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Knowledge exchange and place: A review of literature



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Executive summary

About this study

This is an exploratory study, commissioned to develop an understanding of the way(s) in which the knowledge exchange activities of higher education providers (HEPs) and place interact.¹ This includes examinations of if and how place drives particular knowledge exchange activities, and what the potential place impacts of knowledge exchange might be. The work is intended as a think piece to inform the design of the method for the next full evaluation of the Higher Education Innovation Fund (HEIF). The literature review covers both academic and grey literature in order to examine definitions of place in economic policy, the shifting (place) focus of policy, the role of higher education providers (HEPs) in their local and regional settings, and types of knowledge exchange policy and activities that may lead to place impacts.

Key findings

This review of literature has highlighted a number of points of discussion related to the interactions between place and knowledge exchange, but has also found limitations in the literature. While the role of HEPs in their regional and local systems is well-founded, the literature review finds that there is little overlap between knowledge exchange and place in terms of drivers, with more weight in the literature given to institutional characteristics in knowledge exchange activity choice.²

HEIF has never included an explicit place component, and on the basis of the literature, it is not clear that this should change.³ However, knowledge exchange occurs naturally at different levels of place, and there are indications drawn from the literature of how various knowledge exchange activities are undertaken at different scales, and the potential place impacts that these activities may have.⁴ As such, this work presents implications for the design of the future full evaluation of HEIF. Being able to capture and describe the impacts of knowledge exchange at both the highest level of aggregation and through a place lens may make the evaluative story of HEIF richer. Further work – some of which is already underway – will help to reach greater clarity in this.

HEPs play an important role in defining and delivering place-based policy, and are acknowledged as important drivers of place performance with increasing expectations to demonstrate place impacts (both economic and social). In addition to acting as providers of knowledge and skills development, HEPs evidently contribute to local agenda-setting via participation in sub-national economic governance.⁵

¹ The report addresses seven core research questions: i) How is place defined in broad policy literature?, ii) What role does place play in knowledge exchange, innovation and economic development policy?, iii) What role do HEPs have in their local and regional areas?, iv) How do knowledge exchange approaches respond to place characteristics?, v) What are the policy tools and instruments that HEPs could use to drive knowledge exchange activity in their local area?, vi) What evidence is there of knowledge exchange place impact, and how might this be measured?, and vii) What is the 'best fit' scale of 'place' for knowledge exchange activities?

² Existing place typologies in policy literature are not easily applicable to explaining knowledge exchange, and neither are typologies of innovation and knowledge exchange policy to place

³ Authors variously discuss the spatially bound and in-bound nature of knowledge, and introduction of a place component may risk adversely incentivising activity

⁴ These may be within the local area of the HEP, or in other places further afield.

⁵ For example, via representation on Local Enterprise Partnership boards or sub-groups

The contextual aspect of choosing knowledge exchange activities is still an under-explored topic. While place is important, institutional characteristics provide greater insight into the choice of knowledge exchange activities (e.g., HEP orientation, specialisms). Further work is required to understand how these aspects practically shape decisions, and to link knowledge exchange activities and institutional strategies, which would be expected to also reflect their place context.

A bottom-up review of knowledge exchange literature finds a broad range of knowledge exchange activities that have the potential to generate place effects. The scale of 'appropriate' place⁶ for the activities varies and is dependent upon the type of knowledge exchange activity. An initial mapping of these gives insight into the various spatial levels at play across knowledge exchange activity, as well as which knowledge exchange activities may operate at one or multiple levels of place. Of relevance to potential evaluation design, standard methods and metrics are used to exemplify potential place impact, which could be used in combination with other qualitative approaches. There are further caveats to measuring the place impact of knowledge exchange, including the requirement to examine existing approaches.

Recommendations for further work

Based on this literature review, we recommend a number of additional work strands that would further develop how the place impacts of knowledge exchange can be described and examined in the context of an evaluation of HEIF. These are set out below:

- Develop a bottom-up view of place and knowledge exchange. There are various avenues that could be explored for this, and initial step could be taken via analysis of broad knowledge exchange evidence (e.g., KEF evidence, HEIF returns, etc.)
- Explore how HEPs participate in sub-national agenda-setting in response to place needs. This may be undertaken via analysis of institutional strategies and/or annual reports using content analysis⁷ and primary consultation, including an examination of participation in local governance such as LEP boards
- Further research could substantiate the choices of knowledge exchange activities by types of institution, building on existing literature. As above, this could be undertaken via a combination of content analysis and consultation
- Measurement of place impact requires further attention. This may warrant an examination of how approaches to analysis of impact and attribution are resourced and undertaken in local areas (e.g., as per the Green Book and Magenta Book)
- In addition, further work would be useful to review the range of activities with place relevance from the broader SQW logic models, with associated indicators
- Primary research would help to understand the scales of place at which different types of knowledge exchange activity occurs. This may be achieved by interrogating information held by HEP knowledge exchange professionals (e.g., technology transfer offices), or microdata that underpins Higher Education Business and Community Interaction Survey returns. With the support of HEPs, postcode analysis of contracts or HEBCI microdata could provide greater granularity

⁶ i.e., the scale or level of place at which these activities and their impacts may be expected to occur

⁷ i.e., manual coding and analysis of documents

1 Introduction

1.1 This study

This exploratory study was commissioned by Research England to understand the interaction between the knowledge exchange activities of higher education providers (HEPs) and place. The work is intended as a think piece to inform the design of the method for the next full evaluation of the Higher Education Innovation Fund (HEIF). This report summarises literature on knowledge exchange and place that might inform future HEIF evaluations as well as policy developments, noting though that HEIF does not have specific place objectives. The objective of the literature review is therefore to develop an understanding of the potential place impacts of knowledge exchange activities and the context in which these are to be observed, and how place might drive particular knowledge exchange activities. During the early phase of the study, a workshop was also conducted with practitioners to test high-level ideas about how HEPs consider knowledge exchange and place.

To achieve this, the study team have conducted an assessment of academic and grey literature that covers definitions of place in economic policy, the shifting spatial (place) focus of policy, the role of higher education providers (HEPs) in their local and regional settings, and types of knowledge exchange policy and activities that may lead to place impacts.

The report aims to set out: i) What the literature says in terms of the different mechanisms through which knowledge exchange could have an impact on place; ii) Contextual factors related to the nature of place-based policy that provide important considerations for future evaluation design; and iii) Identifiable gaps in understanding within the literature and how these may be addressed through future work.

The literature review was guided by seven core research questions:

- How is place defined in broad policy literature?
- What role does place play in knowledge exchange, innovation and economic development policy?
- What role do HEPs have in their local and regional areas?
- How do knowledge exchange approaches respond to place characteristics?
- What are the policy tools and instruments that HEPs could use to drive knowledge exchange activity in their local area?
- What evidence is there of knowledge exchange place impact, and how might this be measured?
- What is the 'best fit' scale of 'place' for knowledge exchange activities?

1.2 Context for this work

This piece of work comes at an interesting point in UK policy, in which more focus is being given to place-based initiatives, and the delivery of place benefits.⁸ Literature suggests that HEPs have a role to play in the delivery of place benefits and, while there is no set definition in the UK at the time of writing, it is possible that there are ways in which this can be framed and captured. However, it is important to remember that the full evaluation of HEIF would be

⁸ Including references to place in the UK government's Research and Development (R&D) Roadmap and Innovation Strategy. These also sit in the broader context of Build Back Better and the recent creation of a Department for Levelling Up, Housing and Communities

naturally backwards-looking, and that this should not be conflated with forward-looking policy developments and communications. While HEIF has not had a specific place objective, the guidance around the funding has stressed that focussing locally (or regionally) is an important aspect of knowledge exchange due to the crucial role of close and good contacts between partners.⁹ Similarly, HEIF has long been recognised as making a significant contribution to place agendas, often in conjunction with local/regional funding sources such as European Structural and Investment Funds and other areas of matched funding.

It is in this context that the present study aims to inform evaluation design to provide evidence on the achievements of HEIF to date in relation to its effectiveness in delivering on place agendas and place-related outcomes and impacts in addition to its overall programme-level objectives.

1.3 This report

This report presents a synthesis of key literature. Each chapter includes sub-sections that directly address a specific research question. The core research question is presented at the beginning of each sub-section, with main observations detailed beneath it. The remainder of this report is structured as follows:

- **Chapter 2** examines definitions of place, the role of place in setting policy, and the role that HEPs play in place-based approaches
- **Chapter 3** examines how knowledge exchange responds to place, policy tools for knowledge exchange and innovation that are available in local areas, potential place impacts of knowledge exchange, and appropriate scales of place for knowledge exchange activities
- **Chapter 4** presents a short series of conclusions and recommendations

1.4 Glossary of key terms

The table below presents the key terms used in the literature review. Definitions are also included in the main body of text as footnotes.

Table 1 Definitions of key terms used throughout the literature review

Term	Description
Place	'Place' is an umbrella term, used in a number of different ways, and can refer to both formal administrative geographies (NUTS1/2/3, Local Authority Districts, Super Output Areas), to policy-driven constructs centred on city/city-region geographies, plus travel to work areas and other functional economic geographies or specific ecosystems (e.g., sectoral systems). Place may also refer to academic classifications that reflect policy developments, such as national and regional systems of innovation. Place also describes the focus of spatially-oriented policy
Clusters	Spatially-bound agglomerations of related economic activity, comprising economic, entrepreneurial, and technological activities in specific sectors (Bathelt, Malmberg, and Maskell, 2002; Malmberg et al., 1996)
Smart Specialisation	An approach to economic development that aims to build a concentration of competences in a locality (Foray, 2014; 2015)

⁹ Local growth and regeneration funding for knowledge exchange activities is also included in the HEIF funding formula

Term	Description
Local Enterprise Partnerships (LEPs)	Non-statutory, business-led public-private partnerships that replaced the Regional Development Agencies in England as the focus and vehicle for economic development, including a remit for innovation policy
City Deals	Agreements between a city and national government for certain decision-making powers related to economic development and growth (see: https://www.gov.uk/government/collections/city-deals)
Higher education provider (HEP)	A term to refer to universities and other higher education institutions), (e.g., conservatoires) that are on The Office for Students register for higher education (see: https://www.hesa.ac.uk/support/providers)
Policy mix	Combinations of and interactions between policies in specific settings, including place settings. A policy mix can be defined as the set of policy rationales, arrangements and instruments implemented to deliver public action in specific policy domains as well as their interactions (OECD, 2016)
Typology	Systematic classifications of types of items (e.g., types of places, types of knowledge exchange policies and policy mixes) (Uyarra, E. & Flanagan, K., 2013)
Multi-level settings	This refers to policy mixes that contain locally, regionally, nationally, and supranationally funded and enacted policy instruments
Actor	An umbrella term for individuals and organisation in policy settings
Agency	Defined as the capacity of individuals (or organisations) to act (Uyarra, E. & Flanagan, K., 2013)

Source: adapted from cited authors

2 Definitions and the role of 'place'

2.1 Definitions of place

Research question(s) addressed in this sub-section:

- How is place defined in broad policy literature?

Summary of key findings:

- Place is diverse in meaning and application.
 - Academic and policy-facing classifications that describe shifts in policy thinking and focus: Systems perspectives (incl. regions), city regions, functional economic geographies, clusters, sectoral ecosystems
- Existing place typologies in policy literature are not easily applicable to explaining knowledge exchange
 - ONS geographies are formal and functional (London boroughs, LADs, LSOAs)
 - There is some policy rationale for bespoke classifications at lower scales (e.g., LSOA), though these are statistically driven and difficult to apply to this work
 - Others describe sociological factors such as demographics (MOSAIC/ACORN), deprivation, and benchmark LA performance (CIPFA)
 - OPCS classifications (ONS) describe some useful granularity, but these are demographic and based on census information

Summary of key recommendations:

- Explore further work to develop a bottom-up view of place and knowledge exchange. There are various avenues that could be explored for this, and initial step could be taken via analysis of broad knowledge exchange evidence held by Research England (e.g., KEF evidence, HEIF returns, etc.), before examining other knowledge exchange funding

The first area of focus for the literature review is to examine existing definitions of place in the policy literature, and to seek clarity on classifications or typologies of place that could feed into a better understanding of i) how policy responses are shaped, and ii) the drivers behind which knowledge exchange activities are chosen.

A reading of the broad policy literature¹⁰ shows that the term 'place' is diverse in meaning and application. There is no single definition of 'place' in the policy literature, and 'place' is used more as an umbrella term that describes spatial levels defined by i) 'formal' geographical boundaries such as defined regions, Local Authority Districts, or Super Output Areas,¹¹ ii) specific characteristics such as functional economic geographies or travel-to-work areas, or iii) other classifications such as national and regional innovation systems, clustering, or specific sectoral ecosystems.

In order to work with this diversity of use of the term 'place', we next examined whether there were existing typologies¹² in the literature. Typologies draw together 'place types' based on shared or common characteristics, and our hope was that this would form a workable solution

¹⁰ Including economic geography and political geography

¹¹ Geographies featured in ONS datasets, for example

¹² i.e., systematic classifications of types of places

for understanding how place characteristics may drive policy choices in economic development, innovation, and knowledge exchange.

We found that place classifications included in the academic literature primarily describe shifts in policy thinking and focus. These include, for example, systems perspectives (including national and regional innovation systems), the advent of metropolitan and city-led lenses, functional economic geographies, and spatially-focused clusters and sectoral ecosystems.¹³ These describe the consideration of 'place' factors in policy design. This is described in section 2.2 (below), highlighting the ways in which place-based views of potential, and need, feed into policy design.¹⁴ This can include the role of higher education providers (HEPs) in shaping and delivering policies, but does not sufficiently explain the rationale for particular knowledge exchange approaches.

Several other typologies of place feature in the grey literature that describe characteristics of place types, and describe some useful granularity¹⁵ (Lupton et al, 2011). However, these are generally statistically driven and relate to socio-economic factors such as demographics.¹⁶ As such, these are applicable to policy choices related to, for example, tackling deprivation, and are thus difficult to apply to work focused on explaining knowledge exchange.

2.2 The role of place in knowledge exchange, innovation and economic development policy

Research question(s) addressed in this sub-section:

- What role does 'place' play in knowledge exchange, innovation and economic development policy?

Summary of key findings:

- 'Place' has increasingly defined approaches to economic and innovation policy, design, and delivery, which has implications for how knowledge exchange can be leveraged
- Since the 1990s, economic policy has increasingly focused on identifying and leveraging endogenous sources of growth (including HEP knowledge)
- This preceded several shifts in spatial focus, away from the national level to regional and then sub-national/local levels. The literature suggests that smaller spatial levels can encourage better policy differentiation, while also potentially creating fragmentation and loss of scale
- Alongside these spatial shifts, systems perspectives of innovation became more prominent (focusing on the relational aspects of innovation, including knowledge exchange)

Summary of key recommendations:

- There is no further recommended empirical work in this area

¹³ The literature around clusters sets out the spatially-bound nature of clusters but lacks an overarching definition of 'place'. However, various "cluster" subcategories are explained

¹⁴ Whereby 'one size fits all' policy is viewed as outdated, and the importance of policy considering contextual place-based factors is stressed

¹⁵ Such as ONS OPCS classifications based on census information

¹⁶ Typologies address socio-economic factors such as demographics (MOSAIC/ACORN), deprivation, and benchmark local authority performance (CIPFA)

Considerations of place and spatial factors

A review of policy literature shows that place has increasingly defined approaches to policy design and delivery, which has implications for how knowledge exchange can be leveraged. The role of place in economic policy,¹⁷ has demonstrably shifted in recent decades. The 1990s and 2000s saw the focus of economic policy moving from the nation state to sub-national approaches (Jones and Macleod, 1999). These are perhaps the first signs of moving beyond a 'one size fits all' approach to policy, taking a focus on fostering competitive advantage via the identification and exploitation of sources of endogenous economic growth¹⁸ (Porter, 1990). In economic development, particularly in Europe, these shifts focused first on the regional level (OECD 2008; OECD, 2011), and subsequently on cities and city regions (Katz and Bradley, 2013; Glaeser, 2011), and further to other functional economic geographies.

The relationship between economic growth and the knowledge generated within particular geographies is a well-published topic. Jaffe et al (1989) discuss the cruciality of spatially-bound (local) knowledge spill overs, knowledge exchange and knowledge diffusion processes to fuelling economic growth. One year later, Krugman (1990) laid the foundation for what became known as 'new economic geography' which describes the shaping of spatial economic approaches, and Porter (1990) argued that (local) clusters of economic activities were a driving force for the national economy, highlighting the interaction between knowledge and place as critical determinates of national prosperity. Later still, Glaeser et al (1992) laid the foundation for literature that examines how the characteristics of cities influence economic growth, and Scott (1998) argued that different types of places can influence and underpin growth via their influence on the development of technologies.

Definitions of place and its role in policy

As set out above, 'place' refers different various spatial scales (local, regional, national, supranational) with many different units used to define and describe this. Units are designed for specific purposes, and authors in the policy literature discuss the 'appropriate' levels at which economic and innovation policy should operate.¹⁹ As the focus of policy moved away from the national level to the sub-national, the role of place is balanced with a number of considerations. These include scale, in terms of both ensuring critical mass of assets such as HEPs and innovation-active firms (Saxenian, 1996; Goddard et al., 2013; IPPR and the Northern Economic Futures Commission, 2012), and the ability of policy makers and actors to be responsive to differentiated needs and opportunities (Bentley et al., 2010; Goddard et al., 2013; Shaw and Greenhalgh, 2010). Discussions in the literature show a focus on the region, (Edquist, 2001) to increasingly more narrow geographies, including a focus on cities and city regions as engines of growth (Glaeser, 2011; Katz and Bradley, 2013). Shifts in spatial focus are in parallel to shifts in innovation processes that have implications for knowledge exchange²⁰ (Smits, Kuhlmann and Shapira, 2012).

¹⁷ How geography plays into the formation and delivery of economic policy, including policy for innovation, under which knowledge exchange can be grouped

¹⁸ Including HEP knowledge, research and specialisms, allied to industrial characteristics

¹⁹ This includes functional geographies and political and statistical units

²⁰ The emergence of the Systems of Innovation school of thought focuses on the geographical, institutional and cultural contexts. Part of the rationale of the Systems of Innovation heuristic is the argument that innovation dynamics are not linear as previously envisaged (i.e., investment in, output out), but rather a series of relationships operating in an embedded fashion among specific geographical, institutional and cultural contexts (Nelson, 1993). As such, where innovation policy would have traditionally focused on a 'linear model', more recent innovation policy approaches start from a systemic approach focusing on multiple factors, institutions and relationships (Smits,

Regions²¹ have been a major focus of place-oriented policy in the UK and beyond, and remain a prominent basis for policy in both Europe and the broader OECD nations²² (Uyarra and Flanagan, 2013; Morgan, 2013). The literature highlights several reasons for this. Cooke, Boekholt and Tödtling (2000) describe regions as the optimal scale for economic policy, as there exists a sufficient agglomeration of assets while offering the ability to be differentiated and reactive in approach. An earlier article by Morgan (1997) introduces a number of considerations related to innovation policy in regions. First, is the suggestion that innovation policy at the regional scale can react to the specific nuanced issues in the region (ibid.). For reasons such as these, Cooke and Morgan (1998) argue that policy is better tailored to the regional level, designing, co-ordinating and organising policy via, for example, shared characteristics, industrial heritage and challenges. The appreciation of regional differences gave rise to the emergence of specific regionally-oriented innovation policy (Asheim and Coenen, 2004; Boekholt, 2012), with significant attention given to regional level dynamics. While some authors such as Bathelt have disputed this as the best approach (cf. Asheim and Coenen, 2004), there appears to be a broad-based consensus in Europe and other OECD economies that the region is the most appropriate level for policy that is interactive, focused and differentiated. The role of regional policy in Europe is strengthened by the advent of European Research and Innovation Smart Specialisation Strategies (RIS3), and the OECD has often argued for giving (more) agency to regions (2008; 2011).²³ Smart Specialisation and similar approaches are described in section 2.3, below. The regional focus for policy exemplifies the shift in policy to respond to place characteristics in more differentiated ways than was possible at the national level.

Furthermore, the literature details additional narrowing of the spatial scope of economic and innovation policy. Since the beginning of the 2010s, several studies were published on the role of the city in driving economic growth. Two famous examples, the Brookings Institute's Bruce Katz and Jennifer Bradley's "Metropolitan Revolution" (2013) and Harvard Economist Ed Glaeser's "The Triumph of the City" (2011), have been cited in US and UK policymaker discourse. For example, in 2012 the Financial Secretary to the Treasury, the Rt Hon Greg Clark, spoke at the launch of the second wave of UK City Deals. In this speech, Dr Clark specifically cited Glaeser's work, stating that "cities are the building blocks of the global economy" (UKPOL, 2015). Around the same time, in the UK, the development of City Deals,²⁴ Local Enterprise Partnerships (LEPs)²⁵ and Devolution Agreements are representative of a similar emerging focus on the role of cities and city regions in driving economic growth (City Growth Commission, 2014). Examinations of the role of HEPs in non-metropolitan areas appears to be more sparse in the literature. However, some authors point to a perceived higher level of dependence of rural communities on HEP investments in an educational context (Thompson, 2014). In a global

Kuhlmann and Shapira, 2012). Systems of Innovation focuses on relational aspects, but has latterly been criticised as being too static and based on a narrow focus that ignores links and networks outside of the (local) areas in view (Uyarra and Flanagan, 2013).

²¹ NUTS1 geographies, which in England are: the North East, the North West, Yorkshire and the Humber, the East Midlands, the West Midlands, the East of England, London, the South East, and the South West

²² Various monitoring and ranking approaches have been adopted that take the region as focal point, most notably the European Commission's Innovation Union Scoreboard. The OECD, too, has been reviewing regional policy for the last decade or more, and its prominent products include Reviews of Regional Innovation Policy, and regional economic reviews and rankings.

²³ However, there was no sense of which scale this would be at, such as NUTS1 or NUTS2 geographies

²⁴ City Deals are a form of urban governance, and are agreements between a city and national government for certain decision-making powers related to economic development and growth (O'Brien and Pike, 2018)

²⁵ LEPs replaced the Regional Development Agencies in England as the focus and vehicle for economic development, including a remit for innovation policy. HEPs often play an active role in LEP structures, via representation on policy-making boards and sub-groups

context, the role of HEPs in rural areas is often linked to capacity development, community development, and knowledge infrastructure (ibid.; Pirrone, Droff, and Thouément, 2013). Other authors discuss the benefits of business support and knowledge exchange opportunities provided to small rural businesses, in order to overcome specific contextual challenges, such as an academic outreach programme reviewed by Hill et al. (2016).

While these shifts toward more narrow spatial focus was deemed suitable for differentiating policy approaches in dealing with place needs (UK Parliament, 2010), a number of criticisms are found in the literature. These criticisms can largely be grouped and presented as the following: i) Fragmentation and increased institutional complexity in the policy landscape; ii) A lack of capacity to act in the governance structures of smaller spatial areas; iii) A lack of coordination between the governance structures of smaller spatial areas and between the sub-national level and the national level; iv) A lack of influence of the governance structures of smaller spatial area; and v) And a loss of scale, required for innovation and other policy areas (Bentley et al., 2010; Goddard et al., 2013; IPPR and the Northern Economic Futures Commission, 2012; Shaw and Greenhalgh, 2010).

Outside of these formal geographies, the literature notes several other spatially-bound configurations that have been the focus of policy intervention. These include travel-to-work areas and clusters. The former may define functional economic geographies (Rae, 2017), but the latter offers some further context for the examination of the spatial importance of HEPs. Clusters are a geographical agglomeration of related economic activity, comprising economic, entrepreneurial, and technological activities in specific sectors (Malmberg et al., 1996) and may comprise companies, knowledge creators (such as HEPs), and other organisations that understand and value their interconnectedness (Bathelt, Malmberg, and Maskell, 2002; Rosenfeld, 1996; Rosenfeld 1997). Clusters, as systems of production and exploitation, have been a significant component of many national, regional, and city/city-regional economic policy for several decades (Porter, 1990; European Commission, 2002).²⁶ Clusters are an example of how identifiable strengths and opportunities within a geographical area can be framed and leveraged for economic growth. There is a clear role of HEPs across different types of clusters,²⁷ within the role of supporting and driving (place-based) economic development (Reveiu and Dardala, 2013). This role is explored in more detail in section 2.3, below.

²⁶ There are various subcategories to the definition of "clusters"

²⁷ There are a number of different definitions of clusters: A regional cluster may be defined as a geographically bounded concentration of interdependent firms, often covering a local labour market area or travel-to work area. (European Commission 2002). "Industry clusters" comprise groups of firms that share common suppliers, distributors and know-how and find advantage in a specific geographic location. Isbasoiu (2006). "Modern urban clusters", are distinguishable in that they serve large metropolitan and export markets whereas "Artisanal rural clusters", satisfy mainly local demands (Gulati 1997). Techno-clusters are high-technology orientated, and well adapted to the knowledge economy, whereas historic know-how-based clusters, are based on traditional activities that maintain their advantage in know-how over the years Isbasoiu (2006). "Dormant clusters" are described as manufacturing simple items for poor rural customers, whereas "dynamic clusters are described as locations where firms are closely networked and can enter wider, potentially global markets Sandee (2002). "Incipient clusters" are defined by their early stage of industrial development, predominant location in poor areas, producing for local markets with simple technology and labour skills, and "mature clusters" are characterised by their advancement in terms of technology and skills, oftentimes producing for global markets, with the added risk of vulnerability to global competitive pressures. (Schmitz and Nadvi 1999). "Survival clusters" and "advances mass production clusters" are defined similarly as locations where firms produce for local markets but increasingly face global competitive pressure, and in opposition "clusters of transnational corporations" are defined as being made up of technically advanced foreign firms that are located specifically in areas that draw on regional agglomeration economies, yet with limited links to local firms and institutions. (Altenburg and Meyer-Stamer 1999).

Evidence of the value of place-based investment

Despite the move towards place-based policy as described above, there is little consensus on the value of activities within place contexts (Fraser of Allander Institute, 2009). The challenge of providing unambiguous evidence of the impact of such initiatives is presented as follows in a recent study by Gibbons et al (2021): 'many governments spend large amounts of money on area-based initiatives aimed to improve economic outcomes in deprived neighbourhoods. Despite their popularity, the economic (and broader) impacts of such programmes are uncertain both theoretically and empirically'.

Nonetheless, authors highlight the importance of geography to knowledge spill overs and thus to innovation (Fischer et al., 2005), and the tendencies for industry and firms to agglomerate (Ellison et al., 2010).²⁸ Parés et al. (2014) also argue that great impact can be achieved when local governance actors are enabled to work with other local bodies in their own areas.

2.3 The role of HEPs in place

Research question(s) addressed in this sub-section:

- What role do HEPs have in their local and regional areas?

Summary of key findings:

- HEPs play an important role in defining and delivering place-based policy. HEP economic and social missions are important in economic development, including as knowledge providers, in employment, upgrading skills, etc.
- HEPs are acknowledged as important drivers of place performance in both metropolitan and non-metropolitan settings
 - Increasing expectation to have place impacts
 - Traditionally regional, but increasingly sub-national / local
 - This is evidenced in, for example, Smart Specialisation strategies
- There is a seemingly reciprocal relationship in agenda-setting
 - Inclusion and citation of HEP specialisms in sub-national strategies
 - HEP participation in governance structures

Summary of recommendations:

- Further research could explore how sub-national agenda-setting is handled between HEPs and policymakers in response to place needs. This may be undertaken via analysis of institutional strategies using content analysis²⁹ and consultation, including an examination of participation in local governance such as LEP boards

The literature shows that HEPs clearly play an important role in defining and delivering place-based policy, as well as in delivering economic outcomes for their localities. As set out above, the focus on place in economic and innovation policy was largely brought about by considerations of economic development based on sources of growth internal to the place

²⁸ The economic geography literature discusses the contribution of knowledge spill overs to local growth (agglomeration effects and concentrations of production). The literature on knowledge exchange makes an argument regarding the relational (and spatially-unbound) nature of knowledge. While these perspectives appear to be contradictory, they both describe where the effects of knowledge exchange and collaboration are felt, with many being widespread.

²⁹ i.e., manual coding and analysis of documents

(e.g., knowledge and other specialisms), plus networks of actors (e.g., public governance organisations, HEPs, firms). This wide range of actors and organisations fulfil a broad set of roles in their spatial settings (Deas et al., 2013; Pike et al., 2015). This includes a focus on the role of Higher Education Providers (HEPs) in regional economic development (Benneworth, Charles and Madanipour, 2010; Charles and Benneworth, 2001; Charles, 2003; Charles, 2006; Charles, Kitagawa and Uyarra, 2014; Gohari, Medelen and Aranya, 2019; Gunsakera, 2006; Uyarra, 2010; Power and Malmberg, 2008; Youtie and Shapira, 2008). The literature highlights a seemingly reciprocal relationship of HEPs in economic and innovation policy as: i) Subjects of place-based policy (e.g., basing economic policy around HEP knowledge); And ii) as part of agenda-setting and policy-making by participating in governance (e.g., as part of LEP boards in the UK). These are both important roles that demonstrate different aspects of knowledge exchange. We will explore these in turn.

HEP contributions to place performance: Missions and inclusion in place policies and strategies

Since the 2008 economic crisis, there has been an emergent focus on the role of universities in influencing and improving local/regional social and economic improvement (Deshpande and Guthrie, 2019; Rossi, 2018). In the UK, the 'Witty review' (2013) examined the ways in which regional economic growth could be enhanced, focusing on the higher education sector as a critical partner to local economic governance:

'Universities should assume an explicit responsibility for facilitating economic growth, and all universities should have stronger incentives to embrace this "enhanced Third Mission" – from working together to develop and commercialise technologies which can win in international markets to partnering with innovative local Small and Medium Enterprises (SMEs)'.

HEPs demonstrate the impact of their work in a number of ways.³⁰ The essential regional development role that HEPs can play has been highlighted in the literature as providing intellectual capital in the form of skills and abilities for employment, as well as ideas and knowledge more broadly (Haldane, 2018a), while also acting as hubs and spokes in bolstering the UK's economic growth (Haldane, 2018b). Valero and Reenen (2019) note the 'spill over effects' from HEPs to neighbouring areas, though further consideration of the scale at which to examine this is required.

The role of HEP knowledge and other contributions as listed above can be seen as central in the emergence of Research and Innovation Smart Specialisation Strategies (RIS3). In Europe, Smart Specialisation was a key step in promoting place-based innovation policy that is both complementary to co-developing knowledge activities, and building policy around specific regional strengths and features (Wintjes and Hollanders, 2011). Foray (2014; 2015) describes the advent of smart specialisation in 2009 as being linked to discussions on development activity and building capabilities in European regions. The genesis of this idea is described as fostering attractiveness to foreign direct investment and R&D location as part of building a concentration of competences in a locality. This gave rise to the development of the Smart Specialisation Strategies, whereby a process to enact this development is put in place (Foray, 2014) which help regions to identify the areas of greatest strategic potential in a spatial setting (Kyriakou et al., 2016; McCann and Ortega-Argilés, 2012). Smart Specialisation has been widely adopted in Europe as a building block of regional development (Foray, 2015; Kyriakou et al.,

³⁰ Including (but not limited to) community and public engagement, local growth and regeneration activities, and scientific and technological advances. These pre-exist but have recently been captured by the Research Excellence Framework and Knowledge Exchange Framework.

2016). All regions³¹ in Europe have been invited to produce specific Smart Specialisation strategies that outline their regional competitive advantages and demonstrate how these will be leveraged and maximised for economic growth. The UK developed a national Smart Specialisation Strategy,³² as well as the development of individual Smart Specialisation Strategies for LEP areas,³³ supported by a specialised Smart Specialisation Hub.³⁴

Even as the UK moved away from regionally-focused policy³⁵ to more locally-focused policy, the principles of Smart Specialisation have flowed into the ways in which place-based policies are developed (Goddard et al., 2013; Peck et al., 2013; Smits, Kuhlmann and Shapira, 2012).³⁶ Prior to the introduction of the Building Back Better plan, the role of HEPs within local industrial strategies and the emphasis on their 'place' as an essential part of support for local and regional growth was aimed at harnessing the intellectual and innovative power of HEPs and to connect it with activities beyond the institution and academia (Whiteley et al., 2020).³⁷

HEP contributions to place performance: Economic effects and knowledge spillovers

The economic impact of HEPs is well-established in global literature. A study by Oxford Economics (2017) described the broad economic impact of universities, including supporting jobs in a wide range of industries, with significant contributions to Gross Value Added (GVA). The Oxford Economics report also discusses the impact of universities on the productive capacity of the UK, including providing students with skills and knowledge,³⁸ and a range of private and social returns from university R&D activity.³⁹ Another study, published by Hatch Regeneris in 2020, examined the importance of universities to their local economies.⁴⁰ The study found that universities are of critical importance to their local economies, including direct and indirect jobs, and the student and visitor economy. The study also found that universities bring higher skilled jobs and higher wages, and that the importance of universities is critical in smaller cities. The authors argue that the impact of universities is compounded when multiple institutions are found in one place. Other studies, including an examination of the economic impact of the University of Oxford (Conlon et al., 2021) discuss economic impacts such as (net) research-related income and productivity spillovers. Focusing on the impact of the university's knowledge exchange activities, the authors (ibid.) discuss intellectual property income (e.g., licensing), the activities of university spinouts, and the activities of companies located at various university facilities such as science parks. Other authors suggest impacts of research universities on the local economy such as attracting firms, clustering, and agglomeration effects (Kantor and Whalley, 2009). Audretsch et al. (2003) found that the presence of universities influences the location choices of firms, geographical proximity as a location strategy deemed important in accessing and absorbing knowledge spillovers, with an effect on firm performance.

³¹ Generally based on NUTS1 geographies

³² See: <https://www.gov.uk/government/publications/smart-specialisation-in-england>

³³ See, for example, Greater Manchester: <https://s3platform-legacy.jrc.ec.europa.eu/regions/UKD3/tags/UKD3>

³⁴ See: <https://s3platform.jrc.ec.europa.eu/en/w/smart-specialisation-hub-for-england>

³⁵ Again, based on NUTS1 geographies, and developed/delivered by the regional development agencies prior to their abolition in 2012

³⁶ For example, the LEPs formulate Strategic Economic Plans, which set out local strengths and opportunities for growth.

³⁷ In terms of knowledge exchange, research, and skills

³⁸ Estimated in the report as boosting the UK's human capital stock by an £63bn in 2014/15

³⁹ Estimated in the report as amounting to £28.9bn GVA

⁴⁰ See: https://www.ucu.org.uk/article/10922/New-study-demonstrates-huge-local-economic-impact-of-universities?_ga=2.74239316.714931005.1634824617-1217355618.1634824616#citydata

Looking globally, Valero and Van Reenen (2019) examined the presence of universities in 1,500 regions across 78 countries since 1950. Their analysis found that "increases in university presence are positively associated with faster subsequent economic growth" (p.25), with a doubling of the number of universities correlating to a 4% increase in Gross Domestic Product (GDP) per capita.⁴¹ Valero and Van Reenen (ibid.) also found that there are spillovers of the benefits of university presence to neighbouring regions. In this context, intra- and inter-regional knowledge spillovers are regarded as a central mechanism that supports endogenous growth. Traditionally, knowledge spillovers have been regarded as spatially bounded with studies focussing on the role of geographical proximity (Döring & Schnellbach, 2006). From this perspective, inter-regional knowledge spillovers can be understood as those that enhance knowledge creation in the 'home' region as well as neighbouring regions and is has been assessed through the effect of R&D expenditure on patent activity (Greunz, 2005). More recently, however, studies have demonstrated the importance of non-spatial dimensions of knowledge spillovers such as technological (Kijkek & Kijkek, 2019) and institutional proximity (Kalapouti & Varsakelis, 2014; He, Zhu, Hu & Li, 2018).

HEP contributions to place performance: Participation in place governance

In addition to leveraging HEP specialisms in place strategies as above, relationships between public governance and HEPs are anticipated to have been developed or maintained through the participation of representatives in the LEP boards (Meegan, Kennett, Jones, & Croft, 2014; Pike et al., 2015). Research studying these relationships is concerned with the role of governance organisations and the ways in which they help to deal with complexity by bringing together actors and organisations across their systems. There is limited visibility of the degree of participation by HEP representatives on LEP boards across England, though research of three LEP areas in the North of England (Wain, 2021) found that in two of the three cases, senior HEP leaders were active participants in the LEP board. In all three cases, HEP representatives were involved in thematic LEP sub-groups. The research found that the presence and co-ordination of such leadership in LEP boards was an important factor in the LEPs' effectiveness to design and deliver appropriate policy for their local areas. More research would be required to gain greater visibility of HEP participation (such as examining individual LEP board memberships via public information) and examining KEF and HEIF evidence might provide better evidence on the scale and nature of these contributions.

⁴¹ After controlling for regional fixed effects, regional trends other influences

3 'Place' drivers of knowledge exchange

3.1 Knowledge exchange approaches in response to place characteristics

Research question(s) addressed in this sub-section:

- How do knowledge exchange approaches respond to place characteristics?

Summary of key findings:

- There is little overlap between knowledge exchange policies and place
 - Typologies of policy are academically descriptive, and related to 'needs': Funding, intermediation, governing, training
 - Other combinations of policies and activities are seen as being in response to structural characteristics, which are often national in scale: Macroeconomic conditions, level of socio-economic development, R&D intensity, industrial specialisms.
 - These may be more broadly applicable (RDAs worked on this basis in a more business-focused view of innovation)
- The contextual aspect of choosing knowledge exchange policy instruments is still an under-explored topic, but place is important
 - Knowledge is not spatially constrained, though there are mixed views on this in relation to knowledge exchange (localised processes, industrial activities / dynamic, 'unbound' nature of knowledge)
 - Choices of knowledge exchange activity relate more to institutional perspectives and classifications (HEP orientation, specialisms) than place, but more work is required to understand how these practically shape decisions. It is unlikely that this will be found in written documentary sources, meaning that primary research will be required in the form of consultation with HEPs. Analysis by KEF clusters may bring further clarity, for example examining all HEPs in a region across many clusters, to see whether their place shaped decisions irrespective of types of HEP
- Aspects of institutional characteristics and developments are path-dependant, meaning that organisation developments (such as aiming to grow an institution) impact choices of knowledge exchange approaches. This similarly requires more primary research to understand

Summary of key recommendations:

- Further research could substantiate the choices of knowledge exchange activities by institution types, including across regions. As above, this could be undertaken via a combination of content analysis and consultation

Place characteristics and HEP roles

As part of the institutional fabric, HEPs play into their place settings in a number of ways (see section 2.3, above). As established in earlier sections, the presence of HEPs correlates to positive economic effects and knowledge spillovers for their immediate and neighbouring local economies. As also reflected on earlier, authors have discussed at some length the ways in which universities affect local and regional development, and the role of universities in developing and strengthening the knowledge economy. This extends to the stimulation of innovation and economic growth through knowledge exchange, including commercialisation and technology transfer, but also other modes of engagement and 'hidden' connections (Hughes and Kitson, 2012). Lester and Piore (2004) discuss the 'public space function' of HEPs,

characterised as a distinctive role in which interested parties are able come together to collaborate, ranging from forming/accessing networks, to influencing research directions by identifying common problems and setting standards, through to setting up centres.

Authors point to a variety of ways in which HEPs engage in place and regional development, including economic, social and cultural development (OECD, 2007) and in rural development (Ward et al., 2005). The 2007 OECD review notes that the role of HEPs in relies on a number of factors, including the characteristics of the institutions, the regions in which they are located. One such issue is the level of development of a region (e.g., lagging regions) or the institutional maturity of the area, which influences engagement with governance actors (OECD, 2007). In former case there is an expectation of greater transaction costs in developing the innovative capacity and the knowledge economy of less-developed regions (Feldman, 2014), and a greater need for universities to 'go beyond' their missions (Thomas, Faccin and Asheim, 2020). In the latter case, where there is a lack of capacity or capability of local governance actor to work effectively with universities, this introduces an opportunity cost.⁴²

Approaches to knowledge exchange: Policy perspectives

In order to understand how knowledge exchange may respond to place characteristics, we examined typologies of policy mixes⁴³ for innovation and knowledge exchange. This examination was only partly useful as the literature addressing policy combinations for knowledge exchange tends to focus on a more generic picture.⁴⁴ These articles discuss the implementation of relevant policy instruments over time, with little mention on the interactions between or particular priorities among them. Using OECD data on policy mixes, Russo and Pavone (2021) categorised combinations of policy for innovation and knowledge exchange as four main types: Funding; Intermediation; Governing; and Training. This positions policy mixes that respond to certain needs, albeit none that are place-specific. Another recent paper by the OECD (2019) states that policy mixes should reflect institutional and structural characteristics. Those in consideration in the article are national in scale, though some may be applicable to lower spatial scales as discussed in sections 2.2 and 2.3, above. These include: The level of socio-economic development, R&D intensity, Industrial specialisation, and characteristics of HEPs and public research institutes. Further investigation of the transferability of these factors can be explored in the next iteration of this report.

Despite the above criteria for designing a policy mix, a broader review of literature finds a potential disconnect between the academic literature and practice. The innovation and knowledge exchange policy instruments used in Europe are largely similar irrespective of the country, with differences primarily seen in prioritisation and organisation (Munari et al 2015; OECD, 2019).

An important consideration that transcends levels of place is that existing (and prior) policy mixes in place determine the success of new policy instruments. The nature of interactions between instruments is a crucial factor in this success (OECD, 2019; Halme et al 2019). Several

⁴² Barriers to 'purposive' regional engagement discussed in the OECD review tensions between prescribed national and regional roles where HEPs see themselves as autonomous actors, lack of fit/alignment between HEP disciplines and the needs of local employers

⁴³ Policy mixes refer to combinations of and interactions between policies in specific settings, including place settings. A policy mix can be defined as the set of policy rationales, arrangements and instruments implemented to deliver public action in specific policy domains as well as their interactions (using an OECD 2016 definition). The interactions, synergies and trade-offs between the instruments are central to the concept (Ecker et al 2019)

⁴⁴ In terms of policy instruments and initiatives concerning knowledge exchange, much of the literature tends to rely on the data and taxonomy created by the EC-OECD STIP Compass.

case studies in the literature highlight that at the national level, policy mixes in different countries are oriented systematically according to long-term national goals (Halme et al 2019; Ecker et al, 2019; Spilioti et al, 2019).

Approaches to knowledge exchange: Institutional perspectives

In order to address the relative lack of explanatory power when examining typologies of knowledge exchange policy, we now look to the institutional perspective to gain more insight into the choices of HEPs in pursuing certain types of knowledge exchange.

While regionally-engaged HEPs are seen as critical to regional economic development, there is general concern that teaching and research within them is not sufficiently aimed at responding to regional needs (Chatterton & Goddard, 2000). With regards to industrial innovation specifically, universities and their knowledge transfer activities have increasingly been regarded as 'untapped' sources thereof in the UK (Decter, Rose & Cave, 2010). The role of governmental policy regarding the contribution of HEPs to spatial impact is therefore emphasised, as recent work into the organisation of strategic planning in Brazilian universities suggests that the influence of both internal and external stakeholders including upper-level management, government departments, and external audit bodies, play an important role (Falqueto, Hoffman, Gomes & Mori, 2019). This is in line with prior work by Fumasoli and Huisman (2013) who conceptualise the deliberateness of institutional positioning within HEPs as a balance between a HEP's capability to intervene in its environment and governmental policies.

Within the literature on university contributions to regional development, multiple conceptual models have been developed of which the entrepreneurial university model, regional innovation system (RIS) model, mode 2 university model, and the engaged university model are the most prominent (Tripple, Sinozic & Lawton Smith, 2015). The idea of the entrepreneurial university presents the university as an incubator providing an environment in which entrepreneurial initiatives in the wider community are supported (Guerrero, Urbano, Cunningham & Organ, 2012) including undergraduate entrepreneurship within regional ecosystems (Schmidt & Molkenin, 2015). More critical views have ascertained that while networks between universities and business communities are growing, it remains challenging to establish a causal link between improved regional competitiveness and developments in knowledge-based infrastructures (Huggins, Johnston & Steffenson, 2008). Other perspectives have focussed on the university-government relationship within the triple helix model. In the UK, work on the relationship between TTOs and regional development agencies (RDAs) has demonstrated the value of targeted policy and funding for the development of TTO-RDA mechanisms and more closely aligned performance measures (McAdam, Miller, McAdam & Teague, 2011). Indeed, Vega, Chiasson and Brown (2010) found that universities, at times, take on the role of governments and exercise considerable discretion when it comes to the implementation of policies in the context of enterprise innovation.

Strategic management is an essential part of HEP operations, especially due to the modern diverse missions of HEPs. Research on HEP strategies indicates that HEPs often develop a strategy in reaction to external forces like reforms in the higher education system, international comparisons (rankings), and others (Giuri et al., 2019). Strategic planning is relevant also for the HEPs' approach to knowledge exchange activities. However, specific research on the subject and understanding of how different institutions approach it is scarce and has largely focused on the teaching research mission rather than the third mission (Giuri et al., 2019; Hayes Tang and Wilton Chau, 2020). Newer research such as that conducted by Giuri et al. (2019) attempts to go beyond this by examining the drivers for HEP strategies related to knowledge exchange. The authors (ibid.) found that HEPs differ significantly in resources, experience, research

orientation, location, culture, national and regional socio-economic contexts, etc., therefore there is no uniform strategy towards knowledge exchange. Drivers for the choice of strategic orientation (income generation, service to faculty, or economic development) were characterised by with institutional characteristics more than other factors. We are aware of only this study that explicitly analyses the actual strategies of HEPs and assesses how knowledge exchange strategies differ between different types of universities. This study surveyed 178 HEPs in Europe, and found that 'generalist' and 'low prestige' HEPs mainly focus their strategy on local development while 'specialised' and 'prestige' HEPs orient their knowledge exchange strategies towards income generation. For this study, specialist universities are defined as those focused on applied sciences, while generalist HEPs provide a wide range of courses that span several disciplines (Giuri et al, 2019).

Similar to arguments set out in section 2.3, above, numerous studies have explored HEPs' knowledge exchange activities focusing on location characteristics. Focus on the role of HEPs in the regions within which they are located is based on the assumption that collaboration with other regional actors can change the overall development of that region (Benneworth et al, 2017). For example, a study of UK HEPs found that "academics in uncompetitive regions are more intensively engaged in entrepreneurial activities but generate less income from them than their counterparts in competitive regions, suggesting that there are differences in the income-generating capacity across regions. On the other hand, academic knowledge is found to be more strongly bounded within a certain distance in uncompetitive regions whilst geographical distance seems less of a hindrance to academics in competitive regions. (Zhang et al, 2016). Other research (e.g., Cash et al, 2010) highlights the specific mechanisms applied by HEPs to support strategic focus on the region's economic growth. For example, HEPs adapt administrative infrastructure, align teaching, research and knowledge exchange activities with the region's economic development objectives, and strengthen partnerships with regional industrial stakeholders.⁴⁵

While proximity might be an important rationale for the HEPs' strategic decision making, a 2008 report to the ESRC analysing knowledge exchange from the perspective of UK businesses concluded that this is more relevant for small companies, while larger and well-resourced businesses tend to seek world-leading expertise in their interactions with HEPs regardless of location (Abreu et al, 2008). Other more recent studies (e.g., Brown, 2016) focusing on peripheral regional innovation systems are also somewhat critical of the high policy expectations towards the HEP role and potential contribution to the development of regional innovation systems because of a perceived serious disconnect between the HEPs and other players of the respective regional innovation system. Zhang (2018) argues there is evidence that demonstrates that the most research-intensive universities possess stronger networks with external organisations because high quality research attracts industrial partners looking for expertise regardless of the location, as noted above.

Research on the regional role of HEPs highlights ways in which how knowledge exchange activities align with HEP teaching and research missions. Some studies argue that a strategic approach to the local economic development role is fully compatible with excellence in teaching and research (Lester, 2005). More recent research points to different strategic motivations of the HEP. For example, Benneworth et al. (2017) argue that different motivations and considerations might guide support or (lack of it) for the HEPs' contribution to the region. For example, senior leaders often promote contributions to regional development and

⁴⁵ It should be noted that the discussions of income generation are a reflection of the investigated literature. Other, broader discussions can be found regarding of using income generation as a proxy for impact

encourage strategies that support this. However, it is also reported that senior leaders might strive for more internationalisation and avoid local profiles. Case studies in the Netherlands, Norway and Finland demonstrate some 'internal-to-region' drivers, for example, regional actors' expectations or student recruitment support strategies lean towards regional contribution (ibid.). However, other external drivers like international competition for talent, funds and academic freedom can be equally relevant and might be in tension with regional development focus (ibid.). Also, the above cited report authored by the ESRC concludes that HEPs themselves are not homogeneous institutions, and different organisational units or even individuals might have different perspectives on knowledge exchange (Abreau et al, 2008).

Zhang (2018) analysed the knowledge exchange activities of 133 UK universities and compared two periods of time (2003-2004 and 2012-2013) using HE-BCI survey data and distinguished between established and new universities, and universities in uncompetitive and competitive regions. The study found that established universities perform better in generating income, and universities in the two regional groups do not demonstrate a significant difference in income levels. The author of this research thus concludes that the institutional characteristics of universities influence the performance more than the location (Zhang, 2018). Hayes Tang and Wilton Chau (2020) examined the patterns of knowledge exchange engagement in HEPs in Hong Kong, noting that this was driven by institutional development and capacity building, but was informed by individual institutional history. These findings taken together suggests that there is more explanatory power in examining knowledge exchange activities by types of HEP, including orientation and other characteristics. In the UK, this could be undertaken via an analysis of the Knowledge Exchange Framework clusters⁴⁶ (including an examination of any differences across clusters within regions).⁴⁷

To summarise, although there is widespread understanding that knowledge exchange should be subject to careful strategic considerations, existing literature on how different HEPs approach this is limited. Most academic research has focused on the regional universities or the role of the universities in regions and how this relates to the knowledge exchange mission. There appears to be a common understanding that HEPs can contribute to developing the region. However, the relationship to broader strategic perspectives on knowledge exchange can also be problematic if these strategic objectives conflict. The limited evidence demonstrates that universities tend to develop their knowledge exchange strategies and activities to best contribute to the needs of a particular region. However, it may be that HEPs associated with specific regions choose to support knowledge exchange based on research excellence and the potential for knowledge exchange with actors beyond the region. According to the (scarce) empirical evidence, the latter appears to be the case for specialised, established, and prestigious/higher-ranked universities.

Institutions and complexity

While this review has been able to comment to an extent on HEPs' strategic objectives and gain an indication of some potential drivers, HEPs are often large multi-scalar organisations (OECD, 2007). This raises further questions on the intention behind strategies and how they translate to action. The nature of HEPs makes tracking the underlying strategic intent and

⁴⁶ See: <https://re.ukri.org/documents/2020/knowledge-exchange-framework-clustering-and-narrative-templates/>

⁴⁷ The full evaluation of HEIF could add valuable evidence on this, substantiating the robustness and efficacy of how HEPs make decisions and whether they optimise impacts, including taking proper regard to place

subsequent actions difficult, even at the level of a particular area such as knowledge exchange.

The OECD review cited above (2007) questions whether universities should set themselves such a broad range of tasks when considering their developmental or regional roles and contributions, though others argue that organisational strategies have become important in increasingly competitive and complex environments (Pucciarelli and Kaplan, 2016). While Pucciarelli and Kaplan's assessment relates primarily to positioning the organisation in a market sense, this is also relevant to positioning the organisation alongside policy priorities, for example.

Though there appears to be little literature on the empirical translation of strategy to action within HEPs as complex organisations one article offers a sense of difficulty in this area. Examining universities in Brazil,⁴⁸ Meyer Junior et al. (2018) note tension between macro intentions (management/strategic level) and micro actions (academic level). The authors found organisational complexity and the professional autonomy within academia to be among factors leading to this tension. There appears to be no overtly critical aspect to this observation, simply that micro actions by academic professionals that represent strategies, taking the form of derived from spontaneous and ad-hoc initiatives. This may be mirrored more broadly in areas such as knowledge exchange, though more research will be required to better understand this.

3.2 Policy tools and instruments for knowledge exchange and innovation in local areas

Research question(s) addressed in this sub-section:

- What are the policy tools and instruments that HEPs could use to drive KE activity in their local area?

Summary of key findings:

- Instruments for knowledge exchange can be situated within broader innovation policy
- Many policy instruments are not place-based in nature, but may be used as part of policy mixes to respond to specific needs and market failures

Summary of key recommendations:

- More work is required to understand what drives the choice of instrument(s) and activities, which may include the interrogation of institutional strategies and annual reports, and/or primary research to consult HEP managers

Policy for knowledge exchange is part of broader innovation policy, which itself has a broad dedicated literature. In this broader innovation policy literature, authors discuss the ways in which policy for knowledge exchange responds to certain needs and market failures (Bryan and Williams, 2021; Martin and Scott, 1998).⁴⁹

⁴⁸ Nothing comparable was found in the UK or European context during this review

⁴⁹ Market failures may include financing/cost-related issues, information inequalities, and other externalities. There may not be place-specific in nature, though may form part of place-based responses

The literature details a long-standing case for investment to support knowledge exchange, with several high-profile examples.⁵⁰ Drawing on a broad range of literature, authors describe a number of types of innovation policy designed to overcome market failures and other structural issues (Boekholt, 2012; Dolfma and Seo, 2013; Edler et al., 2013; Edler and Georghiou, 2007). These include both demand side policy (e.g., innovation vouchers, procurement schemes), and supply-side policy (e.g., direct and indirect financial support to firms) that may be at the disposal of sub-national actors, including HEPs.⁵¹ The 2009 report by PACEC/CBR that evaluates third stream funding of the (as-was) Higher Education Funding Council for England clearly sets out the case for HEIF in the context of innovation literature and demonstrated market failures, citing many of the core authors within that literature. While these are not place-specific in nature, their application may be tailored to place characteristics.⁵²

Over and above this, there is also investment to support the conditions for knowledge exchange. Authors find that the extent and success of knowledge exchange depends on broader conditions. A 2016 report from the National Centre for Universities and Business (NCUB) noted how knowledge exchange has demonstrably declined when economic conditions were less favourable. In this regard, the market for knowledge exchange and enterprise development between HEPs and business (including start-ups) may require some intervention to ensure the connections do not falter and can develop towards something sustainable.⁵³ This investment may also include capacity-building to support the development and professionalisation of HEP knowledge exchange offices.⁵⁴

⁵⁰ Substantial investment has been made in the UK towards interventions and programmes that support knowledge exchange activity. This includes the establishment of two cohorts of University Enterprise Zones (UEZs), and investments in English university knowledge exchange through annual allocations of the Higher Education Innovation Fund (HEIF), project-based funds through the Connecting Capability Fund (CCF), and the Research England Development (RED) fund. HEIF is seen as supporting the growth of dedicated interest and engagement with knowledge exchange in higher education (Ulrichsen, 2014) as well as acting to stimulate added-value support from outside the university sector (PACEC, 2015). While the 2017/18 Industrial Strategy uplift allocations through HEIF focussed on business-focused commercialisation knowledge exchange, HEIF also supports broader knowledge exchange. The Scottish Government established eight Innovation Centres in 2012 with a budget of £120m for an initial five-year period (anticipating a need for 5-10 years of support). These were reviewed independently at their mid-point (Reid, 2017) which led to a series of recommendations (including reducing the management reporting burdens) and advice that indicated that any growth of the centres should be absolutely needs based (in terms of the focus) rather than trying to achieve a volume of centres and extensive regional coverage. Innovate UK funded the 'Innovation to Commercialisation of University Research' (ICURe) to tackle some systemic issues that prevented the participation of higher education staff (early career researchers) in commercialisation training (Ipsos MORI, 2020), in order to aid ways in which businesses and academics can work together. In the last few years, UKRI has introduced a new approach to funding for knowledge exchange and engagement activities. Impact Acceleration Accounts (IAAs) are block awards made to research organisations to accelerate the impact of research (see: <https://www.ukri.org/news/ukri-to-unlock-research-impact-with-new-funding-model/>)

⁵¹ These exist within a 'multi-level setting', which refers to policy mixes that contain locally, regionally, nationally, and supranationally funded and enacted policy instruments. As an example, this may refer to knowledge exchange activities designed by HEPs and co-funded by local and national sources, such as HEIF.

⁵² The OECD (2011) suggests that to better design and deliver appropriate innovation (and knowledge exchange) policy, consideration should be given to the institutional context and characteristics of the particular regional or local innovation system.

⁵³ In addition, there is evident long-term interest in HEP-business knowledge exchange in the literature (Council for Industry and Higher Education, 2008) and there is evidence that universities who undertake this could support regional growth (Kitson et al., 2009). More recent research notes that co-location of HEPs and entrepreneurs helps to 'encourage creativity and ideas exchange, or to de-risk entrepreneurial activity' (Madaleno, et al., 2018). Hagen (2008) however has noted that many small and medium sized enterprises are not 'aware of the value that a close university-business relationship can bring them'.

⁵⁴ A prominent example of this is the Irish Technology Transfer Strengthening Initiative, which has run since 2007 (see: https://www.knowledgetransferireland.com/Research_in_Ireland/Technology-Transfer-Offices/)

3.3 Knowledge exchange place impact

Research question(s) addressed in this sub-section:

- What evidence is there of knowledge exchange place impact, and how might this be measured?

Summary of key findings:

- A bottom-up review of knowledge exchange literature finds a broad range of knowledge exchange activities that have potential to generate place effects. These correspond with the HEP missions, adding concrete examples of potential place impact
- Characterisation and considerations of measuring impact use standard methods and metrics
- Caveats to place impact of knowledge transfer include the heterogeneity of businesses that may look to access HEP research in terms of size and sector (for example), and the non-spatial and relational nature of knowledge and knowledge exchange. The implications of these caveats could benefit from further examination

Summary of key recommendations:

- Measurement of place impact requires further attention. This may warrant an examination of how approaches to analysis of impact and attribution are resourced and undertaken in local areas (e.g., as per the Green Book and Magenta Book)
- In addition, further work would be useful to review the range of activities with place relevance from the broader SQW logic models, with associated indicators

Characterising broad outcomes and impacts in a place-based context

The contribution of HEPs' knowledge exchange activities to place impacts can be examined from a number of angles. These can include both economic impacts, cultural impacts, and contributions to local policies and public services. Due to the availability of literature, this section of the report focuses primarily on the former. However, there is literature on the various tiers of engagement of HEPs in regional development that discusses ways in which HEPs may be embedded into the region to promote a learning environment, develop skills and build resources for competitiveness and social cohesion (Boucher et al., 2003). Similarly, the entrepreneurial university literature covers contributions to local policies and public services, including business support, conducting joint research initiatives, and collaborating on internships or apprenticeships.⁵⁵ Literature on network governance and shared or distributed leadership in which HEPs participate to advance place agendas (Liddle, 2015).

Knowledge exchange sits within the third mission of universities, as part of the economic and social mission of the university and its contribution to communities and local/regional areas (Campagnucci and Spigarelli, 2020).⁵⁶ This is often anchored in the HEPs' own localities or regions. In the economic development literature, authors have suggested that the importance of HEPs in driving regional innovation is realised through a combination of a broad range of knowledge exchange activities (as set out in section 2.3, above), with an equally varied set of key performance indicators and success measures (Huggins et al., 2008; Ankrah and Al-

⁵⁵ See, for example, the joint OECD-European Commission initiative HEInnovate for material on entrepreneurial universities: <https://heinnovate.eu/>

⁵⁶ A report by PACEC (2017) urged HEPs to consider the socio-economic impacts of their knowledge exchange activities.

Tabbaa, 2015). Elsewhere in this paper we have discussed economic impacts such as increased GVA, job creation (including highly-skilled jobs), and knowledge spillovers that influence firm location and affect firm performance.⁵⁷ Other authors argue that co-location of HEPs and entrepreneurs (i.e., within a physical space, such as university incubators) foster innovation and entrepreneurship in local areas (Madaleno et al., 2018). Taylor (2021) discusses a reciprocity between HEPs and local industry in which firms can reciprocally influence the type of (graduate) experience they require applicants to have, and students can prepare themselves by gaining that requisite experience. Other types of impacts with a place component include the 'virtuous knowledge transfer and exchange cycle' whereby a combination of spin-out and start-up activity, and HEP-led training programmes for businesses creates a pervasive enterprise culture which in turn feeds into and informs further HEP research and teaching curricula (Hagen, 2008).⁵⁸ Huggins (2008) also discusses how leading advanced regional economies have tended to develop in part because of the innovation and knowledge feedback loops between local business and HEP communities.

The studied literature presents a number of caveats to place impact of knowledge exchange. This includes suggestions that not all local firms and stakeholders are likely to benefit equally from HEP research exploitation. Not all companies can use information in a uniform way, nor can they all equally benefit from the information available. Huggins (2008) finds that locally based smaller companies, with fewer knowledge-generating resources available to them, stand to benefit more than larger firms who may have their own resources and R&D practices.⁵⁹ Johnston and Wells (2020) offer another caveat, arguing that while knowledge spillovers are viewed traditionally as spatially constrained (as per Howells, 2002), when considering the place-based potential of knowledge exchange, it is important to remember that facilitation of knowledge exchange could (or should) happen without restriction to particular locations or geographies. The authors note that national (and international) collaboration should not be inhibited by policy interventions that wishes to encourage the development of regional strengths. Other authors argue that knowledge is relational, requiring new ways of thinking about knowledge exchange (Howells, 2002; Pratt, 2014; Ward et al., 2012).

When considering potential measurement of the place impact of knowledge exchange, some authors suggest that establishing the economic impact of local or regional plans for growth is challenging.⁶⁰ A recent report by the Centre for Cities argues against this perspective, but notes that the Green Book approach could be made more user-friendly and transparent in relation to locally-led assessments (Breach and Jeffrey, 2020).⁶¹ A recent report by Arup (2020) also suggest that the refresh of the Green Book could – in this context – set the quality of evidence that is to be used in (local) appraisal, providing a stronger link with the Magenta Book. Huggins et al (2008) also draw attention to some factors that may limit the impact of university-business knowledge exchange, such as differing timeliness or language. Løkkegaard and Lykke (2016)

⁵⁷ There is a relationship between the size of high-tech industries within a local area and the amount of HEP research in the same high-tech fields, suggesting that high-tech industries are choosing to co-locate near HEPs that develop knowledge in their fields

⁵⁸ Moreover, Hughes and Ulrichsen (2019) found that commercialisation outcomes (e.g., IP or collaborative partnerships) should ideally be relevant and beneficial to industry in order to leverage investment from venture capital. This reinforces the notion that a HEP's place-based impact with regards to entrepreneurship is also dependent on external factors which are to a large extent beyond its control such as the scale of venture capital (VC) activity locally, and the changing demands of local industry (Hughes & Ulrichsen, 2019).

⁵⁹ Meaning that larger firms may be less reliant on HEP-produced knowledge

⁶⁰ By, for example, concentrating investment in already well-performing areas

⁶¹ The authors stress the importance of better resourcing local leaders to use the Green Book to its fullest in analysis for identifying local needs and solutions

refer to this as a 'cultural gap', which can inhibit interactions (especially with small and medium-sized enterprises).

Potential place-based impacts from knowledge exchange activity

This section breaks down the types of activities involved in knowledge exchange undertaken by HEPs as found in the collected literature that could specifically have a place impact. To understand the potential place impacts of knowledge exchange activities, we reviewed 51 documents across a variety of academic journals, academic working papers, and grey literature that studied HEPs and place-based policies in different localities, both in the UK and abroad. In examining these reports, we have also sought any suggestions on how to measure these effects. We have grouped nine types of activities together, presented in turn below.

Relationships and collaborations

There is a widespread consensus that networks and interpersonal relations across academia and the private sector are of critical importance for knowledge exchange and commercialisation in particular. Hughes & Ulrichsen (2019) find that investing in network activities is an effective strategy to gain a critical mass of researchers into a local cluster. In his previous work, Ulrichsen (2016) found that facilitating and developing links between HEPs and private, public and third sector organisations within the wider economy is an important tool in facilitating the full exploitation of investment in the higher education sector, largely through knowledge exchange out of academia and into industry (Ulrichsen, 2015).

Focusing on informal channels, a study by PACEC (2018) stated that interpersonal relations were significantly more useful for private sector actors to connect with academia than the more formal channels. This study, along with Hughes et al. (2016), listed people-based relations among the most important factors in successful knowledge exchange, and these are perhaps more likely to be spatially bound. Hughes et al. (2016), focused on the spaces for interactions, highlighting conferences, networks, guest lecturers, placements on advisory boards, student placements, and employee training services as sources for and outcomes of optimal networks. Furthermore, innovation hubs and entrepreneurial education providers can, through networks of relationships, facilitate collaborations between industry and universities (Taylor, 2021; OECD, 2017).

Commercialisation

The literature suggests that globally, knowledge exchange activities continue to focus primarily on the private sector through commercialisation of HEP research (Hagen, 2008; Rossi, 2018). Rossi and Rosli (2013) found that 36% of knowledge exchange activity reported via the Higher Education Business and Community Interaction (HE-BCI) survey related to commercialisation in the form of spin-outs and IP rights.⁶² ⁶³ Spin-outs by nature are perhaps more likely to be locally or regionally focused, though licensing may be less spatially-bound.

Entrepreneurialism, start-ups, and spin-outs

The literature profiles several types of institutionalised support whereby training programmes for students are implemented to establish and maintain start-ups and spinouts. A study by BiGGAR Economics (2017) details how the University of Oxford achieved 97 start-ups via provision of

⁶² This figure excludes the non-proprietary types of IP more characteristic of Arts and Humanities disciplines

⁶³ Literature suggests that the place-based effects of HEP knowledge in STEM subjects has tended to concentrate on economic and scientific effects (Rossi, 2013), while community-focused knowledge exchange tends to be a focus of social science academics (Bullock and Hughes, 2016).

active support at some stage within HEP programming. The university encouraged their students to use their knowledge and skills to form their own businesses by offering a range of programmes to assist entrepreneurs in scaling and sustaining their businesses. In addition, the University of Oxford produced more 'unicorns' (founders of £1bn value-businesses) in comparison to any other university in Europe (ibid.). Other authors discuss incentives to encourage HEP staff to form spin-outs.

The literature details that this form of knowledge exchange is predicated on human development within the university itself, including the entrepreneurial capacity of staff and students (McMillan, 2016) and may thus be locally or regionally-focused in its impacts. It is also dependent on HEPs incentivising entrepreneurs to accelerate the rate at which they form companies based on academic research (RAND, 2017), also with a local perspective. A study by PACEC (2015) found that the staff of selected HEPs had honed their skills and capacity in facilitating knowledge exchange events which, in turn, led to improved understanding by the participants and higher quality information on the corresponding solutions. As a result, the improved skills contributed to new start-ups and spinouts as well as stimulating sector growth.

Services to industry

HEPs can shape local skills and capital development in a variety of ways. Huggins (2008) found that small businesses are increasingly turning to HEPs when looking for wider services such as accelerator programmes and outreach programming. These can help local businesses to improve their knowledge of new practices and technologies. A study by the British Academy (2021) that examines place-based approaches to research funding also found that HEPs can act as brokers of knowledge between government and industry. However, the authors suggest that this is often heavily reliant on the goodwill of individuals, and is largely ad-hoc in nature (British Academy, 2021).

Access to facilities

Huggins (2008) credits the entrepreneurial spirit within HEPs in part to the knowledge spillovers available from facilities such as incubators, science parks and human development programmes. Science parks, for example, have the added benefit of being co-located on or near HEP premises, allowing HEPs to contribute to the economic benefit to the local area (ibid.). These parks aim to increase the speed of knowledge exchange and generate new links between the HEP and industry which can consist of research funding, student placements and IP.

Science parks are considered successful when they increase the rate of technological commercialisation, create employment opportunities or see firms graduate out of the science park and these are all benefits which might be achievable at a local level (ibid.). For instance, BiGGAR Economics (2017) found that Oxford City's Science Park, run by the University of Oxford met local demand for high quality equipment and laboratory office space. This contributed to retention of talent in the local labour market, helping to keep university alumni within the city following their studies, contributing to economic growth within the city and also within the region. BiGGAR Economics also found that the management of the University's assets created a number of jobs and associated GVA locally.

Human capital development: training

HEPs are traditionally viewed as producers of human capital and a skilled workforce (Valero, 2019). This can be harnessed to produce the human capital needed to advance innovation and economic growth, including at local and regional levels (ibid.). Hagen (2008) notes that the extent to which this influence can impact the local economy is dependent on the extent to which entrepreneurs can be effectively trained in order to become catalysts for

technological progress. HEPs can fill this gap to propel innovative products and services through the market economy. In particular, universities may offer executive education and training programmes targeted for improving human capital in specific regions, (ibid.). Continuing Professional Development (CPD) programmes can be especially beneficial for working professionals who can derive benefit from relevant courses

Human capital development: apprenticeships and internships

A prominent category of knowledge exchange activity found in the literature comprises internships, apprenticeships and career events with the intention of preparing students with the necessary skills to gain high-quality jobs, including in the local or regional area. A study by PACEC (2015) indicated that one of the top non-monetised benefits of HEIF was the placement of students and graduates with firms to work together, apply knowledge and solve problems.

Industry experience for students has been found to be of interest to local businesses too. One in five of the businesses consulted by PACEC (2015) found student knowledge exchange projects had helped resolve technological or operational challenges and provided a useful local talent pool for recruitment. Additionally, innovating the types of partnership models can improve the ease with which companies and external organisations identify and access necessary knowledge (Ulrichsen, 2014). Community outreach activity by HEPs in relation to entrepreneurship can also have place-based effects. For example, Taylor (2021) cites the US-based San Antonio Works programme which involved collaborations between local schools and HEPs, to broker internships, apprenticeships and career events involving both groups.

Mobility and knowledge spill overs

Neumark (2014) explored how knowledge spill overs can be created by the movement of educated workers between locations which, if undertaken with careful consideration, can increase productivity and knowledge in a local or regional areas (including interregionally) without overly decreasing productivity and knowledge in the area of origin (i.e., where a university is based). Neumark also notes that increasing worker mobility may reduce the ability for local policies to exploit human capital spill overs that may otherwise be expected, as benefits may accrue in other areas because highly educated workers tend to be more mobile (ibid.).

Community engagement

Alongside commercial activities, the literature details incentives that emerged to direct knowledge exchange towards local or regional socially-oriented activities, an area encompassing knowledge transfer and innovations to resolve diverse societal challenges (Rossi, 2013). Huggins (2008) and the OECD (2017) have talked about HEPs' potential to actively align their strategic mission statements with operational day-to-day practices that help the general public and play a developmental role in local communities. These activities, focused more on using knowledge exchange to tackle societal issues, mean that universities can make more diverse contributions to their local economies. Thematically, these contributions add to the commercial and scientific focus with contributions to culture (OECD, 2017), as well as public policy (Huggins & Kitagawa, 2012).

The ways in which HEPs engage socially-oriented issues appear to be varied and different from the more 'traditional' activities of patenting and licensing associated with commercial activity. Collaboration with external organisations in problem-solving activities include (non-commercial) informal advisory roles, consultancy services (Hughes et al., 2016), while community-targeting activities include lectures, school projects, and public exhibitions (Hughes et al., 2016; Lawson, 2016), as well as large structured projects, such as establishing community programmes, building institutions, and convening networks together aligned to the region's

needs (Huggins, 2008).⁶⁴ Hughes et al. (2016) furthermore points out that addressing societal issues via knowledge exchange activities in local areas has become more common over time, suggesting that this is sustainable.

3.4 The 'best fit' scale of place for knowledge exchange activities

Research question(s) addressed in this sub-section:

- What is the 'best fit' scale of 'place' for knowledge exchange activities?

Summary of key findings:

- The scale of 'appropriate' place varies and is dependent upon the type of knowledge exchange activity

Summary of key recommendations:

- Primary research would help to understand the spatial scales at which different types of knowledge exchange activity occurs. This may be achieved by interrogating information held by HEP knowledge exchange professionals (e.g., technology transfer offices), or microdata that underpins Higher Education Business and Community Interaction Survey returns. With the support of HEPs, postcode analysis of contracts or HEBCI microdata could provide greater granularity

Based on the groupings of knowledge exchange activity that has the potential to generate place impacts set out in section 3.3, above, we have attempted to set out the ways in which these types of activities may be measured and the potential spatial scale at which they may occur.

The table below represents a revised version of the HEP-validated list discussed in the practitioner workshops held in the inception phase of this study, and acts as a starting point that could be further developed via more primary research to understand where such activities occur empirically.

Table 2 Knowledge exchange activities with potential for place impact and spatial scale

KE activity type	KE activity that has the potential for place impact	Potential measures for place impacts suggested in literature	Potential spatial scale
Relationships and collaborations	<ul style="list-style-type: none"> • Network activities • Organisational links • (Informal) interpersonal links • (Collaborative) publications • (Citations in) institutional strategies 	<ul style="list-style-type: none"> • The number of partnerships developed with local stakeholders (e.g., through research collaboration, joint R&D activity, consultancy projects), and how diverse these are • Number of joint publications between local industry partners, and university researchers 	Local, regional, national, international
Commercialisation	<ul style="list-style-type: none"> • IP activity 	<ul style="list-style-type: none"> • IP revenues (e.g., licencing) 	Local, regional,

⁶⁴ Authors caution that community-based interventions which are shaped and delivered without the input of community members are less likely to build community leadership, resilience, inclusion and equity (National Coordinating Centre for Public Engagement, 2019). Muscat (2020) suggests educating citizens to ensure that harder-to-reach communities are participating sufficiently.

KE activity type	KE activity that has the potential for place impact	Potential measures for place impacts suggested in literature	Potential spatial scale
	<ul style="list-style-type: none"> Start-ups / spin outs Incentives for entrepreneurial activity (students/staff) Knowledge exchange / information events held 	<ul style="list-style-type: none"> New start-ups or spin outs created: The number of new start-ups and spinouts created from within the university can be counted. Turnover and employment of start-ups: Annual turnover and number of FTE and PTE can be calculated. Employment and GVA created by locally-based start-ups/spin outs Investment secured by spin-outs and start-ups: Type and amount of funding (VC, angel, personal, loan and public sector) ROI from student start-ups: ROI can be calculated based on investment within university activities to train and sustain entrepreneurial activities. 	national, international
Services to industry	<ul style="list-style-type: none"> Accelerator programmes Outreach programming Business assistance programmes (including consultancy) Improved R&D 	<ul style="list-style-type: none"> The number and quality of business assistance programmes (including consultancy) Utilisation levels of facilities and equipment-related services on behalf of industry 	Local, regional, national
Access to facilities	<ul style="list-style-type: none"> Increased rate of commercialisation (Specialist) facilities and equipment-related services 	<ul style="list-style-type: none"> Amount of space created (albeit that this is a measure which is not appropriate for HEIF) Employment: The number of FTE and PTE at the science park can be quantified and monitored annually GVA and employment associated with facility hire: Local GVA can be monitored and the number of firms using science park facilities can be quantified 	Local, regional, national
Human capital development: training	<ul style="list-style-type: none"> Education and training courses (incl. executive education and CPD) 	<ul style="list-style-type: none"> The number of participants on education and training courses (incl. CPD) 	Local, regional, national, international
Human capital development: apprenticeships and internships	<ul style="list-style-type: none"> Entrepreneurial development and industry-based placements Research collaboration (e.g., student consultancy) (Business/entrepreneurship) community outreach programmes 	<ul style="list-style-type: none"> Number of placements or collaborative projects undertaken Number of engagement/training events held: HEPs can set targets for the number of training and 	Local, regional, national

KE activity type	KE activity that has the potential for place impact	Potential measures for place impacts suggested in literature	Potential spatial scale
		engagement events with specific targeted outputs	
Mobility and knowledge spill overs	<ul style="list-style-type: none"> • Worker mobility 	<ul style="list-style-type: none"> • Nothing noted in the examined literature 	Local, regional, national, international
Community engagement	<ul style="list-style-type: none"> • Involvement in local and regional partnerships (including alignment of mission statements) • Thematic engagement (by discipline/subject) • Research collaboration and problem-solving activities • Community development support programmes (including events, public lectures, etc.) 	<ul style="list-style-type: none"> • The number of events which engage and educate members of the public • Level of university involvement in local and regional partnerships <ul style="list-style-type: none"> – The number of engagement activities occurring. These typically include: <ul style="list-style-type: none"> – Events (such as seminars, workshops, and conferences) – Networking activities (with enterprise, innovation, and research support) – Student and graduate placements – CPD (incl. staff ability to provide support) – Community development support – Public good 'facilities' • The number of institutional policies a university has in relation to community objectives • The level of enterprise support provided to the community, and its effect on entrepreneurialism within the graduate population 	Local, regional

Source: Elaboration based on literature cited in section 3.3

4 Conclusions and recommendations

This review of literature has highlighted a number of points of discussion related to the interactions between place and knowledge exchange, but has also found limitations in the literature. Primarily, the literature has allowed us to set out important contextual points that may inform the approach to the design of the next full evaluation of HEIF. We have also been able to reach an initial view of varying scales of place for types of knowledge exchange activity, which will also benefit from further investigation. However, there is little overlap between knowledge exchange and place in terms of drivers, with more weight in the literature given to institutional characteristics in knowledge exchange activity choice.

HEIF has never included an explicit place component, and on the basis of the literature, it is not clear that this should change.⁶⁵ However, the nature of knowledge exchange means that it occurs naturally at different levels of place and at different scales, including across multiple levels of place. We believe that this – and the types of potential place impacts identified – has important implications for the evaluation design, with the capture of place impacts (in addition to those at the highest level of aggregation) having potential to make the story of the value HEIF much richer. An examination of place and knowledge exchange could be developed bottom-up, via assessment of held evidence (HEP-submitted HEIF documentation, KEF evidence) and grouped by region, KEF cluster, and other characteristics.⁶⁶ More broadly, a combination of quantitative approaches (using standard measures as identified in the literature) and qualitative approaches (as suggested by SQW's 2019 work⁶⁷) could aid the future evaluation to develop a greater understanding of the types of knowledge exchange activity that is being undertaken across the country.⁶⁸

The main reflections from the sub-sections of the report are set out below, including recommendations for future work to address identified gaps.

Definitions of place

- Place is diverse in meaning and application. Academic and policy-facing classifications that describe shifts in policy thinking and focus: Systems perspectives (incl. regions), city regions, functional economic geographies, clusters, sectoral ecosystems
- Existing place typologies in policy literature are not easily applicable to explaining knowledge exchange. Most are statistically-driven, and those that offer useful granularity are demographic and based on census information
- Further work could be undertaken to develop a bottom-up approach to capturing place for knowledge exchange/HEPs, based on analysis of broad knowledge exchange evidence held by Research England (e.g., KEF evidence, HEIF returns, etc.), before examining other knowledge exchange funding. This should capture the complex web of knowledge exchange activity, and will allow cross-tabulation by location and type, and

⁶⁵ Authors variously discuss the spatially bound and in-bound nature of knowledge, and introduction of a place component may risk adversely incentivising activity

⁶⁶ This is being undertaken by Technopolis as part of a separate but related piece of work, and can be integrated here

⁶⁷ An initial assessment of SQW's logic models undertaken for this work found that the place-based aspects of knowledge exchange represent a narrower set of activities than those in the full logic models

⁶⁸ This could be fulfilled via an examination of which types of activities occur where, and how these relate to institutional and public policies and strategies.

may also allow capture of collaborations across locations. However, this should be carefully couched as descriptive of where and how money is spent, rather than as a rationale for changing funding incentives or structures. The benefit of this approach is low burden on HEPs, who will not be required to provide additional data

The role of place in knowledge exchange, innovation and economic development policy

- Place has increasingly defined approaches to economic and innovation policy design and delivery, which has implications for how knowledge exchange can be leveraged
- Since the 1990s, economic policy has increasingly focused on identifying and leveraging endogenous sources of growth (including HEP knowledge)
- This preceded several shifts in spatial focus, away from the national level to regional and then sub-national/local levels. The literature suggests that smaller spatial levels can encourage better policy differentiation, while also potentially creating fragmentation and loss of scale
- Alongside these spatial shifts, systems perspectives of innovation became more prominent (focusing on the relational aspects of innovation, including knowledge exchange)

The role of HEPs in place

- HEPs play an important role in defining and delivering place-based policy. HEP economic and social missions are important in economic development, including as Knowledge providers, in employment, upgrading skills, etc.
- HEPs are acknowledged as important drivers of place performance (traditionally regional, but increasingly local), and are increasingly expected to demonstrate place impacts. The importance of HEPs is evident in both metropolitan and non-metropolitan place contexts
- There is a seemingly reciprocal relationship in agenda-setting, via inclusion and citation of HEP specialisms in sub-national strategies, and HEP participation in governance structures
- Further research could explore how agenda-setting is handled as responses to place needs in institutional strategies via content analysis (assessment of HEIF returns and institutional, national, place-based strategies) and consultation (interviews or surveys with HEP management and other policy stakeholders)

Knowledge exchange approaches in response to place characteristics

- There is little overlap between knowledge exchange policies and place
- The contextual aspect of choosing knowledge exchange policy instruments is still an under-explored topic, but place is important. However, some authors argue that while knowledge spill overs may be traditionally spatially constrained, exploitation of knowledge should not be
- Institutional perspectives and classifications provide more insight on the choice of knowledge exchange activities (HEP orientation, specialisms), but more work is required to understand how these practically shape decisions. It is unlikely that this will be found in written documentary sources, meaning that primary research will be required in the form of consultation with HEPs. Analysis by KEF clusters (including potential spatial concentrations within clusters) may bring further clarity
- Aspects of institutional characteristics and developments are path-dependant, meaning that organisation developments (such as aiming to grow an institution) impact choices of knowledge exchange approaches. This similarly requires more primary research to understand

- Further research could substantiate the choices of knowledge exchange activities by institution types, including across regions. This could be undertaken via a combination of context analysis (HEIF returns) and consultation (interviews and surveys with HEP managers)

Policy tools and instruments for knowledge exchange and innovation in local areas

- Instruments for knowledge exchange can be situated within broader innovation policy, but more work is required to understand what drives the choice of instrument(s) and activities, which may include the interrogation of institutional strategies and annual reports, and/or primary research to consult HEP managers

Knowledge exchange place impact

- A bottom-up review of knowledge exchange literature finds a broad range of knowledge exchange activities that have potential to generate place effects that correspond with the HEP missions. This is also substantiated by what is captured in the KEF
- Characterisation and considerations of measuring impact use standard methods and metrics
- Caveats to place impact of knowledge transfer include the heterogeneity of businesses that may look to access HEP research in terms of size and sector (for example), and the non-spatial and relational nature on knowledge and knowledge exchange. The implications of these caveats could benefit from further examination
- Measurement of place impact requires further attention. This may warrant an examination of how approaches to analysis of impact and attribution are resourced and undertaken in local areas (e.g., as per the Green Book and Magenta Book)
- In addition, further work would be useful to review the range of activities with place relevance from the broader SQW logic models, with associated indicators

The 'best fit' scale of place for knowledge exchange activities

- The scale of 'appropriate' place varies and is dependent upon the type of knowledge exchange activity. An initial mapping of these based on a bottom-up review of literature gives insight into the various spatial levels at play across knowledge exchange activity, as well as which knowledge exchange activities may operate at one or multiple spatial levels
- Primary research would help to understand the spatial scales at which different types of knowledge exchange activity occurs. This may be achieved by interrogating information held by HEP knowledge exchange professionals (e.g., technology transfer offices), or microdata that underpins Higher Education Business and Community Interaction Survey returns. It is likely that an initial review could be undertaken with the HEP as the unit of analysis with a view of collaborations across locations (e.g., via analysis of HEIF returns). With the support of HEPs, postcode analysis of contracts or HEBCI microdata could provide greater granularity. However, the extent of uniformity or availability of these data are not clear at this stage. The 'best fit' scale of place would remain fairly high-level, but would give a descriptive sense of what activity happens at which level

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