CENTRE FOR RURAL ECONOMY
NEWCASTLE UNIVERSITY

RURAL BUSINESSES, INNOVATION AND NEWCASTLE SCIENCE CITY

FINAL REPORT

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Table of Contents

Executive Summary

- This project explored the extent to which rural businesses in the North East of England are engaged with the Newcastle Science City Initiative (NSC), and with other institutions in the regional innovation system. The project was funded by the Higher Education Innovation Fund Round 4 (HEIF4).
- The project had three stated aims:
    - To explore the results from the 2009 Rural Business Survey in the North East of England to establish the kinds of innovation undertaken by rural businesses;
    - To explore the extent to which, and ways in which, actors in the 'regional innovation system' currently work with rural businesses
    - To develop recommendations as to how rural businesses might engage better with NSC (and other actors in the regional innovation system) in future.
- The project adopted a three-stage methodological strategy: 1) a desk-based review of the literature and policy context; 2) further analysis of the 2009 Rural Business Survey database; and 3) a series of interviews and focus groups with individuals involved in Science City, other key stakeholders in the innovation system and rural business owners, to discuss the key findings from the two previous stages and explore how rural businesses could be engaged more fully with the innovation system, and with NSC in particular.

The key findings from the project can be summarised as follows:

- Much of the rationale for NSC refers to its potential to positively benefit the North East region as a whole. However, previous research has highlighted the limited geographical extent of knowledge spillovers from urban-based actors and institutions in the innovation system. A key part of this project's rationale is to explore the extent to which NSC, and the innovation system of which it is a part, can be said to be truly regional in scope.
- Previous research has found that rural businesses do engage in innovation. While some researchers argue that urban businesses are more innovative than rural businesses, other researchers have suggested that rural business owners have to be more innovative than their urban counterparts as a result of the locational challenges they face, for example, in operating at a distance from markets where there is a limited critical mass of businesses in close proximity.
- The traditional approach to innovation sees it as a linear process which is driven by experts with high levels of scientific knowledge. More recently, however, new approaches taking a broader approach to defining innovation have been advocated, focusing more strongly on learning – and indeed shared learning - rather than scientific knowledge.
- Traditional approaches to defining and measuring innovation (such as through spending on R&D or numbers of patent registrations) have tended to exclude much of the innovation that takes place in rural areas, thus reinforcing the perception that innovation happens only in urban centres with high concentrations of businesses and research and education institutions. National innovation policies in the UK have been criticised as being urban-biased.
- Considerable potential exists for rural areas to be important sources of innovation in the future. For example, they are at the forefront of the demographic ageing process with populations that are ageing faster than

urban areas. They are also important sites for the installation and application of renewable energy technology, (for example, anaerobic digestion, windpower and hydropower), for new developments in environmental tourism and for growing speciality local products in response to changing consumer demands.

- Analysis of responses to the 2009 Rural Business Survey conducted in CRE found that just under half of the businesses (in the sample of almost 1000) had undertaken some form of innovation in recent years, and this included a range of activities, such as introducing a new product or a new way of working. Most of these activities involved small-scale and incremental changes. Nevertheless, 15.4% of these businesses had worked with an external organisation in introducing an innovation, albeit only 5.3% reported that they had worked with Newcastle University. Surprisingly, only a small proportion (3%) of the survey respondents were found to operate in the three NSC themes (Ageing and Health, Energy and the Environment and Stem Cells and Genetics). However, given the importance of issues such as the environment, energy generation and demographic ageing in the future of rural areas, there would seem to be significant potential for NSC to work with rural businesses with connections to these themes, perhaps on a sector-specific basis.
- Other key findings of relevance from the 2009 Survey include the importance of home-working (over 38% of respondents) and of microbusinesses and sole traders (88% of respondents). While most respondents were motivated to take over/start their business by the need to generate income, sizeable proportions were also motivated by a desire to change their work/life balance, take on a new challenge, develop a personal interest and exploit a market opportunity.
- Interviews with national and regional innovation policy-makers reinforced the finding from previous studies that 'rural' does not feature in the national innovation debate. That is not to say that policy-makers actively exclude rural, more that they do not differentiate rural and urban in their policy processes or reflect on the features of rural locations and/or businesses which may affect the ways in which, and extent to which, innovation happens.
- All three Innovation Connectors interviewed as part of the project engaged with businesses across the region, but again no distinctions were made between businesses in different locations. Interviewees recognised the innovative potential of rural businesses and the need to recognise that rural economies were about more than primary sector activity. Some specific challenges in working with rural businesses were noted, including their small size and their poor access to appropriate funding. The location of two Innovation Connectors in the rural North East (broadly defined) is important, although in neither case was this an explicit consideration in the location decision.
- The interviews with selected rural business owners revealed the potential benefits of engaging with institutions in the region in taking forward innovative ideas and in particular with NSC which has different ways of working to the more traditional approach taken by Business Link for example (especially through the Innovation Machine). However, owners felt that rural businesses need to be made more aware of NSC and its role in the region and that other institutions (in particular NaREC and the University) should encourage and engage more proactively with small businesses.

From these key findings, a number of implications can be highlighted for all actors engaged in innovation:

- It is clear that current innovation policy makes no distinction between rural and urban areas. If such a mainstreamed approach to innovation is to be adopted, adequate understanding of the distinctive features of rural areas is needed to ensure that policy is not urban-biased. Such features include the higher proportion of sole traders, microbusinesses and home working and the generally small-scale and incremental (but no less significant) nature of innovation. Policy-makers and institutions need to have a good understanding of the needs of rural businesses (predominantly microbusinesses and increasing numbers of home based businesses) and the kinds of support (and methods of providing it) that would be most valuable to them.

- Work is needed to ensure that the traditional perceptions of rural areas as less innovative and dominated by the primary sector are countered. There is a need to take a broader approach to defining innovation so that it is not all about patents, R&D spending and high-technology, high-profit activities. Innovation may also involve the adoption of a technique which is new to a specific business, sector or geographical area. The innovative nature of many activities undertaken by rural business owners may not be recognised by owners themselves or by the institutional support infrastructure around them.

- Many rural areas now encompass a wide range of economic activities, have seen large-scale investment in infrastructure (including broadband) and an influx of well-educated, highly skilled, resource-rich and forward-thinking in-migrants in recent years. All of these can be capitalised on to boost innovative activity. But rural businesses also face a number of challenges including distance from markets and centres of research, their dispersed nature and the poor quality of infrastructure in some area. These challenges need to be recognised by policy-makers when devising innovation policies. The policies themselves, and the methods used to engage with rural businesses and deliver the support, may need to be more sophisticated.

- At the same time, there is considerable scope for innovation across the primary sector: in agriculture, through new animal husbandry and welfare procedures, new crop strains, new production systems and processing techniques; in forestry, through mechanisation in harvesting and biofuels; in mineral working through land restoration and aggregate recycling. These techniques will become all the more pertinent if food shortages and energy crises materialise.

- In the North East region, the identified themes of NSC (and in particular Ageing and Health and Energy and the Environment) and the presence of two Innovation Connectors in rural locations, offer great potential for better working relationships with rural businesses. NSC events targeted at businesses operating in these sectors and at businesses located in close proximity to NaREC (Blyth) and NETPark (Sedgefield) should help to raise awareness amongst the region's rural businesses about the work of these Innovation Connectors. More could also be made of projects like Newcastle University's 'Centre for Renewable Energy from Land' at Cockle Park Farm which involves research, education and demonstration activities.

- Recognising that its work is still in its early stages, NSC has a job to do to raise awareness of its services beyond Newcastle. Staff could explore the potential for information sharing events or 'roadshows' in rural parts of the region, perhaps tapping into existing business networks and forums (including the Northern Rural Network, local business associations and development trusts, or sectoral networks such as the NFU). Engaged rural business owners such as those interviewed for this project could act as 'role models' in encouraging others to engage more proactively both through such events and on a one-to-one basis.

- NSC, and indeed the other Innovation Connectors, could collect more detailed data about the businesses with which they work and which attend events, including their geographical location (ideally their postcode), their size, age and sector. This would allow much better monitoring of their engagement with different kinds of actors and enable specific businesses, geographical areas or sectors to be targeted if remedial action was needed.

1. Introduction

Newcastle was designated as one of six Science Cities in the UK in 2005 *"in recognition of the world class research being undertaken by its universities and the potential of its science industry base"*. As the Newcastle Science City (NSC) website states: *"Newcastle's vision for the future is to continue to build the city's profile as a world leader in science, supporting the overall economic prosperity of Newcastle and the wider region of North East England"* (Newcastle Science City 2010).

This quote clearly sets out an ambition for the benefits of the NSC Initiative to extend beyond Newcastle and across the region as a whole. This is further elaborated elsewhere on the NSC website, for example, it is stated that Newcastle Science Company Ltd. (a partnership between One NorthEast, Newcastle City Council and Newcastle University) itself works with partners *"to position Newcastle as a premier location for science by building science networks across the region which encourage innovation and entrepreneurship, supporting the development of science-based businesses"* (Newcastle Science City website 2010). Moreover, at least two of the key partners in NSC - One NorthEast and Newcastle University - have region-wide roles to play. The University's mission statement, for example, refers to the important position of the University in playing *"… a leading role in the economic, social and cultural development of the North East of England"*. In June 2008 Newcastle University's Newslink service ran an article calling for "more University/business interaction". This conclusion was drawn at an event in Newcastle in which a number of high profile business professionals from around the North East met with senior academics from the University. The event aimed to forge closer relationships between the business and academic communities to build awareness of how the two can work together to enrich and expand the local economy. The University's Vice-Chancellor Chris Brink commented "*Through our partnership in major projects including Science City, with the new Science Central development, and the Great North Museum, we are already demonstrating the University's role at the social, cultural and economic heart of the North East. We hope that more can be achieved if academics and members of the business community combine their knowledge and expertise to a greater extent.*" (Newcastle University Newslink 2008)

Much of the rationale for NSC refers to its potential for regional impact but, while the tangible investment and infrastructure associated with NSC (particularly the Science Central site) might be very visible to those businesses located in Newcastle, what does the Initiative mean for businesses located in rural parts of the North East? What is the level of awareness of NSC amongst businesses in the region's rural areas and market towns? Do they know how they can engage with and benefit from the NSC Initiative and the other elements of the regional innovation infrastructure? These questions can be asked in the context of a number of relevant broader debates about the role of rural businesses in generating economic growth and innovation, the differences between innovation in rural and urban areas and the ways in which rural businesses may be less likely to engage with institutions in the regional and national innovation systems[1].

[1] Roper et al. (2006) argue that an innovation system comprises *"institutions which jointly and individually contribute to the development and diffusion of new technologies, and which provides the framework within which government forms and implements policies to influence the innovation process"*. They argue that three criteria need to be met if an innovation can be said to exist *"coherence, widely agreed and unified agendas and boundedness"*. When this study refers to national and regional innovation systems, it is this approach that is being referred to.

This report addresses these questions and explores how the NSC Initiative can be made more explicitly regional in its scope, benefitting all of the region's businesses, irrespective of their urban or rural location. The research draws on recent survey work with rural businesses in the North East region and further in-depth empirical work with individuals from institutions in the regional and UK innovation systems and with rural businesses.

The aims of the project are as follows:

- To explore the results from the 2009 Rural Business Survey in the North East of England to establish the kinds of innovation undertaken by rural businesses;
- To explore the extent to which, and ways in which, actors in the 'regional innovation system' currently work with rural businesses;
- To develop recommendations as to how rural businesses might engage better with NSC (and other actors in the regional innovation system) in future.

This is the main report produced from the project. It is divided into a number of sub-sections. The next section presents a review of the relevant literature and policy context for the project. Section 3 describes the methodological approach adopted in the study. The following sections present the results of the analysis and then the report concludes by drawing out a number of implications arising from the research relating to how better and stronger relationships can be formed between rural businesses and elements of the region's innovation system, in particular NSC and the two Innovation Connectors located in rural parts of the North East region (NaREC and NETPark).

2. Literature and policy review

2.1 What is innovation?

Innovation is increasingly recognised as a key driver of economic growth at the heart of the knowledge economy (OECD 1996). In the UK, regions are commonly producing regional innovation strategies to boost their competitiveness and ensure a more coherent approach to research and technological development activities (Dargan and Shucksmith 2006). The traditional approach to viewing innovation is as a linear scientific and technical process driven by experts, focused on the private sector, with scientific knowledge as the key driver of change (Smith 2000). However, more recent approaches have emphasised the role of learning (rather than scientific discovery) in the innovation process. In this process, a greater role is assigned to different forms of knowledge, including tacit knowledge, and social capital. Moreover, a broader approach is being taken, whereby innovation does not just refer to new products and technical processes but also to existing products and processes that are new to a region, institution or company (Dargan and Shucksmith 2006; NESTA 2006). This new, broader approach suggests the need for a strong relationship between such developments and civil society, focusing especially on the presence of networks, both within a territory and between its actors and those elsewhere, in a so-called neo-endogenous approach to development (Ward et al. 2005). Concepts of institutional thickness (Amin and Thrift 1993) and institutional capacity are also important in such place-based innovation (Dargan and Shucksmith 2006).

Concepts such as 'innovative milieu' and 'learning regions' have become increasingly commonplace in economic geography since the late 1990s, emphasising the capacity of regions to support processes of learning and innovation as a key source of competitive advantage (Cooke 1998; Cooke and Morgan 1998; Florida 1995; Henry and Pinch 2000; Storper 1995). These concepts place emphasis on local networks of specialised and interdependent firms able to respond flexibly to market opportunities (Alberti 2004; Asheim 2003; Bellandi 1989; Belussi and Caldari 2009; De Bernardy 1999). Storper (1995) has also emphasised the importance of 'untraded interdependencies', constituted around tacit conventions and informal agreements which aid learning, the sharing of knowledge and ideas and adaptation: here proximity itself is a source of tacit knowledge and hence of innovation. Much of this research is based around the original work of Alfred Marshall (1919) on industrial districts, with more recent work examining Marshall's idea of the 'industrial atmosphere' with social, cultural and educational systems supporting the industry (Alberti 2004; Asheim 2003; Bellandi 1989). Science parks and technopoles represent practical application of such theoretical ideas, bringing together university and industry, including through providing a location for spin-out companies (Klofsten et al. 1999; Ylinenpaa 2001). In Japan, Tsukuba Science City brings together many technology-based businesses; Silicon Valley in the USA and Motorsport Valley in the UK are well documented examples of successful, innovative clusters of high tech businesses and research institutes (Castells and Hall 1994; Henry and Pinch 2000). As Feldman and Florida (1994: 210) note *"Geographers and economists have often noted the congruent clustering of economic activity and innovation. While much about this congruence remains unclear, we know that the clustering or agglomeration of economic activity creates scale economies, facilitates face-to-face interaction, and shortens interaction distances. The interaction of all of these factors lends itself to innovation in economic processes and products"*.

Although Dargan and Shucksmith (2006) argue that a relevant aspect of the learning regions thesis is that it can be applied to less favoured regions as well as more favoured ones (Morgan 1997), the most common thesis is that *cities* are cradles of innovation and, hence, prosperity as they are a rich source of codified knowledge (Knight 1996). By fostering 'territorial clusters of related knowledge-based activities' (including universities, research establishments, corporate HQs, arts and cultural organisations and medical services), government can promote cities as centres of innovation. In contrast, peripheral areas are assumed to lack the dynamics, actors, support organisations and networks conducive to innovation and technological change (Isaksen 2001; OECD 2006; Todtling and Trippl 2005). Co-operation and technology transfer between public research and development (R&D) centres, universities and the private sector are poorly developed in such areas (Doloreux 2003). As Audretsch (1998: 18) argues *"geography matters for innovative activity"*. A cross-country comparison of policy approaches to innovation in the CORASON project (funded by the EU 6th Framework Programme) revealed that in many of the case study countries, urban areas have the clusters of businesses and research establishments, which for national governments lie at the heart of innovatory economic development (IED) (Dargan and Shucksmith 2006). Rural areas received very little mention in any of the national policy discourses surrounding IED. One exception was Germany where some urban-rural differences were observed with government funding in urban areas supporting business start-ups and technological advances, whereas in rural areas such funding is awarded to not-for-profit enterprises or maintaining cultural heritage. However, in most of the case study countries, researchers found that approaches to IED were urban-centric with the EU taking the initiative in fostering innovation in rural areas through bottom up,

community development programmes such as LEADER[2] (Dargan and Shucksmith 2006: 10-11; Moseley 2000).

2.2 The role of universities in generating innovation

Focusing specifically on the role of universities, it has been argued that they play a key enabling function in bringing about regional learning and innovation and constructing regional advantage through knowledge commercialisation, innovation licensing and spin-outs (Anselin et al. 2000; Jaffe 1986; NESTA 2009; Shucksmith and Dargan 2006). Etzkowitz (2005) argues that the basic features of universities make them especially propitious sites for innovation, including: the high rate of flow of human capital in the form of students who are a continual source of potential inventors; the university as a natural incubator providing a support structure for teachers and students to initiate new ventures, intellectual, commercial and conjoint; the university is also a seedbed for new interdisciplinary scientific fields (a source of economic growth and intellectual distinction) and new industrial sectors, each cross-fertilising the other. Conceptual perspectives on the innovation process differ amongst academics however. For example, while 'triple helix' models of innovation envisage positive collaboration between university, industry and government within a region (Etzkowitz 2002; Leydesdorff and Etzkowitz 1998) 'innovation systems' models tend to focus on organisational capabilities, networks and the boundedness of innovation systems (Edquist 2004).

However, as universities are generally located in urban centres, there is little evidence surrounding their role in encouraging innovation in rural areas. This will depend on a number of factors, including the extent of spillover effects from urban-based universities, the absorptive capacity of rural businesses and their lack of knowledge and understanding about how to engage with the higher education sector (Atterton 2005). Work undertaken by Roper et al. (2006) on the Scottish Innovation System (SIS) found that, in terms of knowledge generation, Scottish Higher Education Institutes (HEIs) had stronger links with externally-owned and other UK-owned firms than with indigenous small and medium enterprises (SMEs). In terms of knowledge exploitation, the authors found a profound distinction between firms in the Central Belt and Tayside/Grampian and firms in the Highlands and Islands and Southern Scotland with the latter in large part excluded from any positive system dynamic within the SIS. Not only is it difficult to generate links between businesses in rural areas due to their lack of critical mass and dispersed nature, but the absence in these areas of HEIs and research institutions makes physical interaction with rural businesses (which often lack formal R&D activities) even harder. Recently, recognition of the important role played by universities in generating innovation has led to the establishment of HEIs in some rural localities. In these cases, universities are seen as rural development tools which can simultaneously develop the endogenous capacities of the local population and create the extra local linkages necessary for positive socio-economic development. In the Highlands and Islands of Scotland, for example, Highlands and Islands Enterprise (HIE) note *"the catalytic role UHI will play in stimulating research, inspiring commercialisation and acting as a focus for innovation"* (HIE 2005).

[2] LEADER is an EU funded programme designed to encourage endogenous or 'bottom-up' development in rural communities. LEADER comes from the French phrase 'Liaison Entre Actions de Développement de l'Economie Rurale'.

Other researchers have explored the different ways in which university's can play a role in developing the regions in which they are located. Gunasekara (2006) introduces a conceptual distinction between a university's developmental role in regional development which is cultural, social and political in nature, and its generative role which is essentially economic. The triple helix approach which conceptualises the interaction of universities, government and industry envisages that universities can be vital generators of regional growth, linked to economic strategies involving knowledge generation and capitalisation (Etzkowitz and Leydesdorf 1997, 1999). The OECD's work on university engagement, on the other hand, advocates a more developmental approach that is broad-based and enabling, rather than fundamentally and directly shaping regional trajectories (OECD 1999; Goddard and Chatterton 1999). Gunasekara's work on universities in non-core metropolitan areas of Australia found little evidence of a generative role performed by any of the three universities in the study although the role of a university in the development of an Innovation Campus – similar to the NSC Initiative - could be an example of such a role.

2.3 Measuring innovation

As noted above the traditional approach to defining innovation is as a linear 'pipeline' process driven by experts, usually involving the production of new products, drugs or technology (NESTA 2006). Approaches to measuring innovation have tended to echo this definition by focusing on business expenditure on R&D and on the production of patents (see for example Acosta et al. 2009; Graf and Henning 2009). Boix and Galletto (2009), for example, attempted to quantify the measurement of innovation in patents and an innovation per capita output. The UK Higher Education Business Interaction Survey in December 2001, for example, focused on 'traditional' indicators of innovative activity, including universities' industrial research income, the number of new patents filed by universities, numbers of spin-off companies from higher education institutions and the amount of research expenditure per spin-off company (Universities UK 2002).

Instead, a report carried out in 2006 by the National Endowment for Science, Technology and the Arts (NESTA) (an independent UK body with endowment status) argues that we need a deeper understanding of innovation based on where it actually happens and to develop our approach to innovation policy based on this understanding. The current emphasis on research and development is not sufficient and has resulted in an over-emphasis on a small sector of our economy and the exclusion of the vast majority. The report goes on to argue that traditional indicators of innovation performance - based on business expenditure on research and development and on the production of patents - are heavily biased towards investments in scientific and technological invention (and even then poorly reflect the true level of innovative activity) and do not capture innovation in those sectors which represent the vast majority of the UK economy, particularly service sector activities, including financial services, public services and creative industries (Garner 2006: ii). Instead, NESTA (2006) argues that the UK requires a broad view of where innovation comes from and where it applies, and an imaginative, textured policy that recognises that one size does not fit all sectors or geographical locations.

2.4 Innovation in rural areas

In the 1990s and 2000s, a considerable body of research focused on exploring the characteristics of rural businesses and their innovative behaviour, often in comparison to urban businesses. Much of this work used traditional approaches to measuring innovation. North and Smallbone (2000a), for example, viewed innovation as changes made by firms as part of the process of maintaining and improving their competitiveness and focused on measuring five dimensions, including product and service innovation, marketing methods and the use of computers/IT in administration. Using such measures, the evidence regarding the innovativeness of rural and urban businesses is somewhat conflicting. North and Smallbone (2000b) found significant levels of innovative activity amongst SMEs in rural areas of England, including more remote areas, between 1991 and 1996 and no clear cut differences in the innovative behaviour of accessible and remote rural businesses (see also Keeble et al. 1992). For some businesses being in a remote location appeared to have been a barrier to innovation, for example in terms of the dominance of microbusinesses and sole traders or reliance on a slow or intermittent broadband connection. This study also revealed large differences between sectors in the extent and nature of the various dimensions of innovation (see also Smallbone and North 1999). North and Smallbone (2000a) also found that rural SMEs displayed considerable levels of self-sufficiency in the innovation process with only one third of firms using external sources of assistance.

Others (for example, Keeble et al. 1992; Hoffman et al. 1998; Smallbone et al. 2002) have found that rural businesses are more innovative than their urban equivalents. For some businesses, remoteness appears to be a stimulus for innovation, showing how the need to overcome local constraints can induce firms to become more innovative than they would otherwise be (North and Smallbone 2000b: 155). While some researchers (see for example, Keeble and Tyler 1995) suggest businesses in accessible rural locations were more likely to target new markets and were more frequently involved in innovation than businesses in urban and remote rural locations, others (for example, Smallbone et al. 1999) have argued that characteristics of the rural environment, such as the low population and business density, mean that rural businesses have to be more innovative, for example, by penetrating non-local markets earlier in their development than urban businesses. Keeble et al. (1992) and Keeble and Tyler (1995) also found that rural firms more successfully exploited niche markets than urban firms. More recently, the sub-national review of economic development and regeneration acknowledged that overcoming the problems associated with scarcity and distance has led local businesses to explore novel working practices and new ideas. The Commission for Rural Communities (2007) also acknowledges that rural businesses may make more extensive use of information and communications technology. Other research has argued that rural areas lag behind when it comes to innovation. For example, Henderson (2007: 1) acknowledge that size and distance may limit a rural entrepreneur's ability to produce radical new innovations. They cite data on patents in the US which shows that rural places typically produce less than one patent for every 10,000 people compared to more than 2.5 patents in metropolitan areas. However, they argue that adopting new technologies and retailoring them for new and better uses exemplifies the traditional spirit of rural America, especially in agriculture. A deeper exploration of patent activity reveals that rural places do spur inventions in more mature industries, where inventions and commercialised innovations are more likely to be process-based. Moreover, the ability of rural communities to adopt technologies depends on knowledge dissemination which is harder and more costly in remote areas where places for interaction are more limited. However, as technologies mature, the costs

associated with additional incremental innovations decline because the knowledge and know-how are already disseminated.

Despite the recognition that rural areas lack the benefits of agglomeration, for example as a result of a lack of critical mass of businesses to benefit from knowledge spillovers (see for example OECD 2006), more recent research has tended to highlight the considerable potential that exists for innovation in rural areas, and that it may not involve patents or large R&D spending. For example, NESTA (2007a) argues that traditional rural industries are increasingly important sources of innovation for urban communities, such as biofuels and materials based on fibre crops. Demands from challenges such as climate change have driven innovation in both rural and urban areas, for example, in terms of new weather monitoring systems (NESTA 2007b). These kinds of projects were also found in the CORASON project (Dargan and Shucksmith 2006) where many projects involved the creation and development of small enterprises, or took place in traditional industries, such as agriculture and local crafts. Often innovation occurred almost spontaneously as an off-shoot of other activities and projects regularly achieved innovation in the social and cultural milieu, new forms of organisation or co-operation or building social capital. Thus, as also acknowledged by Doloreux and Dionne (2008), innovation in peripheral regions is often small-scale and incremental in nature, taking place mainly through the application of existing knowledge or through new combinations of knowledge (Asheim and Coenen 2005). Cannarella and Piccioni (2003: 371) argue that *"…rural SMEs often need financial and technical incentives and support from public and private research institutions in order to make innovation accessible to them. Yet bridging research and productive dimensions is not always an easy task. The cooperation between researchers and rural entrepreneurs can become a rather demoralising experience for both parties due to the action of a large number of inadequacies caused not only by financial, technical or organisational factors but also by cultural diversities and different approaches"*.

Recognising the potential breadth of new roles for rural areas in terms of contributing to innovation, the 2008 Rural Advocate's report to the Prime Minister (CRC 2008: 9) notes the need for innovation in rural economies *"to boost product and service development, to deliver consumer needs such as energy, housing and transport, to harness environmental qualities and services and to empower and increase the resilience of communities. Innovation is also about people, ideas and places"*. However, the report notes some evidence of an urban bias in innovation policy, with too much of a focus on technology and on urban-located innovation institutions, assets and drivers, leaving rural areas overlooked (NESTA 2007a; Roper et al. 2006). The report draws on evidence to argue that many small firms in rural areas do not reach their potential and that boosting innovation amongst small rural firms is a clear imperative. Research in Yorkshire and the Humber region in 2003 found that, although rural North Yorkshire was one of six sub-regions where businesses spent more on R&D than the regional average, levels of firms linked through contracts with Universities to carry out their R&D were lower than in the region's cities (Government Office for Yorkshire and the Humber 2005). Evidence collected by Regional Development Agencies (RDAs) on the levels of businesses assisted to collaborate with the knowledge base reveals an urban bias (though this data must be interpreted with care and there are large sectoral and spatial variations) (CRC 2008: 33). The report makes a series of recommendations designed to enhance the potential for innovation in rural areas, and to overcome some of the challenges facing rural businesses and communities, including the disadvantages of distance, weaknesses in service provision, ageing populations and environmental shocks (ibid.).

One of the key recommendations from the Rural Advocate's report is for central government and regional agencies to ensure that innovation programmes and resources are accessible and relevant to rural micro and new firms (CRC 2008: 34). This echoes other work which has noted that innovation policy has an urban focus. NESTA (2007a), for example, acknowledges that the setting of innovation policy at national level means that it is 'spatially blind' and doesn't take account of the widely differing needs of regions and localities. Worse still, rural areas tend to be overlooked by urban-focused policy makers and are normally perceived as playgrounds or dormitories for city dwellers rather than as areas capable of generating innovative economic activity (NESTA 2007a).

The project noted that national governments tend to associate innovation more strongly with urban areas than rural as it is assumed to require concentrations of scientific and technological expertise and proximity to knowledge resources (particularly universities), but it reports several instances whereby new technologies have been used, such as renewable energy technologies (even though they may have been produced by others) or where new technologies are adapted to suit rural needs. The evidence presented here suggests therefore that innovation does happen in rural areas but that it is not well documented through the commonly used metrics. NESTA has mapped out a range of innovations, such as tourism, creative industries, small business, public services and diversification in rural locations (Mahroum et al. 2007). The report identified an important relationship between rural natural resources and innovation with sustainable technologies relying on rural resources and proposes that rural innovation is the 'introduction of something new (a novel change) to economic or social life in rural areas, which adds new economic or social value to rural life' (NESTA 2007b: 10). Whilst rural areas continued to face key challenges in terms of a thin economic base and a weak knowledge economy, partnerships, a distance neutral infrastructure, investment in knowledge transfer and support for the individual were put forward as drivers for future rural innovation. The recent report by Hauser (2010) highlights the need for rapid innovation and technological change in the 21st century spurred on by the grand challenges we face, including climate change and the demands of an ageing society. These are two challenges where rural areas could be at the forefront of developing innovative approaches, firstly given the natural resources of rural areas and their potential to contribute to climate change adaptation and mitigation, and secondly given that the rural population is ageing faster than the urban population.

Moreover, more could be done to further exploit the innovative potential of rural areas, through encouraging rural businesses to work together, developing new technologies to make distances less relevant and engaging rurally located technical colleges to use their hands-on experience to provide learning opportunities for small businesses and individuals. Some rural areas, such as Cumbria and the Highlands and Islands are also benefiting from the introduction of new higher education institutions to exploit new technologies and new methods of working. More broadly, in-migrants to rural areas represent a considerable potential resource for innovation as many are older and have built up considerable skills and experience.

2.5 Innovation Policy and Science City

A number of recent UK policy documents have made reference to innovation as a key driver of economic growth both regionally and nationally. Innovation was identified as one of five key drivers of productivity in *"A modern regional policy for the UK"* (HM Treasury et al. 2003), the document which outlined the government's vision

for a more regionalised, decentralised UK. The government promised to increase spending on the science base and provided resources to the 'Higher Education Innovation Fund (HEIF)' to encourage higher education institutions to reach out to their regional and local economies in promoting knowledge transfer and innovation (HM Treasury et al. 2003: 35). The Science and Innovation Investment Framework 2004-2014 (HM Treasury et al. 2004) set out the Government's desire for the UK to maintain its position in research and retain and build world class centres of research excellence and leading universities, and establishes long term ambitions for UK innovation and R&D. The Framework set out an innovation action plan to be co-ordinated by the Technology Strategy Board (TSB), set up in 2007 to focus on encouraging and supporting technology-enabled innovation. The TSB plays a co-ordinating role between RDAs, devolved administrations, Research Councils and government departments to stimulate R&D and innovation, through tools such as Knowledge Transfer Partnerships and Innovation Platforms. The TSB aims to focus on 'challenge led innovation', finding opportunities in societal challenges such as climate change or the ageing population.

The 'Innovation Nation' White Paper was published in 2008 (DIUS 2008a) and this document started to set out a new, broader approach to innovation (OECD 2008) recognising that it wasn't simply supply driven or a simple process of investing in research leading to commercialisation, but that it was drawn from different sources and was equally demand and supply driven. The White Paper recognised that business was a driver for innovation and that the Government's role was to provide a structure for businesses to innovate and provide support for market failure. Specific schemes introduced by the White Paper included vouchers for businesses to work with a knowledge base institution. In parallel to this, documents such as "Higher Education at Work – High Skills: High Value" focused on the need to increase the number of school and university graduates in science, technology, engineering and mathematics (STEM) with the aim of raising the skills and capacity for innovation (DIUS 2008b).

As noted by NESTA (2007a) innovation policy in the UK has tended to be 'spatially blind', making no differentiation between urban and rural locations for example. More than this, however, as noted earlier, national innovation policy in the UK has been criticised for being urban-biased and too focused on technology, R&D spending and numbers of patents. NESTA (2007a) does acknowledge that some recent documents have taken account of the spatial aspects of innovation policy, such as the Competitiveness White Paper and the Sainsbury Review but NESTA (2007) argues that these documents still tend to replicate one region's success in every other region, ignoring specific strengths and weaknesses. The recent sub-national review of economic development and regeneration may provide a better opportunity for local authorities and regional agencies to develop regional innovation strategies.

The Rural Advocate (CRC 2008) calls on the Department for Innovation, Universities and Skills (as it was named at the time) to take up the challenge set by NESTA (2007a and 2007b) to work with the Commission for Rural Communities and the Department for the Environment, Food and Rural Affairs to ensure that its new Innovation Strategy has a recognisable rural dimension. He goes on *"The potential of a rural innovation initiative to support and stimulate innovation in rural areas and encourage high value development of products, processes and services, merits further investigation"* (CRC 2008: 33).

There is a still a strong assumption in policy making that for innovation to happen successfully it requires concentrations of scientific and technological expertise and proximity to knowledge resources, particularly universities. This has been

accompanied by debates about the competitiveness of city regions and by major national initiatives such as Science Cities. The central role of universities in the innovation process is clearly a fundamental part of the rationale behind the Government's designation of six Science Cities in 2006. These are partnerships made up of the RDAs, local authorities, universities and the private sector. As argued by Garner (2006) the concept of a 'science city' is not new, with many places adopting the term in the late 1960s and 1970s. As Cooke (2001) notes, there has been a trend over the last few decades of policy makers co-locating research centres and innovation-intensive firms in science and technology parks, which could involve designating whole cities as Science Cities or Technopoles (Cooke 2001). Nevertheless, this raises the question of whether the role of universities in stimulating innovation is limited to cities or urban areas, or whether the benefits can be spread across both the cities and rural areas of regions? The findings of Roper et al. (2006) on the SIS suggest that the benefits do not spread widely, but other research has found that knowledge generated at universities does spill over into the surrounding locality (Acs et al. 2005) whilst Anselin et al. (2000) indicated that positive spillovers from university research can have a positive impact on the levels of innovation up to 75 miles from the university itself. Exploring the extent of these processes in the North East region of England is the key rationale underlying the work undertaken in this project.

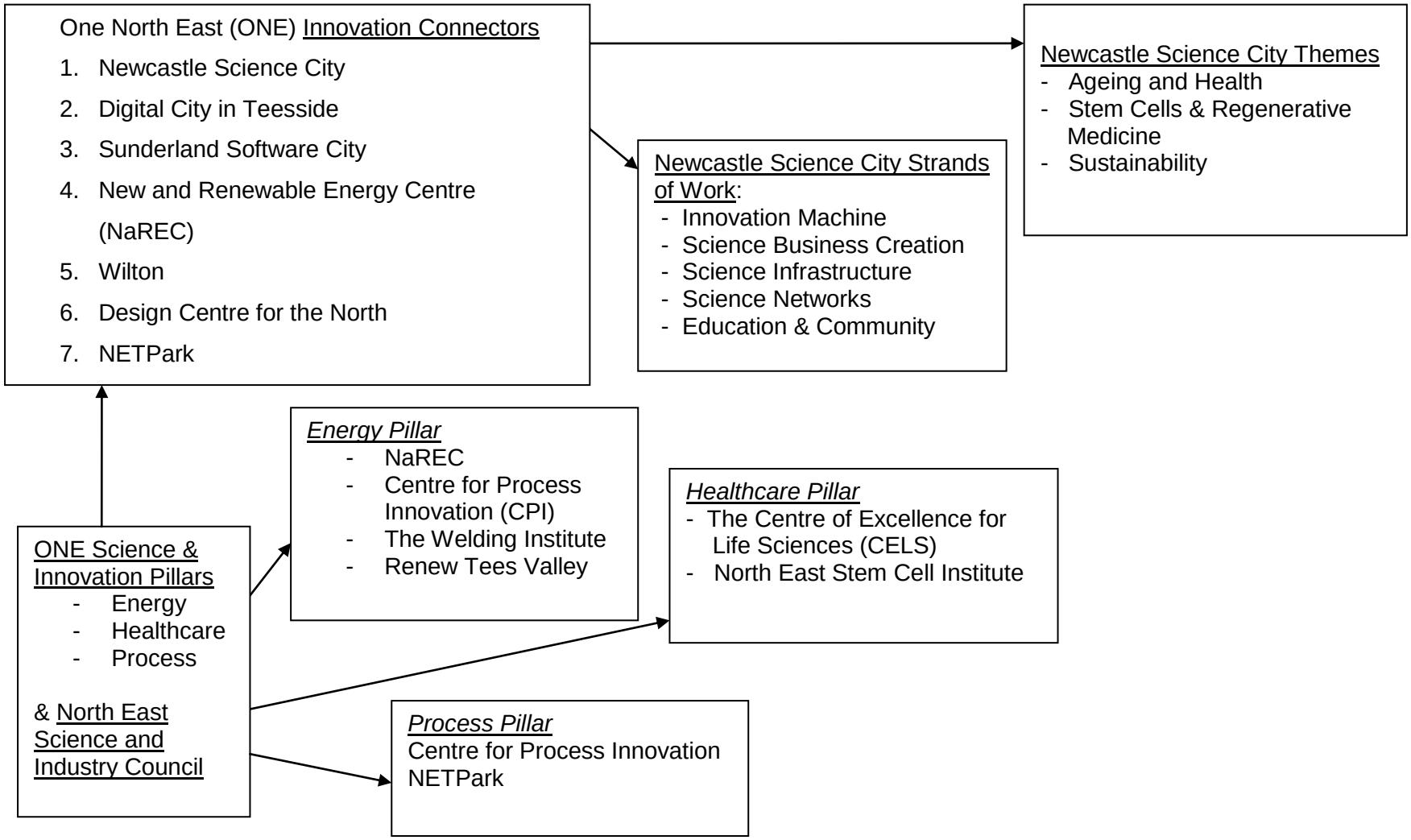
Garner (2006) argues that the Science City status was presented as a challenge to the designated places to step up their economic performance. Initially, no new funds were identified to support development and each of the six cities had the scope to examine which model they wished to adopt according to their own characteristics and taking global best practice into consideration. The designations were at least partly in recognition that cities, rather than being problem places of economic decline and high unemployment, were increasingly the places which are driving growth in the economy (Garner 2006: ii; see also Florida 2002). Critically in the context of this study, Castells and Hall (1994) recognised that the isolation of research activities has little effect on innovation if the surrounding 'milieu' (including economic, social, political and institutional features) is not supportive of linkage to the regional economy. Thus Science Cities must embrace connections with users (including firms and communities) and research institutes and other key players to enable them to be a success (Garner 2006: iii). As Etzkowitz (2005) notes *"Science cities are regional development projects based upon university-industry-government collaborations, that creatively synthesise local and national resources to achieve science-based economic growth. They typically have an entrepreneurial university as their cornerstone"*.

The Newcastle Science City (NSC) Initiative draws on these theoretical approaches with emphasis placed on linking together key elements of the region's learning infrastructure (such as universities and hospitals) with designated centres of excellence and the region's businesses, to capitalise on science expertise to create new ideas, innovations and businesses (Newcastle Science City 2010). Each of the six Science Cities is slightly different in terms of the focus of activities and the way in which activities are carried out. Each builds on existing partnerships and skills bases to create advantages. Figure 1 below shows the researchers' interpretation of the structure of NSC. The Initiative involves the construction of *"a city centre complex to provide an environment for a rapid acceleration in the commercialisation of scientific and technological research. This will form part of a total system that will include inter-related research activities, science education and engaging the public in a greater awareness of the benefits science can bring. It will also involve developing associated facilities elsewhere in the region"* (ONE 2010). NSC has five key strands of work: Newcastle Innovation Machine, Science Business Creation, Science

Infrastructure, Science Networks and Education and Community. The NSC Team work with partners across the region to achieve three key objectives:

- To position Newcastle at a global level as a city synonymous with science excellence, particularly in the areas of Ageing & Health, Sustainability and Stem Cell Technology;
- To support the drive to create more high value science-based businesses and support existing companies to innovate and grow.
- To work closely with the local community, particularly young people, to ensure they can play their part in the development of science in and around Newcastle.

Figure 1: Science City Diagram



2.6 Summary

This literature review has focused on a number of areas of research and policy development of relevance to this project. It began by highlighting different approaches to defining innovation which have tended to view innovation as a linear process, based on scientific knowledge and usually involving 'experts' - often from a university - working with the private sector. However, there has been some recognition more recently of the broad range of activities that could be regarded as innovative, including changes in methods of working and innovation in the social and community sector. The review also highlights the popularity of terms such as 'learning regions' and 'innovative milieu' in economic geography and the importance placed by all of these concepts on geographical proximity. Close contact between local actors (including businesses and education and learning institutions) reduces transaction costs, provides spillovers and creates untraded interdependencies in the local milieu which are all favourable for innovative activity. Recent research in Scotland (Roper et al. 2006) has highlighted the limited extent of links between rural businesses and the country's HEIs, thus excluding rural areas from the positive dynamics associated with the national innovation system.

Approaches to measuring innovation have tended to use data on the levels of R&D spending by businesses or of patent registrations, thus potentially under-estimating the small scale, more incremental – but no less important - innovations which may be more common in rural areas. Research on the innovative behaviour of rural businesses has tended to focus on using such data, but the evidence is somewhat contradictory in terms of the level of innovation amongst rural and urban businesses. What is clear, however, is that in some instances, the challenges of being in a rural location have encouraged businesses to be innovative, and that in future, rural areas are likely to be the source of many important innovations relating to the new demands created by climate change and by changing demand for food and other primary products. The key is to create a supportive environment in which they can be innovative, and the 2008 Rural Advocate's report suggests some ways in which this might be achieved. Finally, the review has briefly outlined some of the key innovation policy developments in the UK in recent years, including the designation of six Science Cities in 2004.

Several key questions emerge from this review. These form the main research questions (and over-arching aims) for this study:

1. What is the evidence for innovation amongst rural businesses in the North East?
2. How far are rural businesses engaged with the different elements of the regional innovation system in the North East, and in particular with NSC?
3. And, given the challenges faced by businesses in rural locations (such as distance from HEIs and the low density of businesses) and the potential for rural areas to be important sources of innovation in future, how can rural businesses be more closely tied into the innovation system in future?

3. Methodology

3.1 Introduction

In order to address the broad aims of this study, a methodological approach with several stages was devised to address each of the stated project aims. The methodological approach had three stages: 1) a desk-based review of the literature and policy context: 2) further analysis of the 2009 Rural Business Survey database and 3) a series of interviews and focus groups with individuals involved in Science City, other key stakeholders in the innovation system and with rural business owners to discuss the key findings from the two previous stages and to explore the ways in which rural businesses could be engaged more fully with the innovation system, and with NSC in particular.

3.2 Literature and policy review

The review of relevant literature and policy documents was mainly conducted between August 2009 and February 2010, with some further material reviewed after this in the later stages of the project. The literature and policy review informed the further analysis of the Survey database and the selection of topics to be covered in the interviews and focus groups.

3.3 Analysis of the Rural Business Survey (2009) database

The second element of the methodological approach involved in-depth analysis of the database of rural businesses created through the Rural Business Survey (RBS) 2009. In early 2009, researchers at CRE carried out a large-scale survey of rural businesses in the North East region (see Atterton and Affleck 2010) [3]. The 2009 survey followed on from the first Rural Microbusiness Survey carried out in CRE in 1999 (see Raley and Moxey 2000). The 2009 survey was mailed out to a random sample of 10,000 businesses in the rural areas of the region (defined using the 2004 urban-rural classification) and a total of 957 usable responses were received, representing a response rate of just under 10%. The 2009 questionnaire asked two main questions about innovation. These are shown in Table 1 below.

[3] The full report and a key findings summary document are available at: http://www.ncl.ac.uk/cre/about/ruralbussurvey.htm.

Table 1: Innovation related questions in the 2009 Rural Business Survey questionnaire

D13 Has your business introduced any innovations in the last five years? This may include product, process or service innovations (e.g. introducing a new work routine, improving IT systems, introducing a new product, business co-operation etc.

Yes ☐ No ☐

If yes, please give details……
……
……

D14 Did your business work with any external organisations or partners in introducing this innovation (e.g. another business, university staff, innovation centre, etc.)?

Yes ☐ No ☐

If yes, please give details……
……
……

Analysis of these responses enabled the research team to ascertain the extent and type of innovative behaviour undertaken by the rural business sample, and different sectors within it, and the extent to which rural businesses worked with external organisations in introducing such innovations.

3.4 Interviews and focus groups

Following on from the database analysis, one-to-one interviews and focus groups were organised with key players in the national and regional innovation system: a) selected Innovation Connectors in the North East region (i.e. Newcastle Science City, The New and Renewable Energy Centre [NaREC] and the North East Technology Park [NETPark); b) Newcastle University; c) rural businesses; and d) national and regional policy makers (i.e. representatives from the Department for Business, Innovation and Skills (BIS), the Department for Environment Food and Rural Affairs (Defra), the Northern Way and One North East [ONE]). NaREC and NETPark were deliberately chosen as they are not located in urban centres in the region. The three rural business owners that were interviewed were selected as they have attended at least one Science City 'First Friday' networking event. Overall some 25 interviewees were consulted for this research project.

The interviews and focus groups were designed to be semi-structured in the sense that a list of questions or topics to be covered was identified beforehand by the researchers, but where appropriate, the interviewer allowed for broader exploration of topics of particular interest or relevance to the interviewee or focus group participant.

The discussion was structured around two major sets of questions. A set of general questions emerged from the literature and policy review and the RBS analysis which

was addressed to all groups thereby allowing for comparisons across groups. The other set included specific questions targeted to draw out issues of particular relevance to the individual or organisation being interviewed, thereby generating a better understanding of the aim and functioning of each key player and their role within the innovation system.

The first set of general questions explored the following issues/themes:

1) What is innovation? Who/what are the key players in the national and regional innovation system?
2) To what extent is 'rural' recognised by national and regional innovation policy and institutions? How do key players engage with and support rural businesses? Are rural businesses marginalised when it comes to innovation support when compared with urban businesses?
3) How and how far do regional innovation key players engage with each other?
4) What, if any, are the major challenges that innovation key players face when working with rural businesses?
5) How can innovation key players better engage with and support rural businesses to become more innovative? Is there a need for a different approach when engaging with rural and urban businesses?

The second set focused mainly on questions addressed specifically to each group of participants according to the role of their organisation in the national or regional innovation system, such as the rationale for creating the organisation, its mode of operation and its structure. More specifically, the questions addressed to policy makers focused on the current priorities within national innovation policy, the importance attached to 'rural' within this context and how innovation in rural areas might differ from urban areas. Given the research aims of this project, the interviews with rural businesses were mainly focused on their understanding of and engagement with NSC but links with other regional innovation key players, such as universities and other innovation connectors, were also explored.

The interviews and focus groups lasted for 1-2 hours. Some were recorded to allow for full transcription whilst in others the researcher/s took detailed notes for subsequent write-up. The transcripts and notes were fully analysed by all three researchers involved in the project to identify key themes. Table 2 gives a list of the interviews/focus groups conducted.

Table 2: List of interviewees and focus group participants

Organisation	Interview or focus group	Date and Venue
Innovation Connectors		
- Newcastle Science City	Focus group	3rd Mar 2010, Time Central, Newcastle
- NaREC	Focus group	12th Apr 2010, NaREC, Blyth
- NETPark	Interview	14th Apr 2010, NETPark, Sedgefield
Newcastle University		
- Entrepreneurial Development Career Service	Interview	10th Dec 2009, King's Gate, Newcastle University
- Business Development Directorate	Interview	28th Apr, CRE, Newcastle University
Rural Businesses	Telephone Interviews	6th, 10th,11th May 2010
Policy Makers		
- ONE	- Interview	16th Sept 2009, Newcastle
- Defra	-Telephone interview	23rd Feb 2010
- The Northern Way	- Interview	11th Feb 2010, Newcastle
- BIS Department	- Interview	23rd February, Sheffield

The remainder of this report discusses the key findings from the empirical work. Section 4 discusses the key findings from the additional analysis of the RBS results while Section 5 thematically discusses the qualitative data obtained from the interviews and focus groups. Finally Section 6 pulls the key findings together and draws out some implications of the findings for actors - including businesses and key stakeholders - in the innovation system.

4. Rural Business Survey Analysis

Researchers at CRE conducted a large-scale survey of rural businesses in the North East region in 2009. As shown in Figure 2 the questionnaire asked businesses about any innovations that they had introduced in the last five years and whether or not they worked in collaboration with any external organisation in introducing that innovation. Businesses were encouraged in the question to give information about changes they had introduced which could be described as reasonably small-scale (such as introducing a new work routine or working with new software) as a means of trying to broaden the scope of what could be defined as innovation (see Dargan and Shucksmith 2006; NESTA 2006), although it is acknowledged that some under-reporting of innovative activity may have occurred given the continued importance attached to traditional understandings of the meaning of innovation (i.e. associated with large scale, high-tech changes).

4.1 Analysis of innovation in the North East sample of rural businesses (n = 957)

Across the total sample of 957 businesses, 46.4% (444 respondents) reported that they had introduced an innovation in the last five years. The innovations ranged from introducing new products, new methods of working (such as new accounting or book keeping systems), new equipment, new IT systems, changing the way of working with customers or targeting new markets. Again across the sample as a whole, only 15.4% of businesses reported that they had worked with an external organisation in introducing the innovation. The organisations mentioned included private and public sector business advisors, IT consultants and web designers, universities, public sector organisations (including local authorities) and various funding bodies. Overall, therefore, we can conclude from our sample that approximately half of the population of rural businesses are introducing innovations, albeit often fairly small scale, incremental changes which may not always generate new employment or high profits, but they do not frequently work with external organisations in introducing these changes.

Exploring the characteristics of the sample further, it was revealed that 'newcomers' were the most innovative business owners (people who moved to the rural North East as an adult) with 47.8% of them reporting that they had introduced an innovation in the last five years compared to 41.0% of locals (people who were born and had always lived locally) and 11.2% of returnees (who were born locally, moved away and then returned as an adult). This reinforces other evidence regarding the importance of in-migrants as sources of new innovative activity in rural economies. The most innovative economic sectors were Professional, scientific and technical (18.7%), Wholesale and retail (16.0%) and Manufacturing (11.3%). Just over 71% of these owners were male, 60% were aged 50 or older, 28.7% reported that they had a postgraduate degree and 31.7% reported that they had a degree.

4.2 Analysis of rural businesses operating in the NSC themes (n = 29)

Analysis was also carried out to ascertain the numbers of businesses in the sample that operated in each of the identified NSC themes: 15 businesses were identified as operating within the Ageing and Health theme, 12 in the Energy and Environment theme and 2 in the Stem Cells and Genetics theme. Of these 29 businesses: 6.9% were in the Construction sector, 37.9% in Professional, Scientific and Technical activities, 3.4% in Administration and 51.7% in Health; 72.6% of owners were male and 27.4% female; 48.1% were over 50 years old; 62.1% had a postgraduate degree and 31.0% a degree. Innovations undertaken by this sub-sample included introducing new IT systems, new products and new training schemes. Just under 38% of this sub-sample planned expansion in the short term (2 years) and 31.0% in the long term (10 years), proportions which are very similar to those in the rural North East sample as a whole (39% and 33.5% respectively).

4.3 Analysis of businesses that had a connection with the University (n = 51)

Representing only 5.3% of the sample, 51 businesses from the Rural Business Survey sample reported that they had had a connection with the University. Within this sub-sample: 80% of owners were male; 61.2% were aged 50 or over; 40% had a postgraduate degree and 30% a degree; the highest proportions were in the

Manufacturing (17.6%), Professional, scientific and technical (17.6%), Wholesale and Retail (13.7%) and Agriculture (11.8%) sectors (reflecting the largest sectors in the sample as a whole.

4.4 Summary

Analysis of the Rural Business Survey sample of 957 businesses revealed that 46.4% of them had introduced an innovation in the last five years and this ranged from introducing new products and targeting new markets to using new accounting or IT systems. Such changes would not normally be regarded as innovation using traditional definitions. Very few businesses were identified as operating within the NSC themes (only 3% of the total sample) and only a small proportion of respondents reported that they had had a connection with the University (5.3%). The findings from the Survey would therefore appear to suggest that rural businesses are important sources of innovation, but that a broader definition of the term is required to ensure that such activity is both adequately measured and acknowledge and, perhaps more importantly, well supported by business support and enterprise agencies. Although only a small proportion of the Survey sample was identified as falling within the identified NSC themes, given the importance of demographic ageing and energy generation in rural areas, there is no doubt that these themes are pertinent to rural areas.

It is also important to note a range of other characteristics of rural businesses that were analysed through the Rural Business Survey. These features are important to take into account when devising policies designed to support rural businesses, including with regard to innovation. Over 38% of respondents in the Survey reported that their business was attached to or part of their home (excluding businesses in which farming was the main activity). Microbusinesses and sole traders made up 88% of survey respondents. While 82% of respondents reported that their broadband provision was adequate for their current business needs, only 65% of respondents said that it was adequate for their future business needs. While the highest proportion of respondents was motivated by the need to generate a main income, sizeable proportions were also motivated by a desire to change their work/life balance, to take on a new challenge, to develop a personal interest and to exploit a market opportunity. These Survey results suggest that rural businesses and their owners may have some characteristics which differ from urban businesses and thus modifications are required to policies to ensure that they serve both urban and rural businesses effectively.

5. Interview and Focus Group Analysis

This section of the report thematically discusses the key findings from the interviews and focus groups. Interviewees are not referred to by name in the following analysis but instead quotes are coded as follows: ‘NSC’ for Newcastle Science City participants, ’NaREC’ for NaREC participants, ‘NU’ for Newcastle University, ‘PM’ for policy makers and ‘RB’ for rural businesses. Each of this code is followed by a number.

5.1 How does rural fit within the broader innovation policy context?

The literature review and the interviews with policy makers highlighted that at both national and regional levels there is a growing interest in innovation. There is little doubt that innovation *"is key to world competitiveness and the cornerstone of successful businesses"* (UK Trade and Investment 2009: 2). Two major documents lie at the foundation of the national innovation policy: the 'Innovation White Paper' (2008) and 'Going for Growth: Our Future Prosperity' (2009). The former set out a political ambition to make the UK an 'Innovation Nation'. Through this, innovation was to be encouraged and promoted beyond the traditional sectors (those investing in R&D) and open to all levels and all sectors of the economy. However, the recent economic downturn following the largest international financial crisis, led policy makers to re-think their strategy for innovation, as a key component for restoring strong and sustainable long-term economic growth. The 'Going for Growth' document stresses the need *"to ensure that policies and investment in skills, infrastructure, innovation and finance for businesses reinforce the fundamentals of … [British] competitiveness"* (p.2). Therefore, as a result of the recession, the focus of national innovation policy was shifted from all levels and all sectors of the economy towards support to key sectors where the UK has a competitive advantage and/or the potential for high growth of future markets. This change in the innovation policy was well captured by one of the interviewees who remarked that: *"[national] innovation policy has evolved due to the recession"* and although "*the Innovation White Paper still remains relevant with things to carry forward"* (PM2), Going for Growth is the new framework/template for innovation.

At the regional level, responsibility for boosting productivity and economic growth through innovation lies with the RDAs. Each RDA builds on their region's assets (including universities' expertise and science parks) and is responsible for, *inter alia*, the identification of and support for high innovation projects within the region. Although such regional activity is guided by national level priorities, regional institutions are important in setting the innovation agenda.

Evidence from the interviews and focus groups conducted in this project supports that from previous studies in highlighting that *"rural does not feature in the [wider] innovation [political] debate"* (PM1) (see also, for example, Dargan and Shucksmith 2006; NESTA 2007a). Nor is there any place-specific innovation policy for rural areas. RDAs support for innovation and business activity is not spatially selective, but should involve all businesses no matter whether they are situated in an urban or a rural area. Although the 'mainstreaming' of rural in policy-making in England is relatively new, differentiating between urban and rural businesses was not something that policy-makers had really considered, with one commenting:

> *"In a sense, it is not something I've thought about … It is just innovation in the North … [but] we are aware of large rural chunks… Cumbria … the whole Yorkshire Moors area. …. I still have not got my head around rural innovation as a specific sub set. That might be useful to carry on at some point. We are looking for our next range of projects on innovation and there might be an angle to interest to all RDAs. If there was something with a rural impact within innovation we would be interested in that."* (PM3)

It was suggested that limited research had been carried out on innovation in rural areas and as a result policy-makers were relying on "*old information and preconceptions about rural areas rural with poor broadband and a lack of access to universities"* (PM 2). As reported in the literature review, some universities have

opened up in rural areas recently (including Cumbria, Cornwall and the Highlands and Islands of Scotland) and broadband provision in many rural locations is improving. At the same time, there is undoubtedly a need for more research into how innovation in rural areas differs from innovation in urban locations[4]. At the same time, the Government (at least up until the recent election) has increasingly been placing emphasis on 'mainstreaming rural' so that there are fewer separate rural policies and programmes. This requires policies to be effectively rural proofed at the outset, as one interviewee alludes to:

> *"It is mainstreaming, [or] so it's the intention of all government departments". You don't have a separate rural policy, you look to rural proof your policies. So as part of developing a new policy you would sound it. You would speak to rural businesses."* (PM2)

The Commission for Rural Communities (CRC) and the Rural Advocate as the 'rural champion' have a key role to play in challenging the Government to rural proof all of its policies, as argued by the Rural Advocate in his 2008 report to the Prime Minister where the need to rural proof the White Paper 'Innovation Nation' was specifically identified (CRC 2008)[5].

5.2 The role of regional 'Innovation Connectors' in the innovation system and the links between key innovation players

Newcastle Science City

Newcastle Science City is one of six Science Cities (SCs)[6] designated in 2004 by the former Labour Government *"to foster innovation in the British economy by creating closer partnerships between academics, researchers, entrepreneurs and business leaders"* (UK Trade and Investment 2009: 9). Although the concept of a science city is not new, the idea behind the creation of these six SCs was to recognise that the entire UK economy needs to capitalise on its science excellence and create prosperity from science. At least part of the rationale for designating the Science Cities was to draw scientific and research excellence outside London and the South East (such as in the London, Cambridge and Oxford 'golden triangle') where such activities have tended to concentrate, and thus to reduce economic disparities between the North and South of England.

Newcastle Science City's work covers a range of different activities[7], including 'Science Business Creation' which links science with businesses and *"aims to support a portfolio of entrepreneurs and businesses that have the greatest potential to generate high-growth revenue and quality employment opportunities"* and 'Science Networks' which enable collaborative working regionally and internationally. Education and Community is a special project carried out in collaboration with Newcastle City Council which fosters the engagement of the whole Newcastle local community, particularly young people, with science and technology. The project raises awareness of science and changes the attitude and dynamic around education

[4] Defra has recently commissioned a project to explore a range of research questions, including the ways in which innovation differs in rural and urban locations and the opportunities and barriers for business innovation in rural areas. The project is being undertaken by GHK Consultants.
[5] On 29th June 2010 the Government announced the abolition of the CRC and the strengthening of the Rural Communities Policy Unit within Defra.
[6] The other five Science Cities are at Birmingham, Bristol, Manchester, Nottingham and York.
[7] See: http://www.newcastlesciencecity.com for more information.

by launching innovative science projects in schools. This is the only strand with a very local focus.

The Innovation Machine (NIM), supported by a team of six business and innovation experts, is perceived as the NSC *"flagship project which is aimed at promoting high growth companies"* (NSC1). The NIM is seen as a demand-driven business model, a technology-pull mechanism, that assists entrepreneurs to identify 'unmet need', 'find solutions and setting up high growth, demand led sustainable businesses (NSC1, NSC3, NSC4). The uniqueness and the strength of the model lie within its construction:

> *"What separates Newcastle's Innovation Machine from other business models is that the emphasis [is] on … the IP [intellectual property], that can be quantified as a proposition. That sets aside your business from everyone else's in the market. You're away from the competition. You actually place yourself in a wide space. That is why this business model is strong. … We use a traffic light system, through the different stages of the project. So we have three main stages, one to three. One – identify the unmet need. Identify if there is an opportunity there, do some market research and once that is done you can develop the business plan and identify the value added. … So, it is a three stage process and the emphasis is on identifying the IP, which will help the business grow and more importantly make it sustainable."* (NSC4)

The focus group conducted with NSC staff discussed the creation of NSC through a partnership of One North East, Newcastle City Council and the Newcastle University. It was felt that the designation represented a good opportunity for these three key players to come together to create an innovation strategy and infrastructure to meet their needs and stimulate further regional economic growth. The purchasing of the Scottish and Newcastle Brewery site as the location for Science Central, has helped to strengthen the partnership (NSC1). Science Central is *"destined to become the powerhouse of Newcastle Science City"*, a place where *"science based businesses sit alongside academic research institutes, cementing partnerships and enabling a true science ecosystem to be realised"* (www.newcastlesciencecity.com).

As reported by one participant in the focus group with NSC staff, Newcastle was designated as a Science City because of *"scientific excellence that came from our universities and centres of excellence and industrial engagement through our science excellence"* (NSC1). The work of NSC is now led by a company limited by guarantee (Newcastle Science Company Ltd) which was set up in April 2009 to co-ordinate the efforts of all regional partners. The provision of a 'vehicle' through which to channel funding, implement tangible projects, build partnerships and deliver added value services, was seen as essential by all founding partners. All three partners provide funds for the company, which currently employs some 23 people. The staff covers five major strands of work: The Innovation Machine, Science Business Creation, Science Infrastructure, Science Networks and Education and Community.

In order to achieve its objectives NSC has to engage and connect with its founding partners but also with other local, regional and national innovation actors. The role of Newcastle University within the partnership is seen as crucial. The University contributes financially, provides leadership and is involved through science and technology expertise across the five strands of work. Moreover, the University took the lead in the identification of the areas of excellence, the science themes that lie at the core of NSC:

> *" … the University has aided in identifying the themes and building a science credibility. Our role … is to make sure that we understand the offer in the context of the region and the global direction."* (NSC1)

Although initially there were four science themes, following a recent revision and amalgamation there are now only three: 1) Ageing and Health co-ordinated by the Campus for Ageing and Vitality at the General Hospital; 2) Stem Cells and Regenerative Medicine at the International Centre for Life and 3) Sustainability. At present, the latter is very much a priority theme for both NSC and Newcastle University, and includes not only energy and environment as scientific sub-themes but also marine technology, transport, urban sustainability, food security, health and environment and social science and policy. Science Central is the key site for this theme. The theme also bridges links with other Innovation Connectors, such as NaREC:

> *"Our sustainability theme is a priority for us … and there has been a lot of work inside the University to identify this area of strength. What we at SC are doing is to put it [sustainability] in regional context and demonstrate where the links and networks are in the themes"*. (NSC1)

In addition, the University supports NSC to deliver its main objectives via infrastructure, science enterprise and participation in the NIM, but also provides office space, advice and funding. The methodology developed and used in the NIM is to be included in teaching modules across the university. For example the MSc Programme in Renewable Energy and Enterprise Management includes a module of 40 credits which focuses on business creation and enterprise management. People involved in the Innovation Machine are also to be invited to teach workshops or modules (NU1). The importance of NSC is also clear in the University Engagement Strategy and in Newcastle University's 'Vision 2010' document which includes as objectives: '*to attract top talent to the North East', 'to develop and implement the concept of NSC', 'to support regional growth and culture' and 'to implement strategic partnership initiatives to address major global challenges'* (Newcastle University 2009: 10)[8].

NSC fits within the wider innovation policy context through an active engagement with other key innovation players at both national and regional levels. NSC meets regularly with the other five SC teams to inform each other about their activities and to share experience and ideas. All SCs want to ensure that their voice is heard by the Government. At the time of the interview for this project, all six SCs were working on a collective policy paper which identified and highlighted the important areas of support required from any incoming government. By working in partnership *"the SCs can add value to other innovation hubs and this will reinforce national quality"* (NSC5).

The link with ONE, as one of the founders of the SC initiative, is also seen as very important. Within its Regional Economic Strategy, ONE has designated NSC as one of the seven Innovation Connectors (ICs) within the North East region. ONE was a key player in the creation and development of NSC and envisages NSC as a *"hub for world-class innovation"* which will support companies and businesses all across the region. ONE encourages all Innovation Connectors to work closely together.

NSC considers that working in collaboration with the other regional Innovation Connectors is also very important as each of them have different things to offer:

[8] Available online at: http://www.ncl.ac.uk/documents/vision2021.pdf.

"We believe we have a core offer of innovation support services that are unique to Newcastle Science City and we offer more peripheral services that are not unique to us, but part of a package could be. That is why we work with the innovation connectors. Also they offer things unique to them. For the past year we have been actively looking for partnerships with the innovation connectors through formal partnerships, a memorandum of understanding." (NSC1)

NaREC and NETPark

The New and Renewable Energy Centre (NaREC) and the North East Technology Park (NETPark) are two out of the seven Innovation Connectors[9] (ICs) in the North East England.

NaREC is a 'Centre of Excellence' for designing and delivering world-class innovative technology for new and renewable energy, is located at Blyth in Northumberland. The North East Technology Park (NETPark) as a flagship science and technology park with a focus on electronics and electronic engineering, located at Sedgefield in County Durham. Mainly designed as business clusters with a clear geographical and sectoral focus, the major aim of the ICs is to stimulate economic regeneration, competitiveness and knowledge transfer across the entire North East region through innovation.

NaREC is one of the five Centres for Excellence established by early 2000s by ONE through its 'Strategy of Success'. The strategy aim was *"to develop, based on existing strengths, leading expertise within the North East in emerging technologies for growing markets, and in the exploitation of those technologies"* (http://www.strategyforsuccess.info/page/about.cfm). As renewable energy was becoming a 'hot' issue on policy makers' agenda, NaREC (a proposal submitted to ONE) was seen as a good opportunity for the North East region. It was set up at Blyth, because of its "*history of heavy engineering here in the past with shipyards and the docks"* but also because "the space became available" with portside access (NaREC 3). Currently the company employs around 120 people.

As an Innovation Connector, NaREC has received ONE funding. However, as this funding is not long-term, NaREC is now focusing on expanding and developing its commercial side. During the focus group for this project, NaREC was described as an IC with two different roles: a supplier of public goods, more precisely support for those companies within the region that are looking to invest in energy technologies, and as a supplier of R&D for the private sector at the regional and national level.

Given its profile NaREC seems to fit well within the broader national innovation context. Four major sectors lie at the core of NaREC's work: (offshore and onshore) wind energy, marine renewables, electrical networks and (wave and tidal) distributed energy. Indeed, NaREC features amongst the most important national players in the UK Low Carbon Industrial Strategy[10]. NaREC focuses primarily on engineering and industry consultancy, but also provides business support services and world-class testing and demonstration facilities for the renewable and electrical power sector:

[9] Newcastle Science City, Digital City in Teeside, Sunderland Software City, NaREC, Wilton Centre, Design Centre for North and NETPark.
[10] See: http://www.berr.gov.uk/files/file52002.pdf for more information.

> *"At a top level we are an engineering consultancy, that's at a high level. We're split into various divisions. We've got distributive energy, photovoltaic, any low carbon solution for the built environment and it is probably fair to say that distributive energy is more of an engineering consultancy and wind energy is a bit of both consultancy and testing. We have some big test laboratories."* (NaREC2)

To raise its profile NaREC provides lectures on renewable energy to schools, local communities and organises a series of supply chain events. NaREC has a strong link with BEDE Academy in Blyth, a school specialised in Engineering and Enterprise, and consider this as their "flagship school".

NaREC engages to a greater or lesser extent with various innovation key players. Its link with ONE is clear, given that 50 percent of the company's funds are provided by the RDA. As regards NaREC's links with Newcastle University these tend to be on an individual or project basis rather than anything more formal. Individuals are often involved with the University on various projects; however there is no over-arching strategy guiding work with the University, but in the opinion of focus group participants there is considerable room to strengthen this relationship. The following is an example of this link:

> *"Through our work looking for inward investment funding we attracted Yarmac to the region in 2007. Yarmac had a power system for the European market. The links we had with the … Agricultural Department, at Cockle Park, we provided expertise and funding... We worked with the University on that level, which has been quite good. It helped us for inward investment and the university in the use of Cockle Park."* (NaREC2)

The Cockle Park project (the creation of the Centre for Renewable Energy from Land) was mentioned by two other interviewees in this project as being one tangible example of how the University engages with rural businesses (in this case a farm). The interviewees were keen to point out how more could be made of this project, not least as a demonstration of 'good practice'.

Amongst participants there was also a perception that universities have a different role in terms of innovation development:

> *"Well, universities have a very different role in terms of innovation development. Things may not be technically applicable and research may have not any application. Whereas NaREC all the work we do is pretty much focused on product."* (NaREC6)

> *"We do research but is applied research."* (NaREC4)

Despite NSC focus group participants noting that there were strong links between NSC and the other ICs, focus group participants at NaREC did not feel that their relationship with NSC was well developed, nor did some fully understand the role of NSC:

> *"We know of it on the periphery. There is no real tie up between us and Science City.*" (NaREC3)

> *"You have mentioned Science City a few times and I'm still struggling with the concept of Science City. What does it do?"* (NaREC8)

This lack of understanding of NSC's role and the poorly developed relationship between NaREC and NSC led some participants to perceive NSC as a competitor in the regional innovation system rather than as a collaborator. However, it should be acknowledged that at the time of the interviews, NSC was one year into its three year programme of building regional partnerships and that this work has continued since then.

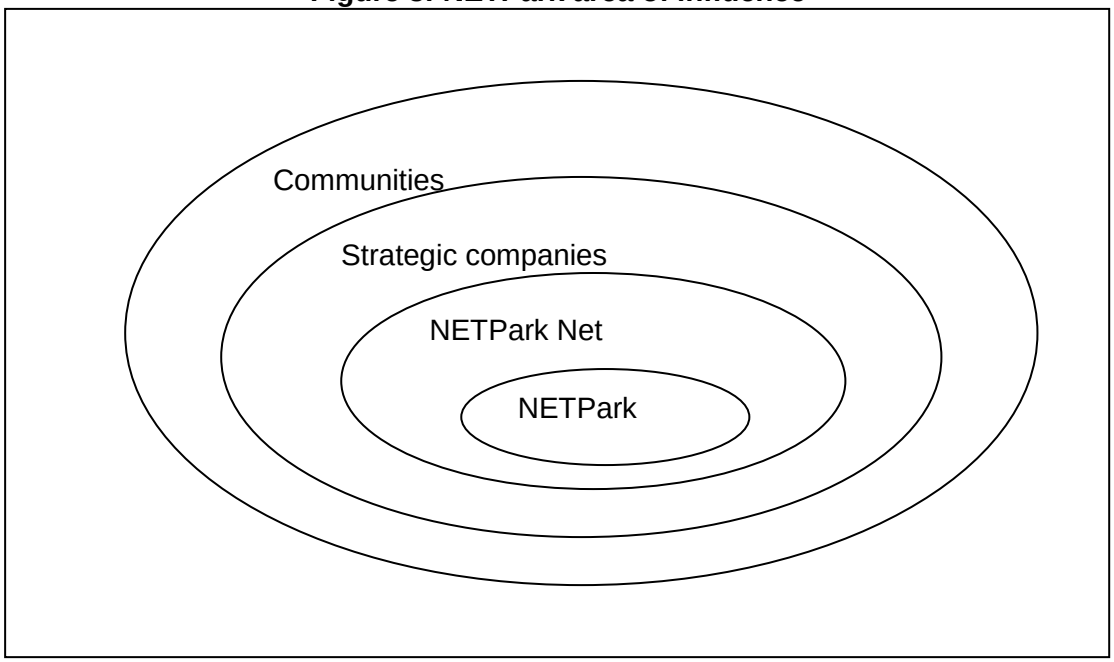
NETPark is located in a rural location just outside Sedgefield in County Durham. The Company's history goes back some 20 years, when County Durham Development Company was established as a solution to the closure of traditional (mining and heavy) industries. It was used to attract business through inward investment to the County. However, with the transfer of many (manufacturing) businesses to Eastern Europe a new approach was required to attract businesses and sustain indigenous companies in the region. A science park model was chosen as a way of attracting high quality jobs to the area and increasing supply chain jobs in construction, housing, retail and schools. NETPark was set up, based upon the North Carolina Research Triangle Park model, but it developed as an Innovation Connector site only after ONE launched its Strategy for Success, looking for the formation of Centres for Excellence within the region. Its area of strength was electronics.

NETPark is situated in a rural location in County Durham primarily because the County Council owns the land. In the same way that NaREC is located in Blyth as the site, portside access and relevant skills were available, there was no sense in which either Innovation Connector is in its location because it is rural. It was recognised that NETPark's location could be a weakness (particularly in terms of transport availability and cost) but also a strength as it serves to attract a variety of companies and businesses to a location which is different from traditional urban centre locations. NETPark was described more as a *"way of doing business and attracting innovation".* A virtual version entitled NETPark NET, which supplies the same services as 'mother-firm' (e.g. intelligence services, business support, fund finding and looking at investment readiness) extends the business community beyond the site into the region and beyond.

Funds for NETPark are provided by ONE, the Technology Strategy Board and the European Union. Businesses also pay for the services available. The diagram below (provided during the interview) highlights the role of NETPark and NETPark NET within the broader innovation context.

NETPark has strong links with the region's universities in both formal and ad hoc ways. Durham University leases a building on site. The five North East University Chancellors are on the company board, but experts are engaged on an ad hoc basis when necessary. In contrast to NaREC, NETPark seems to have better links with the other Innovation Connectors, including Newcastle Science City. The connectors meet up once every quarter.

Figure 3: NETPark area of influence



This project carried out a focus group with staff at NSC and at NaREC and an interview with staff involved in the running of NETPark. NaREC and NETPark were chosen for focus in this project due to their rural location. Overall it seems that the ICs play an important role in the regional innovation system but also in the wider national innovation system. Each IC seems to have a relatively well defined role in the region based on particular sectoral strengths, but it is apparent that relationships between the ICs could be strengthened to the benefit of the system as a whole, and its links with the private sector. Links do exist between the ICs and the region's universities, although again many of these relationships exist on an ad hoc basis and there is some sense in which additional benefits would be accrued if they could be formalised.

Given the need to tie all actors in the region into the region's innovation system, the location of two (of the seven) ICs in rural areas is perhaps significant. However, more could be done to tie them more positively into the rural context in which they are situated, perhaps by drawing local businesses more closely into their work, or even having an event or a stream of work focused on innovation in rural areas.

5.3 Connections between actors and institutions in the regional innovation system and the region's rural businesses

In line with findings in the literature, engaging and working with rural businesses is not necessarily a specific focus for any of the key regional innovation players consulted during this research. Although rural areas and businesses are not an explicit focus, they are also not explicitly excluded. Policy makers at the regional level (especially ONE) do encourage the ICs (and particularly NSC) to work across the region and support companies and entrepreneurs based anywhere in the North East of England. Some respondents recognised the traditionally held perception of rural businesses (that they are mostly agriculture based) but acknowledged that, in reality, rural economies encompassed much more than this:

"There is an assumption of what a rural business does and is engaged in, because you could be an engineering consultancy living in a farm house or in an office. Because it is in a rural area does that make it a rural business?" (NaREC5)

When it was explained to interviewees and focus group participants how rural is defined (using the 2004 urban-rural classification, with (at its simplest) areas of less than 10,000 defined as rural), participants were able to talk about specific examples of engagement with businesses in rural locations:

"I don't know what your definition of rural is, because we work with businesses in Hexham, which is rural? The company itself is considered as an SME. They are a prime of example of a company involved in oil and gas and previous to that nuclear. But now are looking towards renewables and wanting to get involved. NaREC have organised a couple of supply chain events explaining what NaREC do …. And we can give them a helping hand of how to get into the sector. They are starting to crack the supply chain and there are a couple of companies in the region that are involved". (NaREC6)

"I struggle with your definition of rural! … participants have come [to the First Friday event] from a variety of different locations. The numbers I don't know whether we score it as sparse and less sparse". (NSC3)

"Every event we do its inclusive ... When we did the older people event we did not just want people from the city, so if problems were faced there they are found in more than one place. It is inclusive". (NSC1)

"Our First Friday club every month, we have a very informal event with entrepreneurs. No fixed structure and informal networking event and people come from across the region. From Northumberland, Rothbury, Durham, Teesside. So it is a very spread out event people coming in from across the region. That is a good example of the reach" (NSC4).

Newcastle University connects to businesses in different ways (such as through the creation of spin-out companies) and at different levels no matter where the business is located, through (NU1 and NU2):

a) The Careers Service via 3 programmes: Newcastle Work Experience (NEW), Graduate Apprentice (GA) and Entrepreneur Enterprise Programme (run by the Entrepreneurial Unit). The main objective of these programmes is to promote graduate talent by offering employers (mainly SMEs) the opportunity to recruit local talent in a cost-effective way.

b) The Business Development Directorate (BDD) and the Commercial Projects via *Knowledge House (KH)*, *Intellectual Property Commercialisation* (IPC)[11] and the *Consultancy* Units. The KH service offers various companies, organisations and individuals access to the University skills, expertise and specialist resources. Its

[11] "'The University forms a new company (a "spin-out"), and transfers (either by licensing or by assigning) the commercial rights to the IP to the spin-out. The spin-out undertakes the task of developing and commercialising the IP into a product or service and the inventors and the University either derives revenue/royalties from the spin-out's commercial activity and/or holds equity in the company. Licensing means that the transfer of the commercial rights to the IP by the University to an existing company. Typically, the existing company would be a company that is well established in the field of the particular IP and has a strong market presence in that field". (http://www.ncl.ac.uk/business-directorate/commercialization/intellectual_property/commercialize_ip.php)

main role is to attract businesses to use academic expertise/services. The University can sell its services in the form of a consultancy expertise or a contract research.

c) The University regional engagement agenda through which the University is seen as a key player in "driving forward the economic, social and cultural development of the North East of England"[12], but also beyond the region. Research and innovation are at the core of all academic activities. "It is this ethos of *excellence with impact* that underpins [the University] research and innovation portfolio" (Wright, 2009: 1).

d) Specific Faculty and School Programmes, such as for example the Goldman Endowment and the Executive Development Programme conducted by the Business School. The Business School has strong links and works together with a variety of local, national and international companies to develop training programmes for business leaders. Through the Goldman Endowment Programme the School appoints every year two leading business entrepreneurs from within the region to share their experience and knowledge and stimulate entrepreneurship and foster innovation within the North East of England[13].

However, in the same way as policy-makers did not differentiate on the basis of a firm's location, the University does not have a separate strategy of engagement with and support for rural businesses. The perception from the interviews was that business location makes no difference. If rural businesses come along and ask for support the University is prepared to offer it. Equally, given the travel distance of some remote rural businesses to the region's universities and that they are often microbusinesses and sole traders, it may be that rural businesses face specific challenges in approaching the University and it may be that the University needs to offer support to these businesses in different ways to ensure that it is as accessible to them as to businesses located in Newcastle.

Against this background it is interesting to note that rural areas and rural businesses are perceived by both ICs and the University as being very innovative. However, participants also acknowledged that the innovation potential in rural areas is not always automatically recognised by those who are doing it as being innovation. Moreover it was perceived that small businesses from rural areas often do not capitalise on their innovation. Farmers are good examples in this respect and some of the staff members at NaREC considered it as an important aspect which needs to be addressed:

> *"I've seen loads of things on farms that have been very cunning ways of doing things, but the farmer sees it as a means to an end not innovation. I think there is a lot of innovation out there but it is not developed, but used just to get things going and they don't think how else could it be used".* (NaREC7)

> *"If you go around a lot of rural farms you can see how farmers have done things. Quite often it is something very clever, but they don't recognise it as that. They recognise it as getting their water system working again … and get on with farming".* (NaREC1)

[12] See: http://www.ncl.ac.uk/estates/assets/documents/campusforfuture2.pdf for more information.
[13] http://www.ncl.ac.uk/nubs/business/goldman/index.htm

> *"It was something I was going to mention in rural locations they do innovation and have the advantage of a lot of land and may be the aesthetic considerations …. As I said before we don't make that link or definition of what type of innovation it was. But we do get innovators who use our facilities who do have a rural background".* (NaREC2)

Participants in the focus group at NaREC stressed again that the location of the business does not matter when it comes to making an approach and offering support:

> *"Whether it is urban or rural it should not matter. It is where they can do their business. It is like talking about a car, whether it is a blue or green car, but a car. This urban rural thing is not a feature for us"* (NaREC9).
> *"I would say … because we are based in the North East you can't consider just the city, you must consider the rural basis so we've done some road mapping and technology mapping of the whole area."* (NSC3)

Overall, the NaREC participants felt that there were no particular challenges in working with rural businesses when compared with urban businesses. However, some barriers were mentioned in terms of working with small businesses, including the lack of an up-to-date register of SMEs, a lack of critical mass or critical capacity and limited capital grants available for small businesses:

> *"A lot of SMEs interact with others regionally with low level interaction. They don't work up to the large corporation deals. Were there signs?. … Multi-nationals could not access SMEs. …. There is no register of SMEs to work with. … It is a huge barrier".* (NSC3)

> *"There is money but small rural businesses may be too small". …For instance the anaerobic digester is probably not suitable for a single farm, unless you get a group of dairy farmers together to do it. It is difficult to get them together."* (NaREC3)

> *"It does not matter to us whether you are urban and rural, but if you're urban you are more likely to have access to engagement and funding more focused on those places. In rural areas need may be greater."* (NaREC5)

NaREC participants who worked more closely with rural communities saw great potential for them to come together as potential innovation incubators, making them different to urban communities. It was suggested that innovation tends to take place in well defined and organised rural communities:

> *"The Community Energy Trusts you find them well organised and they try to support their rural communities. There have been some big success stories in the North East like the Berwick Wind Turbine and some of the others. I've met some of them and I'm impressed with them. They seem to be individuals who pull themselves together."* (NaREC6).

> *"If you look at an urban environment where people are trying to have community projects they have to build the community to get things done. They are a lot further behind than a rural environment".* (NaREC8)

In summary, there was some evidence that the key players in the regional innovation system that were interviewed for this project did engage with rural businesses, but that the urban-rural distinction was not important to them. As the ICs currently do not record the location of the businesses with which they interact there is no way of

establishing what proportion of these businesses is rural compared to the proportion of businesses in rural areas of the North East or compared to the total number of businesses with whom each IC has had some form of contact. It seems that a business is a business no matter what its location. During the interviews and focus groups participants could recall specific examples of businesses in Hexham or Rothbury that they had supported but it seems that better recording of the location of these businesses (using the 2004 definition) would be helpful in demonstrating the region-wide (i.e. rural and urban) impact and reach of the regional innovation system. There was recognition amongst participants, and particularly those at NaREC that much innovation does occur in rural areas – and that this is likely to be even more the case in future – and that this represents opportunities that must be tapped into. However, as NaREC is under pressure to become more commercial (as described in Section 5.2) there is a danger that the small-scale, incremental innovation in rural areas by sole traders and microbusinesses might be overlooked in favour of large-scale, urban based projects.

5.4 The perspective of rural businesses

The rural businesses which were interviewed for this project were chosen due to their existing links with NSC. The three business owners were identified by NSC staff as having attended at least one 'First Friday' networking event. Two of the three business owners had particularly well developed links with several players in the regional innovation system.

All three business owners found the monthly 'First Friday' breakfast meetings *"useful"* and *"effective"* as they are informal and bring together an *"eclectic, good quality mix of people",* and create *"a great opportunity to network"* and to *"exchange business cards"* (RB2). The events were described as being in the *"right spirit"* (RB2). Meeting new people and connecting with those who share the same interest in innovation is clearly the most important benefit of attending these meetings. Additionally, NSC staff are *"relatively effective at hosting the events well"* (RB*2).* However, the personal characteristics of those who run businesses were identified by the three interviewees as also being very important: *"First Friday works because people are like-minded"*. It was stressed that private sector people like to be *"in and out quick"*, able to hand over business cards and then leave (RB2). Thus there is a need to be clear about what is on offer to them.

The owners acknowledged the distance that they were required to travel to attend the meetings in the centre of Newcastle but all felt that it was worth it, although two of the three did try to arrange other meetings in Newcastle for the same day to make the trip more worthwhile. It was acknowledged that it was not very feasible for meetings to take place outside Newcastle where attendance would likely be lower meaning that, at a basic level, NSC may be at risk of not reaching targets set by its funders. One interviewee commented that "distance" and the dominance of "old money estates" (RB2) would contribute to lower attendances if the events were held outside Newcastle. Furthermore, it was acknowledged that if the event was held in other areas (e.g. closer to their home) they would not meet *"so many new and different people"* (RB1).

One of the business owners (RB3) endorsed the perception that innovation in rural areas is different to urban areas. He noted the importance of informal networking amongst rural business owners which leads to a 'groundswell of wealth creation' (e.g. through his little black book of key contacts who are drawn upon when necessary)

but which is not recognised by the usual Business Link model. In his view Business Link *"has a bad name"* and *"it is not geared for people for being innovative"*. Moreover, it encourages businesses to create a business plan but has a very *"structured, inflexible system, which is not appropriate for small businesses"*, and the specific criteria and systems it operates for awarding funds are *"too structured"*. In contrast, *"the SC gets the early days thing … get the small business thing"*, for example through hosting workshops in which you can talk through your business ideas in a relatively informal setting. He argued that NSC takes the business idea through the process in a flexible way, particularly through the INM, whereas the *"BL approach stifles innovation and creativity"*. He argued that, particularly in the science arena, it is not all about accounts and projections, it is about *"mental collateral…it is not the same as running a shop"*. NSC's funding system seems also preferable to BL as it supports the setting up of the company and then the debt is repaid to NSC if and when the company realises its revenue forecasts.

Some less optimistic views were also expressed by one of the rural businesses (RB2) when asked about engagement with other ICs, such as NaREC. The relationship was described as *"long and stressful"* which led the interviewee to conclude that NaREC was clearly *"not good at helping SMEs, but rather tended to trample all over them".* This might be partly due to the changes to NaREC's funding and the pressure on it to become more commercial.

Overall, however, there was a sense that awareness of NSC in the rural parts of the region is low. It is certainly the case that the three business owners interviewed were exceptionally well networked and all engaged in highly innovative businesses and thus perhaps do not represent the average small business owner in a rural (or indeed an urban) location. The interviewees felt that NSC needed to be more pro-active in advertising the services on offer to rural businesses, such as through the local/regional media (e.g. newspapers). This could be done by NSC itself, or by other regional key players, such as ONE. This would help to boost awareness of the NSC Initiative and what is has to offer.

Despite their positive views of NSC, the interviewees questioned whether NSC would see enough value in rural areas, not least as a result of its own targets and funding requirements. The feeling was that all ICs, including NSC, will struggle to be genuinely rural unless they pro-actively target rural businesses. The issue of better recording of the location of businesses that engage with NSC was again noted.

The evidence of links between rural businesses in the Rural Business Survey and Newcastle University (as discussed in Section 4) was limited. One business owner interviewee noted that, from previous experience, "*the working style and timings (i.e. operating environments) of businesses and universities were not compatible*" (RB1). Business does not have enough time to wait for the University to come forward and cannot wait for funding decisions which may take considerable time to come through, with the possibility that no funding will be forthcoming. Newcastle University is good at spinning out business ideas but it was acknowledged to be easier to do this if individuals were physically present on site, or at least close to the University. Nevertheless there were some examples of a good working relationship, with one interviewee recalling working closely with an individual in the marine engineering department at Newcastle University. However, again this was based on a good personal relationship and was contained within a specific, well defined project.

Another rural business owner (RB2) expressed his frustration that the University had not become more engaged in demonstration work, particularly in relation to renewable energy (through the CREEL project for example, although the progress of

this project has been hampered by a range of factors). He argued that Universities needed to look more closely at what they are and what they are there for, but accepted that it is hard to change the behaviour of academics due to the pressure to publish. He believed that academics need to be incentivised to work in different ways.

It was also acknowledged by the rural business owners that it was still relatively early days for NSC and that it would take time for word to spread about what the Initiative was all about, and particularly to spread into the rural areas of the region. This was also acknowledged by NSC staff, who also noted the potential for using existing networks to target rural businesses and make them more aware of NSC:

> *"That is why we network and work with associations like the ones we mentioned and use word of mouth. People may be curious and we have not promoted this widely, but First Friday is also gaining momentum. The entrepreneurs we want to target come to First Friday. It started with 30 to 40 and now it is 70 – 80 people. It is a growing network. We would not approach a rural business any differently, but may be their needs are different. If they are isolated and do they need to know of networks and where people meet to exchange ideas."* (NSC1)

> *"I think what we said before and also accessing the NRN is a kind of first step and then following up… [We need to] help people understand what we do and that it is of interest to them."* (NSC2)

Another member of NSC staff also acknowledges the potential for entrepreneurship that exists in rural areas of the North East, who could also be targeted. This individual is also significant in acknowledging that some innovation may be small-scale and low-tech but that is equally as important to foster and encourage (albeit still with an emphasis on high growth):

> *"We are interested in existing businesses as well as budding entrepreneurs. I am going to make a huge assumption that there are a lot of hidden entrepreneurs in rural areas who have come here for quality of life and happen to live in some of the affluent market towns. We are interested if they are interested in innovation, not necessarily high tech. We are interested not just in high tech but novel ways of doing things may be using existing technologies, clever but not high tech, but certainly high growth."* (NSC1)

There was certainly a sense amongst the rural business owner interviewees and the focus group participants at NSC that more could be done to help rural businesses to unlock *"the ideas that are land-locked in rural areas"*. One business owner referred to the need for a support system that is like a 'nutrient rich soup' (including access to finance), and for the creation of a peer group of forward thinking rural business owners to lead others forward. He felt that more could be achieved by business owners working collaboratively, including through existing networks such as National Entrepreneurs Forums where examples of good practice can be shared. It was also important to have greater rural involvement in all kinds of regional institutions and programme designs, beyond *"having a token rural person"*. More broadly, and an implication that applies equally well to urban and rural businesses was a need to stop chasing the grant funding and encourage more long-term strategic investment in companies to benefit them and the region in the longer-term.

6. Conclusions and Policy Implications

This project aimed to explore the extent to which rural businesses in the North East of England are undertaking innovation and are working with external organisations to do so, to explore the extent to which different elements of the regional and national innovation system currently engage with rural businesses and to draw out some recommendations as to how all actors in the innovation system can develop stronger working relationships. This final section of the report summarises the key findings and develops a set of policy implications for all actors in the system.

The key findings from the project can be summarised as follows:

- Much of the rationale for NSC refers to its potential to positively benefit the North East region as a whole. However, previous research has highlighted the limited geographical extent of knowledge spillovers from urban-based actors and institutions in the innovation system. A key part of this project's rationale is to explore the extent to which NSC, and the innovation system of which it is a part, can be said to be truly regional in scope.
- Previous research has found that rural businesses do engage in innovation. While some researchers argue that urban businesses are more innovative than rural businesses, other researchers have suggested that rural business owners have to be more innovative than their urban counterparts as a result of the locational challenges they face, for example, in operating at a distance from markets where there is a limited critical mass of businesses in close proximity.
- The traditional approach to innovation sees it as a linear process which is driven by experts with high levels of scientific knowledge. More recently, however, new approaches taking a broader approach to defining innovation have been advocated, focusing more strongly on learning – and indeed shared learning - rather than scientific knowledge.
- Traditional approaches to defining and measuring innovation (such as through spending on R&D or numbers of patent registrations) have tended to exclude much of the innovation that takes place in rural areas, thus reinforcing the perception that innovation happens only in urban centres with high concentrations of businesses and research and education institutions. National innovation policies in the UK have been criticised as being urban-biased.
- Considerable potential exists for rural areas to be important sources of innovation in the future. For example, they are at the forefront of the demographic ageing process with populations that are ageing faster than urban areas. They are also important sites for the installation and application of renewable energy technology, (for example, anaerobic digestion, windpower and hydropower), for new developments in environmental tourism and for growing speciality local products in response to changing consumer demands.
- Analysis of responses to the 2009 Rural Business Survey conducted in CRE found that just under half of the businesses (in the sample of almost 1000) had undertaken some form of innovation in recent years, and this included a range of activities, such as introducing a new product or a new way of working. Most of these activities involved small-scale and incremental changes. Nevertheless, 15.4% of these businesses had worked with an external organisation in introducing an innovation, albeit only 5.3% reported that they had worked with Newcastle University. Surprisingly, only a small proportion (3%) of the survey respondents were found to operate in the three

NSC themes (Ageing and Health, Energy and the Environment and Stem Cells and Genetics). However, given the importance of issues such as the environment, energy generation and demographic ageing in the future of rural areas, there would seem to be significant potential for NSC to work with rural businesses with connections to these themes, perhaps on a sector-specific basis.

- Other key findings of relevance from the 2009 Survey include the importance of home-working (over 38% of respondents) and of microbusinesses and sole traders (88% of respondents). While most respondents were motivated to take over/start their business by the need to generate income, sizeable proportions were also motivated by a desire to change their work/life balance, take on a new challenge, develop a personal interest and exploit a market opportunity.
- Interviews with national and regional innovation policy-makers reinforced the finding from previous studies that 'rural' does not feature in the national innovation debate. That is not to say that policy-makers actively exclude rural, more that they do not differentiate rural and urban in their policy processes or reflect on the features of rural locations and/or businesses which may affect the ways in which, and extent to which, innovation happens.
- All three Innovation Connectors interviewed as part of the project engaged with businesses across the region, but again no distinctions were made between businesses in different locations. Interviewees recognised the innovative potential of rural businesses and the need to recognise that rural economies were about more than primary sector activity. Some specific challenges in working with rural businesses were noted, including their small size and their poor access to appropriate funding. The location of two Innovation Connectors in the rural North East (broadly defined) is important, although in neither case was this an explicit consideration in the location decision.
- The interviews with selected rural business owners revealed the potential benefits of engaging with institutions in the region in taking forward innovative ideas and in particular with NSC which has different ways of working to the more traditional approach taken by Business Link for example (especially through the Innovation Machine). However, owners felt that rural businesses need to be made more aware of NSC and its role in the region and that other institutions (in particular NaREC and the University) should encourage and engage more proactively with small businesses.

From these key findings, a number of implications can be highlighted for all actors engaged in innovation:

- It is clear that current innovation policy makes no distinction between rural and urban areas. If such a mainstreamed approach to innovation is to be adopted, adequate understanding of the distinctive features of rural areas is needed to ensure that policy is not urban-biased. Such features include the higher proportion of sole traders, microbusinesses and home working and the generally small-scale and incremental (but no less significant) nature of innovation. Policy-makers and institutions need to have a good understanding of the needs of rural businesses (predominantly microbusinesses and increasing numbers of home based businesses) and the kinds of support (and methods of providing it) that would be most valuable to them.

- Work is needed to ensure that the traditional perceptions of rural areas as less innovative and dominated by the primary sector are countered. There is a

need to take a broader approach to defining innovation so that it is not all about patents, R&D spending and high-technology, high-profit activities. Innovation may also involve the adoption of a technique which is new to a specific business, sector or geographical area. The innovative nature of many activities undertaken by rural business owners may not be recognised by owners themselves or by the institutional support infrastructure around them.

- Many rural areas now encompass a wide range of economic activities, have seen large-scale investment in infrastructure (including broadband) and an influx of well-educated, highly skilled, resource-rich and forward-thinking in-migrants in recent years. All of these can be capitalised on to boost innovative activity. But rural businesses also face a number of challenges including distance from markets and centres of research, their dispersed nature and the poor quality of infrastructure in some area. These challenges need to be recognised by policy-makers when devising innovation policies. The policies themselves, and the methods used to engage with rural businesses and deliver the support, may need to be more sophisticated.

- At the same time, there is considerable scope for innovation across the primary sector: in agriculture, through new animal husbandry and welfare procedures, new crop strains, new production systems and processing techniques; in forestry, through mechanisation in harvesting and biofuels; in mineral working through land restoration and aggregate recycling. These techniques will become all the more pertinent if food shortages and energy crises materialise.

- In the North East region, the identified themes of NSC (and in particular Ageing and Health and Energy and the Environment) and the presence of two Innovation Connectors in rural locations, offer great potential for better working relationships with rural businesses. NSC events targeted at businesses operating in these sectors and at businesses located in close proximity to NaREC (Blyth) and NETPark (Sedgefield) should help to raise awareness amongst the region's rural businesses about the work of these Innovation Connectors. More could also be made of projects like Newcastle University's 'Centre for Renewable Energy from Land' at Cockle Park Farm which involves research, education and demonstration activities.

- Recognising that its work is still in its early stages, NSC has a job to do to raise awareness of its services beyond Newcastle. Staff could explore the potential for information sharing events or 'roadshows' in rural parts of the region, perhaps tapping into existing business networks and forums (including the Northern Rural Network, local business associations and development trusts, or sectoral networks such as the NFU). Engaged rural business owners such as those interviewed for this project could act as 'role models' in encouraging others to engage more proactively both through such events and on a one-to-one basis.

- NSC, and indeed the other Innovation Connectors, could collect more detailed data about the businesses with which they work and which attend events, including their geographical location (ideally their postcode), their size, age and sector. This would allow much better monitoring of their engagement with different kinds of actors and enable specific businesses, geographical areas or sectors to be targeted if remedial action was needed.

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