled places to leverage complementary strengths elsewhere, which has strengthened project outcomes rather than diluting them (for example, see the case studies linked to CICP (Box 5-8), RISE (Box 5-6), SiPF (Box 5-5), and Cheshire and Warrington (Box 5-7). There was a sense that these types of approach stimulate genuine collaboration for mutual benefit. In the case of CCF, some projects have involved collaboration of actors who play different roles in the commercialisation process in different parts of the UK. This has been particularly useful for places that lack assets/critical mass themselves, but can benefit from and contribute to R&I elsewhere in the UK. CCF and RISE have allocated **resource to facilitate cross-project knowledge transfer**, highlighting the wider role UKRI can play under the conduct lever to transfer learning across the UK and enable other parts of the country to benefit from R&I investment elsewhere.

**5.20** An alternative approach which also appeared to work well was the creation of **networks across strategic institutes.** In the case of Mid Wales (Box 5-14), this has encouraged collaborative R&D and knowledge transfer across the UK (and raised the national profile of Aberystwyth's Institute of Biological, Environmental and Rural Sciences, IBERS). These findings were corroborated by the literature, which points to the benefits of facilitating strategic alliances between places in order to improve places with more disadvantaged innovation preconditions[63].

## Box 5-7: Case Study – Cheshire and Warrington (part 1)

In terms of competitive funding, the flexibility for partnerships bidding for UKRI funding to span multiple LEP areas is important in allowing Cheshire and Warrington (C&W) organisations to leverage the complementary strengths of others based adjacent to the LEP area. For example, C&W organisations are partners in the Liverpool

[63] See for example: Connected Places Catapult (2020) Identifying potential growth centres across Great Britain

School of Tropical Medicine-led Infection Innovation Consortium (iiCON) Strength in Places Fund (SiPF) project. There was emerging evidence to suggest this project was working well, helping to build collaborative relationships with neighbouring areas and an increasing emphasis on SME outreach.

More generally, for a largely rural LEP area without a large research-led university within the patch, C&W has established a strong track record of collaborating with partners outside the region and drawing on external knowledge/expertise to strengthen its own performance. Proximity to, and complementary assets in, Manchester and Liverpool have been critical to this. In the life sciences for example, organisations based in Liverpool Knowledge Quarter and Sci-Tech Daresbury as well the Oxford Road corridor in Manchester are key partners for R&I activity conducted at Alderley Park. In addition, the University of Chester works with engineering and manufacturing businesses outside C&W to support their growth. Proximity to neighbouring research expertise has benefited both the development of C&W's indigenous innovative firms and encouraged inward investment.

## Box 5-8: Case Study – Creative Industries Clusters Programme (CICP)

Through a £55m ISCF investment, the CICP has funded nine university-hosted Creative Research and Development Partnerships (CRDPs) across the UK to address a distinct and measurable sectoral or place-based challenge(s) identified by the creative cluster of which they are part. It has also funded a Policy and Evidence Centre (PEC). Successful applicants received £4-6m from ISCF for 4.5 years.

CICP sought to accelerate local economic growth by funding R&D in *existing* clusters. Universities played a central role in each cluster (although their functions have varied across the clusters); the presence of large, stable civic partners has been important, particularly to co-ordinate activity and act as cultural brokers in a place. Each cluster also typically involved other HEIs, a small number of large firms and a lot of SMEs. AHRC gave CRDPs free reign to determine the footprint of their cluster. In practice, the clusters have largely been defined by the location of key partners. As a result, some CRDPs have relatively tight spatial boundaries while others cover a wider geography.

The programme also devolved funding decisions to the clusters themselves, and this has stimulated different and novel approaches to addressing local challenges that perhaps were not anticipated by UKRI but have worked well. As part of the application process, applicants were provided with sectoral data by UKRI but, according to consultees, placing an emphasis on local knowledge to define locally relevant objectives and responses has been key to the programme's success in generating local outcomes.

The requirement for CRDPs to involve other partners and leverage significant co-funding has shaped the outputs and outcomes delivered, and it has also helped to

define geographies. For example: the Clwstwr CRDP (led by Cardiff University in partnership with University of South Wales and Cardiff Metropolitan University) initially focussed on South Wales, but it has since reported outputs and outcomes across a wider geography; and the Future Fashion Factory's cluster is broadly defined as Yorkshire, but it also has links to partners in London (e.g., the Royal College of Art). In general, these wider connections seem to have strengthened the outputs and outcomes linked to the intervention. Moreover, they have enabled clusters to link with hinterlands that do not have their own assets/clusters.

The programme has also secured significant leverage in the places they are based, including wider investment that is aligned with clusters' objectives but not directly matching/co-funding the CICP funding itself: through CICP, the comment has been made that "*we seem to have created a landing strip for other people's money*"[64]. Also, two clusters have since secured SiPF, and two have led to industry-backed institutes.

A mid-term review of CICP was published in 2021[65]. This states that economic growth is being stimulated by the activities of the CRDPs through investment in skills and training, creating or saving jobs, creating new spinouts, start-ups and scale-ups, and providing funding opportunities for businesses. This finding was corroborated by consultees, who felt that the programme is delivering a wide variety of place-based and national outcomes. The design of CICP has been fundamental in that success, giving CRDPs the freedom to define their activities based on their knowledge of the sector *and* region.

## Box 5-9: Case Study – Connecting Capability Fund

Connecting Capability Fund (CCF) is a Research England programme designed to incentivise strategic collaboration specifically in relation to the commercialisation of research. It enables universities to pool expertise, build connecting capability and share good practice. The ultimate objective is to increase universities' contribution to productivity and economic growth, by strengthening their capability to engage with businesses and commercialise ideas. To this end, universities were encouraged to collaborate so that businesses could access a range of capabilities or critical mass of knowledge, and/or to build capacity to provide cross-institutional responses to address specific challenges (which could include regional challenges). CCF also made provision for dedicated resource to facilitate cross-project knowledge exchange/sharing good practice (effectively to encourage leakiness). Strengthening places and the development of self-sustaining clusters were intended outcomes of the programme. The original vision for the programme was that projects would be self-sustaining after three years.

[64] https://www.pec.ac.uk/blog/transforming-investment-in-r-d
[65] AHRC (2021) Creative Industries Clusters Programme (CICP) - Mid-Programme Review

Two-thirds of projects funded were regionally based (and, according to a review of CCF in 2020, had a "*good geographic spread across England*" with half outside the Golden Triangle). Others included partners from across the UK and had less of a geographical focus.

Place-based projects were typically designed to address regional innovation priorities and challenges that were distinctive to that region, with an emphasis on how CCF would be genuinely additional to existing activities taking place in the area. Spatial footprints were defined bottom-up. There are examples of CCF projects initially focusing on a smaller geography but widening their networks over time. Some CCF projects have involved partners from across the country with strengths at different stages of the commercialisation process. UK SPINE, for example, was led by University of Oxford with University of Birmingham, University of Dundee, Medicines Discovery Catapult and the Francis Crick Institute as the original hub partners; these five organisations brought expertise in different stages of the translational journey in relation to ageing therapeutics.

In addition to outcomes relating to progressing commercial readiness of R&D, the interim review of CCF found evidence of "*positive effects on the regional economies*" – this included strengthened local networks and "*ecosystems for commercialisation*", raising universities' voice in regional strategic discussions, the creation of high growth spin-outs from HEIs, and catalysing local investment into innovation assets (such as incubation space). The evaluation also noted that, as a result of strengthening relationships through CCF, some partnerships are now developing further bids with a regional focus. That said, many projects were built on existing partnerships and/or depended on a strong university lead. The comment was made in the CCF review that the three year timescale of CCF was insufficient for projects to become self-sustaining. Again, this highlights the time it takes to build relationships and capacity.

### Investment in diffusion mechanisms

**5.21** In addition to collaboration, diffusion is a key challenge in relation to place-based outcomes, particularly in places with a fragmented business base and thin networks (typically Scenario 3 or Scenario 4). In these circumstances, consultees argued that R&D investment is necessary but not sufficient. In general, insufficient attention is paid to the existence and effectiveness of diffusion mechanisms (and how this varies in different spatial contexts). We are not looking to rehearse general literature on what works in terms of diffusion here, but highlight two lessons arising from our case studies that might be useful.

**5.22** **First, the case study evidence highlighted the importance of locally-based intermediaries**, as the interface between research and the wider business base and, in effect, acting as the "glue" to help secure/anchor benefits arising from R&I investment locally. There are examples of this working well, where locally-funded intermediaries support the business base in engaging with R&I assets/funding (for example, in the case of Cheshire and Warrington) and where UKRI interventions include **dedicated and place-targeted resource**

**for locally-based intermediaries** to help connect local partners (for example, see the KTP case study (Box 5-11)). The Knowledge Transfer Network also plays an important role in this space. There are also examples in the case studies of **dedicated actors embedded in research centres** with specific responsibility to connect academia and business, which has reportedly worked well in realising place outcomes (e.g. the CSIT centre in Belfast). A further example is the Mid Wales case study (Box 5-14). Whilst it is not plausible nor appropriate for all UKRI interventions to allocate resource to local intermediaries, it does reinforce the importance of:

- greater clarity on roles/responsibilities for dissemination within projects
- local engagement/dialogue and ensuring that UKRI investment is aligned/integrated with place-based actors/mechanisms that support diffusion on the ground.

**5.23** Second, our case study evidence also pointed to **investment in people as a key route for diffusion** and realising economic benefits in a place. This has worked well where resource for training is provided alongside R&I capital investment into research centres, equipping people with the skills to effectively deploy and integrate innovative products/processes in firms and realise economic benefits from adoption. This includes training for local businesses, helping to ensure R&I benefits translate into local economic benefits (i.e. stickiness), but also makes an area a more attractive proposition to inward investors, providing access to both R&I *and* skilled labour. Good examples of this are Sheffield City Region's AMRC Training Centre (Box 5-4) and the STFC-funded Hartree Centre's complementary skills development programme.

### Visibility and alignment of R&I interventions

**5.24** A final set of comments in relation to building links within innovation ecosystems surrounds the visibility and alignment of UKRI's interventions in a place. Looking forward, these could present opportunities to help UKRI contribute more consistently to place-based outcomes. These lessons are also relevant across other R&I funders in helping the system function more effectively. Three groups of observations can be made in this context:

- First, **there is an opportunity to improve the availability and use of data linked to local R&I investments**, particularly beyond the major capital investments. Local R&I systems work better where there is engagement and shared intelligence between partners (including national and local stakeholders). UKRI has sought to improve the availability of sub-national expenditure data over recent years[66], which is currently aggregated at regional level, and project level data are available from Innovate UK. That said, more fine grained data – both in terms of spatial disaggregation and across UKRI's Councils – would be useful to local stakeholders operating at (for example) city region or LEP level. Challenges in gathering UKRI data for this study, and consultees' partial or

[66] See for example here: https://www.ukri.org/what-we-offer/what-we-have-funded/regional-distribution-of-funding/

limited awareness of UKRI investments in a place, suggest there is room for improvement. We recognise that not everything can be co-ordinated (not least to avoid huge costs/bureaucracy), and the relative weight of UKRI's role compared to other actors/investments varies in different places, but better sight of UKRI investments could help local stakeholders to strengthen synergies between investments where appropriate. The importance of accessible data applies equally to other R&I funders across the system.

- Second, **where R&I investments (capital and revenue) are aligned and reinforcing in a place,** the impact can be impressive – as illustrated by the Global Open Finance Centre of Excellence in Edinburgh (Box 5-3) and the Medicines Discovery Catapult in Cheshire and Warrington (Box 5-10) where capital and revenue investments have been well aligned. In the context of UKRI funding, this appears to work better where UKRI has local presence/engagement, local/national priorities are aligned (and clearly articulated locally), and/or where local leadership/co-ordination is strong. There was feedback from consultees that some UKRI investment, notably competitive funding, could appear "ad hoc", "short term" and "sporadic" at a local level. While these local perspectives need to be understood, the objectives linked to competitive funding must also be recognised fully. These types of interventions are designed to support R&I excellence to progress the UK's national R&I capability, no matter where it is located. There are therefore structural tensions which need to be recognised all round. However, for local stakeholders consulted for this study, the consequential challenge was then described in terms of planning, building a critical mass of R&I activities locally, and joining up R&I activities/investments. There could be an opportunity for UKRI to better connect and communicate its own investments - especially in places where ecosystem links are weak – through better dialogue and data, again helping place-based stakeholders to join up locally. Place-based programmes such as SiPF are helpful in providing substantive, longer-term investment that is designed to align with local priorities, but UKRI may want to consider if/how place agnostic investments could be delivered with greater awareness of/connection to wider investments in a place. As noted above, sustained integration of investment from various sources is seen as key to realising local economic benefits – and consistent and effective integration is easier if there is sustained investment (or at least greater foresight on the pipeline of forthcoming competitions that is shared with local stakeholders).

- Third, **there may be scope to strengthen alignment between early and later stage R&I activity in a place,** particularly where research is relevant locally, to ensure value is generated/accrued locally (i.e. encouraging 'stickiness'). As illustrated in the Belfast City Region case study (Box 5-1), this depends on alignment between UKRI investment and other funding. By working in partnership and combining multiple sources of funding, Belfast's CSIT has been able to integrate R&I activity across the TRLs, with EPSRC supporting lower TRL activity and Innovate UK and Invest NI supporting industrial engagement at higher TRLs. The case studies also highlighted the opportunity to better connect Research Council investment at TRLs 1-3 and Innovate UK activities at 3-4+ in

some places, particularly where research expertise and the wider business base are very well aligned sectorally. This could help to translate earlier stage R&D into local benefits.

### Box 5-10: Case Study – Cheshire and Warrington (part 2)

Major capital investments into R&I infrastructures appear to be working well, in part reflecting the significant scale of investment (combined with local attributes that support the realisation of those impacts, including a diverse and innovative business base, skilled labour, and open innovation/collaborative culture, strong local networks, and a good supply of private sector-led/specialist space for R&D). Moreover, complementary UKRI grant funding has been secured by firms associated with these infrastructures.

For example, the presence of the Medicines Discovery Catapult (MDC) as a key piece of the UKRI research infrastructure at Alderley Park has worked well in encouraging clustering at the Campus, even though it has only been open for around six years. The MDC has partnered with organisations on site for R&D projects, attracted new companies to the campus, and generated wider economic multipliers through the supply chain. This clustering process has been supported by the volume and quality of business space available at the site, and the proximity to, and strong relationships with, complementary assets in Manchester and Liverpool. Individual firms at the Campus have also secured Innovate UK and Medical Research Council funding. Here, relatively large grants of £1m plus were reported to be important in allowing ambitious life science firms to attract the new staff and purchase the equipment they need to support their growth.

## (iii) What helps build capacity and leadership

**5.25** The third key factor which underpinned the place scenarios in Section 4 surrounded place capacity and leadership. In some respects, this ought to be easier to influence than either the components or the linkages. Our research provided some useful insights in terms of what helps in places where capacity and leadership may be underdeveloped.

### Capacity of stakeholders to engage in R&I activities

**5.26** The role and buy-in of the private sector is important in realising economic impacts, but there are issues relating to its ability to engage with some UKRI processes/place-based programmes, particularly in places where innovation capacities/relationships with research assets are weak. This was evident in the UKRI investment data and in the case studies. For example, in SiPF Wave 1, the most successful applicants were led by HEIs rather than business, with anecdotal evidence to suggest businesses struggled with UKRI grant payment terms and/or the risk associated with leading large consortia; and the CCF review noted difficulties in finding enough business partners who could commit to engaging in a three-year project, especially where the target audience was SMEs with no prior experience of working with universities. It is increasingly recognised that equal opportunity to apply for

open/competitive grant funding does not necessarily mean equal access to competitive grants, and that awards in some parts of the UK have been few in number.

**5.27** Our case studies highlighted adjustments that might help to build capacity, including **facilitated access and capacity-building support through the provision of regionally based/embedded representatives** (e.g. KTPs (Box 5-11)), **targeted promotion activity** in areas that are under-represented in terms of applications (e.g. Smart (Box 5-12)) and/or **minor adjustments in programme design and processes** that could support broader uptake of general open funding calls (e.g. ESRC (Box 5-13)).

## Box 5-11: Case Study – Knowledge Transfer Partnership (KTPs)

The KTP programme is part of UKRI and provides grant funding for three-way partnerships between businesses, universities/research institutions and graduates to deliver a specific, strategic innovation project lasting 12-36 months. Its overarching aim is "to help businesses improve their competitiveness and productivity through the better use of knowledge, technology and skills within the UK knowledge base". The KTP programme is typically considered to be place-agnostic, but multiple case studies highlighted important role of this type of intervention in terms of place. As one consultee put it, "KTPs are a conscious way of engaging with a region". KTPs have a relatively good geographical spread across the UK in terms of the businesses involved, with 82% of university leads located outside of London or the South East (2007 to 2020).

The KTP programme has Knowledge Transfer Advisors (KTAs) which are regionally based and embedded within research institutions, and act as an intermediary to facilitate access to the programme. These are located across the UK, and play an important role in stimulating/convening KTP partnerships locally. The KTAs also play a wider catalyse/convene role to help firms to connect with universities/research institutions or find associates to form a KTP project, across the UK. This is particularly important for firms based in areas without any/relevant university expertise in close proximity, enabling them draw on expertise elsewhere to innovate and grow.

The programme has recently provided additional capacity-building and networking support in some places that were lacking the capacity to apply as a trial, increasingly the number of KTAs in these areas. In doing so, the programme has adjusted the degree of facilitated access to reflect differences in capacity in different areas. It is too early to fully assess whether this has been effective - it is expected to take a few years before changes in capacities and behaviours can be observed - but a long-term commitment to capacity building is seen as key to widening the reach of KTPs further.

Evaluation evidence demonstrates how KTPs have strengthened relationships between project partners (and ongoing opportunities for collaboration), changed firms attitudes towards R&I investment and strengthened their absorptive capacity, leads to job creation, including creating jobs for graduates in the KTP firms (helping to retain talent locally in high quality jobs), and improved academics understanding of industry needs.

Even though there is currently no evidence on whether KTP outcomes differ between different types of place, the case study illustrates the value of this type of programme in places with limited collaboration and innovation capacities, or issues of talent sorting (albeit on a small scale in the case of KTPs).

## Box 5-12: Case Study – Smart

Smart is Innovate UK's open grant funding programme. It is a competitive fund for "game-changing and commercially viable R&D innovation that can significantly impact the UK economy." Since 2019, projects can be undertaken by single SMEs alone, or in collaboration with businesses of any size and Research and Technology Organisations. Depending on duration and partnership structure, project size can range from £25k to £2m, with Smart paying a proportion of these costs.

Data on awards suggests that the spatial distribution of awards within England is consistent with the distribution of businesses. Consultees argued that targeted promotion activity in areas that were under-represented in terms of applications has been helpful in widening the reach of Smart. The programme also runs a biannual series of presentations at universities without a strong connection to Smart, and 14 different universities across the UK are targeted each year to raise awareness amongst potential student entrepreneurs who might not otherwise discover Smart. Consultees reported a correlation between increased efforts to promote and widening uptake.

## Box 5-13: Case Study – ESRC Open Grants

The ESRC Research Grants (Open Call) is a continually open programme, providing grant support for "standard research projects, large-scale surveys and other infrastructure projects and for methodological developments." Applications can range from £350k to £1m of grant funding for periods of up to five years, and cover any of the disciplines supported by the ESRC. Proposals are encouraged "with the potential for significant scientific or societal and economic impact", but the programme has no specific objectives (in relation to place or otherwise).

Open Call funding is typically concentrated in a relatively low number of institutions. These are distributed across the UK, but are concentrated in 15 Russell Group institutions (five of which are in the Golden Triangle). However, the case study found that during Covid-19, by shortening the application form and decision-making process, and placing more emphasis on tackling imminent social issues that tend to be more prominent in deprived areas, the range of applications has increased and non-typical institutions have received more funding. It was suggested that a cultural shift towards defining research excellence more widely than academic publications may help to

broaden the distribution of funding further. Whilst engaging with local communities as part of the research process was not a pre-requisite in this programme, consultees suggests there may also be scope to encourage this (where relevant) in some types of place to increase the local stickiness of research.

### The capacity of local stakeholders to animate, connect and co-ordinate

**5.28** The **capacity of local stakeholders to animate, connect and co-ordinate, and lead the local ecosystem** was a prominent issue across our case studies (and the example of Vinnväxt above and the wider literature[67]). As noted above, some universities are playing a central role as economic development actors and provide a useful conduit for UKRI to engage with place, but capacity to engage on this topic is highly varied across the UK. Case study evidence suggested that direct **UKRI investment to build capacity in anchor institutions specifically in relation to place** is helpful, giving institutions not just the capacity/resources to prioritise local engagement activities but also the permission to do so within their own organisations (for example, in Sheffield City Region (Box 5-4) and West of England (Box 5-2)). Consultees also referred to the Higher Education Innovation Fund (HEIF) in England in this context; its flexibility and the ability to fund activities to create the conditions for innovation has worked well (e.g. investment in place-making/culture). The potential for a greater role for national knowledge exchange funds (such as HEIF in England and devolved equivalents) in connecting local economic strategies with UKRI priorities was also noted. The case studies also highlighted how **revenue funding for softer aspects of the innovation ecosystem are also important (e.g. network and capacity building) *in addition to* investment in R&D assets** in places where the links between components and capacity are weak. Mid Wales is a good example (see Box 5-14).

## Box 5-14: Case Study – Mid Wales

UKRI investment into Mid Wales has focused largely on capital investment – notably into IBERS and, more recently, the new innovation and enterprise campus AberInnovation. Designating IBERS as one of BBSRC's eight Strategic Institutes has been helpful to raise the profile of Aberystwyth and build networks across the UK. IBERS also hosts an EU/Welsh Government-funded Knowledge Exchange Hub which is tasked with translating the latest research into accessible material and communicate this with relevant sector advisors in the area (who then disseminate knowledge across the local business base). However, according to case study consultees, there has been limited wrap-around revenue funding alongside the major capital investments to support capacity building, stakeholder engagement, and network strengthening. This

[67] See for example: Professor Philip McCann (2019) UK Research and Innovation, which highlights the importance of building local institutional capacity to ensure that genuinely locally-tailored policies are designed with the explicit involvement of local communities and widespread local engagement of different types of local stakeholders.

has been a barrier to maximising place-based outcomes from these investments in a place like Mid Wales, where the innovation ecosystem is thin, networks are weak, capacity/experience in commercialisation and engaging with SMEs is limited, and there has been limited partnership working and leadership in relation to innovation agendas historically.

# 6. Designing local responses

## Key messages

- Understanding how the Theory of Change works in different places helps to highlight key pinch points in the system that might require intervention, in order for R&I investments to translate into place-based outcomes more effectively. The most effective policy response might differ, depending on the local context.
- For example, in places where the basic components are in place but the joins between those components are weak, the policy response may need to focus on interventions that incentivise key innovation actors to take a more prominent role in co-ordinating the landscape and/or programmes that instigate collaboration and relationship building. Plugging this gap in the Theory of Change might then enable other parts of the system to work more effectively. In places where the R&I asset base is very thin, intervention to build local capacity, facilitate collaboration with partners elsewhere and stimulate in-bound leakiness might be the priority.

**6.1** Section 5 presented a great deal of evidence in terms of what appears to help across the three key factors (introduced in Section 4) which defined different spatial scenarios. In the paragraphs that follow, we attempt to draw this together to summarise key priorities under Scenarios 2, 3 and 4. These are idealised responses and real places are much more complicated. However the purpose of this discussion is to give some sense of what a blended response could, in principle, look like, informed by the evidence presented in Section 5. Throughout, the aim is to unlock the chain of transmission at the core of our Theory of Change.

## Responding under Scenario 2

**6.2** Scenario 2 arises where institutional assets are present, but the local R&I system is underpowered (i.e. where the basic components are in place but the joins between those components may be weak). As a result, in schematic terms, the Theory of Change is unbalanced. The top left may be out-of-kilter with other elements and outcomes are compromised as a result. Given our findings in Section 5, it is possible to piece together a basket of interventions that could, in principle, make a difference. In the round, these are intended to use the existing components of the local innovation ecosystem whilst making the joins work better and also investing in capacity building and leadership.

**6.3** Figure 6-1 below summarises what this could mean. One possibility – given the relatively strong components – is that local universities are encouraged (and resourced) to be very proactive locally. This would mean that they function more effectively as anchor institutions and they take responsibility for animating the development of the wider ecosystem. Another

possibility is that steps are taken to develop meaningful local innovation strategies (building local capacity and leadership in the process) and then to resource their delivery.

## Responding under Scenarios 3 and 4

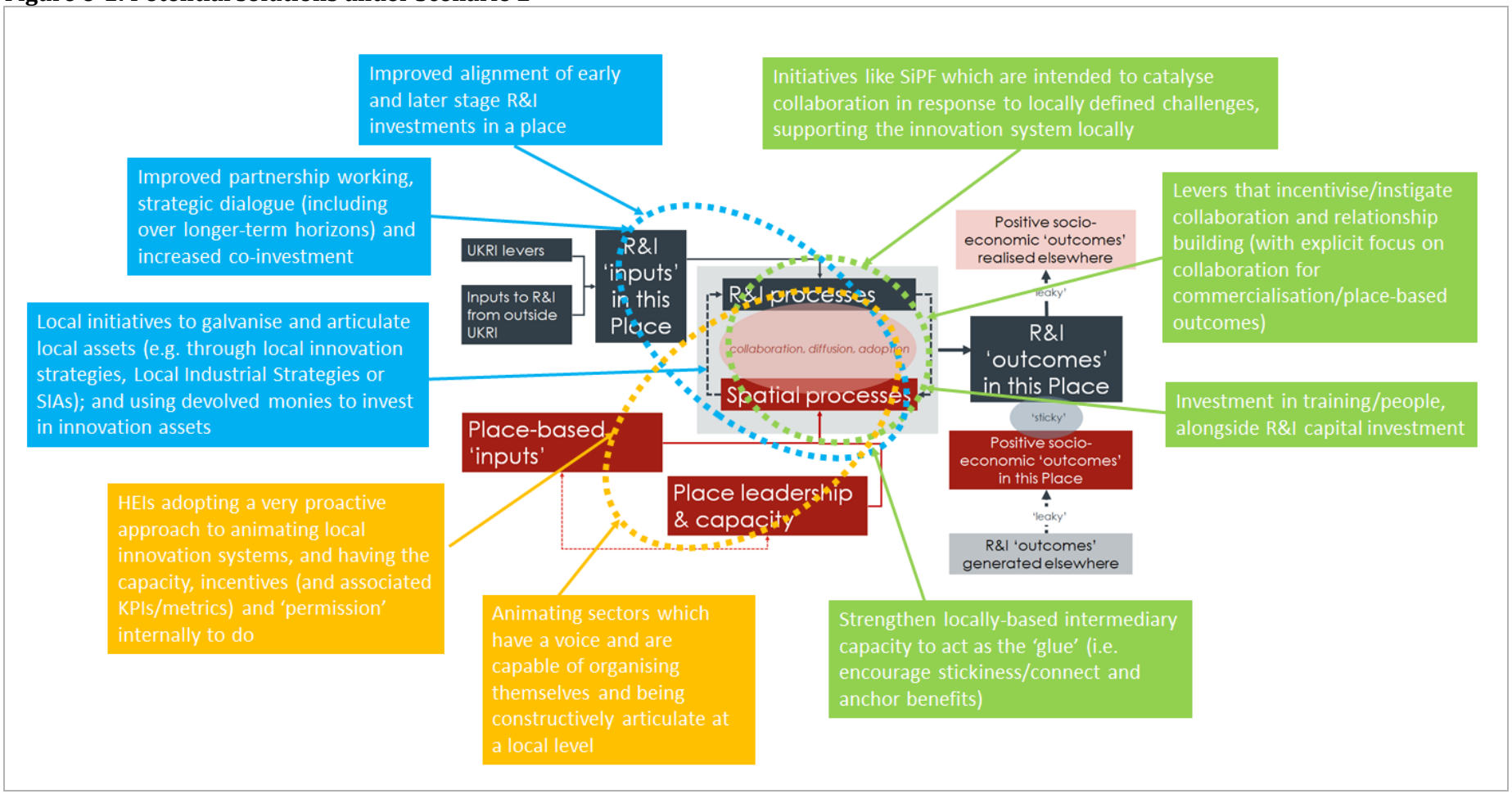
**6.4** The basic challenge under Scenarios 3 and 4 is that there is simply very little to work with in relation to R&I. In this context, the imperative will be for responses that are different from Scenario 2. In principle at least, the aim must be to build the *de facto* asset base – whether this is physically within the local area or whether it is achieved through external collaborations of different forms.

**6.5** Figure 6-2 below sets out potential responses in the context of an underpowered innovation ecosystem. It emphasises the need for effective diffusion and dissemination mechanisms, ensuring that local businesses are able to draw in and on R&I inputs, even if these are produced elsewhere. It also highlights the need to build stickiness such that local assets are not lost, despite the current weaknesses; in principle at least, this could mean enhancing other basic place attributes (e.g. access to housing that is affordable) which are beyond the remit of UKRI. Finally (particularly although not exclusively under Scenario 3), there is a need to be alert to assets that could become drivers for wider R&I processes in the context of social, technological and regulatory change; there may be particular opportunities in areas with (say) key environmental assets and/or natural resources. From our area-based case studies, reference was made to emerging opportunities in this context; one example surrounded the possibilities surrounding the production of lithium (linked to batteries for electric vehicles) in Cornwall and the Isles of Scilly.

## Reflections

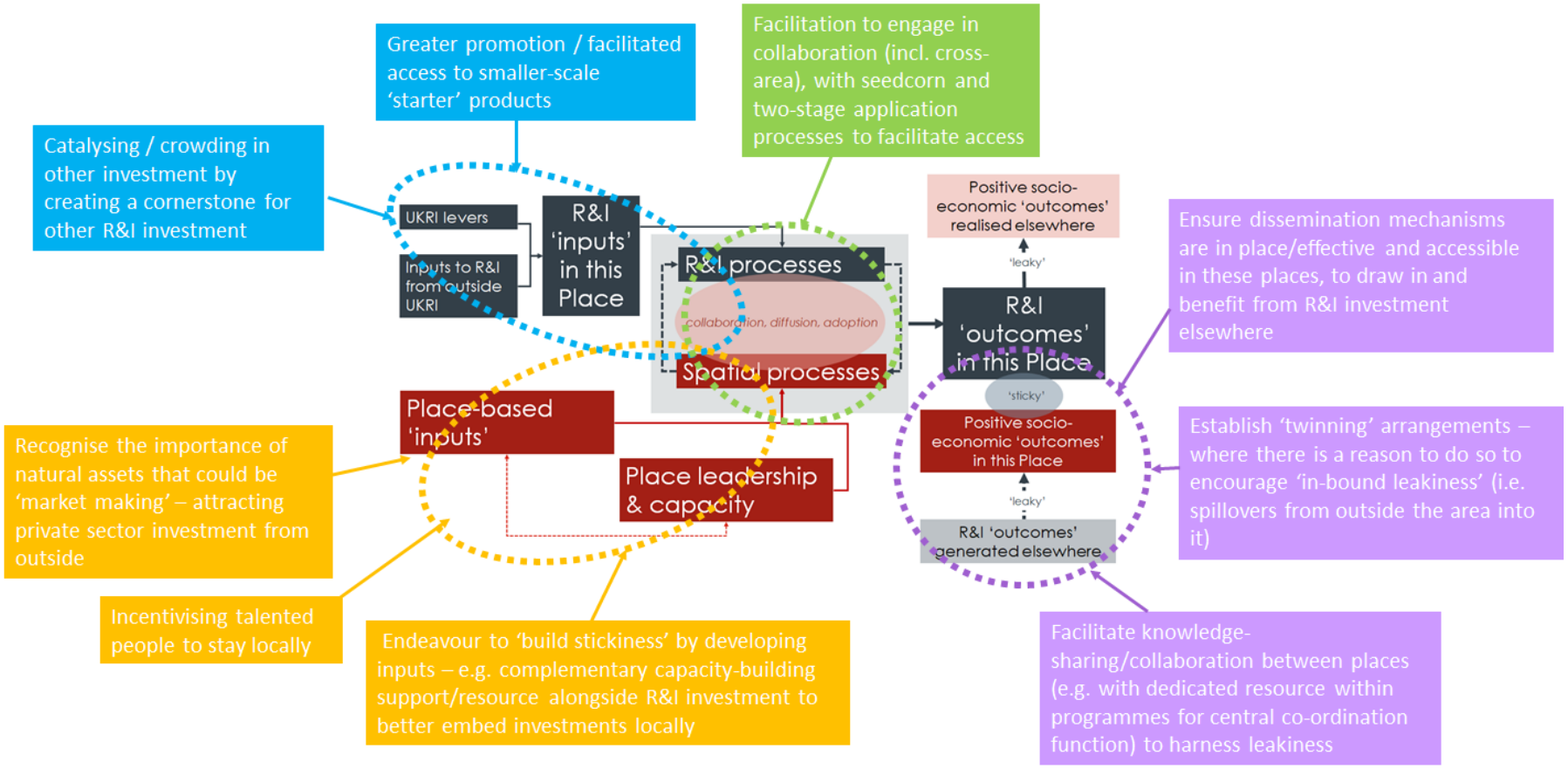
**6.6** As we have made clear throughout, places differ from each other and they are complicated; none fit simply within any of the Scenarios we have defined here, although there may be similarities and insights linked to them. **The key point is that the overarching Theory of Change works in different ways in different places, and the effectiveness of the chain of transmission also varies. Policy makers – at both national and local levels – need to understand this better. Interventions ought to be developed to reflect these very different local area contexts.**

**Figure 6-1: Potential solutions under Scenario 2**




*Source: SQW. Blue = solutions to strengthen the relationship between R&I inputs and spatial/R&I processes; yellow refers to solutions to strengthen place based inputs and processes; and green indicates solutions that strengthen R&I/spatial processes.*

**Figure 6-2: Potential solutions under Scenario 3 (and potentially Scenario 4)**




*Source: SQW. Blue = solutions to strengthen the relationship between R&I inputs and spatial/R&I processes; yellow refers to solutions to strengthen place based inputs and processes; green indicates solutions that strengthen R&I/spatial processes; and purple suggests solutions linked to leakiness (in the context of places with limited assets)*

# 7. How the system could be improved, and how UKRI could play its part

## Key messages

- Different responses are needed in different parts of the system. This varies depending on context, and many different actors are implicated (locally and nationally). The forthcoming UK Shared Prosperity Fund will be important, given its remit to support local businesses to innovate, as part of wider public support for R&I.
- Given the purposes of UKRI – and the heightened importance of place in major policy statements – there is scope to deliver broader outcomes through marginal but place aware adjustments to the operation of each of UKRI's four levers. This is not about redefining UKRI. It is about identifying the smallest changes that could make the biggest difference to place-based outcomes, and flexing existing systems and processes in an incremental way, alongside UKRI's place-specific interventions.
- UKRI might consider, for example, providing better and more consistent evidence on how its R&I investments and outcomes vary spatially, strengthening alignment between R&I investment, designing all interventions with place-awareness, rethinking performance metrics to incentivise changes in behaviours, and facilitating inter- and intra-area knowledge exchange. There may be a case for different investment rationales in different contexts.
- For places with weaknesses but some strengths on which to build, UKRI's Strategic Added Value in relation to place-aware outcomes should be tangible; but equally, there are times when its role will, in practice, be smaller, recognising its own particular remit, and its finite capacities and resources. In all cases, UKRI's levers ought to be working in tandem with other parts of the system to achieve these outcomes.

**7.1** The evidence gathered in the course of this study has demonstrated that there is a link between investment in R&I and socio-economic outcomes at a local level. The nature of that relationship is complicated; typically, it has evolved over decades and within it are both vicious and virtuous circles at a local level which tend to be cumulative and path dependent in their effects. Much of this report has been concerned with describing and explaining the nature of those relationships. In this Section, we consider what, reasonably, might be done in response. Our comments relate first to the system as a whole and then to the particular roles of UKRI.

## System-wide implications

**7.2** **There is a need, simply, for a greater recognition of the links between long term patterns of investment in R&I and socio-economic outcomes at a local level**. This is an

empirical statement, not a political one. To unpack it, there is a need to turn again to our overarching Theory of Change (Figure 2-1).

### R&I investment inputs and the R&I processes that follow (Top left in our Theory of Change)

**7.3** Differences in the scale and focus of **R&I investment inputs (and the R&I processes that follow)** are one driver of the contrasting socio-economic outcomes seen in different places. As the UK's largest public funder of research and innovation, UKRI has some responsibilities in this context – a fact that is recognised in its own corporate publications (and, indeed, through the commissioning of this study). However UKRI is not the only funder of R&I inputs. In vibrant areas, the private sector and/or major charitable trusts/philanthropic organisations and/or other forms of UK government-funded research (e.g. from Department of Health, Ministry of Defence, etc.) are often significantly important; there is strong evidence of crowding in R&I and pin-pointing what drives what is very difficult.

**7.4** Elsewhere, UKRI may have a limited local role simply because the institutions/individuals in which it would normally invest are missing. In some of these local areas, significant investment in the foundations of R&I has occurred with funding from other sources, most notably over recent decades, through the EU Structural Fund programmes.

**7.5** Looking ahead, plans for the forthcoming UK Shared Prosperity Fund (UKSPF) will be important. One of its purposes – set out in the Levelling Up White Paper – is "*stimulating local economies and job creation, by supporting local businesses to start, innovate, export and grow*"[68]. To some extent, this signals continuity with the EU Structural Fund programmes, although UKSPF is not likely to cover the same breadth of innovation-related investments as ERDF. The spatial scale at which UKSPF monies will be used presents both opportunities and challenges given the findings from this study. For those local areas that considered the assumptions underpinning SiPF to be too big in terms of scale, district council geographies might be helpful[69] (and a district council footprint would be very much smaller than the definition of place implicit within SiPF) although there is a risk that resources are so thinly spread and fragmented that they struggle to achieve impact. UKSPF monies should be seen as part of wider public support for R&I and a strong local dialogue will be important across the board. Whatever the precise cocktail of R&I investment – and its relative and absolute scale – more intentional consideration should be given to the links between research, knowledge exchange, commercialisation and business innovation at a local level. **In animating and sustaining this dialogue, responsibilities are necessarily shared – and it will be important that all relevant actors in the R&I system play their role.**

[68] *Levelling Up White Paper*, HM Government, February 2022 – page 242

[69] The Fund is expected to operate and allocate funding at a "strategic geography" level (for example, Regional Economic Partnerships in Scotland, four regional strategic geographies across Wales, and Mayoral Combined Authorities, the Greater London Authority or lower tier or unitary authorities elsewhere in England). See here

### Place-based inputs – and place leadership and capacity (Bottom left and middle in our Theory of Change)

**7.6** At one level, place attributes are a set of givens. However, they play a critical role in terms of the scale of investment in R&I and the local impacts associated with it. They vary substantially across different parts of the UK, and the causes are deep-seated. Responsibility for addressing them sits with the entire machinery of UK government (and beyond).

**7.7** In general terms, areas with strong place attributes tend also to be sticky. This means that they hold on to more graduates; retain their most effective academics and researchers; and persuade local businesses to (re-)invest and innovate locally. **Areas that perform less well need to see investment in R&I assets and potentials, and to build stickiness around them**. This could mean, for example:

- identifying and encouraging local 'heroes', particularly entrepreneurs who could become serial local investors
- influencing local culture, ambition and attachment to – and sense of – place (for example, as encouraged through the work of NERC, ESRC and AHRC)
- investing in economic wellbeing so that: the other adult in a household can find a good job locally; it is possible to buy a reasonable house locally; and there are good local schools such that the whole household can thrive locally.

**7.8** Place attributes of this nature both follow and cause effective local economic development. In seeking to achieve them, many parts of the system will need to respond – as indeed the Levelling Up White Paper demands. Within this system-wide context, **all local areas should be encouraged to think specifically about possibilities and priorities in terms of R&I**. At the very least, this would ensure that an R&I narrative exists across all parts of the UK which in turn should enable a dialogue with national organisations, including UKRI.

**7.9** **In developing local narratives, attention ought to be paid to local market-defined comparative advantages.** Of particular importance are those that appear to be emerging as a result of technological, political/regulatory or social changes; and investment should follow (in, for example, specialist property solutions to help unlock commercialisation processes). In principle at least, emerging comparative advantages provide the opportunity to change the course of path dependency and if comparative advantages are real, the private sector ought to be interested and prepared to invest (possibly in concert with the public sector).

**7.10** However it is also important to recognise that in some local areas (typically those which have attributes of Scenario 2 or (especially) Scenarios 3 and 4), comparative advantages are very difficult to define in a way that does not compound structural weaknesses (thereby fuelling, rather than ameliorating, vicious circles). Here, **the need is for basic economic development and regeneration interventions at a local level accompanied by systematic attempts to encourage the diffusion and adoption of innovative practices (taking us to the core of our Theory of Change)**, perhaps following R&I investment

elsewhere. This requires creative responses from a range of different actors, and a genuine commitment to levelling up ought itself to be helpful in this context. Relocating particular public sector functions to areas with the attributes of Scenario 3 or 4 could, for example, provide the basis for change.

7.11 **In local areas which are trying to effect structural change, place leadership and capacity is critical**. A compelling local innovation narrative will achieve little unless it is used to galvanise commitment and to influence and/or secure and/or direct the use of resources: strong local leadership (both civic and political) can make a real difference in this context. This means defining and agreeing local priorities and seeing them through to implementation. It also means making the case for particular places in a way that is both compelling locally and aligned with national investment priorities. For the national system as a whole, the *quid pro quo* involves giving local areas some autonomy and control. All of this is easier in areas with innovation assets than those that lack them (so Scenario 2 situations rather than Scenarios 3 or 4). In general terms, helping to build local leadership capacity – including through the devolution of some investment decisions – is likely to be a key part of a systemic response to the challenge of securing more equitable socio-economic outcomes across different parts of the UK. This is not to suggest that every investment decision can or should be devolved – or that every priority must be defined around place – but **greater place awareness is essential and devolution needs to be meaningful if trajectories of path dependency are to be changed. Local leaders will need to be equipped to respond effectively and well**.

### Processes at the heart of our Theory of Change

7.12 **Spatial processes** are a critical part of our Theory of Change because they tend to drive the cumulative effects described above (whether virtuous or vicious).

7.13 We have observed that there are different dimensions which need to be addressed. Specifically, there are questions about the balance between (a) investments in the components of an innovation ecosystem and (b) support/investment to facilitate linkages between those components. Over time, these two elements play out in different ways in different types of places:

- In relation to what we have defined as Scenario 2, the R&I system needs to function better. There is no inherent reason why this cannot happen. Many actors have responsibilities and assets, and the responses outlined above ought to be helpful
- Within Scenarios 3 and 4, there is a different set of issues. The challenge, fundamentally, is the dearth of resources with which to work. More foundational responses are likely to be needed.

7.14 **Processes of collaboration, diffusion and adoption – the very core of our Theory of Change – are potentially transformative across areas with the characteristics of Scenario 2, Scenario 3 and Scenario 4**. This is the point of overlap between spatial

processes and those relating to R&I. Diffusion and adoption are critical in terms of extracting economic value from R&I activities, and, in the context of place, determining *where* this economic value is accrued. Accelerating diffusion and adoption needs a multi-faceted approach both nationally and locally; and greater collaboration (within and between businesses and research organisations) may well help in unlocking it.

**7.15** External solutions (across places) may also be part of the solution, especially in those localities that lack strong assets (and where path dependency is a problem rather than a solution). In this context, harnessing **leakiness** should also be part of an overall system-wide response. Fundamentally, this requires good networks and relationships – including to other places/institutions. It means, for example, attracting inward investment of different forms – a process which might be accelerated with the growth of remote working and 'anywhere jobs'. This is where UK-wide organisations have a particularly important role to play in reflecting on their own corporate investment decisions.

## How UKRI could play its part

**7.16** **Given the purposes of UKRI – and the heightened importance of place in major policy statements – there is scope to move from a place-less framing and narrative around R&I investment to *place as both backdrop and process*, consistent with our overall Theory of Change.** This is not about redefining UKRI. Instead it is about unlocking Strategic Added Value – in other words, delivering broader outcomes through marginal but place aware adjustments to the operation of each of UKRI's four levers (convene and catalyse; incentivise; invest; and conduct). Alongside UKRI's place-specific interventions, this means identifying the smallest changes that could make the biggest difference to place-based outcomes and flexing existing systems and processes in an incremental way.

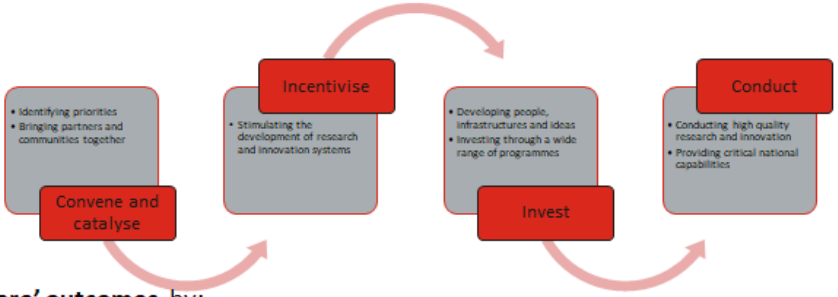
**7.17** Through UKRI's four main levers, there is a range of possibilities for exercising Strategic Added Value and advancing place aware outcomes, as shown in the diagram below. For example:

- UKRI might consider **providing more evidence on how R&I investments and outcomes vary spatially**; this itself would help inform broader decision-making and it could inform system-wide responses (of the forms described above) both locally and nationally. This could include 'place proofing' during policy development and implementation (see below)
- There may be scope for **strengthening alignment across different strands of UKRI's R&I investment.** Particularly if it was informed by locally owned innovation narratives, it might be possible to align more effectively different Research Councils' investment decisions, and investment at different points in the commercialisation journey (ensuring that investment in innovation is better aligned with investment in research)

**Figure 7-1: How UKRI could exercise Strategic Added Value to deliver place-aware outcomes.**

**A: <u>Convening and catalysing</u> R&I with 'place aware' outcomes**, by:
1. using better and more consistent local evidence/data/intelligence…
2. …and using evidence based local narratives around R&I strengths/potentials to galvanise local partners and communicate with national agencies
3. working with regional facilitators/animateurs…
4. … and sustaining a more consistent dialogue/relationship with localities
5. working towards 'place proofing'

**C: <u>Investing</u> in R&I with 'place aware' outcomes,** by:
1. joining-up investment, and harnessing synergies
2. appraising and investing with place-awareness
3. rethinking performance metrics
4. recognising the particular challenges of small places (SIPF-lite?)
3. 'anchoring' anchor institutions, to play greater local role




**D: <u>Conducting</u> R&I with 'place aware' outcomes**, by:
1. focusing more consistently on the full TOC – including the full translation journey (in theory *and* practice) with connections to follow-on support/investment
2. aligning research investment with local priorities

**B: <u>Incentivising</u> R&I with 'place aware' outcomes**, by:
1. incentivising intra-area (and pan-UKRI) knowledge exchange (in part, to build capacity/networks for longer-term benefit)
2. incentivising inter-area knowledge exchange
3. championing latent potential (e.g. around key natural assets), and investing more consistently in response
4. aligning D with R locally
5. incentivising 're-sorting', e.g. to incentivise talented young people to build careers across the UK
6. harnessing/better engaging with local investment, providing an opportunity for UKRI to lever its own resources

- UKRI may wish to consider **rethinking performance metrics to incentivise changes in behaviours (ensuring the research that it supports makes a contribution to economic development) and facilitate inter- and intra-area knowledge exchange**. This could effect greater leakiness in favour of areas which could benefit.

## What might 'place proofing' look like?

For many years, policy-makers have sought to rural proof interventions and Defra has championed rural proofing across government. Rural proofing provides some lessons and pointers in relation to possible place proofing. Fundamentally, rural proofing is designed to ensure that rural areas receive fair and equitable policy outcomes. Rural proofing ought to apply to R&I interventions in any case – but the principles and methodologies of rural proofing could be applied to R&I interventions recognising that different kinds of local areas have different relationships to R&I investment.

In principle the proofing process should be applied throughout the policy cycle. Informed by the evidence gathered through this study (and to be gathered in the future), four sequential questions could be posed – three ex ante and the fourth ex post (or at least during the delivery process):

1. What might be the direct and indirect impacts of the intervention in different types of place?
2. What might be the scale of these effects?
3. What actions could be taken to enable interventions to work more effectively and consistently across different types of place?
4. What impact has the policy had, and how might it be improved further?

**7.18** More generally, UKRI could be more explicit in recognising that investment in different places could achieve different things in different ways. Taking this argument further – and given the cumulative and path-dependent nature of the relationship between investment in R&I and socio-economic outcomes in particular places – **there may be a case for developing different investment rationales**. In principle, these could distinguish between *investing for success* and *investing for change*. An extreme formulation would involve different objectives, investment criteria, metrics and assessments of progress. Given UKRI's remit, this may not be feasible. However it ought to be possible for UKRI to invest for success whilst also investing for change. This could include:

- actively adjusting objectives and defining complementary outcomes as a central part of funding packages

- actively paying greater attention to the design of interventions such that they deliver place aware outcomes
- designing and appraising interventions in a manner that is itself place-aware. This means, for example, recognising that interventions in areas that resemble Scenario 3 are unlikely to deliver anything like the same level of leverage as, for example, those in Scenario 1 or Scenario 2
- actively thinking through how investments could support wider R&I/place processes in different types of place and/or how complementary support might be needed to help facilitate this and build local capacity.

**7.19** In moving from a place-less framing and narrative around R&I investment to *place as both backdrop and process*, UKRI will need to recognise that places vary and its role in different places varies (despite its national remit). Our research suggests that:

- sometimes UKRI's role should be prominent and its Strategic Added Value in relation to place-aware outcomes should be tangible
- there are times when its role should, in practice, be smaller or different, recognising its own particular remit, and its finite capacities and resources.

**7.20** In order to help inform its own activity, we provide a checklist overleaf. This is highly simplified. However it summarises the place-based contexts in which the smallest changes in relation to R&I investment could make the biggest difference through UKRI's Strategic Added Value. The focus here is on *additional* effort, above and beyond R&I investment already taking place in these areas, which might be helpful. Broadly speaking, it suggests that UKRI's marginal impact may be greatest in areas with the attributes of Scenario 2. Although there are significant needs, areas which have parallels to Scenario 3 and 4 may be especially challenging. Here, UKRI could potentially facilitate collaboration and inflows of knowledge (i.e. in bound leakiness), and/or seek build capacity.

**Figure 7-2: Levelling up and UKRI – prioritising UKRI's additional investment in Strategic Added Value**

| Does the area... | 'Scenario 2' Places | 'Scenario 3' Places | 'Scenario 4' Places | 'Scenario 1' Places |
|---|---|---|---|---|
| ...have actual or emerging comparative advantages (given wider trends and drivers) that could stimulate growth and investment? | ✓✓ | ✓ | ✓ | ✓✓✓✓✓ |
| ...have a strong components of the ecosystem? e.g. larger and smaller businesses with investment potential and growth ambition | ✓✓✓✓ | ✓✓ | × | ✓✓✓✓✓ |
| ... have strong networks and collaborative relationships? | ✓✓ | ✓ | × | ✓✓✓✓✓ |
| ...have the institutional leadership and capacity to organise itself and galvanise resources? | ✓ | × | × | -- |
| **Additional*** steps that UKRI might take to use its R&I levers to optimise 'place aware' outcomes<br><br>*N.B. we are not suggesting that UKRI stops doing anything | Case for **additional*** UKRI activity<br>**HIGH**: Wide-ranging response, recognising that small changes – stemming from collaboration, diffusion and adoption – could make a big difference, probably through all four levers | **MEDIUM**: Targeted response with an emphasis on investments that incentivise R&I institution behaviours and collaboration/capacity building, which may shift place from Scenario 3 to Scenario 2 | **MED/LOW**: Watching brief – other parts of the public sector must lead, and UKRI should ensure links are in place, particularly in relation to collaboration, diffusion and adoption to help inbound 'leakiness'** | **LOW**: No additional intervention (effectively business as usual for UKRI), but links to less well-resourced places must be encouraged/facilitated, using the different levers as appropriate. This should precipitate some outbound 'leakiness' |

*Source: SQW*

*** Or if the place is home to natural assets (for example) that become nationally significant and through support could move the area from Scenario 4 to Scenario 3*

# 8. Reflections from this study

**8.1** This has been a small piece of work across a big and complicated agenda, but it aims to provide a framework for UKRI to be more place aware; something that, if done well, could make a large difference to UKRI's impact across UK. It also provides lessons that are relevant for other funders in the R&I system. The Theory of Change provides a broad framework that can be applied in different contexts to understand where the relationship between R&I investment and place-based outcomes works well and where it might break down. This in turn helps to pinpoint where public sector responses (locally and nationally) might be required to enable R&I investments to contribute more effectively to the levelling up agenda. In the paragraphs that follow we summarise key findings in response to the three main research questions that have structured this study.

## How might areas be characterised in terms of current and future potential R&I capacity and intensity?

**8.2** Informed by data analysis already undertaken by BEIS, our qualitative research has illustrated how local areas vary substantially in terms of their R&I capacity and intensity. Broad contrasts can be made between areas with and without significant R&I assets. The presence of assets is necessary but not sufficient in terms of strong local R&I systems. In many local areas, the links between assets is equally important and these could be strengthened substantially. Strong local leadership and capacity is also important in working R&I assets, although leadership and capacity needs assets to work with. History matters and it can take a long time for investment in R&I to translate into outcomes on the ground.

**8.3** Whilst we have developed high level place scenarios, it is important also to recognise that every place is different. Relevant data are typically available at ITL2, but these areas are really too big to make much sense of local R&I capacity and intensity. Local intelligence is crucial in understanding how a place works in relation to R&I investment and place-based outcomes.

## How and why do the characteristics of areas affect the success of UKRI's levers in supporting and stimulating R&I, and *vice versa*?

**8.4** Our case studies have demonstrated how different aspects of the Theory of Change and factors that influence outcomes vary in different types of place. This has implications for the success of UKRI's levers in generating place-based outcomes and the role that UKRI might play looking forward. The evidence gathered in this study suggests that, for example, different places can react differently to the same input, depending on the local economic context, which can lead to different place-based outcomes. The study has also found that place characteristics shape the operation of UKRI's levers. This is because some places have stronger assets, processes and capacities than others.

**8.5** The evidence illustrates how local narratives are complex and multi-layered. Characteristics of a place are dynamically inter-related, and this interplay influences how (and to what extent) investment in R&I leads to place-based outcomes. Strengths in some factors can compensate for weaknesses in others, but often we observe virtuous or vicious circles at the local level. Scale, location/remoteness and density also matter, both to place-based inputs and the efficacy of R&I/spatial processes at the centre of the Theory of Change.

**8.6** The need for R&I assets/actors to be present is obvious, but the study highlights the importance of institutions' attitudes, capacities, priorities and behaviours in relation to their role in local economic development. Two other factors have a critical bearing on socio-economic outcomes:

- links between the components of an R&I ecosystem, and the effectiveness of spatial processes linked to knowledge spillovers, collaboration, diffusion and adoption
- local leadership and capacity to animate and connect the local ecosystem, particularly when R&I investment is aligned with a shared local narrative for innovation and its role in local growth.

**8.7** Both factors play a really important role in anchoring the benefits and accruing value associated with R&I investments locally (i.e. encouraging stickiness), and in facilitating R&I investment in one place to generate outcomes in another place (i.e. harnessing leakiness). Where these factors are sub-optimal, it can hinder R&I investment (including from UKRI) in delivering place-based outcomes.

**8.8** We have also observed how the scale and nature of UKRI levers influences place-based outcomes, and how these can work differently depending on local context. The success of different UKRI levers can depend on having an existing R&I base to build upon, and in some places, other parts of the R&I system might need strengthening in order for some interventions to work. Nonetheless, the evidence has highlighted approaches that might help in different types of place – such as strategic partnership working and sustained integration/alignment of investment, incentivising relationship building, networks and collaboration, and sustained investment in human capital, capacity- and network-building – to maximise outcomes from existing R&I investments and create strong foundations for future R&I investment. The international evidence corroborated these findings.

## What are the implications for policy?

**8.9** A better understanding of where and why the relationship between R&I and place-based outcomes breaks down (or could be improved) in different contexts presents policy-makers with choices. Intervention can be targeted at aspects of the system/Theory of Change that are sub-optimal. A range of actors have a role to play in this context, including local stakeholders and national bodies, in terms of direct R&I investments and wider investment that helps to create the conditions/foundations for effective local ecosystems. UK Shared

Prosperity Fund will influence this, particularly on the demand-side in terms of local innovation. UKRI ought to have a role in shaping it.

**8.10** The evidence suggests that UKRI's levers are relevant to all three key features of an effective innovation ecosystem – establishing/strengthening the components, developing links, and building capacity. However the scale and nature of this role might vary under different place scenarios. SiPF is widely welcomed, and more interventions of this nature are encouraged. That said, even SiPF is considered to be too big for some places (which lack industry primes and/or research intensive HEIs). In those contexts, there might be a case for something like 'SiPF lite' with smaller awards and more focus on SMEs, although it would be important that some link to R&I assets was still made (even if non-local). In circumstances where the asset base is thin, more importance could be attached to making leakiness work for the benefit of places with fewer assets – perhaps through the supply chain. The study has also highlighted the value of hybrid interventions that facilitate collaboration within and across places, as well as place agnostic programmes in this context. In many places, helping to plug gaps in the system can allow wider R&I/spatial process to take place.

**8.11** More generally, UKRI should consider how it designs interventions in a way that is at least more place aware, with greater recognition of how spatial context might influence the outcomes and effectiveness of an intervention. In practice this could mean, for example:

- inviting more bids from local consortia
- linking investment in research more closely to investment in local innovation
- encouraging local areas to develop their own R&I narratives and using these to help inform national (and local) investment decisions
- encouraging local areas to invest their own resources in a way that aligns with UKRI investment decisions and UKRI priorities, and ensuring that information is available and communicated to facilitate this.

**8.12** Even through marginal adjustments to the operation of UKRI's four levers and flexing existing systems, there is scope to make a tangible difference to place-based outcomes, including in areas in which levelling up is likely to be a priority.

**8.13** We suggest that UKRI considers piloting and experimentation as part of its response to the place agenda. This could include a control and trial element to experimentation in order to fully understand impact and the counterfactual. Trial and error, and allowing for failure and learning from this, is central to innovation. This is an important function for UKRI as well as localities, and two-way knowledge flows and learning should be encouraged. A useful pilot might be to test the benefits/effectiveness of proactively co-designing an intervention in partnership with local stakeholders under the different scenarios.

**8.14** Throughout this study, we have been cognisant of UKRI's vision to build an "*outstanding research and innovation system in the UK*" and put "*the UK at the forefront of solutions to*

*national and global challenges*"[70] which drives investment decisions based on quality and excellence. The points above demonstrate how UKRI could make a greater contribution to the place agenda *without* compromising its overall purpose. For example, this might include some interventions that deliberately target places that exhibit the characteristics of Scenario 2 (say), combined with more place aware interventions across the board – i.e. providing different types of support in different types of place whilst also maintaining a focus on quality throughout.

**8.15** However, we also recognise that in some circumstances, UKRI intervention may not be appropriate or meaningful, and not every UKRI intervention can or should be directed to place priorities. The full breadth of UKRI's mission needs to be recognised (although we would still flag the importance of being place aware). UKRI is not a regeneration agency and some parts of the UK need regenerating before institutions within them are able to engage fully in R&I and before the people and businesses within them are able to benefit/contribute significantly.

## Final reflections

**8.16** Finally, we offer some reflections which are practical/methodological rather than conceptual, but they are important.

**8.17** The existing evidence base needs to be strengthened and communicated more effectively. Available data are often insufficiently granular (ITL2 regions are big geographies), and UKRI's own data on the spatial distribution of R&I inputs/levers are partial (and also insufficiently granular). There is little evaluation evidence that tests spatial outcomes and what drives these. Further research on the extent to which outcomes vary would be useful, including for place agnostic interventions. The case-based approach also highlights the importance of local intelligence (and the value of collaboration and partnership working with local actors) to understand how a place works and, crucially, what hinders the relationship between R&I and place-based outcomes. This evidence is important in informing policy decisions at national and local levels. Encouragingly, the UKRI Strategy 2022-27, published as this study was closing, sets out commitments to strengthen UKRI's evidence base further in future.

**8.18** There is also an opportunity to consider spatial context earlier and more consistently in programme design, including for place-agnostic programmes - i.e. focus more on alignment in design rather than just access in delivery. Again, this could include regional input and engagement in the design process. In addition to appropriately designed objectives and metrics, routes to impact should be considered consistently (in programme design and applications), including in relation to place, to encourage a greater focus on this agenda.

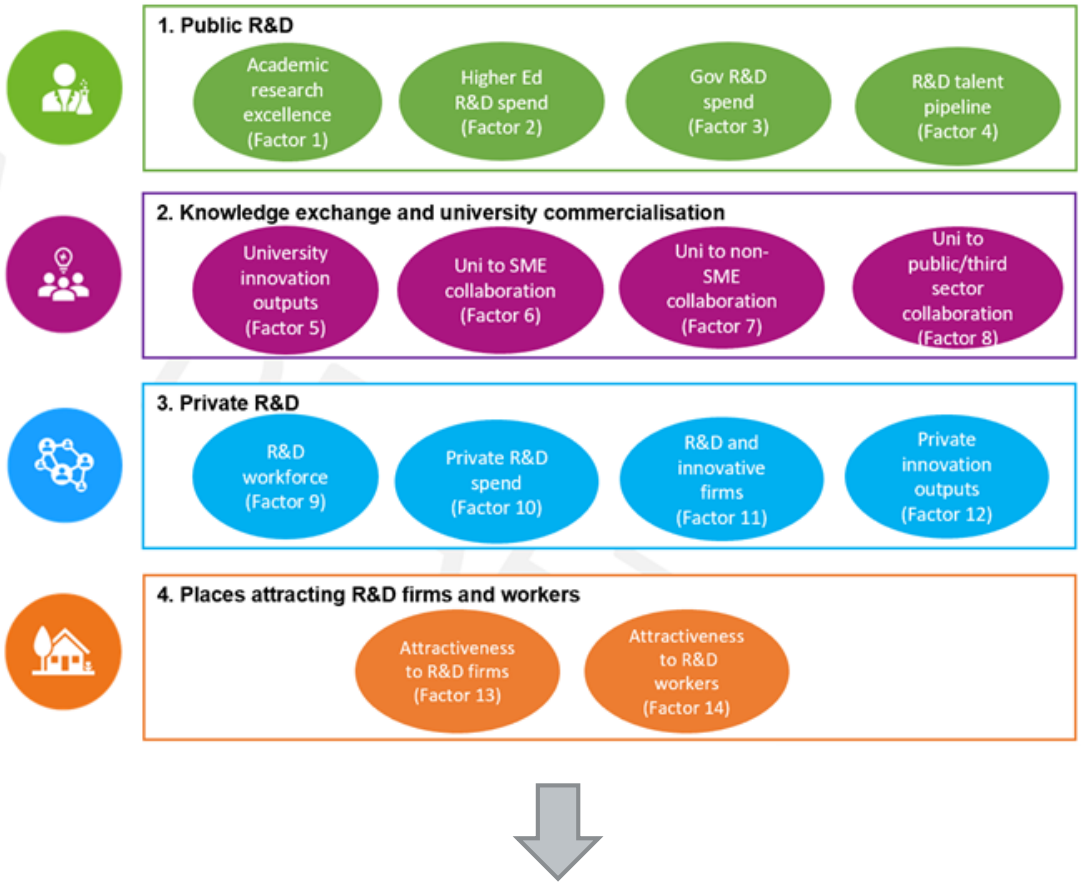
[70] UKRI Strategy 2022-2027

# Annex A: Further information

## R&I place typology

A.1 BEIS analysts have undertaken data analysis using their open access Research and Development (R&D) spatial data tool[71] to identify six 'types' of place based on R&D enablers (at ITL2 sub-region level and using a method known as k-means clustering). The 14 factors used in this analysis were chosen as indicators of strong R&D regions and due to data availability at the sub-region level of granularity. These 'types of R&D places' were used to inform the selection of area-based case studies.

**Figure A-1: Analysis of 14 key factors that reflect important features of regional R&I systems**




[71] https://www.gov.uk/guidance/access-research-and-development-spatial-data

**Table A-1: Analysis identifies six 'types' of place**

| Type | BEIS Framework Description |
|---|---|
| 1 | These regions are very strong across the factors used in this analysis that relate to R&D activity, and these regions are well known globally for their R&D strengths. |
| 2 | These regions score strongly for most of the factors used in this analysis. University research and talent pipelines scored highly, with high levels of knowledge exchange between universities and business and high levels of R&D and innovative firms |
| 3 | These regions score highly on university research and talent pipelines, and on knowledge exchange between universities and large businesses (but less so for smaller businesses). They have lower levels of R&D workforce and private R&D spend. |
| 4 | These regions score highly in R&D workforce, R&D and innovative firms, and private innovation outputs (despite mixed scores on university capability to perform R&D) |
| 5 | These regions have high scores for the quality of university research and produce high levels of future R&D talent. However, their R&D workforce is smaller (perhaps suggesting that the future talent do not find suitable work locally). These regions have lower scores on the quantity of Higher Education expenditure and Government research expenditure. |
| 6 | These regions perform the least well on average in the factors used in this data analysis. This may be due to long-term trends leading to the region being less able to attract or retain R&D skills, firms and investment. |

**A.2** BEIS categorised ITL2 sub-regions using the framework above. For the purposes of this study, SQW chose the following case study areas as examples across the BEIS typology:

- Sheffield City Region: Type 2
- Edinburgh: Type 3
- Cheshire and Warrington, and West of England: Type 4
- Belfast City Region and Mid Wales: Type 5
- Cornwall and Isles of Scilly: Type 6

**A.3** Please note, as explained in the main report, the case study areas are not a precise fit for ITL2 sub-regions in some cases.

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## About us

### SQW Group

SQW and Oxford Innovation are part of SQW Group.
**www.sqwgroup.com**

### SQW

SQW is a leading provider of research, analysis and advice on sustainable economic and social development for public, private and voluntary sector organisations across the UK and internationally. Core services include appraisal, economic impact assessment, and evaluation; demand assessment, feasibility and business planning; economic, social and environmental research and analysis; organisation and partnership development; policy development, strategy, and action planning. In 2019, BBP Regeneration became part of SQW, bringing to the business a RICS-accredited land and property team.
**www.sqw.co.uk**

### Oxford Innovation

Oxford Innovation is a leading operator of business and innovation centres that provide office and laboratory space to companies throughout the UK. The company also provides innovation services to entrepreneurs, including business planning advice, coaching and mentoring. Oxford Innovation also manages investment networks that link investors with entrepreneurs seeking funding from £20,000 to £2m.
**www.oxin.co.uk**