

Research report: March 2010

NESTA Making
Innovation
Flourish

Local knowledge

Case studies of four innovative places



Local knowledge

Case studies of four innovative places

Foreword

As the UK emerges from the worst financial crisis since the 1930s, many towns, cities and regions are facing up to rapid change in their industrial and social landscape. In some cases, the very economic and social foundation on which they depended has been shaken by the recession. In others, structural change has occurred over a much longer timescale. Either way, it is clear that innovation and new sources of growth are needed if local economies are to thrive and recover.

This report contains four case studies which show how innovative economic activity can radically transform an area. Rather than trying to create the whole innovation system from scratch, they show that successful regeneration fundamentally involves making the most of existing assets, creating links and exploiting synergy between what is already in place, and then building upon these and plugging the gaps by drawing in resources from outside.

It should be clear from this work that there is no 'one size fits all' solution. Different places present different opportunities, local areas must utilise and make the most of local strengths. This requires strong, committed regional leadership and decisive, imaginative policy. We hope that these four case studies will inspire and encourage policymakers to consider how local innovation policy can adapt to existing local assets and advantages, and to build the wider links necessary to supplement and make the most of these.

As always, we welcome your views.

Stian Westlake

Executive Director, Policy & Research, NESTA

March, 2010

NESTA is the National Endowment for Science, Technology and the Arts.

Our aim is to transform the UK's capacity for innovation. We invest in early-stage companies, inform innovation policy and encourage a culture that helps innovation to flourish.

Introduction

Dr Sami Mahroum

It is often more important for most cities, regions and countries to absorb knowledge, adopt and spread innovations, than it is to create new ideas and products through invention and discovery.¹ There are real economic and social gains generated when places adapt concepts that have originated elsewhere. History is littered with examples of economies that have unsuccessfully attempted to reach high levels of self-sufficiency and autonomy in knowledge and innovation – not just North Korea, Albania or Mongolia, but even China and India until the 1980s. Today's fast-growing economies owe their growth to a willingness to learn from others as much as exploiting their own original ideas.

This has not prevented a growing discourse over recent decades about the importance of the creation of regional innovation clusters, 'smart' cities and technology 'valleys'. These discussions sometimes even appear to envisage local isolated autarky. Numerous cities and regions across the world have launched innovation strategies that aim to create 'ecosystems' that are self-contained factories of knowledge creation and exploitation. Regional and central governments have chipped in to create special funds to support such activities in specific locations guided by economic development and social cohesion principles. However, despite all the good will and best intentions, the plethora of programmes and initiatives aimed at creating complete regional innovation systems have not yet produced significant gains. Inequality between regions continues to be large and there is no evidence of a strong convergence in economic performance.² This is because most regional innovation policies have been based on at least one of the following fallacies:

- The creation of new knowledge through discovery and invention and the subsequent development of this new knowledge need to happen in the same place for economic value to be created locally.
- New economic and social value can emerge only from the creation of new knowledge and translating this into new products and services.
- The path from a new idea to new product or service takes familiar routes, often from universities or industrial labs to the market.

In truth, this is hardly ever the case. **The creation and exploitation of new knowledge do not have to be co-located.** There is no point in cities or regions, let alone countries, trying to create all the components of an innovation system within their boundaries. If a city or a region is good at generating new ideas but bad at exploiting them locally, then its optimal option is to link with partners elsewhere which have the resources and expertise to exploit those ideas and turn them into products and services which can be deployed on a massive scale.

New economic and social value more often than not is the result of a successful adoption-exploitation process rather than creation-exploitation. The ultimate benefactors of one innovation will always be the wider users who will create more value from it than the original creators. Put simply, you don't need to have invented the computer to use it to generate your own new ideas.

Indeed, knowledge exploitation and the creation of new value happen through a variety of routes. The channels through

1. NESTA (2008) 'Innovation by Adoption: Measuring Innovation in UK Nations and Regions'. London: NESTA.
2. OECD (2009) 'How Regions Grow: Trends & Analysis'. Paris:OECD.

which a new idea, technique or discovery move from their birthplace to the market are diverse. A university could develop a new idea, while a firm might exploit it. Their production lines aren't usually in the same place. A new technique can be learnt through formal and informal networks, by a local professor, expert, a firm or a university. Ultimately, it will be spread and become known through formal or informal training.

The over-emphasis on the creation of self-sufficient regional innovation ecosystems is risky, inefficient and ineffective. Local policymakers should instead focus on what their economic constituencies can do best within a global innovation system. Innovation policies should support the capacities needed to harness global resources and be competitive within global innovation chains and not confine themselves to a particular locale. For that, regions need to invest in the three key capacities that are needed to plug-in to external national and international value chains: the capacities to access external knowledge, to anchor (hold) it and diffuse (spread) it in the local economy.

These three capacities do not rest on a well defined set of tools and instruments. In some places they may involve a physical infrastructure; in others they may be provided through social networks or strong inter-institutional linkages.

The collection of essays in this report detail the different ways obtaining these critical learning and value creation capacities can be achieved.

Building capacities from scratch

In Milton Park, just outside Oxford, a special site was developed at the crossroads between academic excellence, transport networks and economic clusters. Milton Park has evolved to become an important knowledge platform in an otherwise rural region. Its success owes a lot to two significant geographical factors that have allowed it to provide all three capacities: its position on major transport routes and its proximity to the science base.

Milton Park became a successful science park because it did not try to replicate a whole innovation system at a micro-level. Instead, it became a regional hub for the transfer of knowledge and the deployment of resources between the Midlands, East of England,

London and the South East of England. The Park was open to both academics and firms, and served as a base for cumulative learning and resources. The tenants and the management team collectively adopted and assimilated new inventions and practices, and spread them throughout the regional and national economy, as well as internationally.

Re-adapting industrial legacy and renewal

In Blyth, Northumberland, the New and Renewable Energy Centre (Narec) represents another pioneering example of capacity-building through economic renewal using infrastructure from historically important but defunct industries.

Wind turbines, especially the new generation of very large ones under development at Narec, require heavy shore-based development, manufacturing and support facilities. The required infrastructure is similar, in many respects, to the facilities required to support traditional economic activity in the North East, such as shipbuilding and maintenance, and off-shore oil and gas extraction. Narec has adapted redundant facilities that are remnants of declining industries and redeployed them to link the local economy to new global growth markets.

These facilities are expensive to develop from scratch but Narec realised that by converting existing infrastructure it would achieve a comparative advantage over other international locations, primarily by becoming a platform that provides the three critical capacities for value creation.

An 'archipelago' of innovation communities sharing same space

In an urban setting, the access, anchoring and diffusion infrastructure look different. The institutions that provide these functions do so only if the communities in which they reside are in a position to contribute to their functions. This means that the attributes of the resident communities are equally important in shaping the collective capacity of a place. Hence two different business communities might experience the 'offering' of place differently as their positions and capacities to benefit from the physical, institutional and

social infrastructure of the place might vary. This was accentuated in the case of Brick Lane in London, an area with a long history of social innovation, which benefits from the richness of the different small and diverse communities using the same physical territory. Brick Lane is not formed of one community, but of many, and occupies not one social space, but several. So, its ability as a place to provide access, anchor, or diffusion channels varies from one community to other. The social, economic, cultural and political activities of the place both draw upon and speak to various scales. Brick Lane functions as a series of micro-communities, with relatively little interaction between them. Thus, despite the influx of capital, people and ideas from elsewhere, Brick Lane remains an extremely poor area because its communities don't mix and too many of them lack the necessary skills.

More than a garage, less than a park

The scale of these capacities can be observed at the micro-level of an individual entrepreneur. The well known stories of Silicon Valley garage or bedroom entrepreneurs does not imply isolation. The ability to use a garage or a bedroom as places to start-up new ideas and develop them into businesses is derived from the strength of the social network of the individual entrepreneur. The HUB was founded as a response to such needs.

The HUB provides meeting rooms, colour printing, scanning, file sharing, file backup, mailing address, fax and postal services, storage, PA support, a walk around landline phone and a resource library. Its members can choose to buy anything from pay-as-you-go desk space to unlimited use of the space and facilities. As such, it represents a social innovation aimed at providing a social environment for individual entrepreneurs and micro-firms where they can gain access to various types of resources, and engage in cumulative learning exchanges. At this level, the HUB functions as a micro-environment where access, anchoring and diffusion processes can take place among otherwise disparate players.

Going forward

Physical infrastructure is important, but it should be relevant and geared towards

enhancing connectivity, flows and openness, rather than autonomy and self-dependency. Regions should refrain from building complete blocks that are meant to serve specific functions for many years, and instead aim at creating 'modular infrastructure' which can be used in a variety of ways and have the potential to be retrofitted to respond to future needs.

Place branding is important, but not sufficient to attract the right type of players to a city or a region. Instead there is a greater need to target specific types of player (organisations, institutions or firms) that have the ability and potential to engage both locally and globally. The traditional emphasis on providing seed and venture capital for local entrepreneurs or incentives to multinational enterprises to open a local plant, needs to be complemented by incentives for existing organisations in the public and private sectors to help attract external investors.

Another lesson that can be derived from this set of essays is the need to give more attention to the need of individual innovators. The individual innovator remains an important player in innovation systems, as the examples of Bill Gates (Microsoft), Larry Page and Sergey Brin (Google), Steve Jobs (Apple) or Jeff Bezos (Amazon) show. Such individuals are currently not served by the existing publicly supported infrastructure for innovation such as science parks and innovation incubators. The free agent entrepreneur would benefit from the presence of 'innovation kiosks', such as the HUB, which will provide an on-time and on-demand access to various sets of resources including access to a much needed social environment and peers.

Finally, communities are important. Thinking about places in terms of economic and industrial structure alone can be misleading. Communities define places and shape much of their economic activity. Investment in people's abilities is thus critical, but should take into consideration the need for both interdisciplinary and specialist knowledge. Creating synergies and complementarities between diverse economic communities should frame regional education and training policies. Without realising the diversity of their economic communities, many regional policies will emerge as too general to be locally effective.

Contents

Local Knowledge

Case studies of four innovative places

Part 1: Milton Park: developing a successful high-tech business park	7
Professor Helen Lawton Smith, Birkbeck College and Professor John Glasson, Oxford Brookes University	
<hr/>	
Part 2: Narec: discovering new ways of powering innovation	20
Adroit Economics	
<hr/>	
Part 3: Brick Lane: community-driven innovation	28
Kate Oakley and Andy Pratt, Enterprise LSE	
<hr/>	
Part 4: The HUB: creating a space to nurture innovation	40
Joost Beunderman and Indy Johar, Research00:/ and Demos Associates; Clara Maguire, Research00:/; and Shelagh Wright, consultant and Demos Associate	

Part 1: Milton Park: developing a successful high-tech business park

Professor Helen Lawton Smith, Birkbeck College and Professor John Glasson, Oxford Brookes University

1.1 Milton Park: background to an innovative place

Introduction/context

Milton Park is a remarkable science and business park in Oxfordshire in the South East of England. Oxfordshire has the archetypal knowledge-based economy. Over the last 30 years it has evolved from a sleepy rural county, with several agricultural-based industries, an ailing motor plant and an ancient university, to house one of the most dynamic economies in the UK. Although high-tech entrepreneurship started in the county in the 1940s and 1950s, it was not until the 1970s that the number of firms increased rapidly.³ By the mid 2000s, it was one of three counties (with Berkshire and Buckinghamshire) that collectively had the highest percentage of employment in high-technology knowledge intensive services of any European Union region⁴ (Lawton Smith *et al.*, 2007).

Milton Park combines three parks in one: offices, industry and science. Located about 20 miles (32km) to the south of Oxford city, it began life as a railway supply depot for military supplies in the 1930s, before becoming a post-war industrial estate. In 1984 it was acquired by MEPC (Milton Estates Property Company) and grew rapidly after the revision of the Planning Use Class Orders in 1987 (B1-Business Use), which allowed a mix of research, commercial and industrial activities within a single planning consent. In that sense, it is a relatively recent innovation park. In the early 1990s planning controls in Oxford were relaxed; they had previously restricted science park developments to the area close to the universities. Until then, Milton Park was the only major site for firms in the emerging high-tech sector, even if they were located in old properties.

The planning measures which allowed the establishment of the Oxford Science Park also affected the county more widely. Combined with the Park owners' property management strategy, they supported the contemporary and rapid development of Milton Park, allowing for the construction of dedicated premises as the park expanded. So, despite of its distance from Oxford and competition from local science parks, the Park still has many more leading-edge firms (including university spin-outs) than any other Oxfordshire science park.

This essay will show how Milton Park has evolved to become an important platform for the access, anchor, and diffusion of knowledge in an otherwise rural region. Its success confirms studies showing that science parks and their variants provide important mechanisms for transforming places through their role in the transfer of academic research, and in creating and supporting technology-based firms (Sainsbury, 2007).

A recent report by NESTA has examined the regional capacities needed to engage a place in learning and innovation and categorised them into three main elements: access, anchor and diffusion.⁵ These three capacities are critical to support knowledge creation and innovation development in any given place. Milton Park enjoys all three elements and this has allowed it to generate considerable economic, technological and social benefits for the wider region.

3. In the decade 1991-2000 the county had the highest employment growth in high-tech services of any UK county and was also an important centre for high-tech manufacturing. By 2004, there were approximately 3,500 high-tech businesses (600 in manufacturing) employing about 45,000 – 14 per cent of the county's total employment.

4. Lawton Smith, H., Glasson, J. and Chadwick, A. (2007).

5. Mahroum, S., Huggins, R., Clayton, N., Pain, K. and Taylor, P. (2008).

1.2 Case study: Milton Park, a home and a gateway for innovation in Oxfordshire

1.2.1 Capacities derived from location, facilities and strategy

Milton Park's access, anchor and diffusion capacities (or their 'innovation absorptive capacity') stem from a combination of three assets: its geographical location, its facilities and its management strategy. These assets enable its tenants to absorb the external innovations and knowledge they need for innovation, and to use them to create new products and services ('innovation development capacity').⁶

According to the NESTA *Innovation by Adoption* study, *access capacity* is the ability to connect and link to international networks of knowledge and innovation. This capacity requires agents, resources and culture. *Anchor capacity* is the ability to identify and domesticate external knowledge from people, institutions and firms. It is their ability to 'anchor' these external flows that makes a business park an innovative place. This could be provided through training facilities, networking, transport connectivity or sustainable infrastructure. *Diffusion capacity* is the collective ability of a place to adapt and assimilate new innovations, practices and technologies, and spread them in the economy. This is closely related to development capacity (knowledge creation and knowledge exploitation).⁷ Here, examples of indicators of active diffusion are the high quality skills, networks and 'boundary spanning' activities.

In Milton Park, its agents are high-tech enterprises, local public sector science organisations and the managers of the Park. The managers engage with local government⁸ (Lawton Smith *et al.*, 2005) to help sustain the Park's politically important position within the local economy.

1.2.2 Geographical location and innovation opportunities

Two significant geographical factors are particularly important (Figure 1). The first is its position on major transport routes. The second is proximity to the science base (Figure 2).

The 300 acre (121 hectare) Milton Park site is located on the outskirts of Didcot on the main London to Bristol/Cardiff railway; there are also good rail links to the North West and North East. The site is adjacent to the major A34 (Birmingham to Southampton) trunk road and the UK motorway system, allowing easy

access to Heathrow and Gatwick airports. These geographical attributes facilitate national and international connections.

Most of Oxfordshire's seven science-based laboratories are located very close to Milton Park. Originally these were all government funded directly (for example the United Kingdom Atomic Energy (UKAEA) laboratory, Harwell), and indirectly through research councils (for example, the Rutherford Appleton Laboratory located on what is now the Harwell Science and Innovation Campus). Through privatisation and science policy, these laboratories are increasingly entrepreneurial. They and their spin-off companies develop and spread their ideas across the county and within Milton Park in particular.

1.2.3 Facilities underpinning an innovative place

Milton Park competes with more traditional science parks in Oxfordshire by virtue of having a wider range of buildings (often more 'quirky' buildings), more flexible leases, a substantial land bank and a more open planning regime. These features are critical in anchoring tenants to the site. Forty-two per cent of the site is occupied by offices, 17 per cent by R&D/laboratories, 9 per cent by manufacturing with the rest used for miscellaneous other activities including shops and services (see Figure 3).

1.2.4 The innovative enterprises

Milton Park is home to many of Oxfordshire's high-tech enterprises. The site is now one of Europe's largest mixed-use business communities, with more science and bio-tech companies than anywhere else in Oxfordshire. It accommodates some 165 companies which employ around 6,500 people between them.

Summary details of occupants are shown in Table 1. Major companies include:

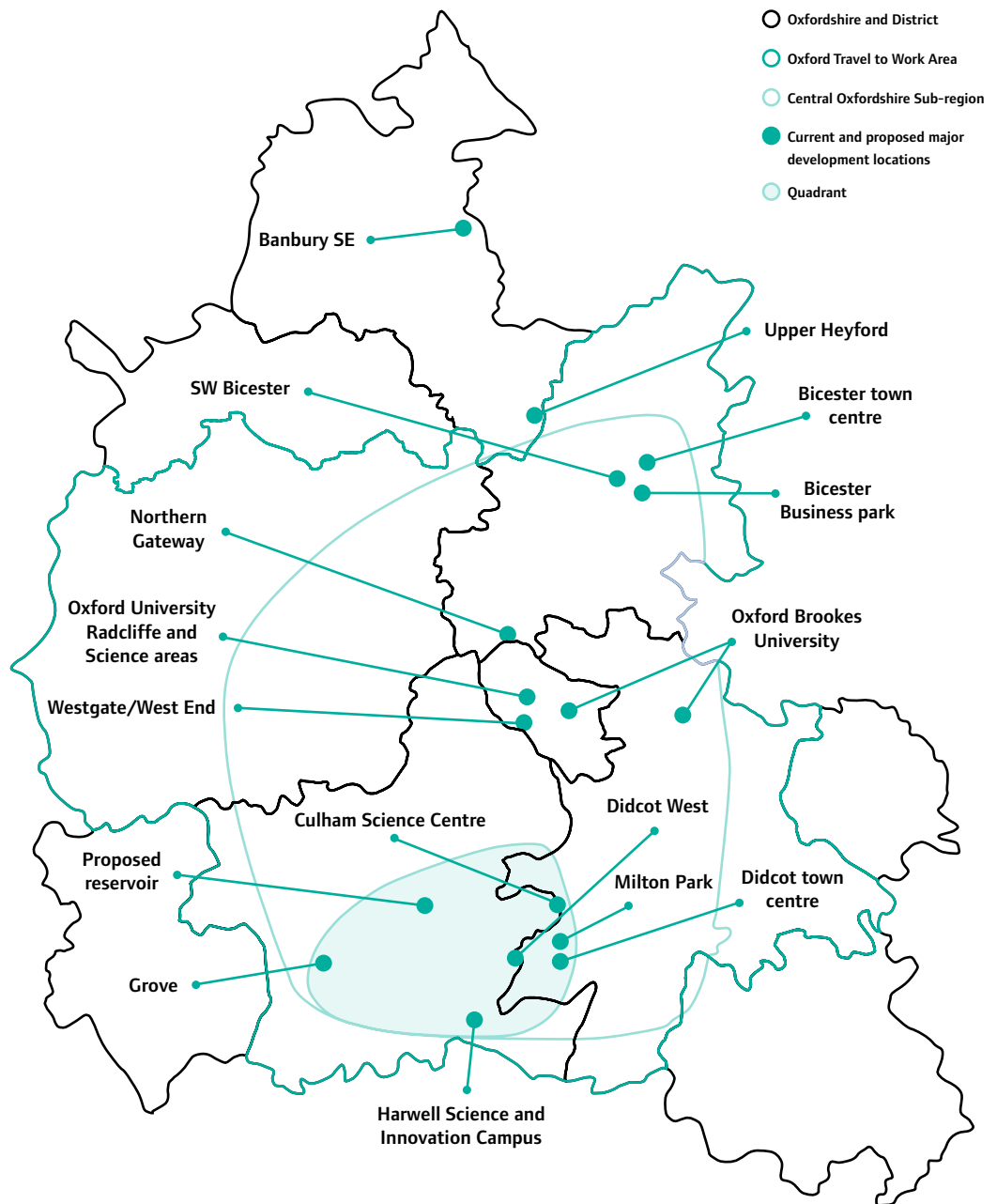
- RM (largest UK manufacturer of IT equipment for schools).
- Taylor and Francis (one of the UK's largest publishers, imprints include Routledge).
- Evotec (a leader in the discovery and development of novel small molecule drugs).
- PV Crystalox Solar (producing solar power components).
- LTI Metaltech.
- Psion (the mobile computer maker).

6. Mahroum, S., Huggins, R., Clayton, N., Pain, K. and Taylor, P. (2008).

7. Ibid.

8. Glasson, J., Chadwick, A. and Lawton Smith, H. (2006).

Figure 1: The distribution of major high-technology locations in Oxfordshire



- Oxford Semiconductors.
- Bookham Technology.

Milton Park is a science centre of excellence with over 500,000ft² of science space (46,000m²) – and which is home to over 30 science-based companies including much of the Oxfordshire bioscience sector.

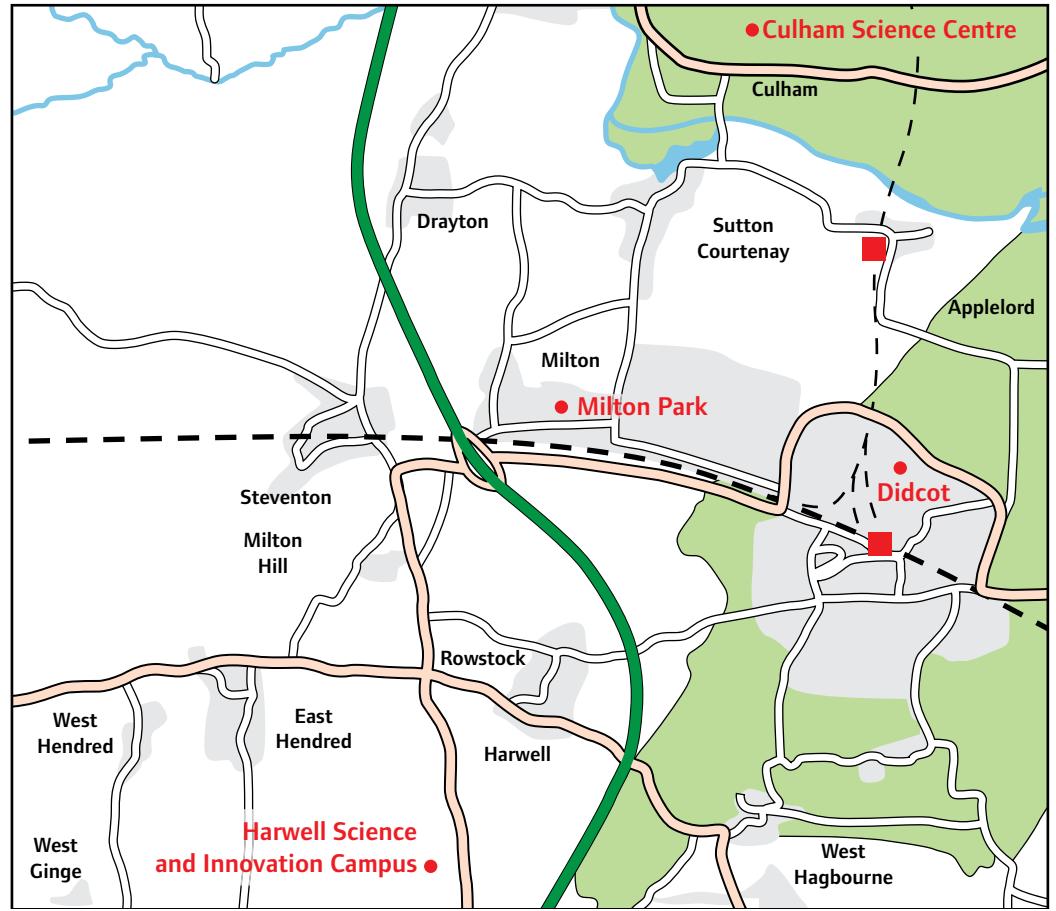
Many tenants are from outside the UK, reflecting Oxfordshire’s increasingly

internationalised economy. The growing number of foreign investors brings additional R&D intensive activities to the Park, particularly in bioscience.

1.2.5 Single ownership of Milton Park: innovation culture and regional innovation capacity

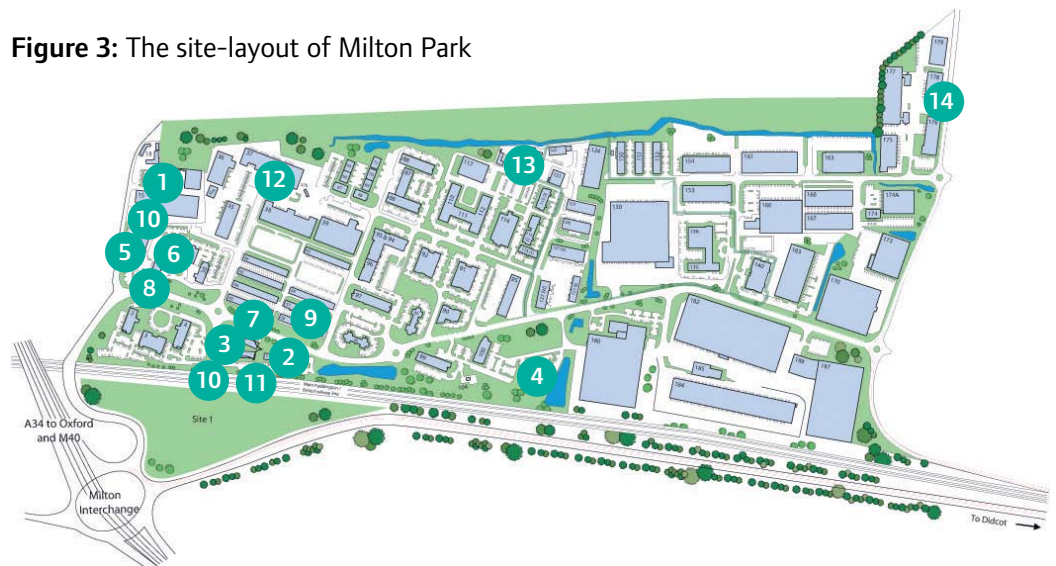
A key feature of Milton Park is its single ownership, which enables strong control of how the Park is developed. Ownership, and the resources the management team provide,

Figure 2: Specific location of Milton Park in southern Oxfordshire



Source: Quadrant Partnership in SQW 2007

Figure 3: The site-layout of Milton Park



- | | | | |
|------------------|-----------------|----------------------|----------------------|
| 1 Fitness centre | 5 Post Office | 9 Dry Cleaners | 13 Car Servicing (2) |
| 2 Restaurant | 6 Barclays Bank | 10 On-site Security | 14 Car Servicing (3) |
| 3 Health centre | 7 Hairdressers | 11 Shops | |
| 4 Nursery | 8 Beauticians | 12 Car Servicing (1) | |

Source: MEPC

Table 1: Milton Park – array of businesses – detailed breakdown (percentage of all firms) (2004)

Sub-sector	Percentage
Manufacturing – Electronic and electrical equipment	4%
Manufacturing – Healthcare/pharmaceuticals/life science	16%
Manufacturing – Engineering	4%
Other manufacturing	7%
Services – Transport, distribution and logistics	13%
Services – Real estate, construction and building	10%
Services – Financial	4%
Services – Software and computer	6%
Services – Retail	6%
Services – Publishing	3%
Other services	29%

Source: MEPC

Box 1: The relocation of the publishers, Taylor and Francis, to Milton Park

Routledge relocated its journal division to Milton Park in 2002, following its acquisition of Carfax Publishing in nearby Abingdon. The move to Milton Park would consolidate all the journal activity in that area. In 2004, Routledge's books division was also moved to Milton Park.

Milton Park is a good location for the publisher, not least because of its low rent. But the company kept its London office to remain close to some of the publishers who have remained in London. Milton Park had other attractions. It is close to the home of the CEO in charge of books and journals. It has good access by train and road. A shuttle bus runs from outside the station to Milton Park. Routledge pays the train fares of staff who still work in London, but are required to spend a day a week in Milton Park. There are also good training facilities nearby. Oxford Brookes University runs publishing courses; OUP and Palgrave are nearby and there are training courses at Milton Hill and on the Park. This means that there is

a strong skills base, but it also means that staff can be recruited by other companies.

Staff turnover is still rather high, and the initial decision to move to Milton Park was controversial – with many staff opting for redundancy rather than making the move. Obviously Milton Park lacks some London attractions: there is only one restaurant on site. Local people have cars and can leave the site at lunch times but London-based staff lack that option – and are left with the site facilities and Didcot. Oxford is less accessible for a quick visit as the Oxford railway station is not in the town centre.

However, set against these disadvantages is the advantage for many staff of living in a more semi-rural location, with a strong commitment to housing growth at more affordable levels than in London. The physical working environment is different to London, where people worked in small teams. On Milton Park, it is open plan. On sustainability, the CEO was keen to move to a paperless office, and staff had to get rid of most of their paper files. Indeed, the facilities manager won an award for social responsibility for driving forward that process.

attract and retain tenants and develop a culture both of innovation and ethical and sustainable development. This access capacity helps anchor tenant commitment to the park, hence their knowledge is also 'anchored' to the park and the region. This leads to diffusion capacities and developmental capabilities whereby the tenants, and the management team collectively adapt and assimilate new inventions and practices, and spread them throughout the regional and national economy, as well as internationally.

The Park is part of the MEPC portfolio, owned by Hermes Investment Management. MEPC owns more than 12 million ft² (1.11 million m²) of business space in the UK, of which 3.4 million ft² (316,000m²) is at Milton Park. Currently MEPC has eight sustainable business communities in the UK – six of them outside large towns and two in city centres. MEPC has owned Milton Park for 15 years and has invested more than £40 million in facilities.

The MEPC strategy of helping new firms and innovation in established firms, through

on-site incubation and science centres, is a key element in its commercial activities. This management approach has created an ability to connect and link to international networks. They have supported this capacity through incubating some of Oxfordshire's leading high-tech companies and improving the county's knowledge of innovation.

In 2008, MEPC Milton Park announced further support for entrepreneurial technology start-ups by launching a new, purpose-built Innovation Centre providing high quality offices and business support for up to 60 small and growing companies. The centre is part of a longer-term strategy to attract more high-growth companies to the Park, particularly in the science and technology industries. Companies that join the Milton Park Innovation Centre will benefit from a range of state-of-the-art offices on flexible terms, access to investment networks that match investors to businesses, mentoring and regular networking events. These are critical in further development of access, anchor and diffusion capacities resulting in innovation.

Box 2: The biotech company Summit at Milton Park

Milton Park biotech company Summit has bucked the economic downturn by signing a £70 million deal with a US company which could offer hope to sufferers of a fatal genetic disorder. The deal covers Summit's development of a treatment for Duchenne Muscular Dystrophy (DMD). Most sufferers die in their twenties. Steroids are the only therapy, but they simply delay progression of the disease. DMD affects one in 3,500 boys, with an estimated patient population of more than 40,000 in the developed world.

Milton Park benefits from the increased economic viability of Summit as a consequence of this collaboration, as well as the prestige to the Park from the link-up which will translate into its attraction to more international companies. Under the agreement, US company BioMarin will invest £3.5 million in Summit's shares now, and pay £25.5 million if it meets certain milestones, followed by royalties.

Jean-Jacques Bienaimé, chief executive of BioMarin, said: *"Summit's work could have the potential for treating the entire spectrum of DMD patients, not just those with a particular gene."* Summit chief executive Steven Lee said: *"We are very pleased that BioMarin has become our partner for the DMD programme. I believe they will help to deliver a medicine in the shortest timeframe possible for the benefit of all DMD patients. For Summit, this deal is important as it is the first of many that we anticipate signing."*

In a more recent development, Swiss company Evolva Biotech is to pay an undisclosed sum to Summit when the two companies sign a licence agreement to develop a potential treatment for infectious diseases associated with bio-terrorism. Both developments mean that Summit's longer term presence on the site is now more likely. As an innovative place, the Park can claim to be at the centre of ground-breaking advances in medicine.

Source: Science Vale UK

To ensure continual improvement, the company monitors performance through regular surveys. These show a high level of user satisfaction with the Park services and management. These are further indicators of anchor capacities as well as diffusion capacities which take the form of innovations and practices, in this case internal to the site, but diffused by being replicated in other locations.

1.3 Milton Park: international reputation and global information flows

1.3.1 Access capacity and channels of information flows

Access capacity is defined as ‘the facility to tap into international networks of knowledge and innovation, and absorb and use the information in the creation of new products and services’.

These include the presence of international firms on site and the contacts that firms have with overseas companies and people and their networks.

Attracting international firms: creating an international innovation community

Milton Park is a key location in an area which is gaining an international reputation as a business location for companies wanting to make their mark in business and

research. Although much of the demand for accommodation is from home-grown companies, around a fifth of tenants are foreign-owned firms, (including those that have been acquired by overseas companies). This means that there are frequent visits from parent companies, as well as flows of people into the site from the parent and other overseas operations. Both have the effect of bringing access to international networks to Milton Park and transferring that knowledge within the Park through engagement between their staff with individuals working for other firms on site.

Major UK companies attracted to the site, for example Taylor and Francis who moved from New Fetter Lane in central London, bring with them their own international networks (see Box 1).

International channels of information flows

Many of the firms on site have extensive international links with overseas companies. Through these they access knowledge and innovation. An example is the biotech company Summit (Box 2) which illustrates access capacity and diffusion channels, through the company’s international collaboration.

Milton Park compares positively with other science parks in the presence of so many

Box 3: Oxford Asymmetry/Evotec at Milton Park

Oxford Asymmetry (OA) International, founded by Professor Steve Davies from Oxford University, was an early and is a continuing Milton Park success story. It was set up to develop a methodology of producing pure left or pure right handed compounds which form the basis of drug development. It exists thanks to the support of the former owners of Milton Park, Nick Cross and Ian Lang, as Davies explained: *“After several fruitless months, I was at a Christmas party at Harwell and met someone from the Oxford Trust. He knew I was looking for funding, and introduced me to Ian Laing, Nick Cross and Tim Cook (later the managing director of ISIS Innovation). At this stage, Tim was employed by Nick and Ian to find*

companies in which to invest, but had had little success. So we held meetings, after about a month decided to go ahead together, and in 1992 Oxford Asymmetry became the first spin-off company in which Ian and Nick invested.”

OA moved from very basic space (£2-3 per ft²) on the site to more tailor-made ‘business campus’ type space. The company grew fast and was floated on the Stock Exchange. It now occupies over 170,000ft² (15,793m²), and employs over 1,000 people. In 2000, it was bought out by the German company Evotec, a leader in the discovery and development of novel small molecule drugs. Its main line of business is providing research results to its partners in the pharmaceutical and biotechnology industries through research collaborations and proprietary projects.

potential local partners. For example, BT's Adastral Park near Ipswich has no companies within a hundred miles that can collaborate with BT – so that BT's ideas are exploited over a hundred miles away – what a BT senior manager has called the 'volcano effect'. By contrast, Milton Park has many science-based companies that are capable of exploiting ideas from nearby laboratories such as Harwell (source: Toby Warren, Head of Community Strategy, Vale of White Horse, February 2009).

Moreover, the international profile of the park links tenants to wider networks. It has an internationally recognised address. In the last year, MEPC has entertained visitors from Scandinavia and Russia to see how the Park works. In addition, over half the hits on the Park website are from outside the UK.

Information flows, international labour mobility and regional development

Milton Park's absorptive capacity also arises from the mobility of its tenants and their contacts with local researchers, Oxford's two universities (University of Oxford and Oxford Brookes), and its nine hospitals. The professional population of the Oxfordshire region is highly mobile, giving the region one of the least fixed populations in the UK.⁹ The highly skilled people able to absorb knowledge on site and tenants from a wide variety of backgrounds, collectively have an extensive set of networks. All this increases the site's absorption capacity

The pool of labour on site and in the nearby research base is a key benefit of the Park's location and a strong reason for firms to stay. The sustainability of this pool of labour is

supported by local area growth plans. Didcot housing supply is seen as very important for attracting young staff. Housing is 'relatively' cheap. The Vale of White Horse Local Development Plan (to 2026) is based, amongst other targets, on employment growth of 5,000 jobs at Milton Park.

1.3.2 Anchor channels in practice

Anchoring is the capacity to harness external knowledge in order to attract the best people, investment and companies. A distinctive characteristic of Milton Park is a capacity to anchor tenants to the site, thereby retaining external knowledge from employees and their networks. This is achieved through flexible accommodation, tenant support in areas like training and the geographical location. The site also has good networking and social facilities on site, as well as a strong ethical and environmental ethos.

Anchoring innovative firms

The strategy of retaining firms works through a combination of flexible leases, supporting growth at each stage of company development, and the increasing quality of the physical environment. The Park's competitive advantage over nearby science parks lies in its mix of accommodation and policy of tailoring leasing and building arrangements to tenants' short and longer term needs. Its enlightened management policy of helping companies grow has retained them so that they don't outgrow the Park. This also anchors staff and graduate students to Milton Park and the area as a whole.

The Park has had incubation facilities since the 1980s. These include the Business

Box 4: Neflex oil exploration at Milton Park

Neflex, a major employer of doctoral graduates from international locations, chose Milton Park as its global headquarters from a shortlist which included Cambridge and Vienna, in 2009. Building 97, Milton Park's new environmentally friendly office building (which won MEPC the South of England and South Wales' regional award in the Commercial Workplace category) has its first tenant in long-term Park resident Neflex. The leading petroleum consultancy

has been a tenant in Milton Park since 2003 and has now doubled its office space, acquiring the whole of the second floor and 2,565ft² (238m²) of space. With clients including Shell and BP, Neflex is the world-leader in the provision of certain web-based geoscience products that assist international oil companies in planning their global upstream programmes. Milton Park has provided Neflex with four offices, each increasing in size, supporting it at every stage of development as it has grown ten-fold from a start-up to an industry leader in the energy sector.

9. Waters, R. and Lawton Smith, H. (2008).

Development Centre and the old Innovation Centre. A new Innovation Centre (25,000ft² or 2,322m²) opened in 2008 managed by Oxford Innovation (OI). It has already drawn some companies from the Harwell site and has a high retention rate. The range of the company's property portfolio enables it to be more flexible than traditional science parks or business estates.

Examples of how the Park has accommodated tenants' changing needs are given in the case studies of Oxford Asymmetry (now Evotec-OAI) and Neftex. The first is a home grown spin-off from Oxford University (1988) which was then acquired by a German company (Box 3). The second is a more recent tenant in a leading UK oil exploration consultancy company which located on Milton Park in 2003 (Box 4).

Milton Park also provides support for spin-outs from Oxford University, UKAEA Harwell, Culham and the Rutherford Appleton Laboratory. As with Oxford Asymmetry, it provides small premises at competitive rates for early-stage accommodation. It even occasionally takes equity stakes in small companies, sometimes when the company would otherwise have gone out of business, something of particular importance in the recession.

Training, skills and absorptive capacity

Expert advice, mentoring and training are available on site. Business mentoring is available from Oxford Brookes Business School and advice on property from its Real Estate Department. Oxford Brookes postgraduate courses in publishing are used by Taylor and Francis. More recently the local further education college has opened a facility on site to provide training in engineering and IT skills as a first step towards working more closely with companies on site.

Networking and innovation

Business networks are increasingly recognised as being crucial to innovation. Milton Park provides a range of networking events and sustainability workshops. Over the years it has hosted the Oxfordshire Investment Opportunity Network (a Business Angel network). It now provides a home for the Oxfordshire Bioscience Network; its 'Bio Tuesday' monthly event has up to 150 participants.

Social infrastructure, sustainable development, and anchor capacities: application of innovative, ethical thinking in economic development

Sustainable development – both socio-economic and environmental – is a key

Box 5: Recent examples of MEPC's sustainability strategy

MEPC Milton Park has been awarded a merit in the 'Britain in Bloom' Neighbourhood Award Scheme. This scheme praises locations which are taking steps towards making their surroundings greener and cleaner. Milton Park was praised for creating an appealing space for everyone to enjoy with particularly high levels of maintenance on the park and recycling. It was also recognised for working with local wildlife organisations to provide a diversity of natural environments and habitats. Regional coordinator for the Thames and Chilterns in Bloom Association, Stanley Bowes, commented: *"Milton Park thoroughly deserves its award of merit for the exceptional effort made in maintaining its clean, tidy and attractive image. The Park's thoughtful design and*

landscaping make it a warm and welcoming environment for the many people who work on and visit the site."

MEPC Milton Park is collaborating with Didcot-based Mountain Mania Cycles to provide a mobile bicycle support service on site. The new service will provide Milton Park's cyclists with bicycle maintenance on site. Mountain Mania will be on the park during the working day with a fully equipped mobile workshop, providing bicycle repair, service and maintenance. The company offers a courtesy bike service, so that if a bike cannot be repaired on site, a free replacement will be supplied until the original bike is repaired.

www.whitehorsedc.gov.uk/Business/science_vale_uk/DetailPage-3499.asp (February 2 2009)

component of the culture of ethical entrepreneurship of the site, which is significant in anchoring firms and their employees. This provides economic and other benefits to individuals and firms.

First, Milton Park tries hard to make the social infrastructure as attractive as possible by providing facilities normally associated with urban development on-site. It has a bicycle repair scheme, gym, swimming pool, sandwich bar, general store, bank, post office, hairdressers, daycare nursery, and MOT facilities for motorists.

Second, MPEC's philosophy of responsible and sustainable economic development translates into a model of management which provides economic benefits to tenants whilst creating a culture of ethical behaviour in keeping with contemporary thinking on the environment. MEPC pay for both a Sustainability Officer and a Travel Coordinator onsite. The Travel Coordinator works to reduce car travel and increase the use of public transport by tenants and visitors. The Park Travel Plan has a car-share scheme and a bus link to the important railway link at Didcot. In December 2008, the Park took delivery of a £175,000 82-seater double-decker bus powered by plant oil. It forms part of the shuttle bus service from Didcot Parkway train station and Didcot's main shopping centre.

Harnessing the capacity of its tenants to develop sustainable technologies is a third dimension of the application of innovative thinking. For example, the fuel system for the new bus was designed by Milton Park tenant Regenattec. Other sustainability initiatives include high levels of energy efficiency on site (through 'smart' metering and other measures); hi-spec new build (with rainwater harvesting and low energy systems), and green provisions in leases. MEPC is a member of the UK Green Building Council. It also works with the local Buckinghamshire, Berkshire and Oxfordshire Wildlife Trust to maintain a range of different habitats to support biodiversity on Milton Park. Box 5 provides further examples of MEPC's sustainability strategy.

1.3.3 Innovation diffusion of innovation and knowledge

Diffusion capacity is the capacity to spread new innovations and knowledge in the wider economy. Locally, this relates to skills, mobility and business networks, both within an area and externally focused. In Milton Park, this

also includes being tied into local systems of governance.

Innovation and skills development

Although Milton Park has a high percentage of employees who are resident in the local districts of Oxfordshire and Berkshire, its spread is much wider than these districts. This can be seen as both a diffusion and access factor.

Networking and innovation

Within Milton Park, informal networks operate between tenant firm employees as a result of sharing facilities on site. More formal networks are also hosted by MEPC. These have changed as the host organisations have changed over time. For example, links with The Oxford Trust, a major driver of high-tech networks, are not as strong as they used to be, as the Trust became more focused on education rather than the high-tech economy. Other networks occupy its space. Milton Park promotes the Oxfordshire Bioscience Network (a network dedicated to supporting the county's biotech sector) which has transferred its base from Oxford Brookes University to the Park. The biotech sector is characteristically international in scope, so through this organisation, Milton Park supports the diffusion of knowledge.

Governance and sustaining innovation

MEPC is also a key player in local systems of governance including a leading role in promoting the South Oxfordshire Quadrant initiative, now called Science Vale UK (SVUK) aiming to capture Silicon Valley connotation. It also helps to deliver one of the South East of England Development Agency's (SEEDA) high-tech *Diamonds for Investment and Growth* – cities and major towns which are major centres of economic activity and can act with their hinterlands as catalysts to stimulate prosperity.¹⁰ The argument is that 'long-term economic benefits that would result from taking an early focus on these critical urban areas would ultimately provide significant benefits for sustainable economic growth. These benefits would cascade outwards to cover a much wider part of the region and would provide enhanced fiscal return which could then be reinvested on other parts of the region'.

These are examples of ways in which knowledge is spread beyond the borders of the Park. As a partner in SVUK, the Park is also involved in the local authority Local Development Framework, and was therefore directly consulted before the draft was

10. The concept is an important part of the regional economic strategy for the South East.

published. One of the strands of the SVUK initiative is the Learning Park which is designed to cover secondary schools, further and higher education, and Milton Park is involved in the design of that strategy.

1.4 The Milton Park experience: doing it again

1.4.1 Main lessons, observations, reflections.

We have seen how Milton Park displays many features of key innovation capacities – access, anchor and diffusion (innovation absorptive capacity) – by providing a platform which is vital to its development of innovation.

Access capacity: Two things were required for Milton Park to exist in its current form and to facilitate connections to international networks of knowledge and innovation. The first was the management's strategy of offering a range of low-cost and flexible real estate. This allowed the development of a 'mixed economy' of activities. The second was that planning regulations had to change to allow the Park to develop this range of property provision. The change, especially in the Use Class Orders, was also timely.

The Park has also benefited from its location in the Vale of White Horse district, which has a supportive planning regime and a positive attitude to development. The district also has the advantage of being an area of substantial housing growth, providing essential accommodation for incoming employees and their families. Geographical location has been an important facilitating factor. And there are good transport connections – on the A34 trunk road, by rail via Didcot Parkway, and by air from London Heathrow Airport.

The Park and its tenants have increasingly accessed links with the internationally outstanding and entrepreneurial science and technology base in Oxfordshire, in the universities, government laboratories and hospitals. These have good connections into key science and business networks locally, nationally and internationally. Summit (Box 2) has agreements on technology advances with US and Swiss companies, for example.

Anchor capacity: the flexible property portfolio which includes a variety of different accommodation, provides diversification, caters for business life cycles, and generates

a mix of core, transitional and opportunistic income for MEPC. There is a constant stream of opportunities – including 500,000ft² (46,450m²) of vacant land with planning permission.

The Park has numerous attractions which are part of its anchoring capacity. It encourages stability whereby growing (and contracting firms) can transfer into more suitable premises. Its semi-rural location and proximity to both Oxford and London provide many leisure and cultural opportunities for the site's employees. And the Park benefits from good training facilities, transport connections, social infrastructure, networking and an ethical culture. The Taylor and Francis (UK, from London, Box 1) case study illustrates this point.

Diffusion capacity: the Park has adapted to local, national and international conditions in order to increase its own profitability and international profile, and that of its tenants. It has spread them in the economy by working with other key stakeholders – local authorities, regional agencies, employers, universities and others. It has also helped to drive policy changes which will improve entrepreneurship, technical innovation, sustainability and best practice in Park management. For example, it is actively leading planning and development initiatives – most recently in the South Oxfordshire Quadrant/Science Vale UK initiative.

1.4.2 Lessons specific to people and organisations in charge of managing such places or running similar activities.

Many of the lessons of Milton Park for others flow from the summary in the previous section. These are divided into those for science/business park managers and for host local and regional authorities.

For the science/business park managers strategic thinking is important. There should be a focus on more than 'rent collecting', instead facilitating innovation through flexible leasing and pricing policies. At Milton Park, this has enabled firms with international networks to find premises appropriate to their needs throughout the different stages in their development. This capacity is enhanced by a supportive environment, which is attractive to potential tenants.

Single ownership of the Park has been crucial. Park managers need to be outward looking, working closely with clients, local agencies and the science and technology base. Despite

Milton Park being particularly fortunate in the strength of the Oxfordshire science base, this did not stop it from striking international partnerships and alliances. It has worked well with the various important networking agencies, including the Oxford Trust. It has also been a leader in networking, perhaps best exemplified with its work with the Oxfordshire Bioscience Network and its partnership role for the recent Science Vale UK initiative.

For the local and regional authorities/agencies, a key message is to recognise the different functions that such sites can serve and the different capacities they generate. The authorities need to work in partnership with parks and other economic development initiatives, through a Local Development Framework (LDF) or similar entity. Milton Park has demonstrated its willingness to facilitate 'cross-border networks' which contribute to 'capturing external knowledge and new ideas', improving its credentials as an 'innovative place'.

Part 1: References

Glasson, J., Chadwick, A. and Lawton Smith, H. (2006) The growth of Oxfordshire's high-tech economy. 'European Planning Studies'. 14(4), pp.503-524.

Lawton Smith, H., Glasson, J. and Chadwick, A. (2007) 'Enterprising Oxford: The Oxfordshire Model'. Oxford: Oxfordshire Economic Observatory.

Mahroum, S., Huggins, R., Clayton, N., Pain, K. and Taylor, P. (2008) 'Innovation by Adoption'. London: NESTA.

Sainsbury Review (2007) 'The race to the top: A Review of Government's science and innovation policies'. See http://www.hm-treasury.gov.uk/independent_reviews/sainsbury_review/sainsbury_index.cfm

SQW Consulting (2007) 'Evaluation of the economic and employment growth potential of the southern Oxfordshire Quadrant'. Cambridge: SQW.

Waters, R. and Lawton Smith, H. (2008) Social Networks in High Technology Local Economies: The Cases of Oxfordshire and Cambridgeshire. 'European, Urban and Regional Studies'. 15(1), pp.21-37.

Part 2: Narec: discovering new ways of powering innovation

Adroit Economics

2.1 Narec: Discovering new ways of powering innovation

A brief history of Narec

The New and Renewable Energy Centre (Narec) is a research and development platform for developers, manufacturers and investors in new and renewable (N&R) energy. It is located in Blyth, Northumberland, an area with higher than average unemployment, low levels of economic activity and several industries experiencing structural decline.¹¹ These headline indicators of economic performance highlight the need for reinvigoration and investment within the local economy.

An example of this taking place is found in Narec.¹² The Centre's remit is to help establish a significant cluster of new and renewable energy firms. To achieve this goal Narec acts as a facilitator of innovation. This essay explores how it supports innovation through the 'absorptive' processes of accessing, anchoring and diffusing new knowledge and ideas.¹³

Narec's site includes facilities that are part of the North East's industrial heritage of manufacturing, extraction industries and ship building, making use of the dockyard facilities, wharf and technical water front areas originally developed for servicing these industries. Much

Box 6: Narec's facilities

Narec combines space, infrastructure, technical facilities and technical support, customised for the new and renewable energy industry:

- Wind Energy Testing Facility – this provides the capacity to test turbine blades up to 70 metres long.
- Wave/Tidal Testing Facility – a dock facility provides the capacity to carry out wave testing with a purpose-built large wave flume.
- Proximity to dockyard facilities, easing off-shore research and development activity.
- Photovoltaics Research Centre (PVRC) – Narec is the only independent, commercial crystalline silicon solar cell¹⁴ research and development organisation in the UK. Its facilities include laboratory space for the PV industry, solar cell process development and small-scale manufacturing of custom solar cells (e.g. concentrator cells).
- Energy Link Laboratory (ELL) – a custom-built flexible platform designed to address issues associated with embedded or micro-generation within electricity distribution networks.
- Low carbon and electrical research and development facilities and services.
- A second site is located in Hebburn. This smaller location is an accredited ultra-high voltage laboratory used to test electricity transmission technologies.

11. 2001 National Census of Population. See: www.nomis.co.uk

12. www.narec.co.uk

13. NESTA (2008) 'Innovation by Absorption: Measuring and Mapping Innovation in UK Nations and Regions'. Draft Report.

14. Crystalline silicon is one of the primary materials for solar cells.

of the regional infrastructure related to these activities is no longer in use, and is often in a state of decay. Narec has given these resources in Blyth a new relevance as part of a global growth industry.

Since its establishment the Centre, has received over £30 million of investment from One North East (ONE) and the European Regional Development Fund (ERDF). This was secured as part of ONE's regional policy of setting up 'Centres of Excellence' for priority industries. In line with the North East Regional Economic Strategy (RES), Centres of Excellence were funded by ONE to support growth in sectors identified as providing opportunities to build on existing strengths and develop new industrial specialisms.

Why focus on N&R energy?

Narec operates in a sector which provides extensive economic and environmental opportunities. N&R energies are power sources that occur naturally and are constantly available.¹⁵ They can be harnessed to produce electricity and other sources of power. The primary sources of N&R energies are:

- Wind – on and off-shore turbines.
- Solar (including Photovoltaic).
- Wave, tidal and hydroelectric (generated from water flowing over manmade structures).

- Biofuels and waste – generated from organic matter from plants or waste created from industrial, domestic, commercial and agricultural products.
- Geothermal – generated from the thermal energy (or heat) stored within the earth.

In economic terms, the N&R energy industry develops these technologies, manufacturing and assembling the parts and components, managing and maintaining facilities and delivering the energy created into the national infrastructure (in the case of the UK, the National Grid).

2.2 Innovation and the N&R sector

The drivers of innovation in N&R

There is a strong potential for growth in employment and generation in the N&R energy sector with a growing desire to generate 'greener' energy and reduce dependence on non-renewable energy sources.

A key political and social imperative is the aim of converting to a low carbon economy to achieve greater sustainability and to combat climate change. International environmental and energy policy has set challenging targets for the UK. Kyoto Protocol and European Union obligations have committed the UK Government to the domestic target of

15. NOF Energy – the leading business development organisation for companies in the oil, gas and energy-related sectors in the UK.

16. IEA Energy Statistics, www.iea.org/statistics, copyright OECD/IEA 2007.

17. North East Innovation Infrastructure Investment Framework, Adroit Economics, September 2008.

Box 7: The N&R sector in the UK

Despite the opportunities it offers, the N&R sector in the UK is relatively underdeveloped. In 2005 just 2 per cent of UK energy production was generated from N&R and waste sources.¹⁶ The sector is starting to show signs of growth; between 2003 and 2007 there was an 86 per cent increase in generation of N&R energy in the UK.

There are a number of wind turbine manufacturers represented in the UK. However, the only advanced manufacturing and development takes place in a single location on the Isle of Wight for the Danish

firm VESTAS. Other UK locations carry out more routine functions such as sales and marketing.

The high value activity associated with the industry is concentrated in Spain, Scandinavia, Germany, China and the USA. The geographical distribution of these activities is determined by market demand, political frameworks and available support infrastructure. Many of these countries acted faster than the UK to develop regulatory environments suitable for fostering growth in the N&R sector. regulatory environments suitable for fostering growth in the N&R sector.¹⁷

generating 20 per cent of electricity from N&R sources by 2020. The Government has established its own N&R obligations under which it aims to meet targets for the generation of electricity by N&R sources domestically.¹⁸ This makes innovation in N&R energy technology essential to maintain current standards of living.

An equally significant factor driving innovation is the aspiration for greater 'energy independence'. This has escalated in recent years with a trend of rising global energy prices and concerns over security issues. These factors have made the goal of domestic energy production more attractive both to business and national governments.

Internationally, innovation in this sector is also driven by the opportunity to lead the development of a major international industry. Wind energy provides a good example of how successful innovation will allow global markets to be secured. Land and sea-based turbines are a proven technology but have been restricted in their application due to the relatively low level of energy generated by each turbine. Technological advances, combined with opportunities to exploit more sea-based locations (with their associated strength and constant presence of the wind), have made wind power a potent form of N&R energy. The ability to innovate is an essential attribute in the resulting race to establish production and commercialisation of the largest and most cost-effective turbines.¹⁹

Innovation in the N&R sector comes in a variety of forms

One key area of innovation is the development of the technology that allows N&R energy to be generated more efficiently, cost-effectively and with higher yields. This involves scientific research, prototype development and testing.

With off-shore wind, process innovation is important to the management of maintenance. Although lessons can be transferred from off-shore drilling, the geography and technology of wind farms pose their own unique challenges. Innovative process development is required to ensure that N&R energy can be fed into the UK's National Grid – an issue which has previously limited growth in N&R energy generation.

The growth of the industry is dependent on innovative processes to manage environmental impacts. For an industry with a strong 'green' rationale, it is important that everything

is done to limit and offset any negative environmental impacts.

2.3 Narec as an agent for accessing, anchoring, and diffusion

This section describes how Narec facilitates economic growth and innovation by enhancing the three characteristics of absorptive capacity identified in the Absorptive Capacity/Development Capacity (AC/DC) model.²⁰ The three types of absorptive capacity are:

Access capacity – the ability to link and connect to sources of knowledge. This includes the ability to form connections and links to appropriate networks to acquire knowledge. The attributes required to achieve this successfully include skills, talent, infrastructure, social capital and 'cultural' factors, such as an organisational culture open to new ideas.

Anchor capacity – the ability to identify and domesticate knowledge flows by using the competitive advantage provided from a place's existing (or 'anchored') people, skills and firms.

Diffusion capacity – the ability to adapt, develop and apply this knowledge and spread it into the economy. This aspect of absorption is often achieved when organisations and individuals are enabled to collaborate, thus creating economic and social capital through diffusion of knowledge.

The following diagram summarises the main characteristics of Narec as a place that allows it increase these capacities for innovation by absorption.

Narec as an 'Innovation Accessing Agent'

Narec aims to develop a compelling reason for international and relatively footloose organisations to choose to work with businesses and other organisations in the region. This could not be achieved without the right connections, or access capacity.

Redeploying legacy industrial infrastructure

Wind turbines, especially the new generation of very large ones under development at Narec, require heavy shore-based facilities. The required infrastructure is similar, in many respects, to the facilities required to support traditional economic activity in the North East, such as shipbuilding and off-shore oil and gas extraction. These industries have declined in

18. NOF Energy.

19. North East Innovation Infrastructure Investment Framework, Adroit Economics, September 2008.

20. NESTA (2008) 'Innovation by Absorption, Measuring and Mapping Innovation in UK Nations and Regions'. Draft Report.

the region but Narec has redeployed redundant facilities in a new global growth market.

These facilities would be expensive to develop from scratch, but by converting existing infrastructure, Narec knew that it could achieve a comparative advantage over other international locations.

This competitive advantage is one of Narec's core strengths and plays a major role in its ability to access knowledge and innovative activity for Blyth. Utilising existing physical facilities has helped the place to maximise its ability to absorb knowledge and ideas – its innovation absorption capacity.

Blyth's accessing capacity is increased further as it is located near the North Sea – the physical location for the off-shore technology. The cost of logistics associated with wind

turbine testing makes proximity to a suitable natural environment of vital importance. Narec's developers recognised the valuable combination of a suitable environment and existing legacy industrial infrastructure. The combination of the two contributes to a powerful access capacity.

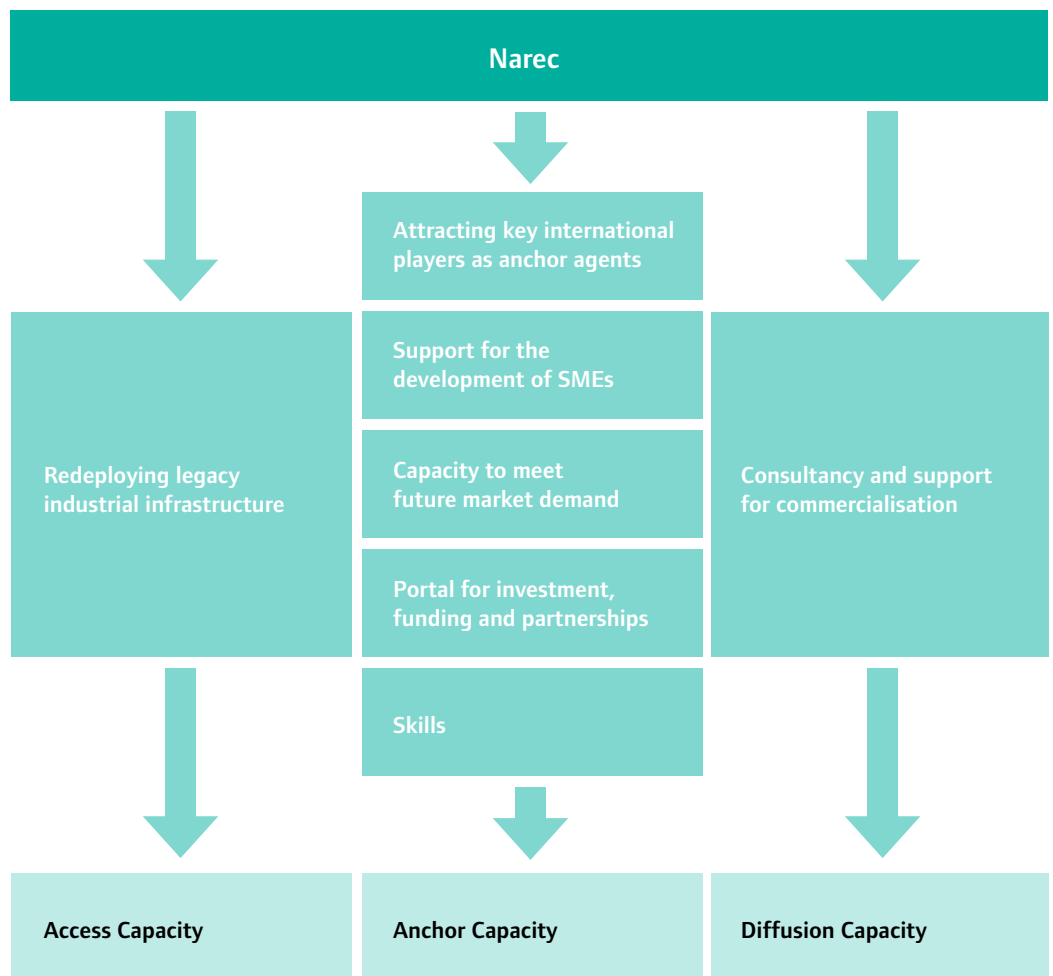
Narec as an 'Innovation Anchoring Agent'

There are a number of examples of innovation being 'anchored' in the North East by Narec.

Attracting key global players provides a strong anchoring capacity

In April, 2008 Clipper Windpower announced plans to develop the world's largest wind energy turbine with Narec. Named 'Project Britannia', these offshore turbines would be almost ten times the height of the 'Angel of the North'. They would generate around 7.5MW of energy, approximately twice as much as the

Figure 4: Narec inputs to Access, Anchoring and Diffusion Channels



Source: Adroit Economics 2009

largest turbines currently used in commercial offshore wind farms. A single 7.5MW turbine could provide for the electricity needs of more than 5,500 homes and offset more than 32 million tonnes of CO₂.²¹

Clipper Windpower is a Californian-based company and one of the largest wind turbine manufacturers in the world. As part of the investment deal Narec provides engineering, testing and development services to the project. The investment initially created 25 skilled engineering jobs and provided a significant boost to the region's reputation in N&R energy research.²² As part of Project Britannia, Clipper Windpower also announced that Blyth would become its European Centre of Excellence for Offshore Wind Technology.

This reflects an anchoring capacity that Narec has provided to Blyth, the North East and the UK as a whole. Internationally, the UK is not perceived as a leader in the N&R sector. However, Narec has significantly enhanced the UK's international profile by creating a hub of activity around which related economic activity can cluster.

Innovation is anchored through investment in SMEs

Narec's reputation has been greatly enhanced by its ability to form partnerships with key players in the N&R energy market like Clipper Windpower. But as a centre for innovation, support for small firms (SMEs) and start-ups is an important part of its anchoring innovative activity.

Such support is provided through consultancy and by developing flexible incubation and facilities and 'second stage' space.

This anchoring channel is a crucial part of establishing a robust cluster of like-minded activity. Diversifying through a vibrant base of SMEs, Narec aims to establish a sustainable cluster of N&R activity in the region.

Currently, Narec only has space to accommodate a small number of start-ups on site. But it is collaborating with a large number of N&R suppliers in the region regarding a proposed 'energy campus' which will provide a variety of incubation and second stage space for start-ups and other small firms in the N&R sector. The project, currently at the feasibility stage, is aimed at both generating a greater anchoring capacity, as well as spreading the capacities of Narec beyond the site itself and in the local economy.

Key achievements can be demonstrated in the support which led to investment in two match-funded SMEs,²³ resulting in the development of the engineering business 'Stingray' device and the SMD Hydrovision 'TidEl' device. The latter gained several awards for innovation, and was chosen to represent UK innovation as part of a Foreign and Commonwealth Office pavilion for World Expo 2005 in Japan.

Being prepared to meet future market demand improves anchoring potential

The ultra high voltage laboratory in Hebburn was introduced as a second site for Narec. The lab is used to test electricity transmission technologies, meeting anticipated demand for this type of service and helping to increase Narec's research and development capacity. By understanding the future direction of the N&R sector, Narec was able to invest in facilities that increased its attractiveness to new investors and firms.

Meeting new and emerging industry requirements also requires flexible facilities that allow innovative research to be carried out in a suitably customised environment. One of the challenges for the 'space' has been to offer an appropriate mix of specialist and re-configurable space. This allows Narec to offer sector-specific facilities, but with the flexibility required by a fast changing industry.

Narec can form partnerships with organisations planning groundbreaking research and development projects. This adaptability and flexibility means that future innovation is more likely to be attracted in the longer-term.

Links with investors, funders and partners makes anchoring more effective

To help position Narec as an attractive partner to international collaborators, the centre has been required to act as a 'portal' to make connections between the private sector and inward investment agencies and structural funds. N&R businesses are attracted to Narec through its access channels, but these organisations must still find suitable funders and investors for future research and development.

Narec is able to anchor the cluster more securely by acting as a conduit between the businesses and investors, funders and regional and national partners. These were utilised in the efforts to secure a significant inward investment from Clipper Windpower²⁴ to develop the next generation of wind turbines,

21. See www.narec.co.uk/main/st1757

22. See www.narec.co.uk/main/st1757

23. Narec Self Assessment (November 2006).

24. Further details on the investment by Clipper Windpower are provided below.

as noted by Ian Williams, ONE Director of Business and Industry:

*“It has been a real One North East and UKTI team effort to secure this project, drawing on the expertise of our inward investment, sector specialist, US overseas office network and business finance teams to secure this internationally important investment”.*²⁵

This is an example of how proactive partnership building has been successful in capturing a sizable investment in research and development activities in Blyth. These partnerships are used to demonstrate to investors that an area has the strategic and political will to support innovative activity. This is part of a strong anchoring capacity.

A wide partnership is needed to communicate the diverse range of issues connected with realising a major international investment opportunity. By acting as a ‘portal’ where the relevant organisations can exchange thoughts and ideas, Narec helps connect an international industry with a local investment opportunity. Narec used this to enable regional partners, such as ONE, to communicate the areas strengths in terms of facilities, skills and quality of life.

Developing skills generates a stronger anchoring capacity

Investments like Clipper Windpower’s have highlighted the importance of the skills within

the local workforce in anchoring innovation. High-level skills have been demanded from scientists and engineers to carry out research and development.

Full-scale commercialisation will require a wider set of skills. Investors need to feel confident that skills gaps in the workforce will not be a barrier to their growth.

This is a challenge that Narec will face in the future. Here it will find its links with ONE useful. As the region’s development agency, ONE is part of a wider skills development partnership for the North East, which is designed to identify and respond to future skills requirements. The local skills base is crucial to an area’s anchoring capacity.

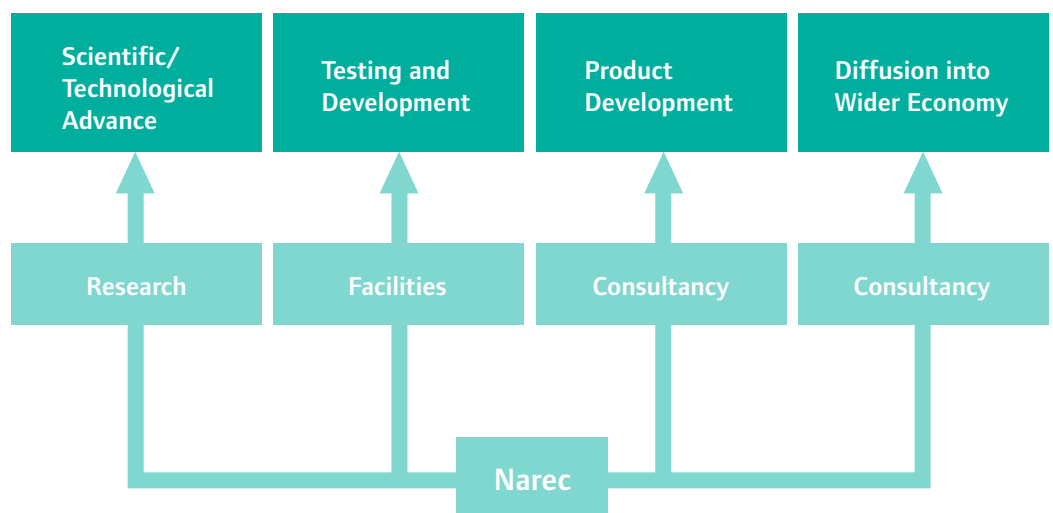
Narec as an ‘Innovation Diffusion Agent’

The research and development activities at Narec are intended for specific commercial applications. This creates a strong stimulus to spread new ideas into the international economy where significant commercial rewards can be achieved.

The primary focus of current activity is research and development rather than large scale production. Narec will not become a true diffuser of innovation until the flow of new products into the commercial market is increased. Narec is well positioned to achieve this aim and some early successes have been achieved. It is positioned at the centre of a chain that takes scientific findings and

25. See www.narec.co.uk

Figure 5: Research and development chain showing key Narec inputs to this process



Source: Adroit Economics 2009

principles, through research and development and into commercialised economic activity. Through its services to support commercialisation of technology, Narec plays an important role in diffusing innovation by helping to bring new products to market.

Figure 5 shows how different services and characteristics at Narec are used to support this process. The input by Narec is delivered across a number of different stages in the process of commercialising innovation.

Consultancy support is an important way of introducing innovative products to the wider economy. This is used to ensure that commercialisation is carried out in the most effective manner and that businesses are supported as much as possible in this endeavour. Consultancy support is at the heart of Narec's offer to its tenants. Narec was originally developed as a 'Centre of Excellence' and its core role was to provide sector-specific business development services.

As highlighted earlier, Narec functions as a portal for information on gaining funding opportunities and links with local agencies. This role is also intended to directly support the commercialisation and diffusion of innovation into the wider economy.

Clustering is also a vital element of diffusion channels. By connecting innovators with a business community of like-minded organisations, a variety of supply chain development opportunities can be identified and acted upon. The ability of businesses to share and adapt products to serve new markets can lead to significant benefits.

2.4 Doing it again

The Narec case study demonstrates how genuine success can be achieved by providing an environment where innovation can be nurtured through fostering access, anchoring and diffusion. This success has led to the site in Blyth becoming internationally recognised for the creation of new ideas and knowledge, and new economic and social value. It has also generated the potential for transformational levels of creation of jobs and attraction of Foreign Direct Investment (FDI).

Narec's contribution to the regional economy

Narec has an ambitious objective of enabling the North East Region's energy sector to

contribute an additional £2 billion to GDP by 2015.²⁶ Albeit in a high-growth global market, this poses a major challenge given that prior to Narec's creation the sector was not well established in the region.

Narec's partnership with Clipper Windpower attracted an investment of £5 million from ONE. If the investment plan is successful, the subsequent expansion in offshore wind power could create up to 30,000 new jobs in manufacturing and bring £3 billion of investment to the North East.²⁷

In January 2009, Narec announced a further step towards achieving its objectives for the regions N&R energy industry with plans to develop the Aerogenerator wind turbine. The Aerogenerator is based on a design which was awarded the Low Carbon Technology Prize by Shell. It differs from existing wind turbines by having its blades mounted on a vertical, rather than horizontal axis. This feature allows it to rotate, capturing wind power from all angles without its blades requiring any repositioning. The project has gained investment from NStar's Three Pillars Fund (a regional venture capital provider) and a research grant from ONE. Theo Bird, Director of Aerogenerator said:

"We believe Aerogenerator can make a big impact. It's efficient and visually attractive. The technical innovations we've introduced make it more robust and stable, meaning we'll be able to build fewer, bigger turbines."²⁸

In addition to these projects, other notable successes from Narec include:

- The PVTC has become established as an innovative research team, combining former staff of BP Solar with North East-based scientists.
- Narec secured a contract to produce and supply PV modules to the Highways Agency to power roadside emergency telephones.
- The acquisition of the Clothier Laboratory allowed high voltage testing and technical expertise to be retained in the North East. This expands Narec service offer and diversifies its customer base. This fits well with the need to need to overcome barriers connected with supplying N&R energy to the National Grid.

26. Narec Self Assessment (November 2006).

27. Press release, BERR, North East set to be manufacturing hub for off-shore wind, 21st July 2008.

28. See www.narec.co.uk

Lessons, observations and reflections

Narec has successfully utilised a combination of legacy infrastructure and sector related skills and redeployed them, alongside business support and new specialised facilities, in a global high growth industry.

Key to success is the Narec team's expertise and credibility in the industry and their openness to engaging with firms and research organisations in a wide variety of ways in order to help optimise the unique set of facilities offered in Blyth.²⁹

Access channels help Narec stand out against international competition. They are geared up to attract inward investment as a catalyst for innovative activity through research and development. Anchoring channels support this by creating a supportive business environment where innovation can prosper. Through diffusion, Narec plays a role in the commercialisation of new technology, bringing it to bear in national and international strategies for 'greener' energy production.

The location provides a physical hub for an emerging sector, which can be used at the heart of regional policy to attract inward investment. This brings together the range of attributes which are important to innovative business. The importance of this was noted by Theo Bird, Director of Aerogenerator, when plans to develop a new generation of wind turbines with Narec were unveiled in January 2009.

"We are pleased to report that the region's rich engineering heritage is very much alive and well in the renewables sector. Our partner Narec comprises a first class engineering team, excellent facilities and access to further support and expertise internationally through its network."³⁰

Through these attributes, Narec has created an environment that is both physically and organisationally suited to meeting the needs of partners in the private and public sectors. This includes provision of first class facilities (which are 'ready-to-go' and contain a flexible but specialised mix of facilities), a portal for the formation of new partnerships, links to the supply chain and suitable infrastructure, and specialised business support.

Policy implications

Narec demonstrates that successful innovation can be achieved when international growth

sectors are identified and targeted. Evidence from global wind turbine manufacturers indicated that the UK was not seen as a destination for these industries. This was because other countries had invested earlier in N&R energy. They were therefore further ahead in the supply of skills, planning and grant infrastructure. However, Narec's well-targeted accessing capabilities have altered this perception and positioned the UK as a credible location – albeit at this stage on a relative small scale internationally.³¹

Regeneration policy often aims to redress the impact of economic restructuring. In Blyth this restructuring made available facilities suitable for a new growth industry. The locality also provided natural and structural resources relevant to the target industry. Innovation policy and regeneration strategy were successfully combined at Narec to provide a potent accessing capacity to catalyse economic activity and inward investment.

Innovations, such as the large scale Aerogenerator, show that our preconceptions of infrastructural requirements for N&R energy can be radically challenged. The size of these new products provides challenges for the planning and environmental policy of national governments. As a result, policymakers must be open to dialogue with innovators and clear about their requirements. A certain and understandable planning environment is vital to innovators so that they can obtain planning permission for products. This is crucial to accessing innovation and anchoring it to a particular place.

29. North East Innovation Infrastructure Investment Framework, Adroit Economics, September 2008.

30. See www.narec.co.uk

31. North East Innovation Infrastructure Investment Framework, Adroit Economics, September 2008.

Part 3: Brick Lane: community-driven innovation

Kate Oakley and Andy Pratt, Enterprise LSE

3.1 Brick Lane as an international brand

Brick Lane³² is an international ‘brand’, conjuring images of a distinctive urban space. This inner-city area of London has been home to a succession of migrant groups over the centuries. It has also long played a key role in London’s textile industries and a centre of clothing manufacture. Today, it is a favoured location for young fashion designers, retailers and others in the creative industries.

The area around Brick Lane has reinvented itself many times over the years. In addition to clothing and creative industries, tourism, food, and the night-time and leisure economies are also important industrial sectors in this area. This blend of economic activity lends a particular set of characteristics to the area, notably the embedding of economic activities in local social relations.

Cultural and creative businesses

The dominant creative and cultural sectors in Brick Lane are characterised by micro-enterprises and self-employed entrepreneurs involved in businesses with quick product turnover, constant innovation and risk. Their organisation is better described as networked, rather than dominated by firms. These industries share a thirst for knowledge and knowhow, which has to be timely and appropriate to the activity (usually one to which it has not previously been applied). Acquiring and processing knowledge in these industries usually requires producers, consumers and niche innovators to work in close proximity, intensively interacting with each other. It usually occurs when there is an interpenetration of the formal and informal, commercial and non-commercial fields. Similar characteristics can also be observed in some

of the small retail and leisure businesses in the area, whether restaurants on Brick Lane or retailers in the Truman Brewery.

Multiple scales

But alongside this micro economy, there is also considerable land and property development. There are also new leisure complexes and shopping centres. This means that larger firms are playing a greater role too. And there is a danger that these new players could use their economic power to crowd out and destabilise activities that seem to contribute to the success of Brick Lane. In this essay, we explore the relationship – or the lack of relationship – between innovation in these diverse sectors and across firms of different size, to examine the extent to which innovations are transmitted between large corporate and smaller firms in these sectors.

Cultural and creative firms share ‘symbolic capital’ with the associated bars and independent shops located in a place like Brick Lane. The association of warehouse spaces with artists or former industrial areas with creativity has an inherent value – as difficult to replicate as it is to calculate. Our interviews suggest that this value remains a draw for small firms. Without doubt, the people who want to work in Brick Lane or simply visit the area are as much a part of its ‘innovation system’ as formal actors in the process of cultural production.

We start from the principle that innovation in places is enabled by their capacity to support access to new knowledge and ideas, anchoring and spreading (or diffusing) them.³⁴ One of our key findings is that the dynamics of access, anchor, and diffusion can sometimes be observed at particular scales: in this case, we point to the importance of micro-communities

32. For consistency, we will use the term Brick Lane, to refer to the area around it, throughout. See Figures 6 and 7 for details of area under discussion.

33. Mahroum, S., Huggins, R., Clayton, N., Pain, K. And Taylor, P. (2008).

rather than wards, boroughs or regions. The fact that each small and diverse community uses the same physical territory differently means that the attributes of the community are particularly important in shaping the collective 'offer' of a place. Hence two different business communities might experience that offer differently because they would draw on different aspects of the neighbourhood. Moreover, our findings suggest the need to recognise the role of existing historical processes and institutions, and the spatiality of processes which we refer to as the 'innovation archipelago': a series of hotspots located close to each other but not necessarily related, culturally, socially, or economically.

The essay will examine current innovation practice and its links with earlier innovation. We are particularly interested in the way that the physical location has played a role in anchoring otherwise open social and economic networks through which innovative ideas may be translated and by which they may travel (or, be diffused). Migration, and diaspora networks are vital to the continuing ability of Brick Lane to reinvent itself, but we are also interested in exploring how innovation is introduced and spread locally, as well as the importance of overseas links.

3.2 Brick Lane

Brick Lane is a small area in East London centred on the local authority ward of

Spitalfields and Banglatown, including the area around and to the west of Spitalfields market. As we can see from the maps (see Maps 1, 2, and 3), Brick Lane is thus located between the City and the East End. This physical location presents opportunities and challenges and its size does nothing to restrict the influence of Brick Lane.

On first view, Brick Lane represents a good case for those who say that one cannot govern innovation and cultural production. However, the picture we sketch points to a more subtle story where practices may not be predetermined, but they are shaped over the long term. Thus, we argue for a longer-term perspective in fostering innovation, one that extends beyond the short life of a single product or industry; a perspective that can capture the wax and wane of social enthusiasm and passion.

The area around Brick Lane is a focus for a city-wide interaction and the interchange of ideas and practices. This has not occurred by chance. Historically, its location alongside the City of London has made it an attractive place for all manner of irregular activities, not otherwise permitted in the City. On the other hand, proximity to the docks meant that Spitalfields was often a first home for many settling in the UK as a result of war, famine, political or economic forces. Major migrations include Huguenots, Irish, Russian and Polish Jews, Bangladeshis, and Somalians. After a time, many of them moved on. Such transience

Box 8: Brick Lane: social and demographic structure

Spitalfields and Banglatown is a ward within the borough of Tower Hamlets, which lies immediately east of the City of London (see map). Tower Hamlets is one of the poorest boroughs in London, with generally poorer job prospects, lower skill and educational attainments than most; as well as being a major recipient of migration from displaced persons around the world. Spitalfields and Banglatown has approximately 9,000 displaced persons resident (in a Tower Hamlets population of 213,000). Fifty-eight per cent of the population is of Bangladeshi origin (compared to 33 per

cent for Tower Hamlets and 2 per cent for London). There are many other ethnic groups represented, and just 22 per cent of residents are White British (compared to 43 per cent in Tower Hamlets and 60 per cent in London), including some from the Jewish diaspora. The area is poor and characterised by a large proportion of social housing and high unemployment. In part, unemployment is skewed by the higher than average representation of 16-29 year olds in the ward. It has a similar employment profile to the rest of London, except that there are twice as many employed in the food and catering industries (10 per cent compared with 5 per cent in Tower Hamlets).

can easily slide into decline, and this is what happened in 1960s and 1970s in Brick Lane.

Social and demographic structure

The 1990s saw the beginning of a renaissance. A regeneration championed by Tower Hamlets council sought to promote three 'anchors of activity' based upon drawing in visitors to the area. Initially they were envisaged as Brick Lane, the Whitechapel Art Gallery and a new institution, 'Rich Mix'.

Rich Mix

Rich Mix was conceived of as a market or a meeting place of ideas, things and cultures. This plan took many years to come to fruition, with many false steps along the way, and the result was very different from the original conception, though the fact that there was a

vision proved critical to its development. The notion of a 'rich mix' was perhaps the key innovative inspiration. Initially, the idea was developed around the notion of 'Banglatown', which became a marketing device for Brick Lane. But, unlike Chinatown, this would be a heterogeneous place. In the end, the extent to which it became simply a Bangladeshi area, or a venue for the Dhaka restaurant owners, is an open question.³⁴

The realisation of the three proposed cultural anchors was a constant problem for Tower Hamlets. The redevelopment of Spitalfields market presented new possibilities that were lost to property development interests. However, the redevelopment of the Truman Brewery site has resulted in a fourth – and unplanned – cultural

Figure 6: Spitalfields and Banglatown as a ward of Tower Hamlets Borough



34. For example, the restaurant owners hail from urban Dhaka, and the workers from rural Sylhet.

environment, spawning the work spaces for many cultural entrepreneurs, a performance space, restaurants and cafes, alongside the burgeoning Brick Lane restaurants.

Spitalfields Market

The area around the market, and adjacent to the boundary of the City has long served as a liminal space, a place in between two different worlds. It has historically been a centre of innovation. Street names like Gun Street and Artillery Lane speak of a lively history, where illegal and noxious activities excluded from the City and Guilds set up in Spitalfields and adjacent Hoxton. Nearby, Curtain Road was the location of Shakespeare’s first theatre.

A rich history of social innovation

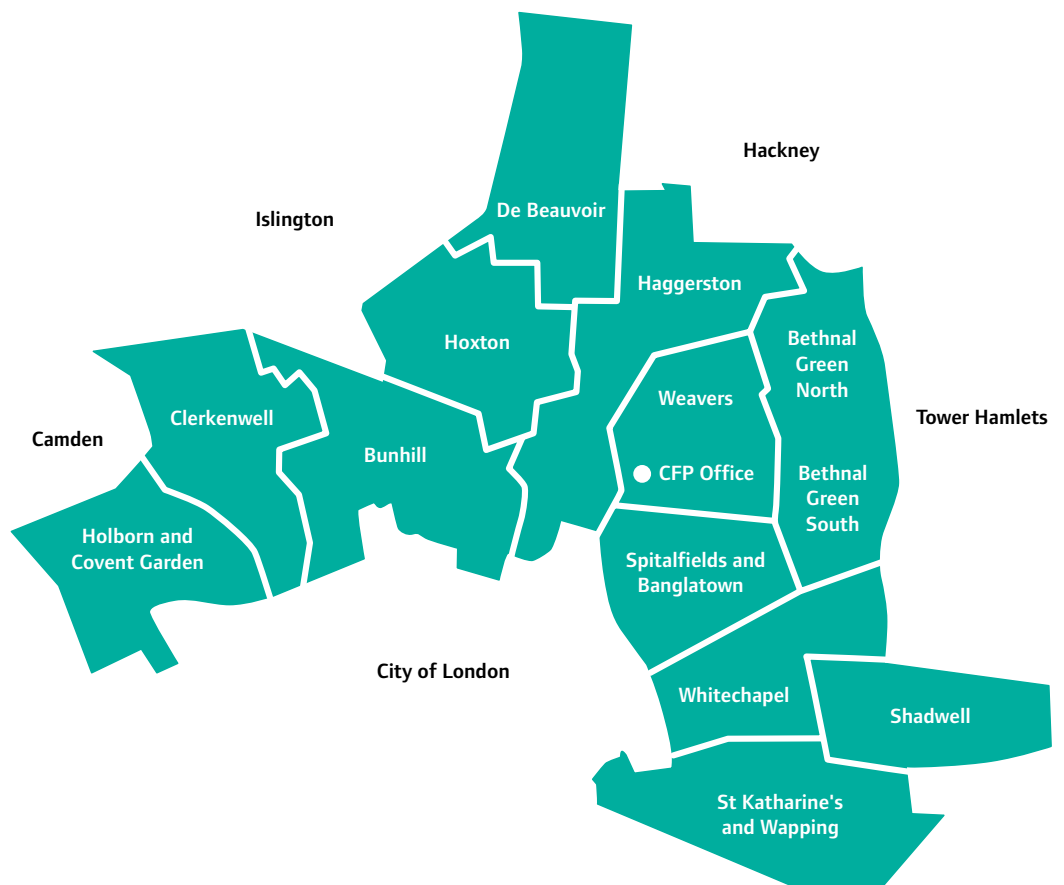
There is parallel history of social innovation centered on Toynbee Hall. The Hall was established as a ‘mission’ in the East End in 1884 by social reformers Samuel and Henrietta Barnett (see also the Whitechapel Art Gallery). This institution reflects the historic and long running poverty of the area, but was also the

site of significant social innovation, much of which fed into the establishment of the UK welfare state. Examples include the Workers Educational Association (1903), one of the first youth courts in the 1930s, an early Citizens’ Advice Bureau in 1949, the Community Service Volunteers in the late sixties, the Child Poverty Action Group (1965) and the Toy Libraries Association in the 1970s. Much of its work today is on micro-credit.

This confluence of events has made Brick Lane an international destination. To some limited extent, it was shaped by the initial Tower Hamlets plan, supported by Tour East and Bethnal Green City Challenge. But its final shape was very different from the original vision. Cultural consumption has become hugely attractive, but it is of a sort that is linked to designer-makers (craftspeople and fashion designers who also manufacture their own designs). A more ‘corporate creative culture’ developed, capable of affording medium-to-expensive levels of rent.³⁵ For these new ‘creatives’ the interaction and feedback is

35. Mavrommatis, G. (2006).

Figure 7: The City Fringe Partnership area: showing wards and boroughs



critical for innovation, even in the age of digital technology. Traders come from all over London to have a pitch at UpMarket in Truman Brewery. There they swap artistic ideas and enjoy the atmosphere.

It is important to note, that despite this influx of capital, people and ideas from elsewhere, Brick Lane remains an extremely poor area. It is still dominated by social housing and reliant on state and charitable support. Organisations like the East London Business Association or the Spitalfields Small Business Association work with voluntary organisations to support training, mentoring and small business growth. Whilst the local authority and many other public agencies say they are committed to social cohesion, it would be hard to argue that much of the wealth generated in the area has 'trickled-down' to its poorest residents.

Similarly, while the diversity of Brick Lane is one of its selling points, the picture we derived from interviews was one of fragmentation, more along class than ethnic lines. If the innovation of Brick Lane comes in part from mixing communities, people and ideas, it does

not run very deep. And this has implications for long term sustainability.

3.3 Knowledge-sourcing channels

We have already shown how Spitalfields changed, and outlined the role of the local authority in that transition. But there are also a number of powerful interests associated with land and property development in the background. After all, much of the area consists of undervalued land close to some of the most valuable real estate in Europe. Not only is there a price differential, but the old Spitalfields market and Bishopsgate Goods Yard offer physical space, a very rare commodity in London. There is no space here further to examine the land development and planning processes, or other issues related to local authority boundaries and the spatial boundaries of public sector bidding (e.g. European Regional Development Fund and the Millennium Development Fund). Suffice it to say that they played an important role in determining the extent and pattern of regeneration.

Box 9: Spitalfields Market

Spitalfields Market has turned from a traditional market of small independent traders into a site for financial trading and upmarket shopping. As a result, the boundaries of Spitalfields have effectively been reduced.

Spitalfields Market occupies a notable Victorian structure from 1887, but it has its origins in the late 17th century. The fruit and vegetable market moved to Leyton in 1991, leaving a vacant site that was quickly occupied by a number of local markets. Increasingly, these have become dominated by designers and craftspeople, and the market has generated an international reputation. However, the site has long been contested, as it is valuable real estate adjacent to the City. A long running dispute raged through the 1990s about the site's future. The battle lines were drawn around conservation initially, not least because the office of the original conservation organization (SPAB: the Society for the

Protection of Ancient Buildings set up in 1877 by William Morris) is located on the site.

Plans for Rich Mix to occupy the site were scotched at the last moment; instead, much of the old market was demolished for the Norman Foster designed LIFFE building (London International Financial Futures Exchange) which opened in 2007. The rest of the old market has been redeveloped as upmarket retail and food chain stores. The development has been commercially successful, but has changed the character of the area dramatically. Its practical effect has been to merge the market into Bishopsgate, pushing the de facto boundary of the Spitalfields area east to Commercial Road. The site is owned and managed by Ballymore Properties, which also owns the Bishopsgate Goods Yard to the north. With the Crossrail and East London line extensions Bishopsgate has become a prime development site, despite the limitations of the conservation area.

Our objective here is to use the lens of the three analytical categories of knowledge-sourcing – access, anchoring and diffusion – to view how Brick Lane/Spitalfields has developed since the late 1990s, and to reflect on the balance between the channels.

Access channels

Access channels are regarded as the ‘ability to connect and link to international networks of knowledge and innovation.’³⁶ Their benefits include privileged access to knowledge and information, preferential opportunities and influence. This capacity requires agents, resources and culture. In Brick Lane’s case, migration networks were an important potential source of information, expertise and trade. By their very nature they are international; migrants bring with them knowledge and know-how from their original countries. They

may have unique contacts there. Innovation may be facilitated by the simple transfer of an idea or product between two places; or as a result of such ideas changing when they are translated to a new environment. Thus the Spitalfields community benefits from a variety of migratory routes and knowledge networks. But they have not been developed fully because those same links with home countries have engendered a resistance to engage with diversity locally. This reduces the opportunities for further innovation.

Traditionally, migratory communities have been at a significant disadvantage in accessing business development resources and finance in their host community. Instead, they often rely on ‘self-help’ through various micro-credit agencies and informal collectives. But in Tower Hamlets, there is also structural support that

36. Mahroum, S., Huggins, R., Clayton, N., Pain, K. and Taylor, P. (2008).

Box 10: The Truman Brewery

The Truman Brewery was not a part of the original Tower Hamlets plan for the cultural redevelopment of Spitalfields. But it has become a self-contained centre of fashion design, the arts and culture, attracting many young middle class visitors to the area.

The Truman Brewery was sold to the Zeloofs, an old East End Ashkenazi Jewish family, in 1995. The family, with a history in the import and export of clothing, wanted the site to become a centre of European Fashion – a new designer-maker hub. Whilst it did attract the designers, it also became home to a wider mix of bars and shops. It has also played host to a series of popular special events.

Tamsin O’Hanlon, who works in the special events team at the Brewery, stresses that the key to its success is that it retains a flexible, diverse portfolio of lease types, tenants, and spaces. This mix is made possible by the ownership of the freehold, which allows longer-term investment and a willingness to experiment. Their ideal tenants would be independent one-off boutiques that are not part of a chain, though they can come from a variety of sectors. This protected them during the dot com crash, as they were not completely dependent on web companies. Similarly, the

long-term personal or family approach to investing should, arguably, help to ward off the rapid pace of commercial gentrification that transformed Hoxton from the hip to the corporate in a few years.

In addition to straightforward property development, Truman has been involved in promoting a variety of events. This included the Body Worlds exhibition in 2002, a show that was considered too controversial by many galleries, but which helped establish the Truman Brewery and Brick Lane by bringing in many visitors who would not otherwise have come to this part of London. This emphasis on animation has continued in shows such as Fashion East and Free Range. Free Range, now in its ninth year, showcases the work of over 3,000 arts and design students and is one of Europe’s largest such shows. The mix of ‘events’ and straightforward tenancy helps Truman maintain its image as not just another property developer and underlies its appeal to its ‘ideal tenants’.

However, despite its proximity to Brick Lane, the Brewery is a self-contained development. The crowd it attracts – largely white, middle class and young – is attracted to the Brewery itself, and there is relatively little mixing between it and the retail, restaurant and rag trade businesses of Brick Lane.

has been mobilised by the council to draw down money specifically for the use of the local community.

These are the immigrant communities and their international scope. The realm of ideas enters through community participation and local (often highly segregated) networks.

Other access channels in Brick Lane include the tourist market, advertising, and higher education through London Metropolitan University. They also include established cultural entities such as the nearby Whitechapel Gallery. Universities and galleries have national and international networks, and this is a role which the Whitechapel Gallery has consciously sought to play, as described below.

Anchor channels

Anchor channels are defined as the 'ability to identify and domesticate external knowledge from people, institutions and firms'. We can interpret this as the way in which various sources of knowledge are retained and embedded. One part of the Tower Hamlets strategy was to use buildings as symbolic 'homes' for regeneration. These would be places that would attract tourists, provide business accommodation and anchor regeneration, often in the face of vested property development interests.

In essence, the Tower Hamlets strategy of anchors – Rich Mix, Spitalfields Market, Whitechapel Gallery and the Truman Brewery – was a precursor to the London Development Agency's Cultural Hubs strategy. One of the real and perhaps unresolved issues has been the balance between production and consumption. The Brick Lane restaurant zone and its business representatives have benefitted greatly from the pedestrianisation, marketing and cultural production in the area. But there are significant tensions between the Brick Lane restaurants and the Truman Brewery; and between the restaurant users and residents concerned about noise and litter.

Staging innovation

Whitechapel's mix of the popular and avant-garde, the local and the global, was one that later cultural institutions, including Rich Mix, sought to emulate. This highlights a more complex interpretation of 'anchor'. Anchors, in this case, are only as good as their capacity to host interactions with access and diffusion functions. Hence, Rich Mix's innovation is the notion of 'cultural space without walls' that depends upon the potential offered by

openness and new ideas rather than its ability to embody innovation in its own buildings. The notion of anchor is perhaps better represented here as a 'stage' – a space for interaction and hosting an interested audience – or in Lester and Piore's term (2004), 'interpretive spaces,' where pre-market conversations can happen in an atmosphere of mutual trust.

Diffusion channels

Diffusion channels are defined as the 'collective ability of a place to adapt and assimilate new innovations, practices and technologies and spread them in the economy. Diffusion can happen either through 'active' or 'passive' emulation.'

In Brick Lane, diffusion can be seen in the extent to which it is copied or that its products are copied. Its draw is a 'go to' desire; one has to visit to pick up its influences and value. Thus, Brick Lane involves ideas being introduced in a relatively small space, requiring people to visit the area physically. This is a highly localised form of diffusion.

However, our research for this essay suggests that localised diffusion processes do not work as well as they might. Brick Lane functions as a series of micro-communities, with relatively little interaction between them. The 'anchors,' such as the Truman Brewery, Rich Mix or Banglatown help attract people, investments and even firms to the area, but they are disconnected from each other. One logical solution might be to 'join up' these anchors to benefit from economies of scale. However, this fragmentation could be the area's great strength and key to its long-term sustainability. This would be a novel interpretation of an innovation space.

3.4 Sustainability and the role, and potential, of policy

The question of Brick Lane's 'sustainability', is in some ways paradoxical, as the reason it has survived is because it has accommodated so much change. Waves of migration have led to turnover of populations and economic activities; a process of succession rather than sustainability. It could be argued that this is Brick Lane's strength as an innovative place. But we have also seen that public policy has in some ways facilitated the anchors that have been a part of this process of succession, giving some sense of continuity and enabling

cultures and ideas to mix. To what extent has this been successful?

Rich Mix was a conscious effort to avoid Banglatown becoming an 'ethnic enclave' like Chinatown (see Anderson, 1987). However, the brand itself has specific ethnic connotations. This is important when a locale has seen so many identities and migrations: why not celebrate this dynamism? Such problems are common in the promotion of cultural quarters (see discussion in Pratt, 2009). The resulting deliberations are never solely based upon economic innovation, but reflect questions of politics, identity and culture. This makes them particularly difficult to resolve.

Good neighbours?

The proximity to the City of London, which provides a young and affluent workforce requiring food and entertainment, gives Brick Lane some of its strength as a 'destination'. Its setting and history of diversity offers an attractive brand. At the same time, global

private capital can be 'tapped', for community projects. Professional service firms, such as lawyers, can provide in-kind expertise. All this means that public and community projects, like Rich Mix, have local expertise and finance not open to other areas.

Equally, the local authority has been important, not least in its willingness to accommodate projects like Truman Brewery. Intermediaries or brokers are also likely to be particularly important under these circumstances, as is their accountability to the community. The economic power of the City has the potential to erase Brick Lane's social, economic and political distinctiveness. The maintenance of balance and accountability is critical to any future economic strategy; and Tower Hamlets has sought to provide that balance.

Archipelago of innovation

Nevertheless, for all its global reputation for innovation, the one term that most interviewees used when describing Brick Lane

Box 11: Brick Lane

Although we use the term 'Brick Lane' to refer to the whole area, it is also the name of a specific street and is used to refer to its collection of restaurants.

Despite the long history of the area as a place of immigration; its reputation as 'curry capital' is relatively recent. In 1997, there were only six restaurants and four cafes; there are now around 60 restaurants. Yet, despite this success, the area has sometimes suffered from a reputation for poor quality or undistinguished food; something which restaurateurs have attempted to combat through events like the fortnight-long 'International Curry Festival', part of the Brick Lane Festival, during which participating restaurants serve a special 'festival menu'. The organisers see this as an important opportunity to emphasise the quality of the food, rather than its ethnic provenance, and to distinguish between establishments.

As in the rest of the UK, the 'Indian' restaurants in Brick Lane are primarily Bangladeshi-owned and staffed. In part the number of restaurants can be accounted

for by the relative scarcity of other opportunities for Bangladeshi workers and enterprises, particularly with the decline of manufacturing and small-scale retail. As Carey (2004) points out, Brick Lane curry houses are not isolated; indeed many were influenced by the success of 'upmarket' restaurants such as Café Spice Namaste and Bengal Trader on the City Fringe, or Soho Spice in London's West End.

Despite the area's global connections, the restaurants of Brick Lane appear disconnected from the more corporate, global dining offer available at the redeveloped Spitalfields Market. Interviewees argued that this has led to loss of business on Brick Lane itself, particularly from City workers who now stop off in the Market for lunch. But the Market has not opened up new opportunities for displaced restaurant workers. The larger food 'chains' use more formalised recruitment processes, such as newspaper advertisements or employment agencies, and are not connected to the informal, personal family networks that dominate the Brick Lane restaurant trade. So the curry restaurant workers may have the right skills, but they belong to a different labour market.

Box 12: Whitechapel Gallery/Library

What Iain Sinclair called, “*that marvel of inspired patronage,*” was originally built in 1901, an example of the late Victorian ethic of the arts as a challenge to the ‘vices’ of poverty and ignorance, that has been reworked in many ‘cultural regeneration’ strategies since.

Today’s policymakers continue to see the Whitechapel as a key attraction for visitors and tourists, albeit one that stresses a different cultural heritage from the more

popular or street level culture of the Truman Brewery.

Recently reopened after a £13 million refurbishment, the distinctive quality of the Whitechapel is perhaps the line it has always sought to tread between fidelity to its locality, its strong social sense of its purpose and the need to reach its local community, and an international, cutting edge programming style. This was the place that introduced Jackson Pollock to Britain, first showed Pop Art in London and hosted Picasso’s ‘Guernica’ on its world tour in the late 1930s.

is ‘tension’ – tension between communities and social classes, residents and nightclubbers, City workers and locals. For the most part the area manages these tensions, but this ‘management’ seems to have resulted in an ‘archipelago of innovation’ and semi-detached micro-economies. The restaurants in the ‘curry capital’, the lifestyle businesses of the Truman Brewery and the new media workers at Rich

Mix may successfully reach other communities in the rest of London and globally, but have very little contact with each other.

This is not so surprising if one views Brick Lane as not one community but many. These communities occupy many spaces and look outwards to the world. The social, economic, cultural and political activities both draw

Box 13: Rich Mix

Rich Mix was originally intended to occupy Spitalfields Market. It would function as a cultural space without walls, bringing together production and consumption, as street markets sometimes do. This original idea was never realised and Rich Mix became another ‘mixed media’ venue like the Cornerhouse in Manchester or Watershed in Bristol with a focus on popular culture and fast-growing digital technology.

Anwar Akhtar, who had been involved in Rich Mix from the early days, noted that many of the people who drove it had backgrounds as club promoters. These were street-level entrepreneurs who mixed things together, and that pushing and selling by the promoters was essential. Although there is still some concern that Rich Mix is disconnected from Brick Lane and even from the Truman Brewery, the ‘buzz’ in the area helped Rich Mix in its initial funding and development. Anwar recalls stapling a magazine feature on the Truman Brewery to

the front of one funding bid – it was ‘worth a hundred business plans.’

As well as mixing communities, and mixing cultural production and consumption, Rich Mix also mixed public and private capital in its funding. In addition to Arts Council funding, it received money and in-kind support from City firms such as Bloomberg, Deutsche Bank and law firms such as Herbert Smith. The presence of large and well-capitalised (at least until recently) firms on the doorstep of Brick Lane, gives it access to a world of corporate fund-raising that Southall or Brixton would find it much harder to tap.

After much wrangling and a fairly difficult birth, Rich Mix now has high levels of occupancy. It continues to try and fuse the subsidised and commercial arts with the local community. Nobody pretends that this is easy in a historically fragmented area where rising property prices and gentrification are bringing in the latest new wave of – well heeled – migrants.

upon and speak to various scales of operation (Garbin, 2002). One cannot seal off Brick Lane, nor view the area as self-contained; its strength may lie in its radical openness. Any future policies should acknowledge and work with this fact.

The Brick Lane case study offers a number of subtle questions regarding the application of the innovation by adoption model. Our main finding is that the dynamics of access, anchor, and diffusion processes can be observed at particular scales: micro-communities rather than wards, boroughs and regions; and internationally. The fact that different small and diverse communities use the same physical territory differently in terms to access, anchor, or diffuse knowledge means that the attributes of the community are particularly important in shaping the collective offer of a place. Hence two different business communities might experience the 'offer' of place differently.

We have stressed the value of paying particular attention to the degree to which activities are embedded in diverse social, cultural, political and economic contexts. We also highlighted the role of neighbours and their economic power (the City), but more significantly we highlighted the non-proximate ties and flows of networks (often of a global character). Finally, the globally connected, locally disconnected, character of Brick Lane makes it a destination for a large number of different consumers and visitors. Thus, there is power in the apparent fragmentary nature of its activities.

Despite the stress on fragmentation and dispersal, it is clear that Brick Lane does work and that it is changing and evolving. This essay points to the need for a subtle and sensitive understanding of the processes involved if they are both to be stimulated and promoted, rather than damaged or undermined in the future.

Part 3: References

- Albrow, M. (1997) *Traveling Beyond Local Cultures*. In 'Living the Global City'. Eade, J. (ed.) London: Routledge.
- Anderson, K. (1987) *The Idea of Chinatown: The Power of Place and Institutional Practice in the Making of a Racial Category*. 'Annals of the Association of American Geographers'. 77(4), pp.580-598.
- Carey, S. (2004) 'Curry Capital: The Restaurant Sector in London's Brick Lane'. London: Institute of Community Studies. Working Paper No.6.
- Eade, J. (1997) *Reconstructing Places: Changing Images of Locality in Docklands and Spitalfields*. 'Living the Global City: Globalization as Local Process'. London: Routledge. pp.127-145.
- Forman, C. (1989) 'Spitalfields: a battle for land'. London: Hilary Shipman.
- Garbin, D. *Community, multi-culturalism and the diasporic negotiation of space and identity in the East End of London*. pp.179-191 in Eckart, F. and Hassenpflug, D. (eds.) (2002) 'Consumption and the post-industrial city'. Franckfort: Peter Lang.
- Jacobs, J.M. (1996) 'Edge of empire: postcolonialism and the city'. Routledge: London.
- Kershen, A. J. (2005) 'Strangers, Aliens and Asians: Huguenots, Jews and Bangladeshis in Spitalfields 1660-2000'. New York: Routledge.
- Lester, R. and Piore, M. (2004) 'Innovation: The Missing Dimension'. Cambridge, MA: Harvard University Press.
- Mavrommatis, G. (2006) *The new 'Creative' Brick Lane: A Narrative Study of Local Multicultural Encounters*. 'Ethnicities'. 6, pp.501-515.
- Mahroum, S., Huggins, R., Clayton, N., Pain, K. and Taylor, P. (2008) 'Innovation by Adoption'. London: NESTA.
- Pratt, A.C. (2009) *Urban regeneration: from the arts 'feel good' factor to the cultural economy. A case study of Hoxton, London*. 'Urban Studies'. 46, pp.1041-61.
- Shaw, S. and Macleod, N. (2000) *Creativity and conflict: cultural tourism in London's city fringe*. 'Tourism, Culture and Communication'. 2:3, pp.165-175.
- Taylor, W (2000) 'This bright field'. London: Methuen.

Part 3: Interviewees

Professor Michael Keith (ex leader) Tower Hamlets Council.

Anwar Akhtar, ex Rich Mix.

Tamsin O'Hanlon, Truman Special Events Team.

Phil Maxell, Photographer.

Tom Fleming, Tom Fleming Creative Consultants.

Fozia Parveen-Sheikh, East London Business Association.

Part 4: The HUB: creating a space to nurture innovation

Joost Beunderman and Indy Johar, Research00:/ and Demos Associates;
Clara Maguire, Research00:/; and Shelagh Wright, consultant and
Demos Associate

37. Storper, M. (1997) 'Regional World: Territorial Development in a Global Economy'. London: Guildford Press; Dei Ottati, G. (1994) Trust, Interlinking Transactions and Credit in the Industrial District. 'Cambridge Journal of Economics'. Vol. 18(6), pp.529-46, December; Farrell, H. and Knight, J. (2003) Trust, Institutions, and Institutional Change: Industrial Districts and the Social Capital Hypothesis. 'Politics & Society'. Vol. 31(4), pp.537-566.
38. Nelson, R. R. (1995) Recent Evolutionary Theorizing about Economic Change. 'Journal of Economic Literature'. Vol. 33(1), pp.48-90, March; Boschma, R.A. and Martin, R. (2007) Constructing an evolutionary economic geography. 'Journal of Economic Geography'. Vol. 7(5), pp.537-548.
39. Nooteboom, B. and Stam, E. (eds.) (2008) 'Micro-foundations for Innovation Policy'. Amsterdam: Netherlands Scientific Council for Government Policy (WRR) and Amsterdam University Press. pp.27.
40. Mahroum, S., Huggins, R., et al. (2008) 'Innovation by Adoption – Measuring and mapping absorptive capacity in UK nations and regions'. London: NESTA.
41. Leadbeater, C. (1997) 'The Rise of the Social Entrepreneur'. London: Demos.

4.1 Introduction: a changing innovation discourse

There is ample evidence that a new innovation landscape is emerging, resulting in the birth of new types of innovation. The growing diversity of creative industries and high end manufacturing, from renewable energy to the modern crafts of northern Italy, has highlighted the importance of particular, localised innovative ecologies.³⁷ These insights have enriched economic theory with a behavioural turn, paying more attention to the micro-factors underpinning the differences between places, including factors that are deeply cultural.³⁸ As Nooteboom and Stam put it, "*innovation within such ecologies is a network phenomenon, arising from interaction between a variety of individuals, firms, knowledge institutes, and public authorities ... embedded in local conditions of infrastructure and institutions, which cannot easily shift to other locations, and may not easily be imitated.*" This is one reason for current policy attention to 'regional innovation systems' and 'local clusters', as well as to the lowest level of analysis: place.³⁹

This essay explores the dynamics of access, anchor and diffusion manifested through the function of one single building or space. In doing so, it uses the framework set out in the NESTA report *Innovation by Adoption*, which works with the AC/DC model to analyse in different cases and on different levels how access, anchor and diffusion capacity have been served: "*Absorptive capacity allows a place to identify, value and assimilate new knowledge. The development capacity of a place allows it to exploit that knowledge.*"⁴⁰ In other words, places need both to be able to draw in good ideas from elsewhere – an

innovation absorptive capacity (AC) – and to use them to create new products and service – an innovation development capacity (DC).

In particular, the essay explores how such concepts relate to one particular field of innovators, a relatively new player in the knowledge-intensive economy often labelled the 'social entrepreneur', as theorised by Charles Leadbeater.⁴¹ Previous categorisations focused on sectors like biomedical research or computer gaming, type of production (product innovation, process innovation) or employee ('creative class'), this category focuses on the values of the principal agents, who with their enterprises aim to deliver solutions to perceived global challenges (particularly social and environmental). This has led to this group of entrepreneurs being dubbed the 'making good' or 'for purpose' sector. We focus on one particular innovation place that has this group as its core audience: the HUB, a global network of spaces for such social pioneers started in London.

4.2 The HUB – introduction

The image of start-up innovators is often dominated by stories of bedroom and garage entrepreneurs – from the Palo Alto garden shed where Bill Hewlett made the first product for Hewlett-Packard in the 1930s (an audio oscillator) to the Seattle garage where Jeff Bezos launched Amazon in more recent times.

The HUB founders, a group of young social entrepreneurs with expertise in designing, curating and delivering high-profile socially aware events, realised that many didn't even have the luxury of being able to use a garage

or bedroom to start new ideas and develop them into businesses. Moreover, they perceived a wider lack of access, scale and resources within the social enterprise sector which they believed was limiting the impact of social innovation in the UK. Bedroom innovators need not be isolated and cannot succeed in vacuum, as Charlie Leadbeater acknowledged in a recent article revisiting his landmark 1997 work: *“entrepreneurship usually comes from teams, not heroic individuals.”*⁴² The network effect is crucial – after all, Facebook’s rapid rise from a Harvard dorm room owed much to the fact it had started among students and staff within Harvard University.

The HUB was created to provide such ‘bedroom entrepreneurs and innovators’ with a place to cultivate collaborations between people with a wide range of different expertise. As Jonathan Robinson, HUB founder, puts it: a *“whole set of people trying to realise good ideas from their bedroom [were] lonely, cut off, not really fulfilling the potential of their ideas. So it dawned on us. What if these people could come together in the same physical space and have a place to hang out?”*⁴³ In this spirit, it was decided that what was needed was to create a physical place which would aggregate these new practitioners and build a ‘sharing economy’ for capabilities, resources, knowledge and relationships. The first HUB was created in London’s Islington in 2005.

From this first space, a single floor in a warehouse building, there has been rapid expansion: HUB spaces can now be found in 14 diverse locations around the world from Bristol to São Paulo, and a second HUB in London was opened near King’s Cross in 2009. This rapid growth suggests that HUBs are responding to a global demand for everyday environments which enable continuous engagement with conditions which can inspire, support and scale innovative ideas. In showing the place factors underpinning this, this essay focuses on different factors of the place-making process of the HUB, elaborating on how micro-interventions can enhance access, anchoring and diffusion capacities. The HUB has done so by creating an environment and culture conducive to innovation.

4.3 The HUB in practice

Though they differ according to specific contextual needs, all HUBs are configured around a series of basic principles: based around open-plan office spaces, they offer a range of different memberships to social innovators depending on need – from a monthly pay-as-you-go desk space to unlimited use of the space and facilities. The latter include meeting rooms, colour printing, scanning, file sharing, file backup, mailing

Figure 8: The HUB King’s Cross comprises a wide diversity of areas in a very compact space that spans two storeys, with meeting rooms in mezzanines overlooking a central cafe/event/bar/work-space that changes function throughout the day, and an additional range of desk-spaces and a member-generated library on the first floor. The host’s table is a central element in the space.



42. Leadbeater, C. Mainstreaming of the mavericks. 'The Observer'. Sunday 25 March 2007.
43. Cited in: Kennett, L. Thinking allowed. ODE, March 2008. See <http://www.odemagazine.com/doc/51/thinking-allowed/> (accessed 21 June 2009.)

address, fax and postal services, storage, PA support, a walk around landline phone and a resource library.

In practice this serves a very diverse set of members, from climate campaigners and ethical fashion entrepreneurs to planning and development finance consultants – all bound by a strong ethic: the ‘making good’ ethos described before. Equally many regard themselves as ‘edge innovators’ operating outside traditional corporate, NGO or charitable channels of legitimacy. They are mostly small, incipient ventures, usually start-up micro-enterprises or not-for-profit initiatives. Some are ‘free agents’, individuals with careers based on a portfolio of projects.⁴⁴

That this core offer has much in common with other initiatives in the innovation and knowledge industries landscape isn’t so surprising. After all, most start-ups and micro-enterprises share a set of needs. Some of the most obvious are well-recognised and catered for in a variety of business incubators providing affordability, rental contract flexibility, shared facilities and access to business support channels. Policy interventions have in the past years generated many of these environments including the (national) Local Enterprise Growth Initiative programme and regional support for the creative industry, such as support for the iShed in Bristol’s Watershed digital media centre or the University of Northampton’s Portfolio Innovation Centre.

Whilst there are many common features in the HUB and such spaces, there are differences too. Unlike many workspace competitors, the HUB sells time rather than desk space to members. This means that most members purchase between 3,000 – 6,000 minutes a month, or buy HUB Unlimited access. Hot-desking, with members purchasing minutes instead of dedicated desks means that space is used more intensively and rarely underutilised, unlike most workspaces where up to 40 per cent of desks may be vacant at any one time. This intensification also means that the HUB creates financial returns per square foot at almost two and half times the rate of other workspace providers (e.g. the HUB Angel has an average revenue of £90-109/ft² as opposed to £40 for others in the field).

The emphasis on peer-to-peer working is a second key element: these small ventures share a common need for a high degree of interaction. For them, validation and development of ideas often comes through

peer-to-peer feedback and networks – not just from within their disciplinary field but also across disciplines. Jane Jacobs argued in her larger scale 1960s study that “*city areas with flourishing diversity sprout strange and unpredictable uses and peculiar scenes... this is not a drawback of diversity, this is the point... of it.*”⁴⁵ For the HUB, this is where the very lowest scale of ‘place’ is relevant, as a place where on a daily basis, face to face feedback, collaborative business model design, process and practice innovation can occur. The high utilisation rate of the hot-desking model is critical in this context to generate the quality of diversity that marks the space and to offer the daily opportunities for peer-to-peer exchanges: proximity to a great diversity of people serves the transfer of tacit knowledge and catalyses its benefits.

Therefore, unlike some business incubators or cheap temporary office formulas, the HUB provides more than spaces where people come just because they need a flexible desk. Instead, they are places to which people belong, imparting identity on their members, and where innovation and agency emerges out of constant ideas exchange and a sharing ethic. This subtle but significant shift from ‘selling a space’ to ‘giving space’ lies at the heart of the HUB experience: the conditions which enable innovation are embedded into its culture. This generates a key difference with another recent trend in the innovation landscape: time limited interventions where a diversity of people come together for a few hours or days to work intensively on innovation challenges, creating embryonic ideas and turning them into online prototypes. Such sessions can take place within firms or outside, as in the NESTA-supported Social Innovation Camp. Like the HUB, such sessions are aimed at forging new cross-connections between people, ideas and initiatives. But the HUB aims to be a permanent social, cultural and inspirational resource, and is therefore neither a ‘mere space’ nor is its capacity for sharing ideas time-limited.

To achieve this, the HUB uses a series of highly specific tools. They broadly fall in two categories: first, the understanding of place-making as a social and cultural process underpinned by conscious investment in social techs, and second, a carefully crafted governance framework to underpin and continuously reproduce its culture.

44. For example, see: Pink, D. H. (2001) ‘Free Agent Nation – the Future of Working for Yourself’. Business Plus.

45. Jacobs, J. (1984) ‘Cities and the wealth of nations’. New York: Random House.

4.4 Place-making writ large

Definitions of 'place' see this concept as an intersection of a wide set of intangible phenomena (identification, investment, appropriation...) with physical space.⁴⁶ This emphasis on the space as an experience has resonance within the HUB, which consciously aims to foster collective social belonging to support the diverse needs of its users. As the economic geographer Graham Drake, speaking about the location needs of creative industries, put it: the user needs to feel that *"This place gives me space"*.⁴⁷ For the HUB, the key place-making practice generating this potential is intensification of use, which as we saw is crucial both in terms of the HUB business model and in fostering exchange of ideas by intensifying opportunities for face to face interaction and connection.

This is facilitated primarily through an 'intensification architecture' which seeks to maximise simultaneous use of the HUB's spaces through optimal flexibility and adaptability, while affording members autonomy and privacy at the same time. For example, the HUB King's Cross changes use throughout the course of the day, moving from being a breakfast bar to a work and meeting space through to an evening events venue. These constant adaptations happen within one venue, which is differentiated with mezzanines and voids to allow a range of activities to take place at once, whilst maintaining the connection between different parts of the space.

The HUB has developed practical tools to support this, which could collectively be called 'sharing software'. Some of this is physical. There is bespoke furniture, with tables designed to allow people sitting at them either to have an element of privacy or to work collaboratively with up to three others. Writable surfaces enable members to leave notes from workshops in the meeting rooms, creating a continuous visible record of how others are thinking and working.

Some tools are virtual, such as an ICT platform [HUB Plus] for knowledge sharing and collaboration that combines social networking functions (including online notice boards) with an open-source space management system. Members are encouraged to engage in brainstorming. There are opportunities to share skills through time banks and in-kind contributions, and there are social protocols based on tolerance and sharing.

All of this creates what the HUB calls a 'sharing economy' where skills, time, knowledge, relationships and resources are treated as both formal and informal currencies – relying on a logic similar to the Social Innovation Camps in using a mix of central coordination and self-organisation.⁴⁸ As such, the HUB has used an approach that relies on taking social innovation seriously in all the details of its place-making process – of huge importance given that recent studies have emphasised the importance of social innovation over technological and other forms of innovation.⁴⁹

The real potential of using place-making characteristics for organisational processes such as innovation has recently been confirmed by a study titled *The Powers of Place: An Inquiry Into the Influence of Place, Space and Environment on Collective Transformation* (July 2008). In this study, Renee Levi surveyed a number of people on their experience of space – including workspace – from temporal retreats to more permanent establishments. She observed that, *"Most of the participants in this study mentioned specific elements they noticed that were part of, and directly influenced, their transformational group experience. These began to appear as patterns or configurations of space that influenced the collective experience."* This speaks strongly to the collective experience of a HUB which creates a permanent version of the 'mood of engagement' crucial to e.g. Social Innovation Camp.

The second element underpinning the HUB model is the social governance of the space, which maintains the everyday viability of intense use and fosters informal and formal exchange. Governing the relationship with the members is crucial to the success of the HUBs. Tatiana Glad, founder of Amsterdam's HUB, argues in a recent article: *"HUBs are nothing without their members, who from even before a building has been found, are involved in the collaborative design of the physical and virtual community, and who go on to play a central role in the production of a HUB's open-source and peer-to-peer programming."*⁵⁰ Their self-organisation and many contributions are what animate the place, making the quality and diversity of the membership crucial.

Aware of this, the HUB purposefully maintains diversity within its membership, in order to ensure it reflects diverse points of view, experiences and capabilities. It is determined to avoid ossifying into an 'old boys' club of like-minded networks. Therefore it seeks to

46. Gregory, D., et al. (2007) 'The Dictionary of Human Geography'. (5th Edition). Oxford: Blackwell.
47. Drake, G. (2003). This Place Gives Me Space: Place and Creativity in the Creative Industries. 'Geoforum'. Vol. 4, pp.511 – 24.
48. Aaltonen, A. (2008) 'Report on the first Social Innovation Camp: Organising the moment of self-organisation'. www.alexicon.info/report-on-the-first-social-innovation-camp (accessed 21 June 2009.)
49. For example, see: Nootboom, B. and Stam, E. (eds.) (2008) 'Micro-foundations for Innovation Policy'. Amsterdam: Netherlands Scientific Council for Government Policy (WRR) and Amsterdam University Press.
50. Glad, T. The Hub|Creating an Ecology of Social Innovation. 'Kosmos Journal'. February 2008. <http://www.kosmosjournal.org/kjo/backissue/f2008/the-hub.shtml> (accessed 21 June 2008.)

draw talent from many places to maintain the quality of its knowledge exchange, maximising the value of chance encounters. Part of this involves a careful membership gate-keeping. There is a day-to-day 'hosting' role which is very apparent in the HUB. Hosts manage space but also support and look after new knowledge networks, brokering relationships between members and between ideas, capital and access to skills such as management capability.

The hosting process is also important to maintaining trust, which is fundamental to the 'sharing economy'. For example, it enables the tolerance which has been very useful in allowing the HUB to effectively oversell space, whilst ensuring that the needs of members are adequately met. In sum, place-making has been understood within the HUB both as a physical and organisational challenge. Because of this, the very growth of the network across the world has been a carefully managed process. It has been set up on a 'smart franchise' model whereby entrepreneurs are welcome to contact the HUB if they want to start an initiative in a new locality and allowed considerable freedom to bring together a local community of future users through their own network, before the final go-ahead to proceed with a fully-fledged project is given. This recognises that whilst some of the spatial parameters are set, the quality of the process essentially depends on the time and commitment of members.

4.5 HUB members and their stories

The HUB now has a UK membership of 450 members, plus over 3,500 working across the globe. Interviews undertaken for internal research at the HUB King's Cross and Angel convey the different roles that it has played in the ideation, formation, growth and success of different undertakings, and the different aspects of the HUB's functioning that has helped to achieve this.

The story of ONZO is revealing. This is a start up company that is revolutionising the interface between energy providers and their customers by producing devices that give consumers access to information which allows them to understand and manage their energy use. Neil Tierney, one of the founders of ONZO had founded Lightweight Medical (focusing on ethical pharmaceutical products) and started to work from the HUB in Angel. There he met Luke Nicholson, one of the co-founders of this first HUB, who also works with

More Associates, a design practice. Through informal discussions over time, they realised that their combined skills could answer a gap in the market and offer a genuinely new product and service. They founded ONZO in partnership, rolling the assets of both firms into the new company. They continued working from the HUB until they received a £7 million order from Scottish and Southern Energy, at which point the company grew significantly to over 50 people and left the HUB space. As Nicholson puts it, *"the path of any young business owes so much to the input of people you find yourself sitting next to, and at the HUB we sit next to amazing people. Before too long, people start to see what they would be capable of doing working together. Then they do it."* Similarly, Tierney adds: *"starting out as a social innovator, you need all the leverage you can get – and you can get that here."*⁵¹ They both agree that budding businesses need the interface with the corporate world to make ideas work financially and in business terms. This is a challenge to which the new, high-spec HUB King's Cross is rising.

Anti-Apathy has a similar story. It was launched in the HUB to promote and support creative approaches to social and environmental lifestyle change. Through contacts made at the HUB, they launched Worn Again with Tamsin Lejeune, another director of the Ethical Fashion Forum. Worn Again is a design-led ethical brand, working in partnership with Galahad Clark of Terra Plana, to develop ethically made footwear and accessories. After growing to seven or eight people, Anti-Apathy moved into Rich Mix with Tamsin. A current joint venture is a partnership with Virgin Atlantic to use seat covers which would end up in the landfill to make handbags for sale on the High Street. In evaluating their success so far, they say that most of all, the HUB created a platform for exchange between emergent practice and interested corporate parties. Finding collaborators matters – and they may include larger companies that can help them grow; the mediation of the HUB in turn provides such larger companies with a degree of quality assurance and confidence about the fledgling initiatives. As Briony Greenhill, founder of sustainable lifestyle website The Nag, explains about her partnership with Anti-Apathy: *"I had an idea and they had an organization. We were able to leverage their connections to get pilot funding."* She therefore credits the HUB with helping get her ideas off the ground and into the mainstream. The same is true for the Ethical Fashion Forum, a network of designers, businesses and organisations

51. Cited in: Kennett, L. Thinking allowed. ODE, March 2008.

focusing upon social and environmental sustainability in the fashion industry, which in five years experiences rapid growth. Discussion with other HUB members supported Tamsin Lejeune in her research that found that the key ingredients to activating ethical supply chains are intelligence in how global markets operate at the production end, a smart equitable and sustainable business model, and a willingness to adapt to new global imperatives. In the past five years, Tamsin has seen small ideas turn into global ventures: new collaborations, extensive internet networking and an online sector database built in partnership with other HUB members. For her, both the international network of the HUB and its cross-sector nature mean opportunities for scaling impact, creating a critical mass of contacts that she would have otherwise not had access to, ultimately enabling her to get into sophisticated vertical innovation.

Interestingly, other HUB members use the space in a different way, either because they cannot initially afford it as a permanent workspace – or because they work for a corporate business with a regular office but prefer the HUB’s networks and atmosphere. Miriam Turner, Innovations Project Co-ordinator for InterfaceFLOR in Europe, a division of US-based environmentally responsible floor coverings manufacturer Interface, uses the HUB for networking to complement her corporate network. She gets peer support there including the rapid review of ideas and the chance to discuss sustainable supply chains in a range of cross-disciplinary fields. All these roles are of critical importance for her brokerage of relationships between InterfaceFLOR and external organisations which help to develop innovative, sustainable products. For her, the HUB forms a place to, *“meet like-minded people doing similar things, but also to get a kick up the ass – such as the inspiration that you get from events.”* She has held disruptive innovators workshops, mentioning that, *“getting introduced to a different way of working,”* has fundamentally altered the scope of opportunities she now works with at InterfaceFLOR.

From these stories, we can see that the HUB plays a key role in ‘horizontal innovation’: it is through the person-to-person connections that new ideas emerge, leading to new ventures. The HUB enables this in three ways – firstly, by making it easy for people to meet accidentally; secondly by providing flexible spaces where production and meeting time can take place in ways to suit the different ventures and

moments; and thirdly, through more formal meetings and collaborations: as ideas emerge, suitable ways are sought to help grow them, particularly by the hosts. In many cases this means opening up ideas and members to new networks and markets.

This shows that HUB members don’t just gain by working together or sharing a space: it is the conscious investment in a culture of exchange as well as deliberate steering to enable actual exchanges that enables innovation. Both this overarching culture and the formal and informal meetings produce the validation, contacts, access to new ideas and the capacity to harness them that are crucial to innovation. Statistics gathered by the HUB in Islington between 2005 and 2007, support such an analysis: 95 per cent of members say the HUB has made a significant impact on their wellbeing, crucial during start-up phase, while 71 per cent have collaborated together on projects.

4.6 Evaluation of the HUB Model at work: access, anchor and diffusion capacity

From these stories, it becomes clear how the HUB succeeds in creating a series of opportunities and attitudes which embed a culture conducive to innovation, enabling initiatives to grow. The HUB’s ambitions are borne out in people’s actual experiences. Here, we evaluate the model and these stories in more detail using the framework set out in *Innovation by Adoption*. In our view, the effects of the HUB model in terms of access, anchor and diffusion need to be analysed in three contexts: the network effects (in members both within a HUB and across its global network), the local effects (on its place context), and the sector effects (on the social innovation sector as a whole) as it has differential impact and relationships in these areas.

4.7 Access capacity

HUB establishments are almost invariably established in environments which already have access to plenty of new ideas. There are plenty of knowledge sector bodies like universities in the London region, for example, which in *Innovation by Adoption* is recognised as having highest innovation capacity within the UK, or the Netherlands’ Randstad region which includes Amsterdam and Rotterdam. Within

52. Cited in: Kennett, L. Thinking allowed. ODE, March 2008.

these regions, HUBs tend to be established in highly accessible, densely populated places that would score highly as places where the 'creative class' preferred to live, their proximity to universities, or their broadband cable and FWA technology. These are places which have among the best international network capacity. What the HUB does within this situation is to speed up access possibilities: they are concentrated hubs for access to networks, information, knowledge and support – whether intellectual, organisational or financial, local or international. International links are generated through the global nature of the network,

leading both to formal visits and events and to 'opening doors' across the world. "São Paulo is an enormous city with many ideas," says Pablo Handl, the director of the Brazilian HUB. "It is already a hub of sorts. But it didn't have a place where these ideas could congregate. Civil society, cultural thinkers and others: Basically they don't cross paths. So we can create the connections, like the host at a party... The idea is also to create a platform that will transcend countries. If a company in Johannesburg wants to expand to Brazil, it will now have personal connections."⁵²

Figure 9: The HUB place-making strategy to foster capacity for innovation has a wider relevance for local economic development policy: an integrated set of tactical interventions spanning the physical, social and organisational is needed to achieve more fertile innovation conditions.

Place making for innovation



This works because many of the members are already well connected. They already have many clients and collaborators and use social network technology to reach into wider cross disciplinary groups. From this basis, the HUB's internal capacity to link and connect across these networks of knowledge and innovation is very high. As *Innovation by Adoption* puts it, this process requires agents, resources and culture. In the HUB model, the agency is provided by the hosts as well as the members themselves – the agents are a shared responsibility which does not solely rely on 'designated' people but on informal arrangements; the resources include the architecture of the HUB, online and other social technologies, and the culture for networking and exchange. Importantly, the access capacity generated is sector-unspecific and multi-faceted. Membership interests span many sectors, making access less specialist and more about connections for anyone interested in new models of practice and new value ecologies. The presence of a shared ethic with complementary skills and professional disciplines enables co-authorship of projects, and makes it significantly easier to access external knowledge to develop ideas, create markets or develop product innovation. This is also valuable for business formation, growth and management – often key problems for start-ups. In other words, the agglomeration of 'strong' and 'weak' ties happens through a culture based around participating actively in lively communicative networks

We saw this in the stories of ONZO and InterfaceFLOR. They were helped by the HUB to link and connect to (inter)national networks of knowledge and innovation – not just through facilitating abstract connectivity, but also very concretely through bringing networks together in one place.

However, the HUB tends to have little meaningful local knowledge exchange. The HUB has received little to no public funding from either central or local Government and therefore its stakeholder relationship is independent of its geography, even though HUB founders are highly sensitive to the types of places where they seek to establish themselves, (and though a HUB may locally contribute to the place value and footfall of these locations). In other words, their influence on wider local knowledge access is limited at the scale of the neighbourhood.

4.8 Anchor capacity

The HUB's ability to intensify access capacity is matched by a very high anchor capacity. It achieves this through the diversity of its membership, the density of so many co-locating firms and the HUB's success in making people embed themselves in their spaces, as well as because of the external people it continuously attracts for events, it starts to function as an 'anchoring' agent. Agents are defined in the *Innovation by Adoption* report as "*organisations (such as firms and universities) that attract new ideas, technologies or processes from elsewhere and adapt them in the local economy.*" The HUB is not itself a content generator. Rather it aggregates, facilitates and showcases new knowledge, and does this in large part through nurturing and attracting skills and talent from elsewhere. For example, its international network makes it easy for people with varying degrees of links to the HUB to make new contacts. The domestication of ideas, through "*identifying, attracting and articulating the context between externally mobile knowledge and immobile local context needs*" is therefore the HUB's main strength: the intensification of use and exchange and the deliberate deployment of sharing software speeds up the knowledge exchange and actor mediation process. The result is a lot of satisfied users who remain attached to the HUB, even where they do not need the workspace – like the executive from InterfaceFLOR – and many lasting connections with businesses even as they 'grow out' of the HUB space itself.

Another important, and relatively new phenomenon, is that the HUB King's Cross in particular has begun to attract older entrepreneurs including former employees of the public sector or consultancies, who use it as an alternative to working as freelancers from home. This adds an important element of diversity to the HUB itself and may prove an interesting model for 'anchoring' and retaining some of this age group in the workforce.

Furthermore, the HUB's capacity to attract people, investment and firms is very high, as their growth demonstrates. After only a limited period of operation, the HUB had grown its membership sufficiently to meet capital debt repayments and become profitable. The HUB King's Cross also used micro-bonds to attract capital finance from many sources. The King's Cross model adds the dimension of a discussion place for people to socialise as well as develop long term connections. Its more external facing

'club' role, on a highly accessible location near the Eurostar and airport train services helps to anchor globalised social entrepreneurs across the HUB network as well as the local and UK-wide membership. This is important beyond creating business ideas, as it is now accepted that the migration of talented people happens through such contacts. Jean-Baptiste Meyer, one of the most highly cited scholars of network influences in mobility, remarks that we need to think of talent: *"not as a volatile population of separate units in a fluid environment but rather a set of connective entities that are always evolving through networks, along sticky branches."*⁵³ The HUB creates and multiplies such sticky branches.

However, as with access capacity, it is less clear what effect this has on HUB locations, both locally and in their ability to retain human capital in the HUB's field of operations. The cost reduction and network effect offered to budding entrepreneurs certainly helps to outweigh the cost of setting up a social enterprise in London. Equally, there is considerable interest in the model, with other UK regions showing an interest in the potential of this type of environment to retain entrepreneurial graduates in their early post-university years

those in the sector. But local network effects and even diffusion of ideas and knowledge across the global HUB network, are much more difficult: HUBs often find it difficult to spread their knowledge in their wider local environments and the online tools created for this purpose are not yet good enough.

So, what do you do?, a Demos report about the creative industries, made two recommendations for policymakers working with contemporary entrepreneurs. First, focus on spaces and meeting places: *"brokers and agencies that combine sector-specific expertise and local knowledge, that provide a point of connection to new opportunities, physical places that build networks on the model of guilds and open members' clubs that provide a place for building informal relationships."* Second, provide stories: *"a constant supply of stories provided by public agencies through competitions, research and awards that reflect back how the sector works and grows, and the value that it creates."*⁵⁴ The HUB provides those spaces and meeting places, and through its carefully constructed place, culture, and social governance arrangements, a powerful story to underpin this. This generates the type of space, atmosphere and involvement that today's free agent knowledge workers need, and offers significant capacity for innovation through a combination of providing access, deepening anchoring and accelerating diffusion.

53. Meyer, J-B., Kaplan, D. and Charum, J. (2001) Scientific nomadism and the new geopolitics of knowledge. 'Revue Internationale des Sciences Sociales'. 168.

54. Tims, C. and Wright, S. (2007) 'So, What do you do?' London: Demos.

4.9 Diffusion capacity

The HUB's capacity to spread information and knowledge between people is very great within the HUB network. Many of the tactics that underpin its access capacity are as important here: a combination of hosting, social protocols, place infrastructure, common ethic and sharing. Knowledge sharing capacity was one of the core objectives behind the HUB's founding, and the stories cited above show how the HUB is able to facilitate both formal and informal knowledge exchange and dissemination of new innovations. The process behind ONZO's smart electricity meter, for which they won the prestigious Red Dot product design award in 2009, is an excellent example of a new technology that spread rapidly thanks to the HUB, where the density of innovating organisations cooperating with other organisations is extremely high. Again we must remember that the HUB operates in an area of London where human capital is extremely high. Its relation with its immediate locality, the local neighbourhood, is much less clearly developed. Diffusion happens within individual HUB establishments and through

4.10 Policy implications

The lessons from the HUB suggest several key policy implications:

First, innovation is not merely consultancy, R&D or transaction-based. It is fundamentally cultural and reliant on developing the conditions which support it – which implies a need to invest in organisational capacity and 'sharing software'. This can involve physical or social spaces or new business models.

Second, it is important to enable ideas and resources to be shared across enterprises. This is a role that the HUB and iShed could feasibly play, particularly in the context of increasing constraints on the availability of venture capital and credit. The HUB and other institutions may provide the framework for administering micro-finance and brokering between funders and start-ups who find it hard to attract venture capital.

Third, there is scope to assess how the HUB place-making formula can be extended into other models and sectors. It could support new models of production and innovation in craft and industrial activities, libraries, Chambers of Commerce and cultural institutions. It would be worth examining how the HUB's lessons could help such institutions to play stronger roles in local economic development. Many more could act as 'third spaces' to foster innovation through more intensive use of their facilities. However, this would require some investment in their infrastructure and in their social software.

Fourth, all this may lead to a reflection on the role of policy in a dynamic innovation model – the nature of policymaking might be at odds with the dynamic innovation processes which are often locally specific and instigated by entrepreneurial 'troublemakers' operating outside clear structures of accountability. How can government policy, local authorities or institutions like libraries respond to bottom-up and disruptive innovation more effectively? For example, would it be possible to design a local policy model that can deliver its aims in a new way by offering innovators access to micro venture capitalists or local bond and stock markets – actually playing a real economic incubation and incremental scaling role at a local level? To an extent, this is a challenge to the HUB as well as to local authorities: the diffusion role of HUBs in their local geographical area is often still quite limited, as is their very geographical scope. Outside London and Bristol, there are no HUBs in the UK and we need to understand what type of organisation could fulfil or initiate similar roles in the economy of a Bradford or Sandwell. Or conversely, in what way could a Sandwell or Bradford social pioneer profit from the network generated in the existing HUB? In other words, the different dimensions of scalability of the model are a key point for further debate.

In conclusion, the HUB presents a particular angle on place-making which fosters micro innovation and entrepreneurship. Its evident success highlights the demand for and possibility of a renewed reflection on economic development policy and practice, particularly in the context of the current economic crisis.

For at its core, despite the differences in detail, the HUB and agencies such as the iShed have fundamentally acknowledged the systemic changing nature of work – the growth of free agent working, the growing significance of micro-entrepreneurship and micro-innovation and the role of social capital in the blossoming of internally-developed innovation networks in highly particular places. As many housing- and retail-led urban regeneration approaches and the focus on external 'talent' may be less salient than before, it is of crucial importance to focus on talent development and exchange within places and on such conditions for micro-economic development.

4.11 At a strategic level this revised focus on micro-economic development presents three fundamental challenges

Firstly, a revised scope: creating the right conditions for micro-economies and innovation to flourish requires more than creating the right physical spaces, connections and lifestyle offer. It also demands the institutions for building up trust between enterprising individuals, the mechanisms for intensifying and diversifying social networks and the cultivation of an everyday culture where people can freely exchange ideas and skills. Even more critical is the need for all these components of practice to be deeply integrated. Secondly, a set of revised policies, creating a policy framework which recognises that economic development needs to be integrated with place-making at all levels and across physical and social dimensions. Thirdly, embedding this policy in the front line of the institutions tasked with economic development and innovation at a local level is the most important challenge: the breadth of knowledge, capability, sensitivities and skills required to deliver the sophisticated interdependencies of this mode of place-making is enormous. In the context of a rapidly changing economic, social and environmental context, with possibly unprecedented constraints on funding, creating capacity at the front line to respond to this challenge will be no easy task.

Acknowledgements

This report was edited by Dr Sami Mahroum, who was the Director of Regional and International Innovation at NESTA, and is currently the Director of INSEAD's Innovation & Policy Initiative in Abu Dhabi

NESTA

1 Plough Place
London EC4A 1DE
research@nesta.org.uk

www.nesta.org.uk

Published: March 2010
LK/31

