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Powering regional engines of growth

How universities can enhance regional economic growth through knowledge exchange

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ABOUT UCI

The Policy Evidence Unit for University Commercialisation and Innovation (UCI) is based at the University of Cambridge and aims to support governments and university leaders in delivering a step change in the contributions universities make to innovation and economic prosperity – nationally and locally – through their commercialisation and other innovation-focused knowledge exchange activities and partnerships.

UCI seeks to improve the evidence base and tools available to key decision makers in public policy and university practice as they develop new approaches for strengthening university research-to-innovation pathways, with a particular focus on commercialisation. To do so it draws on the latest advances and insights from both academic research and policy practice, as well as lessons learned from experiences in the UK and internationally.

The Policy Evidence Unit is funded through a generous grant from Research England. Through this grant we are working in close partnership with the team at Research England to develop next generation data and metrics able to better capture the nature, health and performance of university knowledge exchange.

Find more about our work: UCI Policy Evidence Unit

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1 Introduction

This policy insights paper sets out a conceptual model for thinking about where and how universities have the potential to drive regional economic growth through their KE endeavours. In doing so, we aim to provide an underlying framework able to guide the search for improved data and metrics in this space and the development of more effective regional growth-focused university KE policies and funding approaches.

Growing attention is being paid by the UK government to the ability of all regions and nations of the UK to fulfil their economic growth potential. There is also a recognition that, as a country, we have some of the largest spatial disparities in economic performance of advanced economies, which need to be addressed as we look to the future. As part of this, there are growing pressures and expectations on universities to play a more strategic and active role in delivering ambitions to raise economic growth in their local economies, including through their many and varied KE activities.

The development of policies, regional growth strategies, and funding allocation approaches aimed at enabling universities to help drive regional economic growth through their KE endeavours are often informed in part by the data and metrics available. This includes funders of university-based research and KE, such as Research England, in developing and managing regionally-focused funding programmes. While some progress is being made on regional innovation and economic growth data, we lack fit for purpose data and metrics able to capture the ability of universities to contribute to these outcomes *through their knowledge exchange activities*. As a result, our ability is constrained in terms of:

- Effectively allocating public funding to enable and incentivise universities to contribute more actively and strategically to regional economic growth through knowledge exchange
- Tracking and evaluating the performance of such policy interventions
- Enabling and incentivising effective strategic learning by universities within the system to drive innovation and improvement in how they deliver regional growth impacts.

As a result of these challenges, Research England is working in close partnership with the Policy Evidence Unit for University Commercialisation and Innovation (UCI) and the Higher Education Statistics Agency (HESA, part of Jisc) to improve the data and metrics for capturing the potential and performance of universities in enabling regional economic growth through their KE activities.

To assist thinking in this area, this insights paper develops a conceptual model for how universities can enhance regional economic growth through KE, based on based on a dynamic comparative advantage perspective of regional competitiveness.[1] This forms part of the wider work programme of Research England with UCI to improve data and metrics for knowledge exchange and build their national capability in this area.

[1] We use the term 'regional' to mean any relevant sub-UK spatial geography

Box 1: Some definitions and core concepts

Place-based approach

Place-based approaches see centrally-provided public funding to tackle local/regional underdevelopment traps and facilitate coordinated, collaborative actions that maximise the economic potential of a place (Barca, 2009). They are intended as a means towards achieving inter-territorial equity (Iammarino, Rodriguez-Pose and Storper, 2019).

Space-blind approach

Space blind policies focus on efficiency in that they are intended to maximise agglomeration to boost overall output, but offer little to address the problems of declining and lagging-behind areas (Iammarino, Rodriguez-Pose and Storper, 2019).

Place-sensitive approach

This approach advocates that policy should be both sensitive to the need for agglomeration and the need for it to occur in as many places as possible, as a means to maximise productivity over the long run, to hedge bets against the inherent uncertainty of future innovation, and to master second-mover processes that diffuse innovation (Iammarino, Rodriguez-Pose and Storper, 2019).

Mission-oriented innovation

The mission-oriented approach is intended to mobilise science and innovation to address well-defined societal objectives and drive equitable and sustainable development, from which economic growth is assumed to follow (Daniels et al., 2020; Mazzucato, 2018).

Economic growth

Economic growth refers to continued increases in the size of an economy or sustained increases in outputs, typically measured as variation in gross domestic product (GDP) (Rocha, Kunc and Audretsch, 2020).

Inclusive growth

Inclusive growth involves the participation of a majority of citizens in the decision-making and benefits sharing of the growth process (Boarini, Murtin and Schreyer, 2015).

Sustainable growth

Sustainable growth meets the needs of present generations without compromising the ability of future generations to meet their own needs (Jacobs and Mazzucato, 2016).

Knowledge exchange

Universities teach students and undertake research that creates new and useful knowledge. But they also work with many different types of partner to ensure that this knowledge can be used for the benefit of the economy and society - this is known as knowledge exchange (https://kef.ac.uk/about). KE includes a wide variety of mechanisms through which knowledge is exchanged including collaborative and contract research, consultancy, provision of facilities and equipment services, training and workforce development, commercialisation of intellectual property via spinouts and licensing activities, provision of (formal and informal) advice by academics, and many others.

2 Background and context

The UK exhibits amongst the highest interregional productivity inequalities in the industrialised world, with London and the Southeast (and to a lesser extent Scotland) displaying strong productivity growth, while parts of the Midlands and the North of England, Wales and Northern Ireland displaying little or none (McCann and Yuan, 2022). This has contributed to national productivity (measured as GDP per hour worked) now being around 16% lower than that of the US and Germany. It is also reflected in widening interregional differences within the UK in other measures of wellbeing (e.g. quality of life, civic engagement, town-centre viability, health and life expectancy) (HM Government, 2022; McCann, 2016).

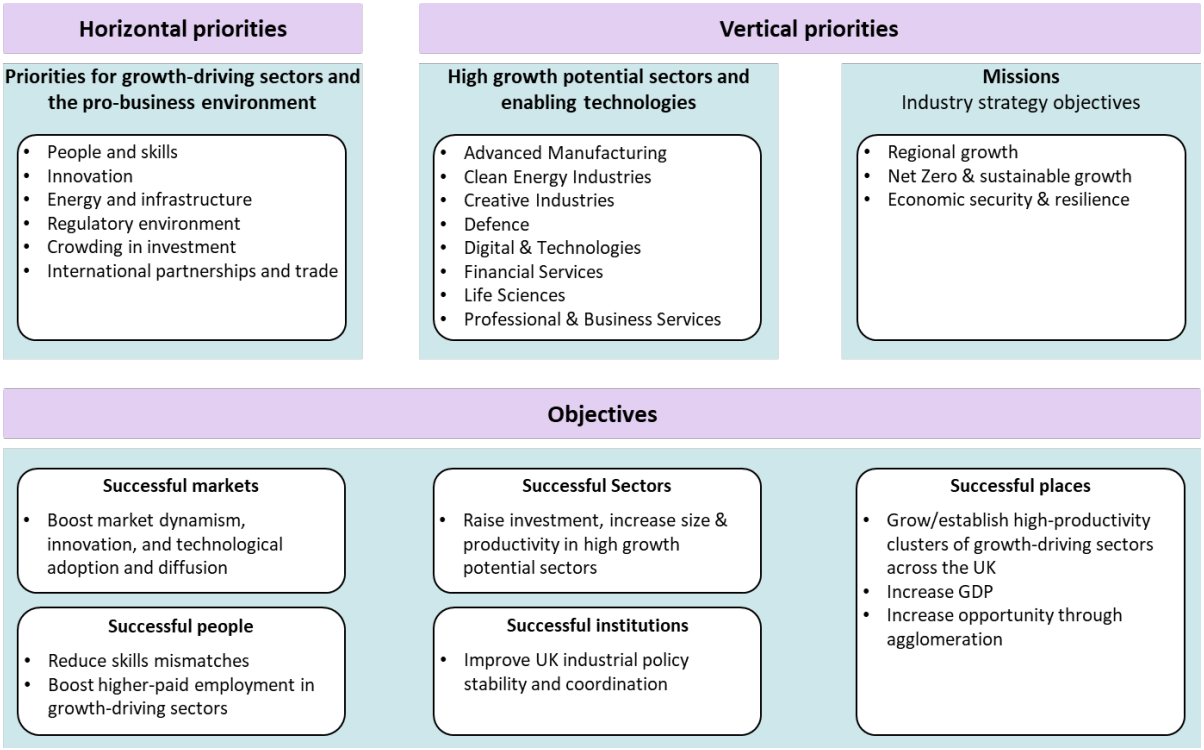
As a result, there has been increasing attention by policymakers and funders across the four nations of the UK on policies and approaches aimed at driving regional economic growth and reducing spatial inequalities. Within these efforts, there are growing pressures on universities to play a more strategic and active role in delivering these ambitions, including through their many and varied KE activities.

For example, in its recent industrial strategy green paper, the UK Government expanded on its plans for a mission-oriented, place-based approach to achieve economic, inclusive, sustainable and resilient economic growth (HM Government, 2024) (Figure 1). Within this there is a specific regional growth objective of unleashing the full potential of UK cities and regions by enabling existing services and manufacturing sectors to adapt and grow while seizing opportunities to lead in new and emerging sectors.

The industrial strategy draws on a consensus that improving national economic growth is dependent on increasing the economic performance of cities and regions across the length and breadth of the UK, and in particular outside London and the Southeast (i.e. a place sensitive approach) (Ulrichsen and O'Sullivan, 2020). It also accepts an emerging shift in regional innovation policy that sees place-based/sensitive innovation and sustainability as being complementary, particularly for future growth and competitiveness (McCann and Soete, 2020; Uyarra, Ribeiro and Dale-Clough, 2019).

Central to this emerging regional growth mission is a new statutory requirement for long-term 'Local Growth Plans' (LGPs) that identify growth opportunities in towns and cities across the country, aligned with sectoral strategies, and outline the programmes and infrastructure to be put in place to seize these opportunities. LGPs are to be developed and implemented by local leaders working in partnership with major employers, universities, colleges, and industry bodies, and will be supported by strong national-local governance arrangements, capacity and capability building, and provision of direct support where needed (Labour Party, 2024). Improved data and metrics on the roles and performance of universities in driving regional growth through KE will be important for ensuring their full potential is realised.

Figure 1 Priorities and objectives of the industrial strategy green paper



Source: authors' elaboration of the industrial strategy green paper (HM Government, 2024)

In recent years there have also been pressures on national research, KE, and innovation funders to adopt a place-based approach in developing funding programmes to pursue regional economic growth objectives. This includes the Strength in Places Fund (SIPF) managed jointly by Research England and Innovate UK and allocated by competition, and the Regional Innovation Fund (RIF) allocated by Research England via formula. These programmes marked a departure from the traditional focus of national research, KE, and innovation funders from space-blind approaches to allocate funding based on excellence, wherever it is located (McCann, 2019; Ulrichsen and O'Sullivan, 2020).

Place-based and place-sensitive approaches would see funding allocated to universities on the basis of some measure of territorial differentiation (e.g. level of development, competitiveness, innovation system deficiencies, or population level) (Dijkstra et al., 2023; ECA, 2019; Huggins, 2003; Martin and Trippl, 2014) and at an appropriate level of geographical focus (e.g. region, city-region, pan-region, functional area). The lack of well targeted data and metrics relevant to drive such approaches led Research England to announce ambitions to improve the availability of regional growth-focused metrics for university KE alongside the announcement of funding allocations for their Regional Innovation Fund 2023/24.[2]

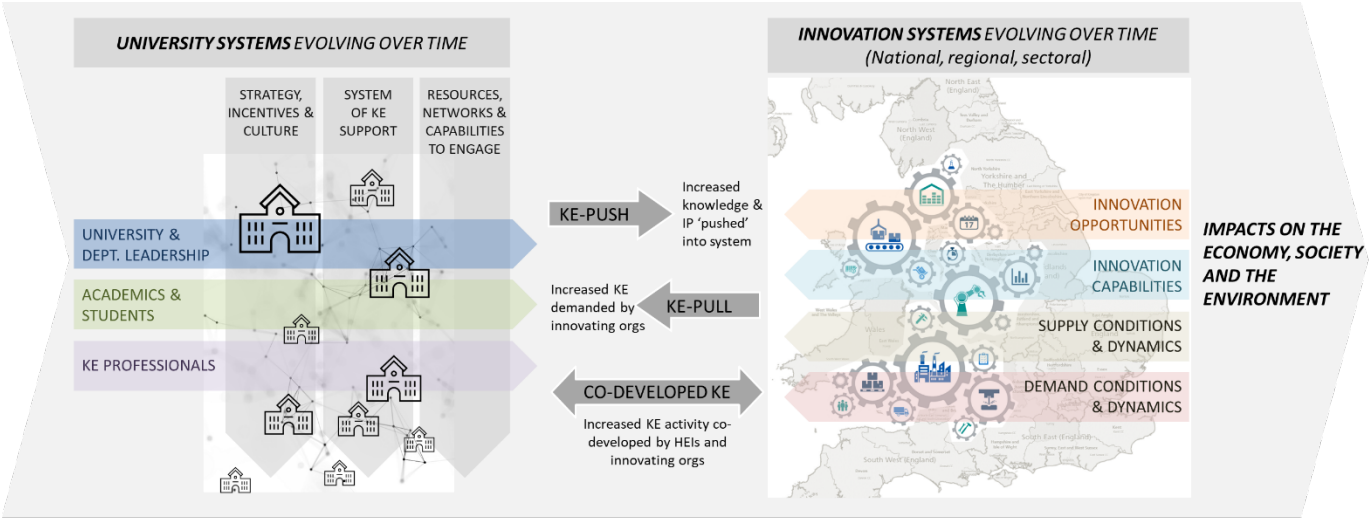
[2] See Regional Innovation Fund (RIF) frequently asked questions (October 2023) document, available at https://www.ukri.org/wp-content/uploads/2021/09/RE-101023-RIF-RE-FAQs-v2-5-Oct-2023.pdf. Accessed 5th November 2024.

There is therefore an increasingly urgent need to develop new and improved data and metrics to inform policy development and funding allocation approaches aimed at enabling and supporting university KE to contribute actively to regional economic growth. This search for improved data and metrics benefits from being grounded in an up-to-date understanding of *how* universities can contribute to regional economic growth through their KE endeavours. This is the focus of this policy insights paper.

3 Towards a conceptual model

Our conceptual model aims to capture how universities can enhance regional growth through their KE endeavours. With our focus on the knowledge-based interactions of universities with non-university partners, we build on our previous work that positions universities as part of a wider system of innovation that comes together to generate, develop, transform and deploy knowledge in ways that deliver economic and societal gains (Ulrichsen and Kelleher, 2023) (Figure 2).

Figure 2 Simplified framework for positioning universities and their KE interactions within the national innovation system



KEY FEATURES OF THE UNIVERSITY SYSTEM

- *Universities are not a homogeneous group; they have different missions and strategies shaped by internal and external pressures as well as their historical evolution and local context*
- *Universities operate as part of a wider system of universities, variously collaborating and competing with each other*
- *Universities are based in very different local environments which shape their strategic choices*
- *Individuals (academic staff, KE staff, students etc.) within universities are shaped both by locally determined incentives as well as national and global incentives*
- *Universities have access to different levels and types of resources (financial, human capital, social capital, physical & virtual capital etc.) to deliver their strategic objectives*

SYSTEM-SPECIFIC STRUCTURE:

- ***Actors** in the public, private and third sectors creating, exchanging, and using knowledge e.g.: MNCs, indigenous large firms, SMEs, universities, research institutions, research and technology organisations, technical consultancies, government departments and agencies, hospitals, standards bodies, regulators, charities, civil society organisations etc.*
- ***Linkages** e.g.: market, non-market, social/economic/political*
- ***Institutions** e.g.: legal/regulatory regimes; public policies; culture, norms etc.*
- ***Accumulated knowledge & technologies***

INNOVATION OPPORTUNITIES SHAPED BY:

- *Capabilities of specific actors, their ability to interact and the institutional framework.*
- *The strength and dynamics of the system that supplies the necessary resources and capabilities for innovation, and the demand conditions and dynamics of the sectors*
- *The choices and behaviours of other actors (i.e. there is interdependence)*

Source: (Ulrichsen and Kelleher, 2023)

Shaped by specific internal and external contexts, resource bases, and histories, which are typically strongly path dependent and evolutionary in nature, this approach sees universities as forming *linkages* (market and non-market-based) with different types of non-university *actors* within the innovation system to generate, develop, and diffuse knowledge to drive innovation, with behaviours, choices and actions shaped by the system's *institutional architecture* ('rules of

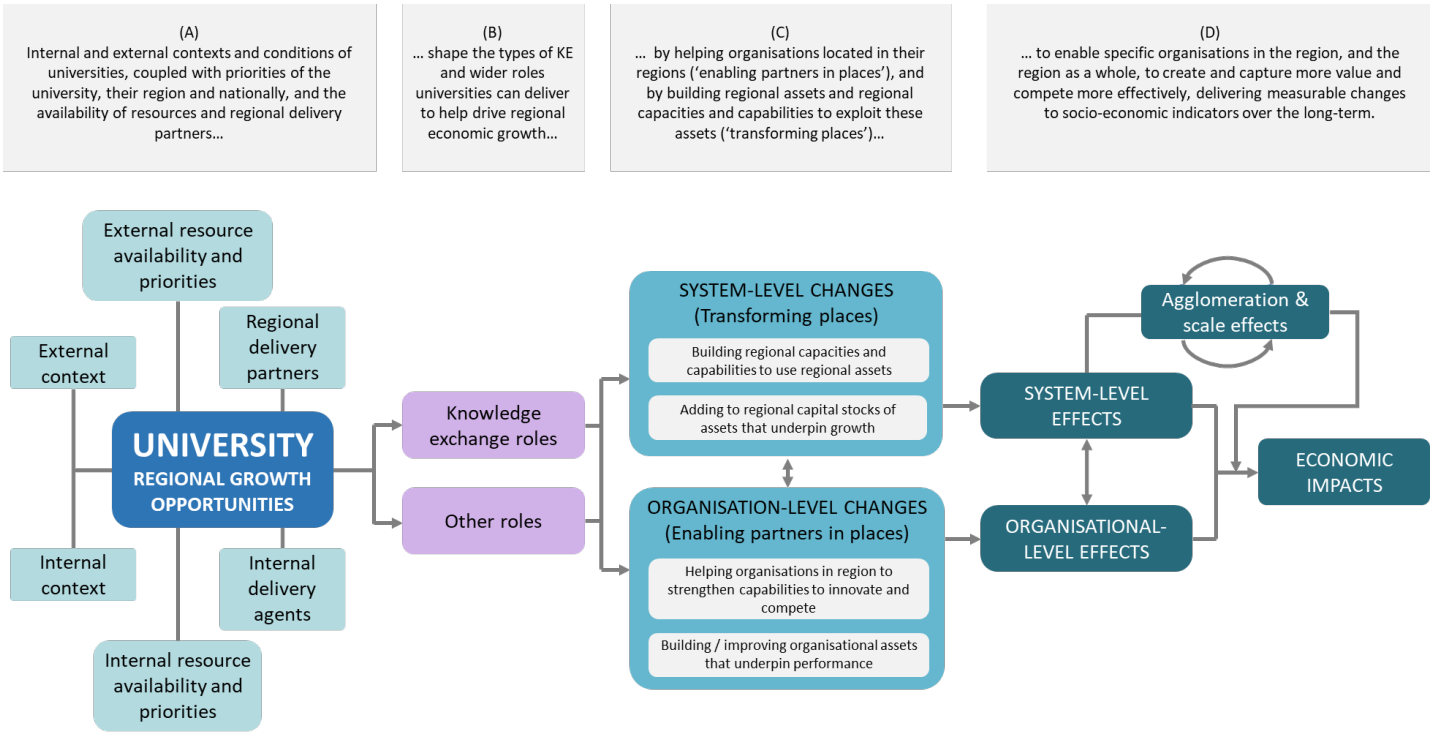
the game' which cover both formal institutions such as policies, laws, regulations and standards, and informal ones such as cultural norms and values).

We have previously conceived of three broad types of KE: (1) opportunities that emerge as a result of the research activity undertaken within the university (*KE-push*); (2) opportunities driven by decisions in non-academic organisations (public, private and third sector) to engage externally to acquire knowledge to feed into their innovation and wider business activities (*KE-pull*); and (3) co-developed and collaborative KE opportunities that emerge through the interactions of universities and non-academic organisations (*Co-developed KE*).

In thinking about how universities can be incentivised to contribute more actively and strategically to regional economic growth through KE, there is a need to develop this framework further. In this paper, we develop a dynamic, multi-level conceptual model for how universities can strategically contribute to regional growth. Crucially, this seeks to distinguish the contributions universities make through KE to specific partners that are located in the region ('*enabling partners in places*' – the organisation-level), from the contributions made to the development of the regions in which they are located ('*transforming places*' – the system level).

We draw upon (1) advances in economics and economic geography on the drivers of regional growth; (2) organisation-level and regional-level strategy theory; (3) emerging thinking in place-based/sensitive R&I policy design and implementation in both the EU and US; and (4) new insights on the regional engagement roles of universities. A simplified version of our model is shown in Figure 3 (see Figure 8 for a detailed version), and is explained in subsequent sections.

Figure 3 Simplified model of universities as drivers of regional growth through KE



3.1 The resource-based view of organisational strategy

Our starting point for the model is the resource-based view (RBV), a prominent organisation-level strategic theory (Penrose, 1959; Wernerfelt, 1984). This sees organisations as holding a range of assets which can be used to achieve strategic goals. These can be tangible or intangible (i.e. physical and non-physical respectively).[3] Intangible assets are particularly important in knowledge-intensive organisations where new value added is disproportionally based on specialised, non-repetitious activities (Kramer et al., 2011). Investments in intangible assets now exceed those in tangible investments as a proportion of the economy as a whole in the US, UK and EU (Haskel and Westlake, 2018).

For an organisation to create value, it is not sufficient that it holds a stock of static assets. Rather, they must be made to interact with each other to render long lived streams of productive services (Penrose, 1959, p.25). The combination of assets and their productive services – known as 'capital' – create value for the organisation in terms of e.g. improved productivity, new or improved products and services, reduced production costs, growth, increased levels of innovation, new market access, increased financial, social and environmental performance, new business creation, and strengthened competitive positioning (e.g. Vu, 2020).

Commonly cited types of capital are shown in Table 1, and their dynamic interaction is represented by Figure 4.

Table 1 Selected capitals (organisational level)

Capital type	Description
Human	Assets controlled by the organisation but embodied in and owned by individuals associated with the organisation, such as experience, knowledge, education, creativity, judgment, abilities and skills
Technology/IP & know-how	Technology and knowledge-based assets, know-how, specialised production processes and tools
Information	Assets developed by the organisation, including databases, information systems, networks, and technology infrastructure
Relational	External assets which the organisation needs or which affect it, such as the suppliers, customers, regulators and partners
Physical	The organisation's land, buildings, equipment, raw materials and products
Organisational	Assets developed by the organisation, such as brand, image, reputation, systems and processes, organisational structures, strategy and strategic alignment, corporate culture, and contractual arrangements
Monetary	The organisation's cash or other financial assets which are equivalent to, or can be converted to cash

Source: Aggestam (2014), Kaplan and Norton (2004), Pike, Roos and Marr (2005). Structural capital is sometimes used to refer to the combination of organisational and relational capital, while the combination of human capital and structural capital is called intellectual capital (Kramer et al., 2011).

[3] For a discussion on the measurement of different types of capital, see (Martin, Nakamura and Soloveichik, 2024)

Figure 4 Dynamic interaction between capitals (organisational level)

Organisations need the capacity and capabilities to develop, exploit and combine assets to create and appropriate value, and build competitive advantage. A range of management, human and technological capabilities necessary for organisations to innovate have been identified (OECD/Eurostat, 2018). Here, we draw attention to four in particular. *Absorptive capacity* enables firms to identify, assimilate, and exploit knowledge from the external environment (Cohen and Levinthal, 1990). *Innovation capabilities* are used to develop new or improved processes that enable development of innovative products and services and their positioning in the market. *Entrepreneurial capabilities* are used to sense, select, and shape opportunities while synchronising with the external environment. *Dynamic capabilities* are more strategic, enabling organisations to reconfigure assets and other capabilities to sense, seize and continually reorient towards new opportunities.

Table 2 Organisational capacities and capabilities for innovation

Category	Capacity/capability
Dynamic capabilities	Refers to a firm's high-level abilities to identify and assess opportunities (sensing), mobilise assets and competencies to address and capture value from the opportunity (seizing), and continually renew the organisation's assets and competencies to build and maintain competitive advantage in dynamic market environments (transforming) (Teece, Pisano and Shuen, 1997)
Innovation capabilities	Product innovation capability enables firms to pool, link, and transform assets to create products or services that are incrementally or radically different from existing ones (Menguc, Auh and Yannopoulos, 2014)
	Process innovation capability enables firms to incrementally improve existing internal processes used to convert assets into products or services, and to introduce radically new processes that make existing processes obsolete (Mikalef and Krogstie, 2020)
	Marketing innovation capability enables firms to meet customer needs, develop new markets, or position products and services in the market (Nwachukwu, Chladkova and Fadeyi, 2018)
Absorptive capacity	Enables firms to identify, assimilate, and exploit knowledge from the external environment (Cohen and Levinthal, 1990)
Entrepreneurial capabilities	Refers to a firm's capacity to sense, select, shape, and synchronise internal and external conditions and assets for the exploration (recognition, discovery, and creation) and exploitation of opportunities (Abdelgawad et al., 2013)

3.2 Regional systems and regional growth

The activities of organisations take place within the context and conditions of specific regions, its history and, crucially, the system-wide capabilities and capitals available to the organisation within the region to drive their operations. Therefore, to understand how universities can help to drive growth within regions, we also need to capture how universities can work to strengthen these wider regional capabilities and capitals that enable companies and others to innovate and compete more effectively and efficiently. To do this, we extend the RBV model of organisational strategy to the regional system level.

This section introduces different types of regional growth and their complementarities and contradictions, identifies productivity growth as a key determining factor of regional growth, describes different theoretical perspectives of productivity growth drivers, and finally integrates these perspectives into an RBV-based, system-level model of dynamic comparative advantage for regional competitiveness. We conclude this section with a discussion of implications of this model for positioning university KE within regional growth policy and strategies.

3.2.1 Regional growth: types, complementarities and contradictions

Our first consideration is the type of regional growth universities may be required to drive. The industrial strategy green paper calls for economic, inclusive and sustainable growth (see Box 1) (HM Government, 2024). We argue that these growths are linked at a regional level.

Economic growth and social inclusion have long been positioned as two 'sides of the same coin' in regional policies (OECD, 2011, p.209). The place-based approach to development policy was originally designed (and implemented in both the EU and US) with twin objectives of increasing employment, income and economic growth (i.e. efficiency) and increasing social inclusion (Barca, 2009; Gansauer, 2024). The UK industrial strategy green paper also links economic and inclusive growth within its regional growth mission (HM Government, 2024).

A number of economic and social arguments have been made for regional policy linking economic growth and social inclusion (Martin, 2024). An efficiency argument holds that policies that improve persistent regional disparities (e.g. in investment, employment rates, productivity) and related aspects of regional economic vitality can help raise national economic performance. An equity argument focuses on evidence that areas with entrenched economic problems (e.g. lack of job opportunities, inadequate housing and public services) also suffer from a combination of social problems which can feed back into the local economy through low demand, low job attachment rates, high economic precariousness, low enterprise, and low rates of skill formation. The social argument holds that regional divergences in poverty and social deprivation justify the redistribution of resources to contribute to a more cohesive, just and balanced society.

The idea that sustainable growth is linked with economic and inclusive growth is a more recent development in regional policy, but is increasingly important particularly in the EU (Uyarra, Ribeiro and Dale-Clough, 2019). In 2005, the European Commission's Lisbon Strategy was relaunched, introducing sustainable development as a policy objective complimentary with economic and inclusive growth (European Commission, 2005). The incorporation of the European Green Deal as part of the Commission's long term policy agenda in 2019 saw sustainable development being prioritised over inclusive and economic growth (Bianchi et al.,

2024; McCann and Soete, 2020; Serger, Soete and Stierna, 2023). In the US, the 'Bidenomics' agenda has pursued a socially-inclusive green-and-secure growth agenda targeting nationally strategic industries, using a place-based approach to invest at scale in 'left behind' places and populations (Gansauer and Westwood, 2024). While the UK industrial strategy green paper emphasises sustainable growth aligned with Net Zero objectives, it does not prioritise this over economic and inclusive growth in its regional growth mission (HM Government, 2024).

There are also arguments for how sustainable growth is linked to equitable and economic growth. A subsidiarity argument for this holds that proactive 'transformative innovation' policy instruments are needed because traditional reactive R&I policy approaches are insufficient to tackle societal challenges (Schot and Steinmueller, 2018). While these can be organised at supranational, national, and subnational levels, the latter is most appropriate to contextualise and legitimate grand challenges locally, facilitate multi-actor coordination in pursuit of small-scale, contextual solutions, diffuse local solutions to other regions with similar challenges, and enhance democratic decision-making (Wanzenböck and Frenken, 2020). A second efficiency argument sees environmental sustainability, productivity gains, social exclusion and macro-economic stability as interrelated policy challenges which require a new paradigm (named 'competitive sustainability') to address simultaneously (European Commission, 2019; Santos et al., 2023). Regions with persistent structural challenges (e.g. investment barriers, large infrastructure gaps, a lack of business innovation and skilled labour markets, legacy industries) are less likely to transition towards greener, more competitive economies, and this will have detrimental consequences for national economic growth and future competitiveness.

While there is an implicit assumption that economic, inclusive and sustainable growth are broadly compatible policy objectives, a range of contradictions and complementarities can emerge in practice which may lead to confusion, uncertainty and ambiguity (Bailey, Pitelis and Tomlinson, 2023; McCann and Soete, 2020) (Table 3). The need to identify complementarities between these as policy objectives is now increasingly being emphasised, with limitations in pursuing any one growth type in isolation become apparent (Rodríguez-Pose et al., 2024).

Table 3 Selected complementarities and contradictions between economic, inclusive and sustainable growth policy goals

Type	Description
Inclusive versus economic growth	Place-based policies seek to shift investments, jobs, and incomes from more to less productive areas of a country, which can result in economically meaningful efficiency losses (Moretti, 2024). As firm innovation levels increase, direct and indirect regional employment levels increase, but low-skill, low-income employment can be displaced (Bogliacino, Piva and Vivarelli, 2012; Ciarli et al., 2018; Harrison et al., 2014; Moretti and Thulin, 2013). Prioritisation of inclusive growth in regional growth strategies can stymie discussions about economic growth (Swinney, 2024).
Sustainable versus economic and inclusive growth	Investing in green innovation can create local high-quality jobs through customised systemic solutions, and can enhance competitiveness through first mover advantage (McCann and Soete, 2020; Stern and Stiglitz, 2023). Reducing environmentally unsustainable production processes can yield local health benefits (McCann and Soete, 2020).

	Less developed urban and rural regions are disproportionally affected by changes brought about by the green transition, leading to increased political dissatisfaction and unrest (Rodríguez-Pose, Dijkstra and Poelman, 2024; Rodríguez-Pose and Bartalucci, 2024). Returns on investment are lower for 'clean' innovation than 'dirty' innovation, and investments in technologies that reduce or remove carbon emissions may delay clean energy transitions (Acemoglu et al., 2012, 2023; Aghion et al., 2014). Smart specialisation, the EU's main regional R&I policy instrument, supports entrepreneurial discovery processes to generate new activities within sectors ('related variety') which may translate into structural change (Foray, 2014; Laranja, 2022). This can enhance productivity, employment growth and economic growth in the short term (Boschma and Iammarino, 2009; Frenken, Van Oort and Verburg, 2007; Saviotti and Frenken, 2008). Mission-oriented innovation limits variety by exerting selection of, and fostering rapid upscaling and diffusion of specific technologies, driven by a shared sense of urgency, which may affect innovation system resilience (van der Loos et al., 2024).

3.2.2 Regional economic growth and productivity growth

Productivity growth is a key determining factor of regional economic growth over the longer term (Krugman, 1997). Productivity growth reflects the ability to produce more output by better combining inputs, for example owing to new ideas, technological innovations and business models (OECD, 2015). In addition, productivity growth is also critical in determining a range of other regional socioeconomic outcomes, such as competitiveness, business dynamism, increased quality of life, employment levels and quality, and economic resilience (Hathaway and Litan, 2014; Kitson, Martin and Tyler, 2004; Krugman, 1997; Martin and Sunley, 2015; Porter, 2003).[4]

Productivity growth is also associated with sustainable growth. The Draghi report on European competitiveness highlights the importance of productivity growth for easing constraints on fiscal spaces, enabling governments to support decarbonisation (Draghi, 2024). The UK industrial strategy green paper links productivity growth with the ambition to build a strong domestic industrial base to gain strategic economic advantage within the circular economy (HM Government, 2024).

3.2.3 Key drivers of regional productivity growth

Regional growth and development strategies have evolved over time with regards the types of drivers of productivity and economic growth being emphasised, shaped by the shifting emphasis on different theories of growth.

Regional economic development policy thinking was long dominated by neo-classical economics and endogenous growth theories (Lucas, 1988; Romer, 1986; Solow, 1956). These offered policymakers a limited range of strategies, focused on investments in infrastructure, human capital, and innovation as key growth drivers. As a consequence, 'one-size-fits-all' policy approaches proliferated globally, characterised by top-down decision-making irrespective of differing regional contexts (McCann and Ortega-Argilés, 2016).

[4] Business dynamism is the process by which firms continually are born, fail, expand, and contract, as some jobs are created, others are destroyed, and others still are turned over (Hathaway and Litan, 2014)

New Economic Geography (NEG) rose to prominence in the 1990s, emphasising how the increasing geographic concentration of economic activity could, over time, lead to a divergence of two similar regions into a high growth 'core' and low growth 'peripheral' region (Krugman, 1991). Concentrations of economic activities represent an equilibrium between factors encouraging agglomeration (e.g. increasing returns to scale, home market effect, self-feeding backward and forward linkages, available labour pools, and external economies arising through localised knowledge spillovers) and dispersion (prices for intermediates, wage levels, competition), with changes in transaction and transport costs altering the equilibrium and generating core-periphery patterns. Differences in 'fundamentals', including endowments of natural resources, labour pools and the quality of local institutions also act as sources of regional advantage (Krugman, 2005). NEG has been influential in the development of place-based policy approaches to encourage agglomeration and scale effects in low growth regions as a way to encourage convergence with high growth regions (Iammarino, Rodriguez-Pose and Storper, 2019). However, a focus on agglomeration and scale effects alone does not necessarily deliver consistent regional development outcomes (Pike, Rodríguez-Pose and Tomaney, 2007).

Also emerging in the 1990s, cluster theory emphasises how national economic vitality and regional competitiveness depends on the creation and strengthening of clusters of interrelated industries in which regions specialise (Porter, 1998, 2001). Industries that trade both across regions and internationally, and are located in a region due to competitive considerations are particularly important in driving regional competitiveness. Geographical clustering yields localised increasing returns, and in particular sustained productivity growth, as firms in these clusters continually adapt and upgrade themselves, developing capabilities to compete in more productive industry segments and sophisticated new sectors, and in attracting foreign investment. *Regional growth is dependent on the region's ability to build innovative capacity in clusters and to provide a favourable business environment for internationally competitive firms*. Porter's well-known 'diamond model' is one attempt to capture the key drivers of competitive advantage, highlighting four key areas, all of which interact with each other: factor conditions (presence of specialised pools of human resources, technologies, infrastructure and sources of financial capital necessary to compete in a given industry); demand conditions (the nature of home demand for the industry's product or service); related and supporting industries (the presence or absence of internationally competitive supplier and related industries); and firm strategy, structure, and rivalry (the conditions governing how companies are created, organised, and managed, and the nature of domestic rivalry) (Porter, 1998). Chance events (e.g. exogenous shock events, surges in demand, major technological breakthroughs) and government influence on competitiveness and business environments also play roles in cluster development (Porter, 1998, 2001).

More recently, institutional economics has become influential in policy thinking, emphasising the capacity of regions to capture or attract economic activity as the key growth driver (Acemoglu, Johnson and Robinson, 2001; Rodrik, Subramanian and Trebbi, 2004; Storper, 1997). This approach sees the quality and efficiency of local institutions (including laws, regulations and networks fostering trust) and government as being as, if not more, important for regional growth than infrastructure, human capital, and innovation. This approach emphasises the importance of investing in institutions on the grounds that they can influence regional economic performance

through shaping networks and processes that drive economic activity, and because subpar local/regional institutions can undermine development efforts (Rodríguez-Pose et al., 2024).

Separately, the transformative innovation approach is now rising in prominence, emphasising the importance of addressing not only the pace of innovation, but its direction along socially-acceptable corridors of development, e.g. through the selection of missions (Mazzucato, 2018; Schot and Steinmueller, 2018). Unlike traditional R&I policy designed to fix market and system failures, this approach explicitly addresses environmental and public welfare concerns within the innovation process itself. The assumption is that this will drive equitable and sustainable development, and in turn, economic growth (Daniels et al., 2020). In other words, economic growth is seen as an outcome, rather than a mission in and of itself. There is now an emerging shift in regional innovation policy towards incorporating a transformative innovation approach, with an acceptance that place-based/sensitive innovation and sustainability are complimentary policy objectives, important for future growth and competitiveness (McCann and Soete, 2020; Uyarra, Ribeiro and Dale-Clough, 2019).

3.2.4 Towards a dynamic comparative advantage perspective on regional competitiveness

We now turn to how these diverse growth theories can be brought together and integrated with the resource-based view at a system level to help us position universities as drivers of regional economic growth and competitiveness. One approach to do this is through a dynamic comparative advantage perspective on regional competitiveness (Martin and Sunley, 2011).

This perspective understands that sustained productivity growth is synonymous with increasing regional competitiveness and is the key driver of regional economic (and other forms of) growth. Regional competitiveness is determined by the productivity of all firms making up a regional economy, and is shaped by patterns of industrial specialisation – i.e. the degree to which a region specialises in a particular industry. Specialisation patterns, in turn, are shaped by:

- The types of assets held within a region, with differences in these endowments providing a source of comparative advantage of one region over another.
- Abilities of regional firms to adapt to constantly changing market conditions and technology advances through the strategic use of internal and regional assets. Dynamic interactions between these assets produce capitals which enable firms to produce certain goods more efficiently compared to other goods, and thereby to build and sustain competitive advantage. The types of capitals produced by regional assets typically cited in growth discussions are shown in Table 4, and their dynamic interactions are depicted in Figure 5.
- How well the regional economic structure adapts to enable development of new productive industries, sectors, and technologies of activity over time. A region's initial comparative advantage can be undermined as that of competitor regions increases. Comparative advantage can be reestablished where regional firms exploit competitive advantages through innovation and collective learning or where new industries are developed. The regional capacities and capabilities commonly recognised as being important to enable economic growth and structural adaptation are shown in Table 5.

Figure 5 Dynamic interaction between regional capitals

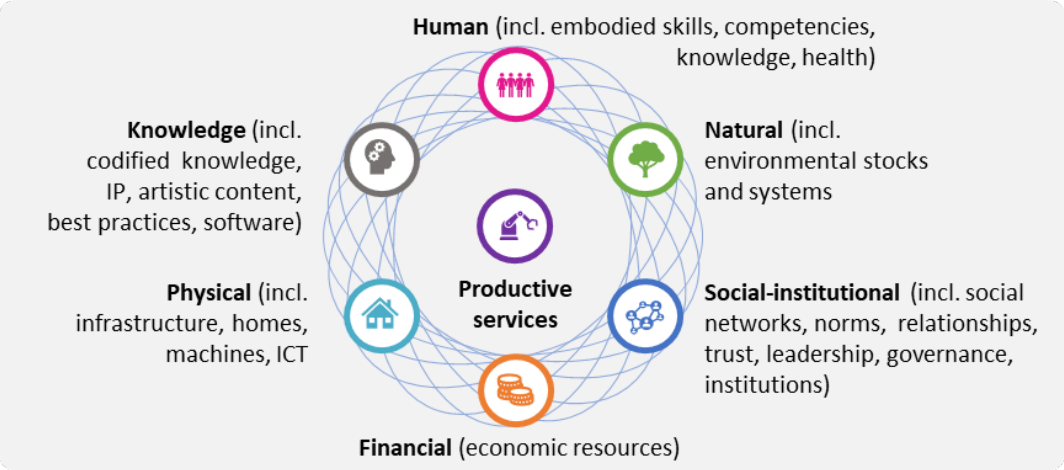


Table 4| Regional capitals

Capital	Description
Human capital	Refers to the knowledge, skills, competencies and other attributes (e.g. health) embodied in individuals or groups acquired during their life and used to produce goods, services or ideas in market circumstances (Westphalen, 1999). A number of areas for improving understanding of the relationship between human capital and productivity have recently been defined, including a deeper appreciation of the social, political, psychological, geographical and economic characteristics of human capital, its differentiated influence on productivity, and the significance of mediating factors (Grimshaw and Miozzo, 2021).
Knowledge capital	Includes ideas; knowledge stocks; intellectual property; accumulated best practices and ways of doing things; databases; entertainment, artistic and literary content; design; software; market research and branding; training; and business process reengineering (Haskel and Westlake, 2018). Unlike human capital, these assets are not necessarily embodied and can potentially live forever.
Social-institutional capital	Social capital refers to social networks, personal relationships, norms, trust and civic engagement that facilitate co-ordination and cooperation for mutual benefit (Putnam, 1993). Institutional capital refers to the potential to build and mobilise social and knowledge capital towards specific goals (Healey, 1998). Factors which influence mobilisation include quality of leadership and the capacity, capability and reliability of local and devolved governance institutions, rule of law and lack of corruption, protection of property rights, financial institutions, freedom for new ideas, and general ease of doing business (Budden, Murray and Turskaya, 2019). While both social and institutional capital are seen as crucial for driving regional economic growth (Olson, Sarna and Swamy, 2000; Putnam, 1993; Rodríguez-Pose, 2013; Romer, 2010), empirical evidence to support this is contradictory. Recent advances in this area have demonstrated that social trust and political trust drive increased productivity, economic growth and development (Muringani, Fitjar and Rodríguez-Pose, 2024; Zenghelis et al., 2020).
Natural capital	Refers to environmental stocks and systems that generate benefits for people (including ecosystems, raw materials, and a stable climate) (Bennett Institute, 2020). The role of natural capital as an input into productivity growth has been established (Brandt, Schreyer and Zipperer, 2017), but limited progress has been made in incorporating natural capital into conventional growth accounting analysis (Martin and Riley, 2023).

Physical capital	Refers to the scale and quality of infrastructure, homes, machines and equipment, information and communications technology and other tangible assets.
Financial capital	Refers to economic resources used to buy inputs to make products or provide services, and is distinct from fixed assets.

Note: These capitals are typically cited, but others have also been identified. Civic capital refers to a set of relations that emerges from interpersonal networks tied to a specific region/locality that contributes to the development of a common sense of community based on a shared identity, set of goals and expectations (Nelles and Wolfe, 2022). Cultural capital refers to assets embodying cultural value (Throsby, 1999).

This perspective extends the RBV to encompass both organisational and system levels, and integrates both cluster theory's emphasis on the role of the business environment in attracting internationally competitive firms and comparative advantage theory's focus on regional assets as two sources of regional competitiveness. It is consistent with NEG's view that localised knowledge spillovers reinforce industry's competitive advantage and encourage agglomeration (Krugman, 2005). It recognises the importance of local institutions in shaping regional economic performance and accommodates transformative innovation's emphasis of the complementarity of place-based/sensitive innovation and sustainability as the basis of future growth and competitiveness.

Table 5 Regional capacities and capabilities

Capability/capacity	Description
Innovative capacity[1] and capability	Regional innovative capacity refers to a core competency comprised of local institutions and resources that supports and sustains innovative activity, moving both the area and industry forward (Feldman, 1994, p.77). It can be thought of as the knowledge and technological infrastructure of a region, including formal knowledge derived from university research and industry R&D, the tacit knowledge accompanying familiarity with a technology, and the commercial knowledge of the market. This includes a 'generative capacity', referring to the generation of new ideas and technologies through scientific discovery (Kempton et al., 2014; Kitson, 2019; Rinaldi et al., 2018). Regional innovation capability involves the efficient allocation of innovative resources, creation of new ideas and their transformation into new products or services, and adoption in practice (Park, Anderson and Seo, 2021).
Entrepreneurial capacity	Entrepreneurial capacity refers to the capabilities and conditions in a location for forming enterprises of all types (Budden, Murray and Turskaya, 2019). It encompasses 'entrepreneurship capacity'[1], referring to capabilities and conditions specific to forming 'innovation-driven enterprises' that pursue global opportunities based on bringing to customers new innovations that have a clear competitive advantage and high growth potential (Aulet and Murray, 2013).
Absorptive capacity	The ability of regional firms to identify, assimilate, and apply external information to commercial ends, individually and collectively (Miguélez and Moreno, 2015). This can increase the ability of the region itself to understand and transform inflows of extra-regional knowledge, and the speed at which technology transfer within, and into, a region occurs. It overlaps with regional innovative capacity.
Collaborative capacity	The ability to collaborate within regional innovation systems, and thereby overcome sectoral and disciplinary silos that reproduce old habits and routines that lock regional economies into traditional development paths (Kempton et al., 2014; Rinaldi et al., 2018). Strengthening network relationships within a

	territory is seen as crucial to more effective public service delivery, tapping shared intelligence and institutional learning, and economic development outcomes (Nelles and Wolfe, 2022).
Institutional capacity	The concept of institutional capacity has evolved over time, from an initial focus on strengthening individual public sector organisations' abilities to effectively and efficiently perform their functions to a broader focus on empowerment, social capital, an enabling environment, and the culture, values and power relations that influence behaviour (Willems and Baumert, 2003). Building regional- and national-level institutional capacity is often a key precondition for the successful implementation of place-based policies (Rodríguez-Pose et al., 2024). In EU policy discourse, it has recently been disaggregated into three key components: (i) the capacity for policy design, (ii) the capacity for policy co-creation with stakeholders (e.g. within Smart specialisation processes), and (iii) the operational, technical, and political capacity for implementation, including monitoring and evaluation capacity (Pontikakis et al., 2022).
Transformative capacities and dynamic capabilities	Abilities to shape and coordinate action towards collectively-agreed transformational goals. These capacities and capabilities enable the design and implementation of effective transformative policies which offer long-term stability and short-term agility (Borrás et al., 2023; Janssen et al., 2023; Kattel, 2022; Laranja and Pinto, 2023).

[1] Used as a key innovation ecosystem metric in the MIT Regional Entrepreneurship Acceleration Program (REAP) (Budden, Murray and Turskaya, 2019).

3.2.5 Implications of the dynamic comparative advantage perspective for regional growth policy and strategy

This dynamic comparative advantage approach has important implications for the design, implementation and monitoring of regionally-focused economic growth policies and strategies.

First, **different regional capitals are interdependent**. Deficiencies in any one may have knock-on effects on the others, resulting in self-enforcing spirals of low income and weak growth (Haldane, 2018; HM Government, 2022). More developed regions tend to have sufficient levels of all capitals.

Second, the interdependencies between different capitals includes **complex, nonlinear relationships** (van Ark, de Vries and Erumban, 2024; Bennett Institute, 2019, 2020; Schiuma and Lerro, 2008). These can increase uncertainty, making it difficult or impossible to predict in advance what capitals should be invested in to drive growth (HM Government, 2022). However, a number of approaches have emerged to handle this complexity and uncertainty in both regional policy and strategies:

- **Policy experimentation and learning** can be used to identify what works in a given context. This is increasingly emphasised as an alternative to traditional predictive, rational, measurable policy approaches which are of limited use in complex environments. Indeed, guidance for EU Smart specialisation strategies emphasises that prioritisation decisions should be justified on the basis of information generated during experimentation rather than on data related to past performance (Coffano and Foray, 2014). We draw attention to a number of experiments of note currently underway. Broad-based investment strategies across the full set of regional capitals are being

trialled to determine whether these can achieve consistent improvements in productivity over the long term in places (Productivity Institute, 2023). The role of transformative investments to realise radical system changes (e.g. in energy, water, mobility, healthcare) and 'transformative bundles' – i.e. coalitions of diverse actors working toward finding schemes to finance shared place-based transformative goals – in the development of a new bioeconomy is being explored as part of Catalonia's Smart specialisation strategy (Schot et al., 2024).

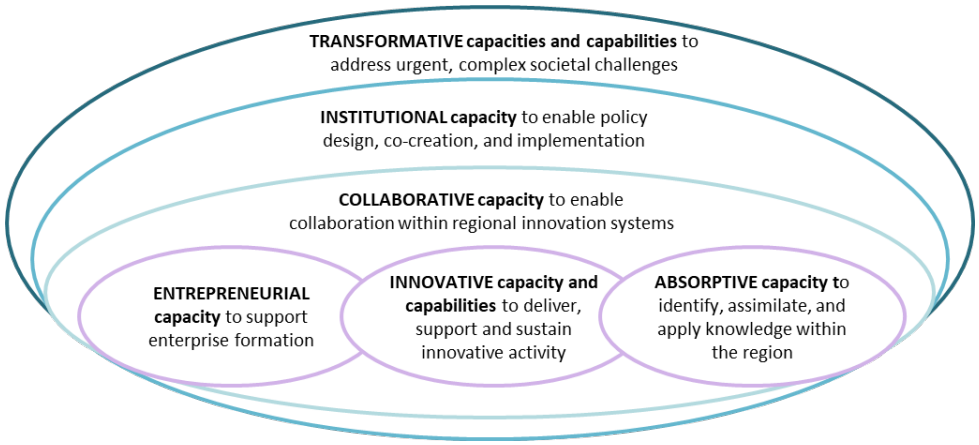
- **Place-sensitive approaches** are designed to counter negative outcomes of geographically restricted development (e.g. the place-based approach's focus on less developed regions) by encouraging innovation in all regions (Iammarino, Rodriguez-Pose and Storper, 2019). The rationale is to manage uncertainty by maximising total future innovation output of the economy in the aggregate and maximising productivity over the long (rather than short) term.
- **Productivity calculations** have traditionally focused on the capital contributions of tangible fixed assets, such as buildings, hardware, machinery and vehicles (Martin and Riley, 2023). These calculations now increasingly emphasise and seek to refine the capital contributions made by intangible assets (Crema and Nosella, 2014; van Criekingen, Bloch and Eklund, 2022; Hintzmann, Lladós-Masllorens and Ramos, 2021; Martin, Nakamura and Soloveichik, 2024; Martin and Riley, 2023).
- **Partnerships** between key regional stakeholders are seen as a way to co-create regional transformation pathways while overcoming silos and paralysis by complexity (see Section 0 for implications for university partnerships).
- **Guidance** for handling complexity in policy design and evaluation have recently been published in both the EU and UK (HM Treasury, 2020; Palmer and Cavicchi, 2023). This recommends the use of approaches including systems-based methods, participatory evaluation, and theories of change.

Third, **threshold effects exist**, in that a critical mass of actors and capital stocks in a given domain must be present before capital investments result in increased levels of innovation (Charlot, Crescenzi and Musolesi, 2015). Most regions will not be able to reach critical mass in any domain within every industry, so that choices will have to be made regarding which domains a region should specialise in to position itself as a leader in the near future. Nor will not be politically feasible for regional authorities to address the specific capabilities and infrastructure needs for all potential economic activities new to a region. These two rationales – critical mass and political feasibility – justify the EU's Smart specialisation approach to regional R&I (Foray, 2017). Smart specialisation is not a horizontal intervention to allocate resources 'neutrally' (i.e. without prioritising specific technologies, fields, sectors or populations of firms) to increase general levels of innovation. It represents an opportunity to strategically concentrate resources on efforts to transform sectors already present in the region (known as 'related variety') or to establish new ones, while avoiding sectoral level specialisation. The intention is to generate knowledge about the future economic value of possible sectoral transformation or new sector establishment through discovery processes before incorporating the most promising options within shared regional development agendas (Laranja, 2022; Laranja, Perianez-Forte and Reimeris, 2022; Laranja and Reimeris, 2022, 2024).

Fourth, **productivity growth can change for two broad reasons**; changes in investment levels (giving organisations more or less financial capital to work with) or changes in how effectively and efficiently organisations work with available capital (Haskel and Westlake, 2018). Regional growth strategies can be designed to attract financial capital for investment in *both* regional capital stocks *and* the capacities/capabilities of organisations within the region and of the regional system more broadly that are needed to drive economic (and other forms of) growth (e.g. see Foray et al., 2012).

Fifth, **different policy interventions emphasise different types of capacities and capabilities** because their theoretical underpinnings envisage social and technological emerging through different mechanisms (Robert and Yoguel, 2022). Evolutionary theories see innovation system dynamism being dependant on the (1) generation of new knowledge, technology and innovation, (2) the diffusion of innovations throughout all parts of the regional social fabric to strengthen the existing knowledge base; and (3) the absorption of new knowledge, technology and innovation for adaptation to local needs (Iammarino, 2005). Institutional economics emphasises the role of local institutional arrangements in shaping the 'rules of the game' for regional innovation and removing barriers to innovation (Rodríguez-Pose, 2013). Transformative innovation approaches focus on the need for structural change to accelerate the pace of innovation in specific, collectively agreed directions (Mazzucato, 2018; Schot and Steinmueller, 2018). This understanding enables us to propose a structure showing how the regional capacities listed in Table 5 are overlapping and nested in nature (Figure 6).

Figure 6 The overlapping and nested nature of regional capacities



Sixth, the **sequencing with which different capacities and capabilities are drawn upon is important** for regional growth. Change within technological or broader socio-technical systems is a dynamic process, in which certain functions or processes must be performed before others (Bergek et al., 2008; Ghosh et al., 2021; Hekkert et al., 2007). This sequencing must be accounted for in regional growth strategies. To illustrate, a 2020 OECD report on innovation policies for regions and cities highlighted how a strategy designed to develop a new innovation ecosystem must first build generative and absorptive capacities to develop regional pockets of excellence, then develop collaborative and absorptive capacities to build critical mass, and finally build generative and international collaborative capacities to become a hub within a global value chain (OECD, 2020).

3.3 Regional knowledge exchange roles of universities

We turn now to the roles universities can play in supporting regional growth within a model of comparative regional advantage. It has been shown that universities can enhance regional economic growth, e.g. through their innovation activities and development of human capital (Valero and Van Reenen, 2019). However, not all universities act as 'full service' anchor institutions with comprehensive regional engagement. In practice, their engagement depends, in part, on the roles they choose to assume within the region.

A range of university regional engagement roles have been identified[5]. Furthermore, the increasing importance of transformative or mission-oriented innovation, and its recent incorporation into EU Smart specialisation strategies, has seen an emerging focus on rethinking the role of the university in place-based innovation policies for sustainability transitions, which includes identification of new types of KE activities universities may be required to perform (Rinaldi et al., 2018; Trippl, Serger and Erdős, 2023).

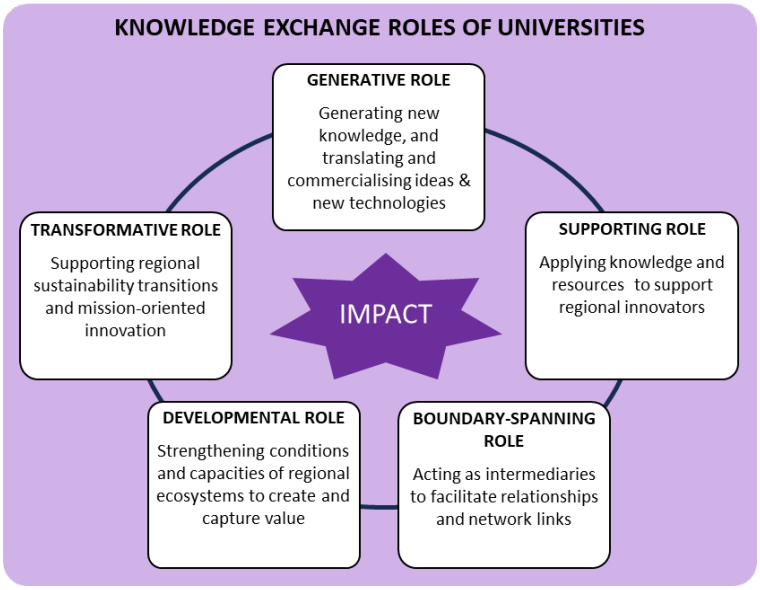
Drawing on the academic literature and insights from practice, Figure 7 brings together our attempt to characterise key types of regional roles for university through KE. These cover:

- **Generative role** – Universities create new knowledge-based assets (e.g. new ideas, technologies, expertise, and approaches), typically through basic, use-inspired, applied research and prototype development activities, and commercialise these through, for example, technology transfer or partnerships with local firms which generates economic value directly. However, the contribution of technology transfer (e.g. through. spin-offs, patents and licensing) to regional growth can be limited, particularly where there is a mis-match between the technologies and ideas generated by a university and the needs of regional economies, or where the scale of activities and actors are insufficient to achieve critical mass in a particular domain within the region (Fothergill, Gore and Wells, 2017; Kitson, 2019; Trippl, Sinozic and Lawton Smith, 2015).
- **Supporting role** – Universities can apply their knowledge-bases and related assets to support firms in the region in delivering their innovation and other business activities. This can range from providing access to university facilities and equipment to helping partners develop and test prototypes, to training and workforce development, identifying new innovation opportunities, providing support for accessing export markets, and solving technical problems hampering partners' existing innovation or business activities.
- **Boundary-spanning role** – Universities can enhance regional collaborative capacity by acting as boundary spanners or intermediaries within regional innovation systems, e.g. facilitating relationships and network links between organisations within the region and between regional and national/international organisations, equipping organisations with the skills to collaborate, or by acting as honest brokers to mitigate power imbalances.

[5] These have been explored in a 2024 blog series by Simon Collinson, Tomas Ulrichsen and Fumi Kitagawa, available at: https://blog.bham.ac.uk/cityredi/place-matters-universities-and-local-innovation-systems/, accessed 23rd December 2024. Lester (2005) also provides a valuable investigation of how universities contribute to local innovation systems.

- **Developmental role** – Universities can actively engage in the economic and social development of their regions to create and capture more value locally by strengthening regional innovative, entrepreneurial, absorptive, collaborative, and institutional capacities, and in helping to build up critical regional capitals, including for example regional innovation infrastructure, strengthening the regional skills base, facilitating access to finance for regional firms, and working to improve the quality of life and attractiveness of the region for talent and investment. This importance of this role for Smart specialisation has been emphasised (Kempton et al., 2014).
- **Transformative role** – The roles of the university in place-based sustainability transitions is currently being rethought and a number of new university models are now emerging (Kelleher, 2023; Trippl, Serger and Erdős, 2023). These suggest a range of areas to which universities could potentially contribute via KE, such as building regional transformative capacities and capabilities to develop and implement transformative innovation policy; supporting reflexive and transformative governance arrangements to mobilise and coordinate regional activities aligned with collectively agreed directions (e.g. the Sustainable Development Goals) and support collective learning; participating in cross-sectoral partnerships to tackle (supra-)regional sustainability challenges; engaging in knowledge curation to help society and decision-makers make sense of the rapidly increasing body of multidisciplinary knowledge; developing human capital with capabilities and frameworks (including ethical considerations) to engage in transformative innovation; and shaping and articulating market demand (Rinaldi et al., 2018; Trippl, Serger and Erdős, 2023).

Figure 7 Types of regional roles for universities through KE



Universities can also contribute to regional economies through a range of non-KE mechanisms that fall outside Research England's KE remit. These include knowledge spillovers arising from university core teaching and research activities, contributions to the built environment, attracting tourism, or hosting events without a KE component. Furthermore, they can contribute to regional economies even in the absence of a specific regional engagement strategy by acting

as a source of procurement and direct employment within the region which can have multiplier effects in terms of indirect and induced employment.

Regional partnerships: from enabling partners in places to transforming places

In thinking through where and how universities can deploy their KE to deliver impacts on regional economic growth and competitiveness, our dynamic comparative advantage model makes a crucial distinction between the contributions universities make through KE to specific organisations that are based in their regions ('enabling partners in places') and to the development of the wider regional system ('transforming places'). This has important implications concerning the types of partnership that universities are expected to engage in to drive regional growth.

By '*enabling partners in places'*, we refer to the organisational level contributions universities make through KE to specific partners located in the region. In particular, this recognises the continuing trend for universities to engage in KE with companies and other organisations located in their local areas (Ulrichsen, 2014).

By '*transforming places*', we refer to the system level contributions universities make to the development of the regions in which they are located over time, including through helping to build up different types of capital stocks in the region as well as helping to develop and strengthen the different types of capacities and capabilities of the region to innovate and implement growth-enhancing strategies (Ulrichsen and Kelleher, 2023). This will likely have to involve broader, more inclusive partnerships between universities and regional public and private sector organisations and civil society that can facilitate deliberative identification and prioritisation of growth opportunities, and their incorporation into shared agendas for regional development. This is currently an area of renewed focus in EU regional innovation policy as such partnerships are seen as being complimentary to and enabling of the Smart specialisation learning by discovery process (Laranja, 2022). This focus has included a shift away from efforts to build broad consensus around elusive collective strategic priorities, and towards mobilising 'coalitions of the willing' around long-term societal wellbeing goals (Pontikakis et al., 2022).

Internal and external factors shaping the choice of regional knowledge exchange roles

We must also recognise that universities' regional KE roles are shaped by a range of internal and external factors (Bonaccorsi, 2017; Kempton et al., 2021; Ulrichsen and Kelleher, 2023).

Internal factors include characteristics of the university and its faculty, staff and students (e.g. age, size, research specialisations and quality, critical mass of research in specific domains); the degree of co-specialisation between universities and regional industry; motivations of researchers for external engagement and sustainability of engagement; the presence and capabilities of intermediaries (e.g. knowledge exchange offices); and availability of resources to support regional engagement activities.

External environmental factors include the characteristics and needs of a place (e.g. level of development, development trajectories, historical legacy, absorptive capacity, innovative character, the industrial base with associated value chains and markets, geographic proximity between universities and firms), national and regional policy context (extent to which policy is determined centrally or locally), and regional development governance (type and quality of regional governance arrangements, effectiveness of multi-level governance arrangements). To

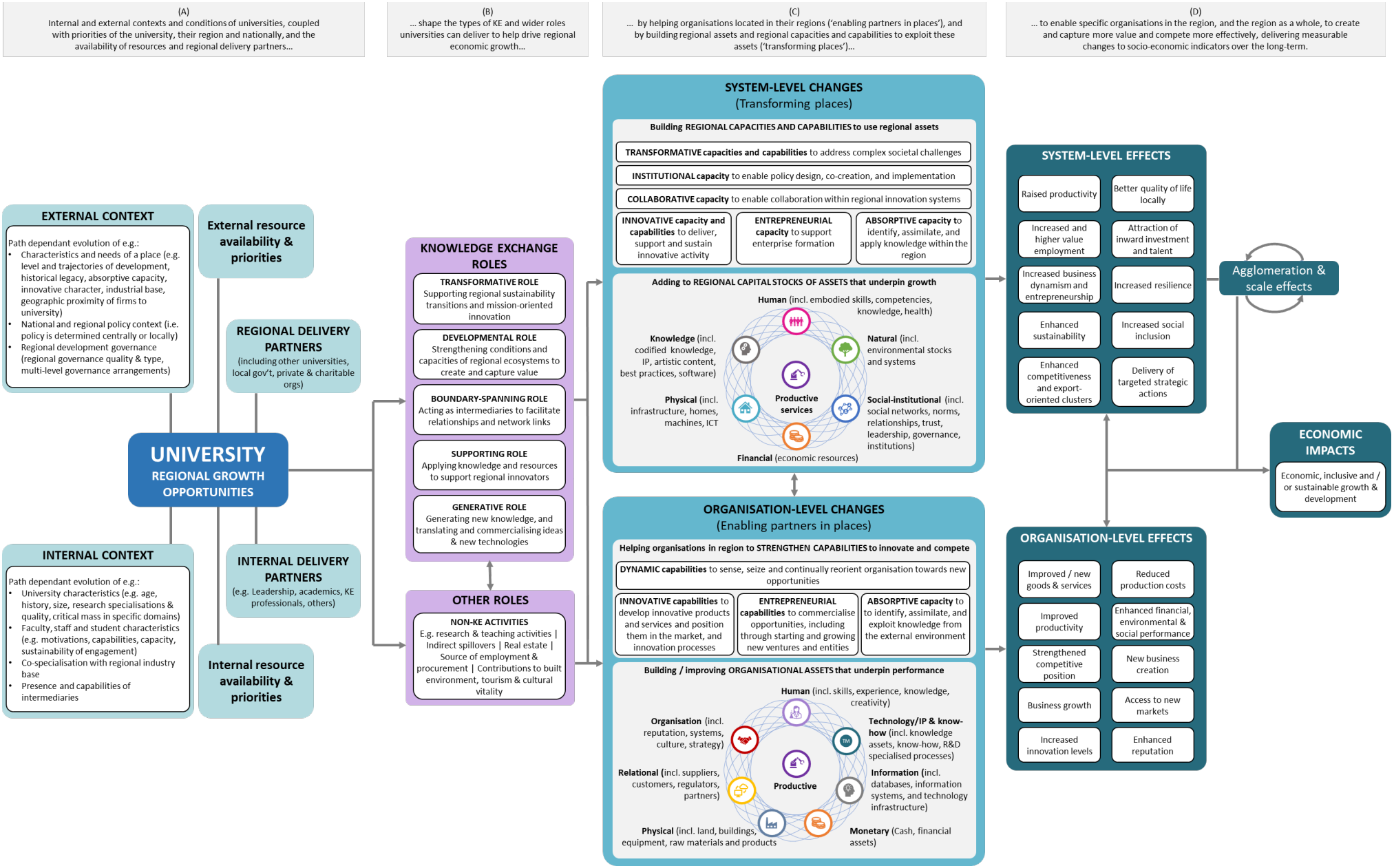
illustrate, less developed regions particularly value the place-based institutional leadership capacity building universities provide (Vallance et al., 2018), while regions lacking significant presence of large firms see universities acting to enhance collaborative capacity to benefit regional SMEs (Kindt, Geissler and Bühling, 2022).

Given the many factors that shape a university's role in their regional growth agenda, and recognising both the interrelatedness of different types of growth and that regions vary in terms of their capital stocks, capabilities, legacies, and needs, it is important that regionally focussed R&I funding instruments are designed with a precision that clarifies the types of outcomes being targeted and the engagement roles universities may be expected to play within specific regional growth strategies (Collinson and Billing, 2020; Lester, 2005).

3.4 Assembling the conceptual framework

Figure 8 brings together the various components of our suggested model for thinking through how universities can contribute to regional economic growth and competitiveness through their KE activities.

Figure 8 Detailed conceptual framework capturing university roles and contributions to enhancing regional economic growth



4 Conclusions and implications

Research England has committed to improving the data and metrics available to better capture potential and performance of universities in impacting on regional economic growth through their knowledge exchange (KE) activities. To support this effort, this UCI insights paper presents an emerging conceptual model for thinking about the different pathways through which these impacts can be realised, based on a dynamic comparative advantage perspective of regional competitiveness. In effect, it provides the backbone for a 'theory of change' to guide efforts to develop better data and metrics in this area of policy, and ultimately to deliver more targeted and effective approaches and funding programmes aimed at enabling universities to grow their contributions to regional growth.

At the heart of our model is the recognition that universities can contribute to their regions through KE both by *working to support companies and others* who are located within the region, as well as by *working to strengthen and transform the places* within which these organisations operate with the aim of increasing the potential for greater value to be created and retained within region for the benefit of its population. We further distinguish between contributions universities can make through KE to not just helping organisations and regions to build specific assets and capital stocks but also to the capabilities and capacities of these organisations and system to leverage their capitals to create and capture value within the region.

We are not aware of any datasets, except perhaps of ad hoc data collections as part of specific research studies, that are able to capture these different types of contributions of universities to regional growth through KE in a systematic and comprehensive way across all universities. The primary national KE data collection, the Higher Education Business and Community Interaction (HEBCI) survey historically collected the amount of income secured by universities from different types of KE from partners within their region, however there were questions regarding the quality and completeness of the data. It also (still) collects information on the amount of income secured by HEPs for regeneration and development programmes (once dominated by funding from the European Regional Development Fund and other European funds). The Knowledge Exchange Framework (covering England only) also seeks a narrative statement from universities capturing how they contribute to local growth and regeneration. These are rich with detail but are hard to compare across universities. Significant effort is therefore required to identify where more systematic data would be beneficial and for what purposes, and how such data could be collected.

The insights and evidence that underpinned the development of the model also pointed to several key issues that national funders of university KE seeking to enable regional growth should consider as they look to develop new funding programmes in this space. This includes being clear about the types of growth being targeted (for example economic, inclusive and sustainable growth) and the complementarities and contradictions between different objectives. Significant effort is also required to translate the overarching objective of increasing regional growth into more concrete building blocks where more tangible targets can be developed. There are also

significant challenges – particularly in the UK given its very complex and fragmented sub-national geographies – in enabling synergies, as well as managing conflicts, between different levels of national-to-local governance structures.

Considerations also need to be given to:

- Whether funding programmes and allocation approaches should be 'neutral'– i.e. incentivising innovation in general without prioritisation of technologies, fields, sectors or populations of firms where it is regarded as insufficient – or non-neutral (as in the case of Smart specialisation)
- The relative benefits and disadvantages of adopting place-based, place-sensitive approaches, or other approaches.
- Ensuring that approaches mitigate against policy lock-in and local policy capture by groups with misaligned interests.
- How a regional growth-focused KE funding programme is dependent on, aligns with, and enables, other policy domains and government priorities.
- How to deal with the significant complexity of regional economies and the many ways through which universities, often working with partners, can contribute.
- How to monitor and evaluate the effects and impacts of KE funding programmes in this space, given the significant complexity and interdependencies that exist.
- How strategic learning by universities and within the system can be enabled and enhanced through data sets and metrics to drive improvement in how regional economic growth contributions are delivered.

In conclusion, universities have the potential to play a significant and transformative role in their local economies, working with partners to increase regional economic performance. Given the many challenges we face as a nation, it is imperative that we provide the support and resources needed to unleash this potential. In doing so, we need to ensure we have the data and evidence need to create well targeted and effective funding programmes and incentives, to drive learning with the system, and to ensure progress towards strengthened regional economic performance is being delivered.

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