KNOWLEDGE QUARTER

CONNECTIONS & TRUST
WITHIN THE
KNOWLEDGE QUARTER

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ABOUT THE KNOWLEDGE QUARTER

The Knowledge Quarter (KQ) is a partnership of 89 academic, cultural, research, scientific and media organisations located in a one-mile radius around King's Cross, Euston Road and Bloomsbury. Collectively, the geographic area of the Knowledge Quarter contains one of the greatest knowledge clusters anywhere in the world. Find out more about our work at www.knowledgequarter.london.

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FOREWORD

There are few districts in any city in the world that can boast the sheer range and quality of knowledge organisations that can be found within the one-mile radius that encompasses St Pancras, Kings Cross, Bloomsbury and Euston in London. From centuries-old institutions such as the British Museum and Sadlers Wells to relatively recent arrivals like the Francis Crick Institute and Google, the area has that rare kind of vitality that comes from the daily collision of diverse ideas, people and perspectives.

The partnership which we now call the Knowledge Quarter was born some three years ago out of this unique urban landscape. A group of us had a feeling that though we were neighbours in the most basic geographical sense, we weren't actually collaborating or working together in ways that did justice to the sheer range of world-class expertise and potential in the neighbourhood.

From a starting group of 35, membership of KQ has now grown to over 85 partners, encompassing organisations big and small, public, commercial and third sector – all united by a commitment to grow and share knowledge. Members range from primary schools to research institutes, from arts organisations to medical science companies, from tiny start-ups to global corporations.

The very particular energy of the group comes from the relationships that have built up between teams and individuals that simply would not have existed before KQ was founded. It's that dynamic that we wanted to explore in this piece of research, in order to gain a better understanding of the networks that have begun to emerge, and how they contribute to new personal connections and relationships of trust.

We are very grateful to Alina Velias and Bernadette Elliott-Bowman for their excellent work in producing this report. For the first time, we have a chance to make sense of how creative innovation grows out the networks the Knowledge Quarter is building, and to use this understanding to help us shape the exciting possibilities that lie ahead for the next phase of our own development.

Roly Keating
Chair, Knowledge Quarter
Chief Executive, British Library

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CONNECTIONS & TRUST WITHIN THE KNOWLEDGE QUARTER

EXECUTIVE SUMMARY

Launched in December 2014 by the British Library and Central Saint Martins, but with its origins dating back to the 18th century within historic Bloomsbury, the Knowledge Quarter (KQ) is a partnership organisation consisting of 89 businesses, universities, and cultural and scientific organisations. Between them, these organisations collectively contain 580 research groups, 13700 academic and research staff and 180 million catalogued items in museums, galleries and libraries. Arguably, the geographic area of the KQ contains the greatest knowledge cluster anywhere in the world.

The KQ was formed to instigate positive collaborations between sectorally diverse organisations and shape the area as an innovation hub. Its stated aims are to promote knowledge exchange between its partners, create tangible projects that benefit the local community, improve the local public realm and to speak with a single voice on issues that impact its partners and the wider area.

This research project is a first step in exploring the value of multi-sector clusters like the KQ. Quantitative and qualitative research to understand the connections and trust formed from the KQ network was undertaken between May and October 2016.

Section One:
Literature Review

In the first section, we summarise the literature on economic clusters and innovation districts. We suggest where the KQ fits within the modern definitions of these two phenomena, and show that it exhibits all the ingredients typical of what is defined as an innovation district. It combines the economic and productivity benefits of pure agglomeration clusters with the tacit knowledge spillover benefits of social network clusters.

We also explore the role of policy in supporting existing examples of clusters. There has been a gradual shift in policy from supporting industry specific clusters to fostering innovation ecosystems capable of working across disparate sectors and institutions. The enabling policy interventions range from improving social and physical infrastructure within clusters to creating collaborative leadership networks.

Section Two:
Desk Research and Interviews

Through interviews with senior stakeholders from 21 partner organisations, we identified a number of opportunities and challenges facing the network. These were:

- A desire from smaller institutions to form partnerships with the wider network and particularly anchor institutions.
- A challenge for some organisations to engage locally, when funding incentives emphasise an ability to demonstrate national and international impact.
- A perception of cultural and long-term value forming from the formation of the KQ, but a challenge in quantifying the nature of its short-term benefit.
- A desire to deepen engagement within the KQ network, but concerns over the capacity available to engage with it fully.

Section Three:
Survey of Knowledge Quarter Staff

Finally, 235 individuals employed at organisations within the KQ were surveyed on a range of issues; including trust, the nature and scale of existing networks and factors which might influence potential successful collaborations. Some of the key findings include:

- KQ employees generally form diverse contact networks. Seventy-two percent of respondents had some form of personal contact within another KQ institution, and of those connections, 53% were with organisations operating outside the respondent's sector. However, only 32% of respondents felt that they knew at least one contact within a partner organisation that they could turn to for help and advice.

- More than 85% of respondents were interested in gaining personal contacts at more inter-sector than intra-sector KQ partners. Half of the respondents who were more interested in gaining intra-sector than

inter-sector contacts were from the science and research sector. Survey respondents were also asked to identify which of a selection of generalised subsectors they were interested in learning more about, or making new connections within. No clear popularity trend was observed in the types of subsectors identified by respondents, reflecting the diverse and interdisciplinary nature of KQ.

- Employees in higher supervisory positions were more likely to have wider networks than those in non-supervisory positions, who struggled to make contacts outside their own organisation. This effect was found to be a result of a lack of time, both due to an individual's workload and the perceived imposition of time limits by the individual's supervisor.

- The most connected organisations in the KQ were large institutions that were generally well-established in the district. The majority of the organisations were non-profit anchor institutions, and half of them maintained previous institutional relationships with each other. In comparison, the least connected organisations were small and medium businesses which were often (but not always) physically isolated from other KQ partners.

- An individual's perception or prior knowledge of an organisation's brand can impact on their willingness to share knowledge with a new contact from that organisation. This has clear implications for smaller KQ partner organisations, which tend to have a smaller audience and are comparatively less well-known within the district.

- The fact that the likelihood of a positive response to communication increases when the sender and recipient have some form of prior connection, either through their organisations or a colleague, suggests that networking events may have a positive impact on the ability of partner organisation employees to connect with the wider KQ community. The KQ structure has the potential to enable smaller organisations to build valuable networks with larger anchor institutions.

Recommendations

Partner Institutions:
Knowledge Quarter partner organisations should give junior staff the time and space to build their network within it. Informal network-building and participation in KQ activities should be viewed as a professional added-value activity. Smaller organisations should ensure there is a designated contact point to engage with KQ activities and the wider network.

Anchor Institutions:
Anchor institutions should consider what support they can provide for smaller organisations in the network. This does not have to be financial support, but could include venue space, access to expertise or opportunities for training. Anchor institutions should also consider creating a budget to support more spontaneous collaborations with local KQ partners.

The Knowledge Quarter:
The Knowledge Quarter should continue to do it what it can to reduce the 'cost' of collaboration through helping links form between organisations. In particular, it should continue to investigate how it can support small and medium sized organisations to engage with local community groups.

National Government:
National Government should expand on this research. It should seek to understand the productivity gains which can be made by facilitating networks and collaborations within the growing number of UK innovation districts. It should also consider how the incentives provided by its funding conditions affect local networks. In particular, it should strive for a balance between incentivising national and international impact and meaningful local engagement.

LITERATURE REVIEW:
THE CHANGING ACADEMIC THOUGHT ON INNOVATION: FROM CLUSTERS TO INNOVATION DISTRICTS

The basic concept of the business cluster has gone through several iterations since Marshall's influential definition of an 'industrial district' at the end of the 19th century.[1] From localised economies in industrial stalwarts such as steel and oil, the emergence of the technology park in the 1950s heralded a new age of science-based innovation. Technology parks, including the Stanford Research Park (a precursor to Silicon Valley), Japanese science cities and the Cambridge technology cluster, tended to be located outside urban centres, isolated and reliant on their own infrastructure. In their next iteration, business clusters recently returned to urban centres as knowledge-focused start-up networks. This was in part due to the high rental costs associated with technology parks, but crucially, for the businesses to take part in the perceived entrepreneurial nature of cities. This influx of knowledge-intensive companies and individuals grew and evolved into the most current iteration of clusters – the innovation district, regions within an urban environment that encompass an interwoven network of people, institutions and industries.

The research on economic development and clustering has similarly shifted from sector-specific clusters towards place-based innovation districts, with publications from organisations including Centre for London, Centre for Cities, SQW and the Brookings Institute highlighting this trend. This summary of the literature provides an up-to-date overview of research on innovation districts and tracks their emergence from the traditional economic and industrial clustering models. Furthermore, a number of recent studies have proposed potential policy recommendations for supporting the development of innovation clusters and districts, which have been summarised below.

Economic and Industrial Clusters

Economic clusters are a common feature in the business landscape, and many studies have attempted to quantify the perceived benefits (both social and economic) of these regions. However, a fundamental issue with this process lies in the ability to adequately define the concept of an economic cluster - while the concept may seem straightforward, many definitions have emerged for what is, in reality, a complex concept. Wolman and Hincapie (2010) give an overview of some of the more well-known variations. Some researchers focus on the interconnectedness of geographically close organisations within a particular industry (Krugman, 1991; Hill and Brennan, 2000). Others go beyond the physical location, considering the benefits of knowledge exchange through the exchange of people and ideas (Marshall, 1890; Glaeser and Gottlieb, 2009). Many authors place emphasis on belonging to the same industry, such as Pittsburgh's steel industry or the technology focused Silicon Valley. This limits the possibility of applying this definition to the current KQ cluster, which incorporates institutions and companies from an extremely wide range of fields. These more industry focused definitions may have been applicable in the early stages of the KQ, when newly

formed research institutions such as the University of London perhaps chose locations to make the most of academic connections and human resources. Clusters are known to evolve from one type to another (Iammarino and McCann, 2006), and an increasing number of organisations joining from outside the historically established industries would likely have induced such a change. Alternatively, Cortright's (2006) broad definition, describes an industry cluster as:

> "a group of firms and related economic actors and institutions, that are located near one another and that draw productive advantage from their mutual proximity and connections"

which is perhaps most applicable to the district in its current form. Cortright notes that in reality, clusters are not easy to compartmentalise, and are typically composed of a diverse grouping of interrelated organisations:

> "...clusters frequently cut across customarily defined sector lines and include suppliers in other industries, service providers, and supporting institutions as well as labor and nonlabor inputs and customers."

A more recent offering by Delgado et al. (2015) takes into account the diverse nature of the innovation district, suggesting that a cluster may be comprised of:

> "groups of industries closely related by skill, technology, supply, demand and/or other linkages."

[1] Morrison, 2015

08/09

As captured by Wolman and Hincapie, the various attempts to define the nature of a cluster share common themes, encapsulating the cost savings and knowledge spillovers obtained through interactions resulting from the geographical co-location of organisations with shared or similar processes, products, or functions; their customers, suppliers, and employees; and service providers and institutions.

Using these definitions, economic clusters can be further categorised based on the benefits that they provide. Clusters formed of organisations from the same or similar industries offer clear economic advantages in terms of transport of materials, resources, and people, reducing costs, and enhancing productivity. Gordon and McCann (2000) identify this cluster type as utilising the "pure economies of agglomeration". Alternatively, clusters composed of informal networks of individuals spanning across various organisations facilitate knowledge exchange or spillover between the organisations.

This "social network model" relies on interpersonal connections, and offers value through localised sharing of experience and skills. Gordon and McCann also define a third cluster type, the industrial complex, characterised by relationships based on trade partnerships. The characteristics of these cluster types are summarised by Iammarino and McCann (2006), as shown in Table 1.

The KQ bridges the space between two of these categorisations, offering economic agglomeration advantages to many of the interrelated industries present in the district, while also exhibiting an obvious affinity to the social network model through the variety and breadth of the connections found within. The KQ is also comprised of many of the key components identified by Engel and del-Palacio (2009) as critical to the formation of an innovation cluster, namely entrepreneurs, R&D centres, venture capital investors, universities, mature corporations and strategic investors, specialised service providers, and government.

TABLE 1

Characteristics of industrial clusters. Modified from Iammarino and McCann (2006).

Characteristics	Pure agglomeration	Industrial complex	Social network
Firm size	Atomistic	Some firms are large	Variable
Characteristics of relations	Non-identifiable Fragmented Unstable frequent trading	Identifiable Stable and frequent trading	Trust Loyalty Joint lobbying Joint ventures Non-opportunistic
Membership	Open	Closed	Partially open
Access to cluster	Rental payments Location necessary	Internal investment Location necessary	History Experience Location necessary but not sufficient
Examples of cluster	Competitive urban economy	Steels or chemicals production complex	New industrial areas

Innovation Districts

A report for the Brookings Institution recognised a recent shift from innovation within traditional economic or industrial-type clusters to urban-centric innovation districts (Katz and Wagner, 2014). While a traditional cluster might focus on a particular theme or industry, innovation districts feature the co-location of innovation-intensive, leading edge institutions and companies of all sizes across a range of fields. The purpose of an innovation district is to facilitate access to other innovators, equipment and knowledge, and the integration of a region within a city emphasises the ability of its members to build networks, benefit from knowledge spillovers, and therefore increase value. Innovation districts grow from and rely upon the communities and infrastructure of the cities within which they are based, emphasising local development over the traditionally segregated or closed model of the industrial cluster.

The Brookings Institution (2014) identified a range of factors that lead to the rise of innovation districts. With the continued growth of the knowledge and technology economy, greater value is being placed on both the density and proximity of people and organisations. In addition to this, a more open research environment has encouraged collaboration and knowledge sharing, which is again facilitated by proximity to other innovators. Finally, changing demographics and attitudes to household roles have driven demand for more accessible and integrated accommodation, employment and amenities.

The report identifies three of the most common models used to classify innovation districts. The "anchor plus" model is typically observed in urban centres and features major anchor institutions surrounded by related companies and start-ups working to commercialise innovation. The "re-imagined urban areas" model describes innovative growth through the repurposing of urban industrial districts. Finally, the "urbanised science park" model describes the growth of suburban areas to incorporate previously isolated innovation regions.

The urban location of an innovation district tends to govern its composition, typically leading to a multifaceted one (Morrison, 2015). This is a result of the close integration of organisations and individuals, caused by the blurring of boundaries between community, work and social elements. Morrison describes the modern innovation district as an "artificial reef"; a region in which an innovation ecosystem can develop nurtured by the existing urban framework, and offering a home to early stage companies that lack the economic backing of larger, more established corporates.

Cluster Formation Mechanisms

The general mechanisms governing the formation of clusters are difficult to quantify, as clusters tend to form under their own specific and individual drivers. However, as clusters are associated with improved economic performance and growth (discussed in detail in the next section), studies have attempted to discern some of the motivating factors for cluster formation, primarily to inform policy recommendations. In a study of the San Diego biotechnology cluster, Casper (2007) found that several factors combined to initiate the formation of the district. What is referred to as the "backbone" of the cluster by network theorists (a core group of initial connections forming an agglomeration anchor for later entrants) was formed by senior managers with links to a prominent company in the region. These individuals formed a social network of trusted advisers, and their professional reputations served to attract further talent and funding to the cluster.

How this "backbone" itself forms is somewhat subject to chance, depending on the actors and environment. The emergence of a backbone could be influenced by pre-existing informal networks (such as the formation of London's financial markets from relationships between a small group of 17th century elites (Iammarino and McCann, 2006)), or the presence of entrepreneurial individuals emanating from a large company or organisation as per the example studied by Casper. A naturally abundant environment could also encourage the formation of a particular industry focused cluster, as evidenced by the emergence of Pittsburgh's steel industry thanks to significant iron ore reserves. Silicon Valley is a further example of the emergence of a cluster from a pre-existing collection of educational institutions (which attracted and produced entrepreneurial individuals who then initiated a research cluster), coupled with additional stimulus through government funding for military-applicable research (Engel, 2015). The biotechnology cluster in Cambridge was formed along similar lines, emanating originally from the University of Cambridge and subsequently from government policies intended to encourage university-industry collaboration (Chiaroni and Chiesa, 2006). It can be postulated that the KQ itself may have formed following a route more akin to that of London's financial centre, resulting from the initial founding of key educational institutes (University College London and the University of London, both established in the early 19th century) which subsequently attracted additional organisations and individuals to the area.

These examples of cluster formation fall into two broader categories identified by Chiaroni and Chiesa (2006) in a study of global biotechnology clusters. The "spontaneous clusters" form through a combination of fortuitous circumstances, including the presence of entrepreneurial

individuals and start-ups and innovative funding mechanisms, while "policy-driven clusters" are artificially induced networks resulting from industry restructuring and development policies.

Less a comment on the formation of the cluster and more a reflection of its composition, Ter Wal (2013) found that the presence of small businesses was an important factor in the success of a French information technology cluster. An analysis of networks in an artificially initiated science park revealed that an integrated network of collective learning developed between IT-focused companies in the park, but a similar network did not emerge in the life sciences-based companies. The IT cluster exhibited continued growth, producing a large number of start-ups and spinoffs, while growth in the life sciences cluster slowed and its composition continued to be dominated by large multinational companies. The employees of the small companies were thought to offer a pathway to connecting individuals across organisational and disciplinary boundaries, whereas the more concentrated structure of the larger companies inhibited the ability of their employees to connect across organisations. As a result, knowledge and skills were more easily shared within the IT cluster, enabling its further growth.

Innovation District Formation

While a traditional industrial cluster may form relatively easily around a resource or location, the emergence or engineering of an innovation district relies on the ability of the cluster to attract or incorporate entrepreneurial talent. Interviews with individuals having knowledge of or involvement in cluster formation were conducted as part of a study to generate recommendations for the formation of Imperial West, a new innovation district in London led by Imperial College London (Ter Wal and Corbishley, 2014). The results suggested that "entrepreneurship is the key ingredient to well-functioning cluster ecosystems", critical for attracting additional entrepreneurial talent, forming start-ups, and increasing the likelihood of corporate investment in the area. However, the report also suggests that it may not be possible to artificially engineer the intangible qualities of an entrepreneurial ecosystem, which highlights the unique characteristics of existing functioning innovation districts.

Assessing The Benefits Of Clusters Economic Clusters

The competitive advantage of clustered business is thought to result from three key areas, which Marshall (1890) first defined as "local externalities":

- A shared labour pool filled with highly trained and skilled workers
- Specialised suppliers in close proximity, forced to innovate to survive
- Knowledge spillover, or the tacit exchange of technical know-how through social interactions in an entrepreneurial and cooperative environment.

The benefits associated with a cluster vary depending on the cluster type (pure agglomeration, industry complex, or social network). The formation of pure agglomeration and industry complex-type clusters have in the past resulted from the desire of companies to reduce operational costs through proximity to similar business types, customers and suppliers, and service providers (Glaeser and Gottlieb, 2009). Organisations which frequently trade goods and services can save time, increase productivity, and reduce transport costs by being geographically co-located. However, the more intangible benefits of clustering, such as the economic impact of knowledge spillover, are harder to measure. The economic effects associated with a cluster are generally determined using available statistics produced by government organisations (such as the Statistical Classification of Economic Activities in the European Community[2]), or through specialised surveys conducted either by national bodies or academic researchers (Spencer et al., 2009). However, the extrapolation of any observed economic variation to the activities of a cluster is complex, and a systematic method able to take into account this complexity in full to accurately assess the economic impact of a social network-type cluster is yet to be developed.

Costs and benefits of economic clusters. Reproduced from Martin and Sunley (2003).

Claimed advantages	Potential disadvantages
Higher innovation	Technological isomorphism
Higher growth	Labour cost inflation
Higher productivity	Inflation of land and housing costs
Increased profitability	Widening of income disparities
Increased competitiveness	Over-specialisation
Higher new firm formation	Institutional and industrial lock-in
High job growth	Local congestion and environmental pressure

Using the methods currently available, various researchers have studied the advantages of clustering. Reporting on the performance of clusters across a range of industries in Canada, Spencer et al. (2009) found that in general,

"when industries are located in an urban region with a critical mass of related industries, they tend to have both higher incomes and rates of growth compared with when they are situated in non-clustered settings. Additionally, it was found that the overall proportion of clustering within a city-region is positively associated with average income levels and employment growth".

The authors highlight that in this case the overall economic performance of a region was heavily influenced by the specific combination of the industries and clusters it contained – since such effects are very difficult to separate out. One method used to achieve this involves a comparison of the effects of clustering across the region, as demonstrated by Boix and Galletto (2009). The researchers assessed the effect of clustering on regional innovation in Spain by analysing 22,500 patents applied for over the period 2001-2006. This revealed an "I-district" effect, with industrial districts producing 30% of the national patent total, and 47% more patents per employee than the national average.

Co-location does not benefit all employees equally. Huber (2012) conducted a survey-based case study on the Cambridge IT cluster which revealed that almost two-thirds of employees did not experience any knowledge benefit to their work from being located within the cluster. The employees that identified having benefitted from the cluster in some way (but not through knowledge spillovers) tended to report advantages leading from a strong labour pool and existing infrastructure for entrepreneurial ventures. However, the results also suggested that the job function of the interviewed employees may determine the perceived "usefulness" of the cluster for knowledge exchange. Senior managers may see more benefit to cluster membership for sourcing business knowledge than engineers might for finding technical knowledge. Further research by Molina-Morales et al. (2011) suggests that knowledge spillover effects are not necessarily an automatic product of clustered industries. Rather than relying only on geographical proximity, the organisations in a cluster must also achieve "cognitive proximity" – the alignment of goals and attitudes to facilitate knowledge exchange.

Martin and Sunley (2003) summarise the various advantages and disadvantages of clustering claimed in the literature. Some of these factors, both positive and negative, can be observed in relation to the KQ. For example, KQ partner University College London is ranked 6th in the UK in terms of spin-out and start-up creation, with a total of 90 new companies created as a result of UCL innovation[3]. Conversely, inflated property and land prices, as well as congestion and air quality issues, are a well-known feature of life in London, although given that these problems occur city-wide it is difficult to untangle the specific impact of the KQ. However, the KQ evidently does not exhibit examples of all the factors listed by Martin and Sunley – for one, the diverse nature of the cluster prevents the onset of over-specialisation.

[2]See http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE).
[3]Source: Spinouts UK, http://www.spinoutsuk.co.uk/listings/university-listings/Default.aspx. Accessed 07/04/2017.

Image ©Bennetts Associates

Innovation Districts

The benefits associated with innovation districts are in some ways similar to those of economic clusters. In a study of London's knowledge economy, Centre for London (2016) found that innovation districts could enhance economic growth, both by attracting large anchor tenants and through the activities of the research, technology and creative sectors. Furthermore, job opportunities in innovation districts could be enhanced as a result of district development (i.e. construction work) and end-user employment. However, Centre for London also found that a key difference associated with innovation districts was the local impact of a successful knowledge cluster. The inclusive growth of a knowledge cluster can result in the upskilling of local residents, as well as the development of a sense of shared assets and community, and can also benefit the local area through regeneration and provision of public space. This effect is a particular benefit of innovation districts; in an urban location the impact of local regeneration will be more widely experienced than in, for example, typically isolated technology parks.

The Brookings Institution (2014) also describe the economic benefits of innovation districts, namely through their capacity for job creation. This not only refers to enhanced employment opportunities within innovative organisations working across disparate areas, but also greater employment accessibility for local people through training schemes in science and other industries. Innovation districts can also enhance the economic wellbeing of the local community by generating revenue associated with the supply of goods and services and housing, providing greater funding for regeneration of the local area. This can also be seen in the use of renewable energy sources in some districts, and the inherent environmental benefits of locating an innovation cluster within an existing population base.

Policies for Cluster Formation and Enhancement

A review of the literature shows that there is no consistent "recipe" for cluster-making; studies have identified the driving factors associated with specific clusters, but no two clusters are the same and the formation mechanism observed for one cluster may not necessarily be broadly applicable to others. Engel (2015) notes that:

> *"A major reason why efforts to transplant the ecosystem of Silicon Valley to other locations have not been successful is that the local context-key players, economic strengths and weaknesses, political realities, and cultural norms - have been ignored rather than incorporated."*

This has made the development of policy for artificial cluster creation difficult, particularly when the intention of that policy was to create a specific cluster type. In a review prepared for the Brookings Institution, Cortright (2006) addresses the vagaries of cluster formation in relation to policy recommendations. He suggested that, rather than trying to create a particular industry themed cluster in a new location, policy should be focused on nurturing an environment that encourages clusters to emerge naturally from existing actors and resources. This environment might be achieved through programs to support entrepreneurship, start-up creation, and knowledge creation, possibly through increasing the availability of capital for such activities.

Policies for supporting and enhancing existing clusters have also been a feature of research. Wolman and Hincapie (2010) provide an in-depth overview of literature-based policy recommendations, which primarily focus on:

- Enhancing the operation of the cluster through improved social and physical infrastructure, including opportunities for networking
- Support for entrepreneurial and collaborative activities, including start-up and spin-off formation
- Identification and empowerment of cluster leaders, and improved representation of the cluster as an entity to external organisations such as government and trade unions
- Developing the cluster by attracting new members, particularly those that fill a "service gap" within the cluster.

While the identification of potential application areas for cluster-development policy is important, it is perhaps more critical to understand the impact these policies have on real-world clusters. Research evaluating the impact of cluster-development policies conducted by Uyarra and Ramlogan (2012) for the innovation foundation Nesta sheds some light on this area. The paper first identifies the challenges that exist in effectively evaluating cluster policies. A large number of variables exist that could be used to measure the impact of policy on cluster performance (including, but not limited to, use of additional resources, success of particular projects, or regional economic outputs), and identifying which should be used to determine the success of a particular policy without skewing the outcome can be problematic. The data available for comparative assessments often does not capture the less easily quantifiable effects of, for example, knowledge spillover. Another added complexity lies in accurately identifying the boundaries of a cluster, as poor boundary delineation may miss or truncate weak links between organisations at the edges of the district. Political or corporate bias may also prevent effective critical evaluation of policy schemes.

Uyarra and Ramlogan identify trends in the effects of existing policies[4] on real-world clusters. Specifically, several policy schemes were found to have enhanced the innovation capacity of the clusters to which they were applied, providing an appropriate framework for the channelling of actors and resources. These policy schemes involved the provision of support services for networking, mentoring, and technical innovation. As a result, clusters reported enhanced productivity and particularly in relation to SMEs. Finally, in a number of cases policy interventions were found to have facilitated the initiation of collaborations and relationships that would not have occurred otherwise (however, this effect was not observed in all programmes).

Nishimura and Okamuro (2010) analysed the effect of the Japanese Industrial Cluster Project, which they describe as a project aiming to provide support to both research and development activities as well as networking in clusters. To do this, they made a direct comparison between cluster members who had taken advantage of the program and those who had not, in terms of their success in network formation within the cluster. The research revealed that network support activities had a much greater effect on the innovation outcomes than direct R&D support, due to the relaxation of constraints and obstacle removal resulting from improved relationships. However, the authors note that the success of the program varied by participant, and that cluster members should take advantage of programs that are most closely aligned with their goals.

Centre for London (2016) highlighted the key role that the local area and its residents should play in innovation district policy recommendations, an aspect that seems to be often overlooked in favour of industry or economy focused policy. Developing an understanding of a region's local assets, as well as enhancing the skills of local people to allow them to find employment within the district in the long term, were thought to be important for the enhancement and democratisation of the innovation process within London knowledge clusters. This could be further improved by the integration of universities and knowledge economy institutions with local businesses and education systems to increase employment, apprenticeship and learning opportunities.

Through interviews with individuals working within innovation districts across Europe and the United States, Katz and Wagner (2014) identified five strategies that play an important role in the comprehension and organisation of successful clusters, as summarised in Table 3. The strategies focus on the collaborative nature of the cluster, and encourage collective efforts for increasing access to capital, utilising technology, and cluster and community growth and development.

[4]The review covered 16 cluster programmes, including the German Bioregio/Bioprofile scheme, French Pôles de Competitivité, Japan Industrial Cluster Project, Barcelona Knowledge Cluster, Danish and Finnish national programs, and Canadian NRC Technology Clusters.

TABLE 3

Strategies of successful clusters, adapted from Katz and Wagner (2014).

Build a collaborative leadership network	Leaders from disparate institutions regularly and formally cooperate to enhance the performance of the district and to encourage idea sharing across organisational boundaries.
Set a vision for growth	Determine economic, physical and social strategy for the short-, medium- and long-term development of the district.
Pursue talent and technology	Attract and develop talented individuals with skills in specific disciplines. Embrace technological development, both for specific (i.e. in cutting-edge R&D) and for community (i.e. fibre optic broadband) use.
Enhance access to capital	Develop an integrated collective strategy to enhance the ability of the cluster to attract investment.
Promote inclusive growth	Improve the wellbeing of surrounding low income areas through community regeneration, employment and educational opportunities.

Several of the factors described above are captured in a framework described by Morrison (2015). The framework integrates the concepts of leadership, urban planning, productivity (i.e. the composition of knowledge-intensive start-ups), collaboration (between the various cluster members, individuals and companies) and creativity (the availability of cultural, social, educational and gastronomical variety to encourage a creative milieu). The model suggests that an artificially engineered innovation district would require significant leadership and organisation in its early stages; with increasing self-sustainability of the cluster, the leadership aspect would become less important.

Imperial College London's Imperial West development is an ongoing project in London which aims to engineer a new innovation district in the city. Guidance published by Ter Wal and Corbishley (2014) on the process for achieving a successful cluster at Imperial West highlights the importance of building the foundations of the cluster on existing competences -and specialisations, in a similar manner to the traditional formation of industrial clusters. However, the report suggests that a key difference in the formation of a successful innovation district could be a focus on emerging industries rather than pre-existing sectors, which may be more likely to attract innovative and entrepreneurial individuals and companies. Based on the idea that "spin-off creation is the natural engine of cluster formation", the report further recommends that engineered clusters should ensure that space is available not only for the incubation of new start-ups, but also to allow successful start-ups to remain in a nearby location to the originating research institution, thus facilitating the formation of an interrelated cluster.
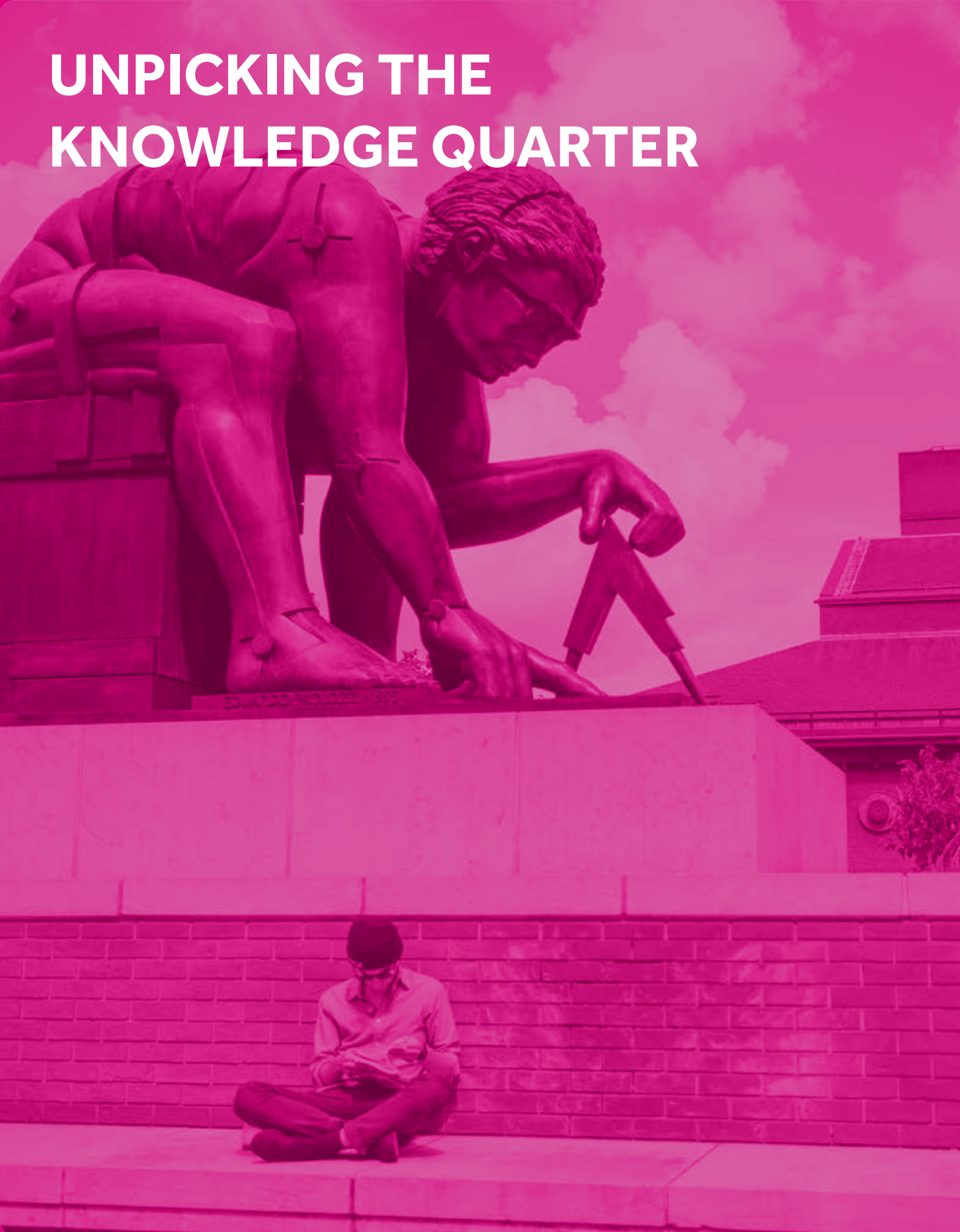
The Knowledge Quarter as an Innovation District

This review has identified some aspects of the KQ that fit within the framework of established research. In summary:

- The KQ does not fit easily within some of the more traditional definitions of a cluster, which describe specific industry centred organisational agglomerations. Rather, the KQ's partners span a broad range of industries and fields, leading us towards a broader definition that more accurately represents the diverse nature of the district.

- The KQ cuts across the cluster categories, combining the economic and productivity benefits of the pure agglomeration type with the tacit knowledge spillover benefits of the social network type. The KQ is also comprised of many of the organisational actors that are typically found to make up innovation districts.

- The KQ has a strong core of educational and research institutes which may have formed the backbone of the cluster during its early stages. Many well-known innovation clusters, such as Silicon Valley and the Cambridge biotechnology park, were initially formed thanks to a pre-existing research core emanating from one or more universities.

- The KQ experiences several of the advantages and disadvantages commonly known to affect innovation clusters. The district has a reputation for new firm generation owing primarily to the activities of its research-oriented partners. It also suffers from issues associated with environmental air pollution, congestion, and land and property pricing, though this may simply be a symptom of a city-wide phenomenon. The KQ -has not become over-specialised, as evidenced by its diverse collection of partner organisations spanning a broad range of industries.

UNPICKING THE KNOWLEDGE QUARTER

To better understand the composition and perspective of the Knowledge Quarter (KQ) network we used a combination of desk research and interviews with 23 KQ partner organisations. There are two aspects to the KQ. The first comprises the organisations which have formally subscribed to the partnership. The second includes the organisations which are not in the KQ partnership but are in the KQ area.
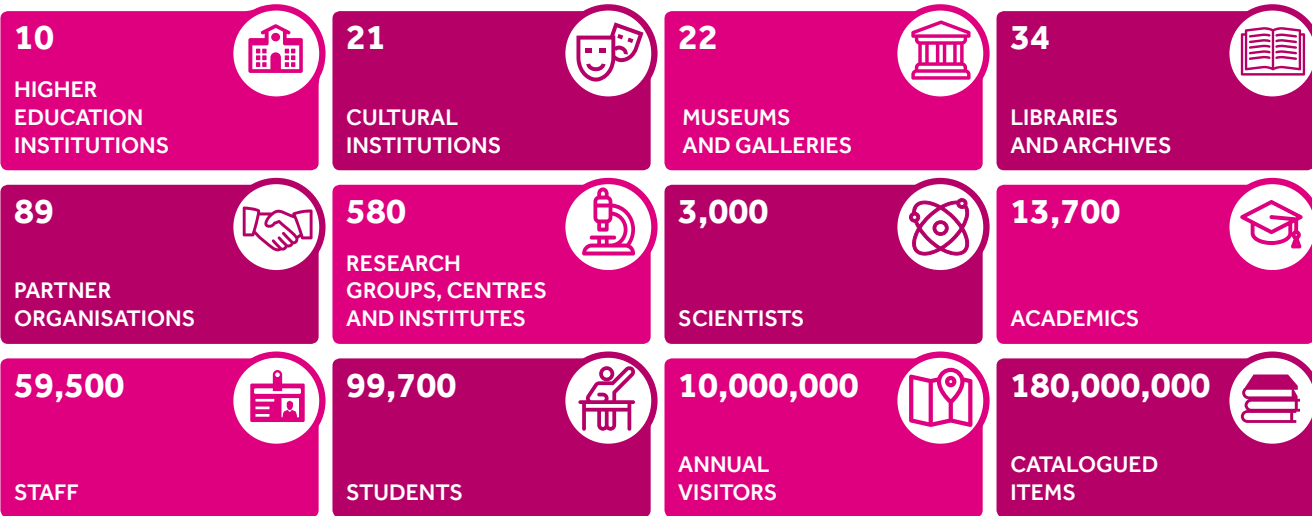
Knowledge Quarter Partnership

As of August 2017, the KQ is a formal partnership of 89 organisations located in a one-mile radius around King's Cross, Euston Road and Bloomsbury. Partnership of the KQ is open to any organisation based within a 1-mile radius of King's Cross that "actively engage in the advancement and dissemination of knowledge." Since its inception in 2014 it has welcomed a further 56 organisations as partners, including the Alan Turing Institute, City, University of London and Islington Council.

There are multitudes of ways to categorise KQ partners, and a basic attempt to do this can be seen below. Partner categorisation is difficult as many institutions in the KQ are understandably cross-disciplinary in nature. What is clear is the sheer breadth of sectors represented, with no clear sector dominating partnership of the KQ.

In the context of traditional classifications of innovation "assets", the KQ has a combination of anchor institutions, innovation drivers and innovation cultivators.

The Knowledge Quarter in Numbers

10 HIGHER EDUCATION INSTITUTIONS	**21** CULTURAL INSTITUTIONS	**22** MUSEUMS AND GALLERIES	**34** LIBRARIES AND ARCHIVES
89 PARTNER ORGANISATIONS	**580** RESEARCH GROUPS, CENTRES AND INSTITUTES	**3,000** SCIENTISTS	**13,700** ACADEMICS
59,500 STAFF	**99,700** STUDENTS	**10,000,000** ANNUAL VISITORS	**180,000,000** CATALOGUED ITEMS

MEMBERSHIP OF KNOWLEDGE QUARTER, JULY 2017

- 7% Education Organisation
- 11% Research Organisation
- 13% Higher Education Institution
- 17% Membership Organisation
- 24% Cultural Organisation
- 26% Other

Other:

- 6% Publisher
- 5% Community Organsiation
- 3% Charity
- 3% SME
- 2% Local Council
- 2% Trust or Foundation
- 1% Architecture Firm
- 1% Coworking Space
- 1% Law Firm
- 1% Entertainment Firm
- 1% NHS Trust

A large number of KQ partners are 'knowledge hubs' or large anchor institutions which are capable of driving innovation in themselves. Anchor institutions are large organisations (often non-profit), which once established, do not tend to relocate and thus strategically have a long-term vested interest in the areas in which they are based.

These institutions include Birkbeck, University of London; City, University of London; the British Library, Camden and Islington NHS Foundation Trust, Google, Royal Veterinary College, Central Saint Martins, Springer Nature, SOAS, University of London; The Francis Crick Institute, University College London, Wellcome Trust, Universal Music, Sadler's Wells, the British Museum and The University of London.

These institutions will often have dedicated projects and programs to promote innovation and the creation of new businesses, i.e. their focus is on the application of knowledge to create transformative technologies, products and/or services. Examples include the Royal Veterinary College's London Bioscience Innovation Centre, UCL's Innovation and Enterprise department, the British Library's Business and IP Centre, Wellcome Trust's Hub, and Central Saint Martins' Design Laboratory.

These organisations are in close proximity to other innovation "cultivators" such as the Digital Catapult and Impact Hub King's Cross. This is in addition to a number of science and technology based membership organisations which have specific innovation-focused programs themselves. These include the Design Council Spark initiative, the Crafts Council's Innovation Programme and the Institute of Physics' Open Innovation Programme.

One important area which is often overlooked in the literature on innovation districts is the importance of civic institutions, both culturally and educationally. The KQ contains 33 organisations from the education and cultural sector. It is these organisations which are not only capable of helping to attract talent into the area, but also act as bridges for local community engagement.

The Knowledge Quarter Area

In addition to the formal KQ partnership, the KQ area (within the London Boroughs of Camden and Islington) has a similar diverse composition. There is arguably no single particularly dominant sector in the KQ area. Analysis by Shared Intelligence shows that LB Camden contains London's leading clusters of activity in the areas of biotechnology research and development, architecture, audio-visual broadcasting, higher education, precision engineering, publishing, marketing and graphic design and scientific research and development (2011).

The London borough of Camden, in which the KQ largely sits, is projected to be one of London's fastest growing boroughs (URS, 2014). In addition, research by SQW in 2015 shows that LB Camden has the second highest turnover of all London boroughs from science and technology companies (£22.2bn) and LB Islington the seventh (£6.3bn). In addition, Camden has the second largest number of science and technology companies (7,435) and Islington the third (6,310).

There is also an important start-up scene supported by a number of co-working spaces such as Camden Collective, Interchange, Impact Hub King's Cross and the imminent opening of Rocket Space. According to the ONS, the LB Camden has the third greatest number of start-ups in London with 4,180 new enterprises having been set up in 2014. Data from Hubble found that search interest from tech start-ups looking for space in King's Cross increased by 36% in 2016.

In many ways, the formal partnership understates the wealth of organisations contained within the area. Just a few of the significant institutions in the KQ (but not formally part of the partnership) include Great Ormond Street Hospital, Cancer Research UK, London School of Hygiene and Tropical Medicine, the Royal National Institute Of Blind People, Architectural Association School of Architecture, Arcadis UK, Heatherwick Studios, the British

Heart Foundation, the Government Art Collection, ARUP, the Royal College Of Paediatrics and Child Health, the Royal Academy of Dramatic Art, Bloomsbury Publishing and Facebook.

In addition, the area is already seeing a wave of significant investment, attracted by the arrival of a number of large anchors. The next five years will see the construction of corporate headquarters for Universal Music, McKinsey and Company, and Google as well as the extension of the British Library, the Anna Freud research centre campus and the national Dementia Institute at UCL.

This is underpinned by transport connectivity: the KQ area has one of the best-connected transport hubs in London and the UK. Euston station serves over 71 million people each year, while the King's Cross St Pancras transport hub links six London Underground lines with two national mainline rail stations and the international high speed rail network. London's five international airports are within an hour of the KQ, with direct services to Heathrow, Gatwick and Luton.

Themes From Knowledge Quarter Partnership Interviews

During interviews with senior individuals from partner organisations about the KQ partnership, four key themes emerged. First, there was a desire, particularly among smaller institutions within the partnership, to connect with larger anchors and the broader partnership. Second, organisations felt there was friction between being able to fulfil international and national missions and being able to engage locally. Third, organisations found it difficult to place a short-term value on the KQ. They viewed the value as long-term, intrinsic or cultural. Finally, while all organisations expressed a desire to deepen their engagement in the network, many expressed concerns over the capacity needed to enable connections within it.

Forming connections between small and large KQ partner institutions

Organisations within the KQ vary dramatically in size, ranging from multinational corporations with tens of thousands of employees to micro enterprises which might employ no more than two individuals. In interviews, smaller institutions (ranging from start-ups to specialist) all expressed an interest in being able to raise their profile within the partnership. A variety of reasons were given, including supporting scale-up ambitions, developing audiences and unlocking access to expertise.

In particular, there was a desire from smaller institutions to form connections with large anchor institutions. However, smaller organisations felt that it could be a struggle to convince them to "sit at the table". One interviewee stated that "mammoths can die out. [Large organisations] should not just talk to each other; they should talk to small organisations."

Interviewees from both small and large organisations pointed out the challenges in forming these connections. It was recognised that the support larger organisations could provide was not necessarily financial. One anchor institution explained that large organisations need to have the "confidence to have budget set aside for collaborations". Another anchor institution explained that there was a great deal that could be done to support business improvement within SMEs.

Image ©The Place

Balancing national with local ambitions

Another key theme identified via the interviews was a friction in partner ambitions, occurring between international and national ambitions and the ability to engage locally in a meaningful way. A number of KQ partners are world-leading or national centres for their respective specialist fields. At the same time, many partners are local community groups and organisations. Unsurprisingly, the interviews indicated that there seemed to be a slight disconnect between these two groups. Community organisations interviewed all expressed the need to better integrate organisations within the local area.

Anchor institutions and national centres highlighted that their audience, and hence their responsibility, lies not only within their immediate surroundings, but stretches to national and international levels of impact. The focus on wider impact may be in part driven by public funding, which currently places a strong emphasis on demonstrating wide impact, and attaches lower value to local activity.

Whilst anchor institutions have demonstrated a cultural shift and are now beginning to invest and expand their community engagement programmes, the same is not necessarily true for small and medium-sized institutions based within the area. As one community group pointed out, "a lot of organisations are not built to deal with the local". Smaller organisations expressed a desire to engage locally, but felt that they did not have the resources to do so meaningfully.

Valuing the KQ Network

Organisations expressed difficulty in quantifying the value of the KQ network and the connections that it might facilitate. On the one hand, the intrinsic value of proximity was recognised. One interviewee explained that "proximity gives access – immediate access to the right people". On the other hand, it was not completely clear how to measure the value a "networking organisation" provided, particularly in the short term.

For some, partnership and collaboration were part of their organisation's fundamental principles; others specialised within their niche networks and relied on constant interactions within them. Some felt that their current collaborations would have happened anyway, regardless of the KQ, but that the partnership allows some of these connections to be accelerated.

Other respondents felt that the value gained from the KQ was cultural. One interviewee explained that in the past, "there was a culture where people were quite individualistic and protective of knowledge. Now ... people see benefit of collaborative and interpersonal relationships. Now I do not see suspicion [here]".

Capacity for Enabling Connections

Finally, whilst many organisations in our interviews were positive about the ability of the KQ to help form connections, the availability of resources needed to form these connections was a common concern. In the words of an interviewee from a large anchor organisation, "all collaborations are laborious".
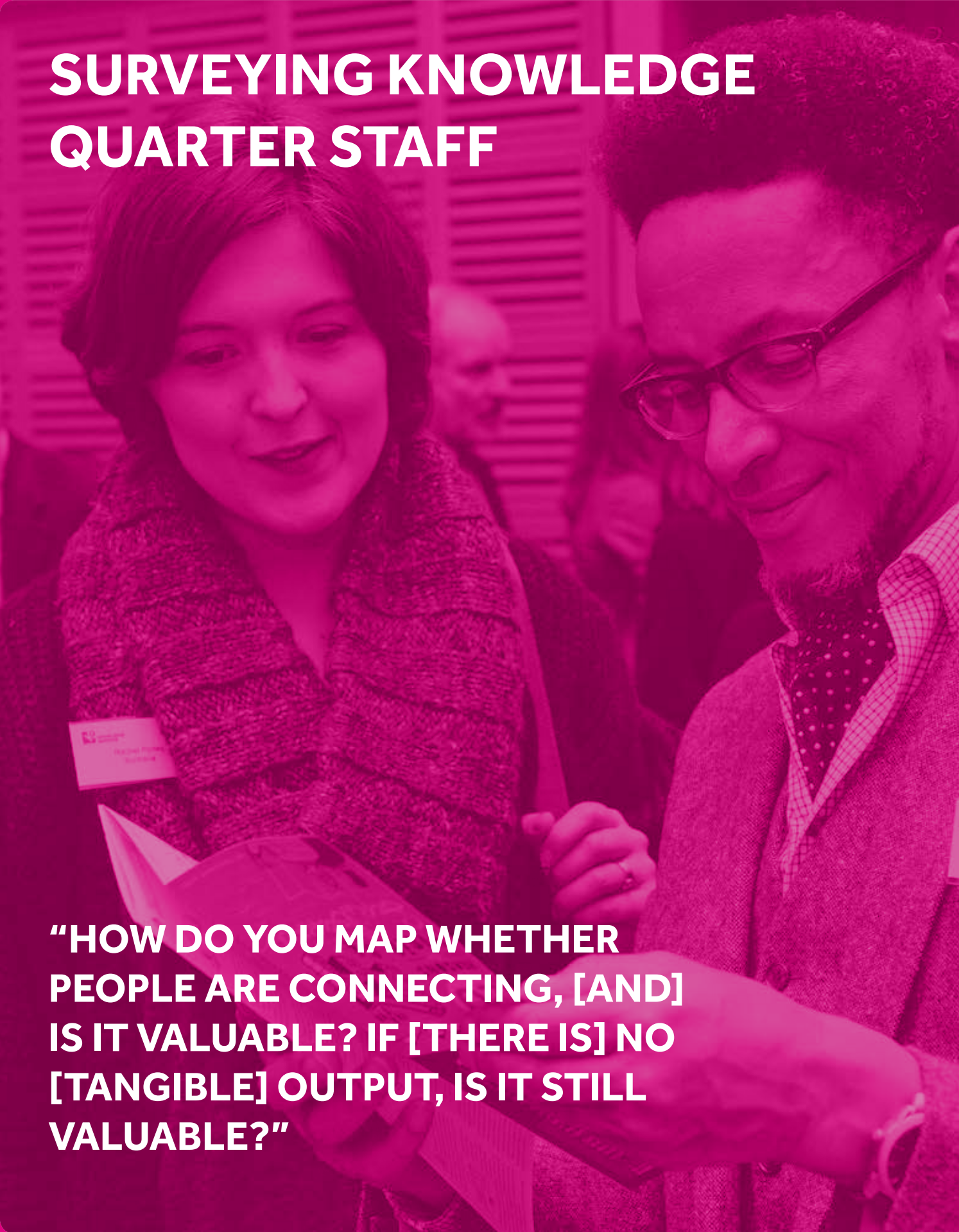
All organisations, regardless of sector or size, recognised the value of connections, but also identified that it was a struggle to dedicate time and resources to enable them to form before "business as usual takes over". This effect may be more acute depending on size. Smaller organisations even expressed difficulty in dedicating time to sit on subgroups. One or two interviewees had managed to overcome this issue by maintaining a dedicated KQ contact.

There was recognition that the KQ could expose individuals to a wider range of contacts from a particular organisation, and cut down the time needed to form a particular connection. However, a number of partners felt that the KQ could focus its time on acting as a "network broker". Some felt that providing the right structure and format would amplify the impact of the KQ network in being able to reduce the 'cost' of creating connections.

It is worth noting, that since this research was undertaken – the Knowledge Quarter invested in and launched the Knowledge Bank. The Knowledge Bank is an online platform which allows staff within partner institutions to connect based upon shared skills and areas of interest. It encourages participants to form a new connection either by sharing their skills, exploring a topic that interests them or developing a new professional contact from within the Knowledge Quarter. The end goal is to propagate the informal networks within the KQ cluster.

In addition, the Knowledge Quarter has also expanded its events programme and introduced a number of informal events with the principle aim of catalysing connections between institutions.
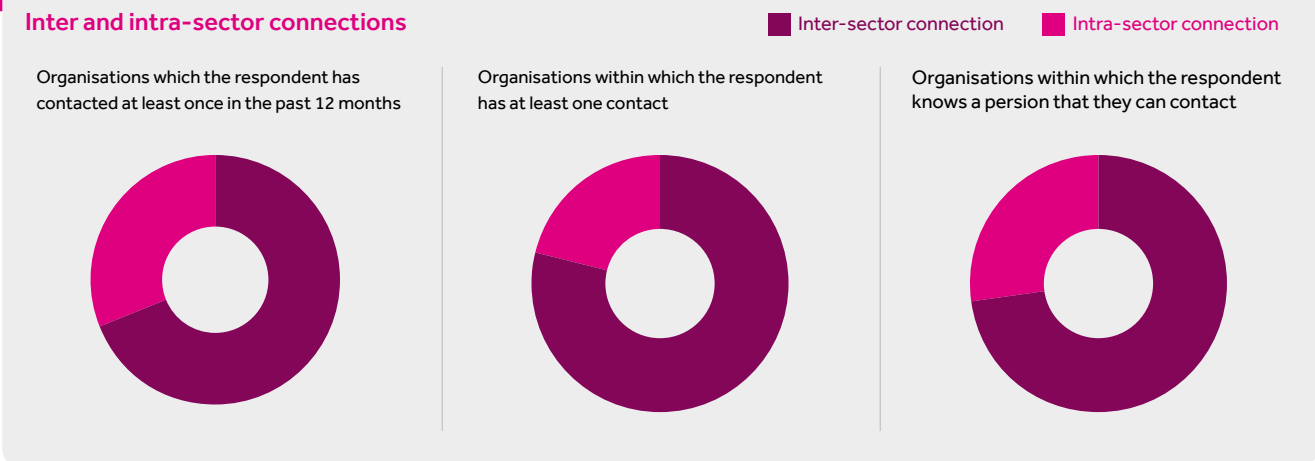
SURVEYING KNOWLEDGE QUARTER STAFF

"HOW DO YOU MAP WHETHER PEOPLE ARE CONNECTING, [AND] IS IT VALUABLE? IF [THERE IS] NO [TANGIBLE] OUTPUT, IS IT STILL VALUABLE?"

FIGURE 1

Inter and intra-sector connections

■ Inter-sector connection ■ Intra-sector connection

Organisations which the respondent has contacted at least once in the past 12 months

Organisations within which the respondent has at least one contact

Organisations within which the respondent knows a person that they can contact

A survey was completed by 235 individuals employed at organisations within the Knowledge Quarter (KQ). Of the survey respondents, 33.6% identified as male and 66% as female, a distribution which has some agreement with the overall gender distribution in the KQ. Data supplied by 37 KQ partner organisations shows that 62% of those organisations employed more women than men, and that of the total number of employees within those organisations, 54% identified as women.

A majority of the respondents had worked in the KQ for between 1 and 5 years (48%), and 81% were aware of the KQ prior to completing the survey. Within their organisations, 87.7% of the individuals surveyed were employed full-time, and 61% held a first-level or higher managerial role.

Individual Connections and Networks in the Knowledge Quarter

A key aim of the survey was to discover the nature and scale of the networks existing between individuals employed at each of the KQ partner organisations. To address this, survey respondents were asked about their personal links with other organisations in the KQ, and to describe those relationships in terms of the personal engagement involved.

Respondents were given a random sample of 20 KQ organisation names and asked to indicate those which they had been in contact with within the past 12 months. They were also asked to indicate the organisations at which they:

- Could name at least one personal contact
- Knew a person that they could ask for advice, personal introductions or other advice.

Approximately half of all respondents stated that they had been in contact with at least one KQ partner over the 12 months prior to completing the survey. Similarly, 51% of respondents indicated that they could name at least one personal contact within a KQ partner organisation. However, only 32% of respondents felt that they knew at least one contact within a partner organisation that they could turn to for help and advice. On the other hand, those respondents who identified one or more contacts in this category could, on average, identify two individuals whom they might turn to for assistance.

Sectors – Looking in or Reaching Out?

The results can be broken down by sector and analysed in terms of the nature of the connection, inter- or intra-sector. An inter-sector connection is defined as a link between individuals working in two different sectors, while an intra-sector connection is a link between two individuals working in the same sector.

It was found that 53% of respondents had more connections outside their own sector than inside, while only 12% had more connections inside their own sector than outside. Of the total number of connections identified by those respondents who contacted another KQ organisation within the previous 12 months, 69% were inter-sector. Similarly, 79% of connections identified by those with at least one personal contact in a KQ organisation, and 73% of connections identified by individuals having at least one person to whom they could turn for help and advice, were inter-sector. Of the small number of respondents found to have more intra- than inter-sector connections (29 individuals), 34% belonged to the education sector. The majority of KQ partner organisation employees have been able to successfully extend their personal networks outside their own sector, taking advantage of the diverse range of institutions within the district.

New Relationships

The survey respondents were also asked to indicate at which of the KQ partner organisations they would like to have more personal contacts. More than 85% of respondents were interested in gaining personal contacts at more inter-sector than intra-sector KQ partners. Half of the respondents who were more interested in gaining intra-sector over inter-sector contacts were from the science and research sector.
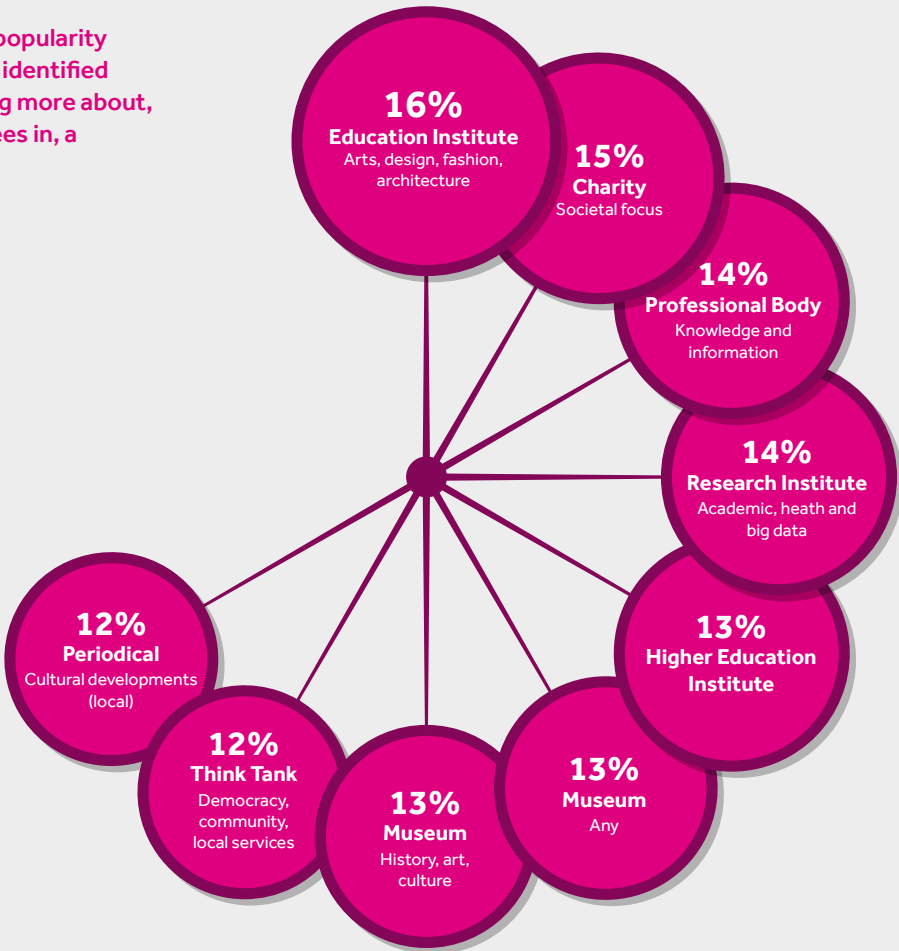
Survey respondents were also asked to identify which of a selection of generalised subsectors they were interested in learning more about, or making new connections within. The most popular subsectors are shown in Figure 2. No clear popularity trend is observed in the types of subsectors identified by respondents, reflecting the diverse and interdisciplinary nature of the KQ.

Facilitating Network-Building And Knowledge Spillover – Identifying the Characteristics of Connected Individuals in The Knowledge Quarter Organisational Role and Implications for Network-Building

Of those individuals that reported having no form of contact with another KQ organisation, 50% were employed in non-supervisory roles. The survey also revealed that those respondents in managerial or supervisory positions were more likely to have contacts in other KQ partners – 37% of respondents in non-supervisory roles reported having no external KQ contacts, while this was true for only 18% of those in supervisory positions higher than first level. This might suggest that networks between KQ organisations are currently maintained through supervisory and managerial contacts. This may in part be due to the perceived time available for external communications – on average, those in higher level supervisory roles felt that they could dedicate four more hours to networking activities than those in non-supervisory roles.

Generalised subsectors by popularity (where survey respondents identified having an interest in learning more about, or connecting with employees in, a particular subsector).

16%
Education Institute
Arts, design, fashion, architecture

15%
Charity
Societal focus

14%
Professional Body
Knowledge and information

14%
Research Institute
Academic, heath and big data

12%
Periodical
Cultural developments (local)

13%
Higher Education Institute

12%
Think Tank
Democracy, community, local services

13%
Museum
History, art, culture

13%
Museum
Any

Impact Of Organisational Strategies On Individual Networks

The survey also asked respondents to identify whether they were aware of policies or strategies within their organisation intended to encourage external collaboration or dissemination of knowledge and expertise within the wider community. Seventy-nine percent of all survey respondents stated that they were aware of such policies within their organisation. In 61% of the organisations that provided more than one respondent, 75% or more of the respondents from each were aware of outreach policies within their respective organisations, and 99% or more of respondents from six organisations indicated knowledge of such policies. However, the existence and visibility of an organisations' collaboration and knowledge sharing strategies do not necessarily correlate with an upswing in an individual's number of network connections within the KQ. Of the six organisations whose survey respondents all reported awareness of their respective outreach strategies, four employed survey respondents who could not identify any contacts in other KQ partner organisations. In fact, respondents from these organisations make up 41% of the total number of individuals without external KQ contacts.

Impact of Time Working Within The Knowledge Quarter On Individual Networks

Of the 235 survey respondents, 28% could not identify any type of contact in another KQ organisation. To understand what factors might have prevented these respondents from forming networks within the KQ, the results can be broken down based on the characteristics of the respondents within their own organisations. Our survey revealed that 73% of respondents who could not identify a contact within another KQ organisation had been working inside the KQ for five years or less. This breaks down into 38% of respondents who had worked in the KQ for less than a year, and 24% of respondents who had worked in the KQ for one to five years. The results also showed that those respondents who had worked in the KQ for between six and ten years were least likely to have no contacts in other KQ organisations. This employment range may act as a pivot-point between the newer KQ individuals who have not yet been able to form networks outside their own organisation, and longer-term KQ organisation employees who may be both more institutionalised, and less likely to take advantage of the growing popularity of social media and other electronic means to develop contacts outside their internal network.

Profiling Well-Connected And Poorly-Connected Individuals In The Knowledge Quarter

To understand what factors may influence the ability of individuals working within KQ partner organisations to develop wide networks, an analysis of the best- and worst-connected individuals was conducted. This analysis ranked the respondents by their total number of connections, and compared 66 individuals who could not identify any external organisation contacts with 62 who could identify four or more contacts. Figure 3 shows a summary of the typical survey responses of the top- and bottom-ranked individuals to a selection of questions. The top-ranked individuals could identify an average of seven connections of varying familiarity in external organisations, and 50% of those individuals held senior managerial roles within their organisations. Conversely, most respondents with no external contacts inside the KQ held non-managerial roles within their organisations.

In general, better-connected individuals felt that in an average working week they would be able to spend more time communicating with external organisations than poorly-connected individuals, based on their actual estimated workload. In practice, better-connected individuals did spend more time communicating with external partners and clients than internal colleagues. In addition, well-connected individuals felt on average that their line manager would allow approximately four more hours per week for communication with external organisations (10.1 hours total), compared to poorly-connected individuals (5.4 hours total). Well-connected individuals were also more aware of their organisation's policies for external collaboration and knowledge sharing, and were more aware of the existence of the KQ prior to completing the survey. When asked about the importance of developing more personal and professional contacts and exchanging ideas, poorly-connected individuals placed more value on connections within their own organisation than without it. While only 13% of well-connected individuals valued connections inside their own organisation more than external connections, 43% of poorly-connected respondents felt that internal connections were more important. Conversely, a large percentage of both well- and poorly-connected individuals (63 and 40%, respectively) felt that developing connections and sharing ideas inside and outside their organisations were equally important. Overall, well-connected individuals valued both types of
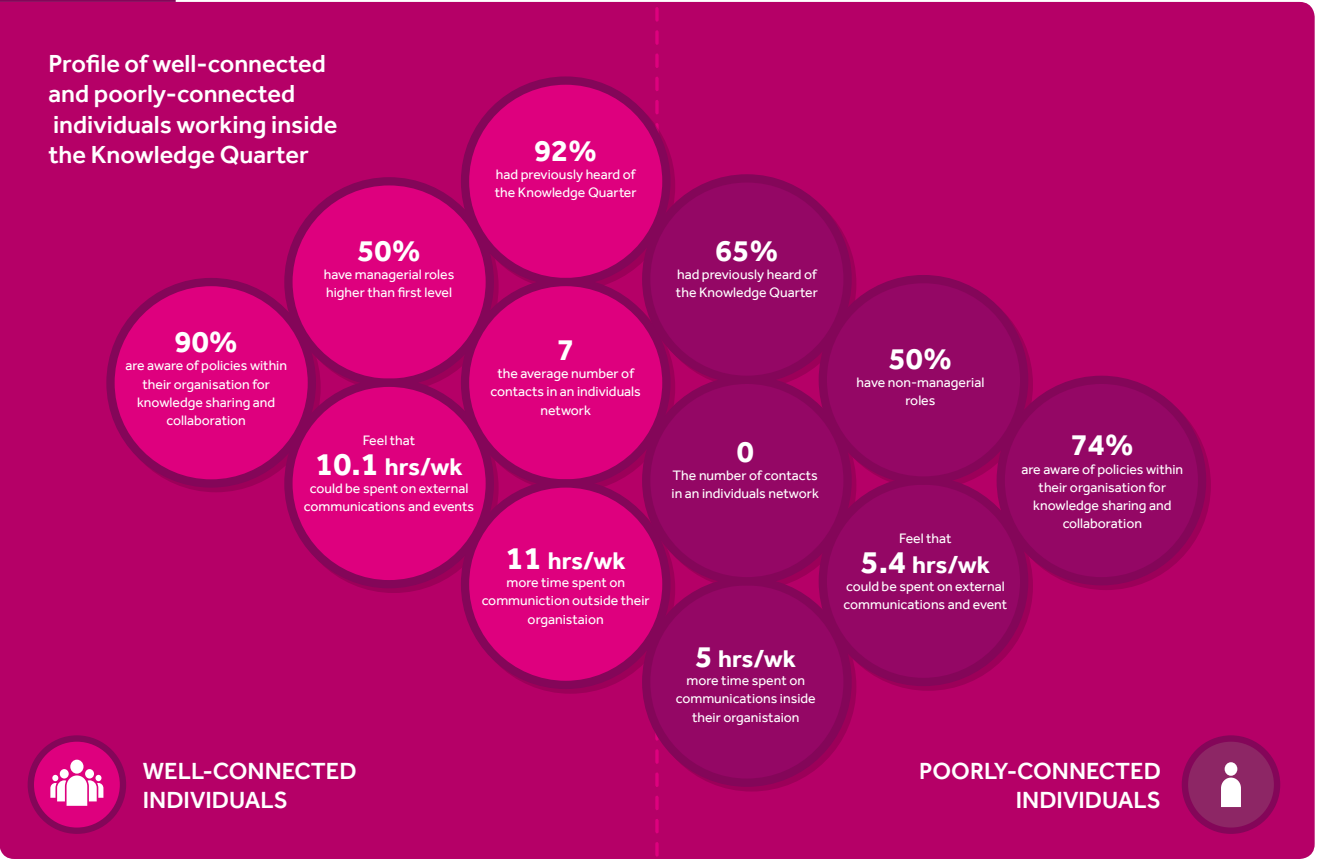
connection more than poorly-connected individuals – 79% of well-connected individuals felt that developing both new internal and external organisational connections was either important or essential, while only 57% of poorly-connected individuals valued new connections in the same way.

Survey respondents were asked about their behaviours and concerns in several hypothetical scenarios, to develop an understanding of the factors affecting external communication and collaborations. These responses were used to identify whether any behavioural trends existed in the best- and worst-connected individuals as described above. Respondents from both ends of the spectrum generally appeared to share similar concerns and values, as summarised in Table 4.

A majority of both well- and poorly-connected individuals felt that the ease of communication, goal alignment, and personal interactions with potential partner organisations, as well as that organisation's brand, were important factors in deciding whether to initiate a collaboration. Similarly, both groups did not believe that prior working experience with a potential partner organisation was a significant decision factor.

Both groups also felt that the distribution of responsibilities, uncertainty over equal effort, goal alignment, and poor timing of the project could negatively affect the success of the collaboration. However, most respondents from both groups felt that communicating the project within their own organisation would not be an issue.

While well- and poorly-connected respondents expressed similar views on collaborations, it can be noted that well-connected individuals were 13% more likely to believe that problems could arise from the delegation of project responsibilities. Well-connected individuals were also more likely to respond to unsolicited email communication from someone they did not know directly (84% to 74% of poorly-connected individuals).

On an individual level, they key differences between well-connected and poorly-connected individuals tend to stem from their ability to spend time developing their network. The survey shows that an individual's capacity for network-building is influenced by their organisational role, which impacts on the amount of time available for these activities, as well as their knowledge of internal policies and external structures (such as the KQ) designed to increase connectedness. However, the behavioural differences between well-connected and poorly-connected individuals were comparable, which suggests that external factors (i.e. the overall connectedness of the organisation) can also influence an individual's capacity for network-building.

TABLE 4

Trends in factors affecting collaborations

	Well-connected (n=62)	Poorly-connected (n=66)
Respondents who felt that the issue was very or extremely important in initiating a collaboration		
The other organisation's brand/reputation	50%	53%
The personal qualities of the individuals you would be working with	63%	55%
How easy it would be to meet up and discuss the project if needed	44%	45%
Clarity on how each organisation sees the final outcome of the project and what they want from it	82%	88%
Respondents who felt that the issue held little or no importance in initiating a collaboration		
Experience of having worked with the organisation/the team in the past	60%	67%
Respondents who felt that the issue would be quite or extremely problematic while collaborating on a project		
Which organisation takes responsibility for leading and admin	58%	45%
Uncertainty within each organisation over how much effort the other partner(s) put in	61%	53%
Aligning the goals of different organisations in the collaborative project	52%	61%
Bad timing for either organisation (the objectives are not yet priorities, or it conflicts with another project)	79%	77%
Respondents who felt that problems associated with the issue would be limited or non-existent while collaborating on a project		
Organisation members communicating the project inside their own organisations	79%	77%

FIGURE 3

Profile of well-connected and poorly-connected individuals working inside the Knowledge Quarter

WELL-CONNECTED INDIVIDUALS

- 92% had previously heard of the Knowledge Quarter
- 50% have managerial roles higher than first level
- 7 the average number of contacts in an individuals network
- 90% are aware of policies within their organisation for knowledge sharing and collaboration
- Feel that 10.1 hrs/wk could be spent on external communications and events
- 11 hrs/wk more time spent on communication outside their organistaion

POORLY-CONNECTED INDIVIDUALS

- 65% had previously heard of the Knowledge Quarter
- 50% have non-managerial roles
- 0 The number of contacts in an individuals network
- 74% are aware of policies within their organisation for knowledge sharing and collaboration
- Feel that 5.4 hrs/wk could be spent on external communications and event
- 5 hrs/wk more time spent on communications inside their organistaion

FIGURE 4

Top five rankings for connection types identified by survey respondents.

Top five KQ organisations in which KQ employees feel they have at least one contact to seek advice or help from

Top five KQ organisations in which KQ employees have at least one contact

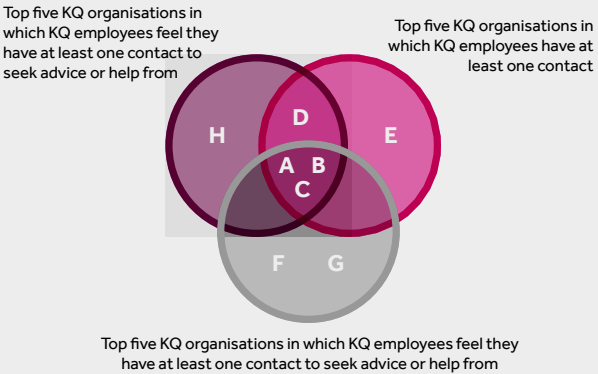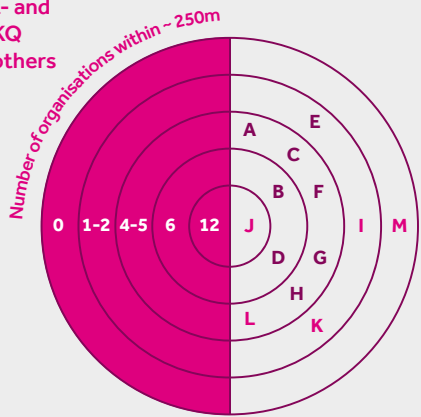Top five KQ organisations in which KQ employees feel they have at least one contact to seek advice or help from

FIGURE 5

Proximity of most- and least-connected KQ organisations to others

(see Table 5 for anonymised coding information).

Number of organisations within ~ 250m

0 1–2 4–5 6 12

TABLE 5

Anonymised data on organisational connections.

Number of KQ employees who:	contacted the organisation in the past 12 months	identified at least one contact in the organisation	identified at least one contact within the organisation to seek advice or help from	Organisational data:	Number of employees	Length of time as a KQ partner
A	18	16	11		500–1,000	SF
B	15	15	10		500–1,000	SF
C	11	14	10		5,001–10,000	SF
D	13	-	8		1001–3000	SF
E	11	-	-		500–1,000	SF
F	-	13	-		1001–3000	SF
G	-	12	-		1001–3000	SF
H	-	-	8		5,001–10,000	SF
I	-	0	-		≤15	> 1 year
J	-	0	-		≤15	> 1 year
K	-	0	-		≤15	1–2 years
L	-	0	-		≤15	SF
M	-	0	-		≤15	1–2 years

Links Between Knowledge Quarter Organisations

An analysis of the connections between the organisations identified by individual respondents indicates the most- and least-connected KQ partners in the network. Using three statements, partners were ranked based on the number of times they were identified by an individual as forming part of each of the three connection types.

Table 5 summarises the rankings of the anonymised organisations, along with some relevant organisational data.

Figure 4 shows the five most-connected organisations in each category, illustrating the overlap between the organisations. Three KQ partner organisations appeared in the top five of all three categories, and one further organisation appeared in the top five of two categories. All eight of the most-connected KQ partners were large organisations with at least 500 employees, and were KQ founding partners. Four of the eight most-connected organisations were also previously linked to each other through institutional relationships.

Figure 4 also illustrates the power and reach of anchor institutions in the KQ. All but one of the eight most-connected organisations are large non-profit institutions, each with a relatively long history in the KQ. The eight anchor institutions account for the employment of over 17,000 workers, and as demonstrated, have significant links to the KQ community.

In comparison, the five least-connected organisations were all found to have 15 employees or less and tended to have joined the KQ after its founding. As shown by Figure 5, the least-connected organisations also tended to be more physically isolated from other KQ organisations than those that were well-connected – 60% of the least-connected organisations were within approximately 250 metres of only one or two other KQ organisations, while 87.5% of the most-connected organisations were within 250 metres of at least four other KQ organisations. However, while physical proximity may be a factor affecting the connectedness of KQ organisations, it is evidently not the only factor – of the 13 organisations considered, the member with the highest number of other KQ partners nearby was also one of the least-connected.

Impact of Communication Method on Successful Network Building

Understanding what causes an individual to respond positively to communication from a new, previously unknown contact from another organisation is important. Approaching a contact in the correct way could improve an individual's chances of successfully making a new connection and expanding their personal network. To learn more about the reactions of employees at KQ partner organisations to this initial contact, the survey respondents were asked how likely they would be to respond to an email from someone they had never met, requesting information or insight. Each respondent was asked a question which comprised one of the following three randomly allocated phrases, which describe how the email sender came to know of the recipient (the survey respondent):

• I came across your LinkedIn profile
• I came across your professional profile on a digital platform for knowledge-sharing and collaboration partnerships that both of our organisations are a part of
• I met your colleague at an event and they recommended to get in touch.
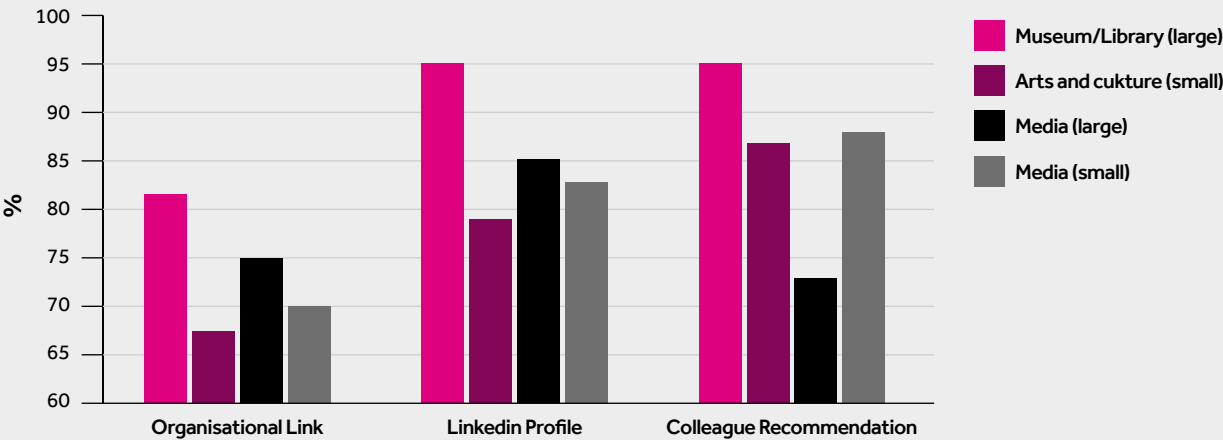
In addition, the type of organisation that the email sender originated from was varied by recipient. Four possible KQ organisations were randomly allocated, with two organisations representing media outlets, and two representing cultural institutions. Of each organisation pair, one was small and locally known, while the other was a large, internationally recognised institution.

As shown in Figure 6, survey respondents were generally open to communication with new contacts, with a majority of participants somewhat or extremely likely to respond favourably to any variant on the email format. Participants were most likely to respond to an email from someone with whom they had a personal link, and particularly if that link was via a colleague. Similarly, survey participants were least likely to respond favourably when the sender had found their profile via LinkedIn and had no other prior connection with the respondent. Furthermore, an email from an employee at a large, well-known organisation was more likely to receive a positive response than a smaller, less well-known organisation, both generally and within the same sector. This trend was particularly evident within the cultural institution pair, with an email from an employee at the larger institution up to 16% more likely than the smaller organisation to receive a positive response. In fact, the larger of the two cultural institutions had a 95% chance of receiving a positive response to an email request initiated based on a colleague recommendation or an organisational link.

The results show that an individual's perception or prior knowledge of an organisation's brand can impact on their willingness to share knowledge with a new contact from that organisation. This has clear implications for smaller KQ partner organisations, which tend to have a smaller audience and are comparatively less well-known within the district. However, the fact that the likelihood of a positive response to communication increases when the sender and recipient have some form of prior connection, either through their organisations or a colleague, suggests that networking events may have a positive impact on the ability of partner organisation employees to connect with the wider KQ community.

FIGURE 6

Percentage of survey respondents likely to respond favourably to unsolicited contact from an unknown employee at another KQ organisation.

Legend:
- Museum/Library (large)
- Arts and cukture (small)
- Media (large)
- Media (small)

RECOMMENDATIONS

The Knowledge Quarter has all the ingredients needed to be a world class innovation district. It contains an innovation eco-system within which a variety of actors including anchors, innovation cultivators and SMEs are interacting across a range of sectors. A great deal of connectivity already exists within the Knowledge Quarter, particularly between sectors. The challenge is to find ways to deepen these connections. More than ever, institutions can gain from facilitating the formation of informal connections between their employees within the KQ.

Recommendation 1

Knowledge Quarter partner organisations should give junior staff the time and space to build their network within the cluster. Informal network building and participation in KQ activities should be viewed as a professional added-value activity. Smaller organisations should ensure there is a designated contact point to engage with KQ activities and the wider network.

Recommendation 2

Anchor institutions should consider what support they can provide for smaller organisations in the network. This does not have to be financial support, but could include venue space, access to expertise or opportunities for training. Anchor institutions should also consider creating a budget to support more spontaneous collaborations with local KQ partners.

Recommendation 3

The Knowledge Quarter should continue to do what it can to reduce the 'cost' of collaboration. It should continue to investigate how it can support small and medium-sized organisations to engage with local community groups.

Recommendation 4:

National Government should expand on this research. It should seek to understand the productivity gains which can be made by facilitating networks and collaborations within the growing number of UK innovation districts. It should also consider how the incentives provided by its funding conditions affect local networks. In particular, it should strive for a balance between incentivising national and international impact and meaningful local engagement.

Image: Bennetts Associates / Photographer: @Marley von Sternberg

APPENDIX

TABLE 6

Knowledge Quarter Descriptive Statistics

	(n=235)	Number	Percentage
AGE	Under 34	104	44.3%
	34-44	53	22.6%
	45-54	52	22.1%
	Over 54	25	10.6%
	Not supplied	1	0.4%
EMPLOYMENT TYPE	Full-time employed	206	87.7%
	Not full-time employed	28	11.9%
	Not supplied	1	0.4%
EMPLOYMENT ROLE	First level manager/ supervisor	64	27%
	Manager/ supervisor higher than first level (including senior leadership)	79	34%
	Non-managerial/ supervisory	90	38%
	Other/ not applicable	2	1%
LENGTH OF EMPLOYMENT WITHIN THE KNOWLEDGE QUARTER	Less than one year	56	24.0%
	1-5 years	113	48.0%
	6-10 years	33	14.0%
	More than 10 years	31	13.2%
	Not supplied	2	1.0%
ORGANISATION SECTOR	Education	36	15.3%
	Arts and Culture	24	10.2%
	Science and Research	62	26.4%
	Museums, Libraries, Archives	73	31.1%
	Other (inc. Local Authorities, Media, Charitable Funds and Professional Bodies)	40	17.0%
ORGANISATION SIZE (EMPLOYEES)	Less than 51	47	20%
	51-500	48	20.4%
	More than 500	140	59.6%

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