



UK Services Innovation Network

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Service economies have developed rapidly to the point at which they dominate many economies. A group of three companies, British Telecom, Hewlett Packard and IBM have been working together to understand how existing service models might develop and in particular, using the UK economy, the role that government support for both pre-competitive and near competitive support might play in this process. This paper summarises one result of those discussions -- a proposal to investigate the role of service networks in the development of agile, competitive economies.

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The Challenge

The future of the UK economy depends upon the retention and growth of high-margin services. Established industries, such as the international finance sector, are being supplemented by emerging, typically regionally specialized, service-oriented businesses. Examples include bio-informatics, animation, telemedicine, high-performance automotive design, and e-learning. Simultaneously, ambitious and aggressive government restructuring of services for both businesses and citizens is underway in order to enable an agile, competitive economy. The economic and social health of the UK is highly dependent on both business and government abilities to execute on these ambitions.

It is clear that the UK's ability to restructure and grow new high-value services, and so compete with other highly developed services-based economies, is limited by our ability to design, procure, manage, and evolve sophisticated services programmes which combine economic, political, social, and technical imperatives. The US is already developing the intellectual infrastructure through a combination of academic-, business-, and government-funded research and development programmes and is demonstrably in advance of the UK and the wider EU. Nascent industrial and academic research, development, and education exist in the UK but need to be grown rapidly. Within the UK, structures do not exist to support the multidisciplinary challenges of close industrial-academic-government collaboration.

Complex technology enabled services have the potential to transform the social and economic life of the UK. The challenge we face is to enable an infrastructure — technical, political, and intellectual — that can deliver on this promise.

The Opportunity

The UK has an opportunity to seize the initiative and develop itself as the centre of innovation in services by exploiting existing, and growing new, expertise. The US experience of co-development of science and technology and commercialization provides a model. Specifically, we can

- exploit the UK's existing strong IP base, combined with existing government commitments to shared and centralized services;
- radically improve the UK's ability to procure and manage complex and innovative information-centric systems in both government and industry;
- radically improve the provision of infrastructure for collaboration, both supporting local growth and attracting inward investment; and so
- increase employment and investment in sectors that are less susceptible to low-cost economies, thereby sustainably growing the UK tax base.

The idea here is to focus on *regional clusters*, together with a national facility, to support research and development, cluster interaction, and shared services.

Clusters of production have formed within manufacturing industries for as long as those industries have existed. Sometimes driven by the availability of raw materials (such as flint tools), sometimes driven by the availability of skilled labour (such as in lace making). Within pure service industries, however, the reasons why clusters of these industries emerge and are sustained are less clear. In service industries, the dominant cost of production is the skilled human labour required to deliver the service. The cost advantages that a geographic site can have will include availability of already trained staff (from other

providers), availability of near trained staff (from Universities and schools), and availability of innovative offerings, either by producing new offerings or in combination with other providers, to produce a new service.

As the costs of transport of material goods drop then clusters around areas of production advantage will strengthen. The development of services which both complement and enhance these areas of intellectual, technical and industrial advantage will strengthen the UK clusters. Producing an environment in which services can be readily and correctly composed reduces the transport costs in the formation of new services. This should in turn strengthen the clusters engaging in the activity.

At the level of cluster development we face two significant challenges - understanding why service clusters form and how their local advantages are enhanced and exploited? Analogous with the 'traditional' manufacturing cluster, it is essential that we understand how to improve transport costs (essentially the composition of services) and how we reuse this understanding service formation, clustering and composition to develop in other areas.

In summary, we propose that a UK Services Innovation Network be established in order to exploit these opportunities. The Network should be structured as a collection of regional hubs, ideally enabled by RDAs and supporting specific clusters, together with a coordinating national facility, or *Institute*.

Regional Hubs

- Support clusters of high-value services industries via training and infrastructure.
- Support interaction between one another and co-development of service composition.

Institute

- Research and Development Co-ordination.
- Cluster development (services composition) and shared support services.

The Structure of this Document

Following on from our introductory remarks on the challenge and opportunity facing the UK in the high-value services industries, we begin with four case studies of existing clusters within the UK. Specifically, we consider the *media* cluster around Bristol, the *e-learning* cluster in Sussex, the *bioinformatics* cluster around Cambridge, and the *telemedicine* cluster around Sheffield. There are many examples of sophisticated clusters beginning to develop sophisticated services offerings and these are intended to be illustrative only.

We discuss the nature of service oriented clusters and their interaction, including a representation of the structure of the proposed network. Using existing clusters as components, we then provide a discussion, based on a hypothetical example, of the value of *services composition*, explaining the value and suggesting some supporting mechanisms.

We conclude with discussions of the main roles of the institute. Firstly, co-coordinating research and development activities; and, secondly, providing support for the development of meta-hubs, as well as shared services.

Examples of service cluster development within the UK

The growth and success of business clusters – be they in manufacturing, distribution or sales is an often observed and well studied phenomenon. Clusters of high value services organizations are becoming increasingly obvious in the UK. We have chosen four such clusters as examples, partially because they are in different stages of formation (established with high potential for further growth, established but in need of new markets, established but extremely dynamic and relatively unstable and nascent in that order), but also because the ‘meta-clusters’ that this proposal would encourage provide a rich route to growth, both internal to the UK economy and outside of it.

The Cambridge Biotechnology Cluster

The Cambridge Bio-technology cluster is primarily involved in biopharmaceutical development, including drug discovery and related services such as platform technologies, research reagents and chemistry and biology services. The cluster's other activities include: contract or clinical services, human healthcare diagnostics, food and agricultural biotechnology (agbio), and biotech instrumentation and equipment. There are over 185 firms employing a total of 10,000 people with an annual turnover of more than £1B, with a significant fraction of that turnover generated from exports. The cluster is developing biophotonics and biosensors which could be combined with service offerings from other clusters. This is clearly a cluster that is both mature, and also has significant potential for growth.

The Sussex e-learning Cluster

The cluster of e-Learning companies in and around Brighton and Hove is the largest cluster of its type in the world, representing approximately 11% of the world market in 2004 with a turnover of approximately £60M. Clients include both the public and private sectors, with the natural advantages of being based in an English speaking country explaining the reportedly strong export record. As a cluster, this is relatively mature, but needs to seek fresh opportunities to grow further.

The Bristol Media Cluster

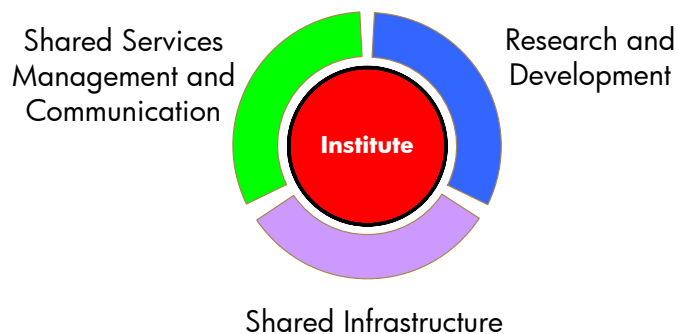
The Bristol New Media cluster provides a wide range of digital media services, including multimedia presentation creation, web presence creation. Within the cluster there are over 1800 firms employing 3,236 people with an approximate turnover of £340 Million. These are almost entirely small firms and can respond quickly to new opportunities. Clearly they can offer these skills to all of the other identified clusters. This is an extremely dynamic business environment – as witnessed by the sheer number of organizations and has been likened to a ‘primordial soup’ of service industries.

Sheffield Telemedicine

Sheffield has a long tradition of development, design and manufacture of medical instruments. Diversification and specialization was forced on the area following the loss of ‘traditional’ steel making and finishing industries, and with two reasonably strong universities, combined with a medical school, this appears to have been a natural transition. Services associated with medicine, including design and analysis appear to be beginning to become established although their value is difficult to assess at the moment. This is one example of the probable emergence of an IP centric, high value service cluster, building both on local expertise and a culturally diverse environment.

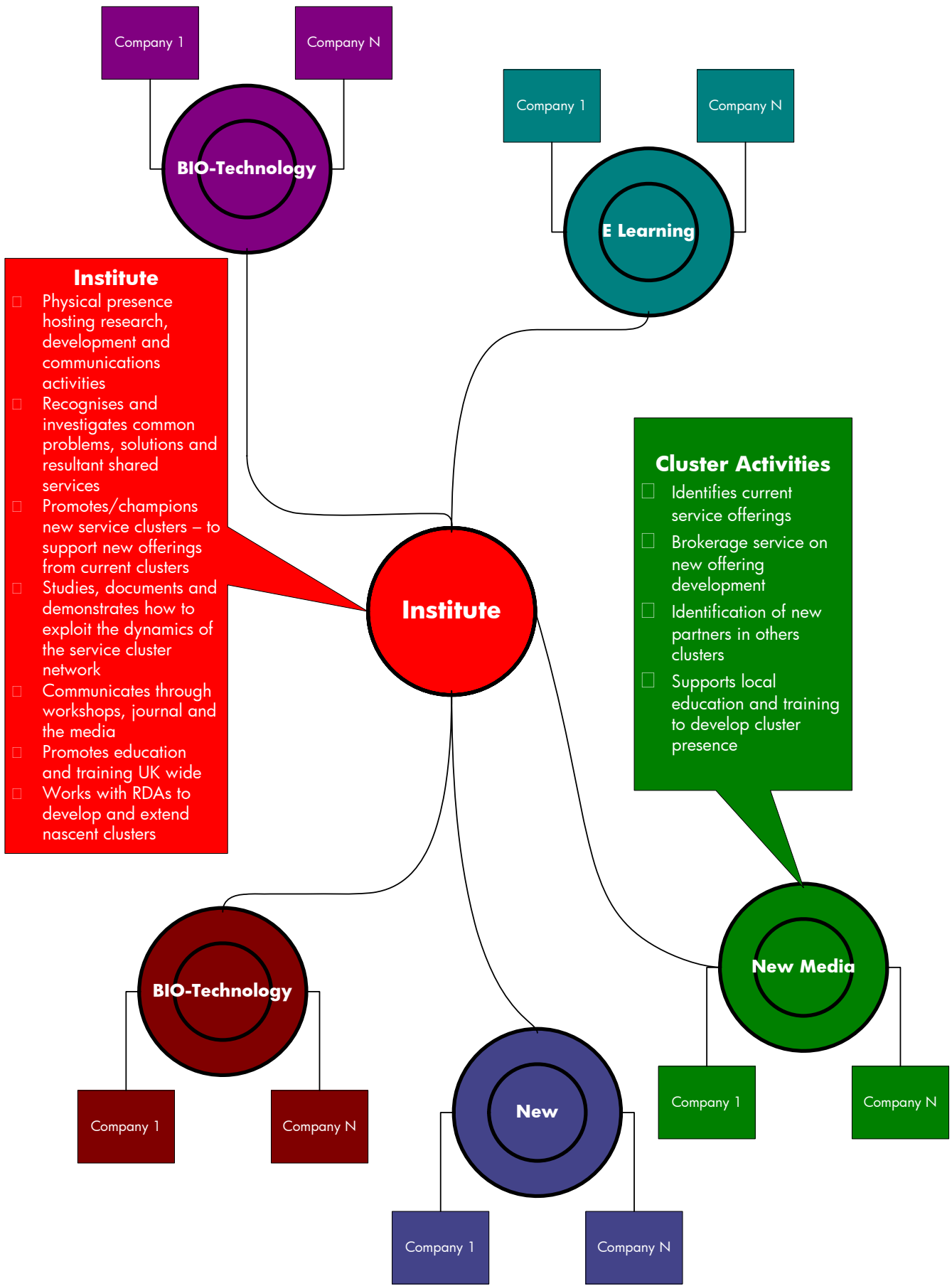
Making meta-clusters work

Many of the factors that influence the growth of individual clusters are relatively well understood – concentrations of differentiating IP, educated workforces, access to capital and communications. The issues involved with extending these specialized clusters by combining them in ‘meta clusters’ to develop new high value services that depend on such combinations is not well understood. The ‘institute-hubs’ model we propose is partially designed to tackle problems that we know already exist such as the development of standards, the coordination of shared service and infrastructure creation, and the active engagement of research and development activities as diverse as social sciences, economics and mathematics. Other rôles relate to the need to develop and maintain shared infrastructure, to retain and extend reusable intellectual assets, and to develop an understanding through experiment and observation as to how such meta-clusters can be constructed, developed and their benefits realized in both home and external markets.



While the Institute will need to draw upon both industrial and academic expertise, it is clear that at the moment, the bulk of research (as opposed to near market development) in the area of services networks, their development and support, is being conducted by large complex services providers such as BT, Hewlett-Packard and IBM. There is a clear implication that during inception, this activity will be best developed through Industry leadership, and that the development and acceleration of academic research that will eventually support the UK services industry should be achieved through programmes of secondment to both the Institute and its partner clusters. This research into services and service delivery must draw on many disciplines. There is a role for an engineering approach, founded upon mathematics, physics and computer science. However, these are not an adequate basis from which to understand services. Services are produced in real-time by the interaction of the customer with the systems and employees of the company. The strong human element in service delivery means that human disciplines such as psychology, psychology and sociology, as well as management science, economics and systems theory, are required for a full understanding. Although ‘virtual’ organizations have proven effective in industrial-academic collaboration in the past, there is an extremely good case to provide the Institute with a physical embodiment which can be used as a nucleus by seconded (industrial as well as academic) research and development staff.

The clusters are responsible for the development of service technologies and the necessary interfaces that need to be specialized in order to enable the development of these meta-clusters. Lowering the barriers to entry for local expansion (through education, training, standards and infrastructure for example) while keeping them high for external competitors is essential for rapid growth. Competing clusters (such as Oxford, Cambridge and Dundee for the bio-sciences for example) should be encouraged, wherever practical to share standards and virtual infrastructure. The ‘trick’ if that is what it is, is to exploit the mass of UK intellectual and industrial development rather than allowing it to dissipate through fragmentation. Given the distribution of IP centric clusters throughout the UK, there is an obvious role for regional development agencies in the development and promotion of specialization and meta-clustering. The figure overleaf summarizes our conception of the relationships between clusters and the Institute with outline rôles and responsibilities.

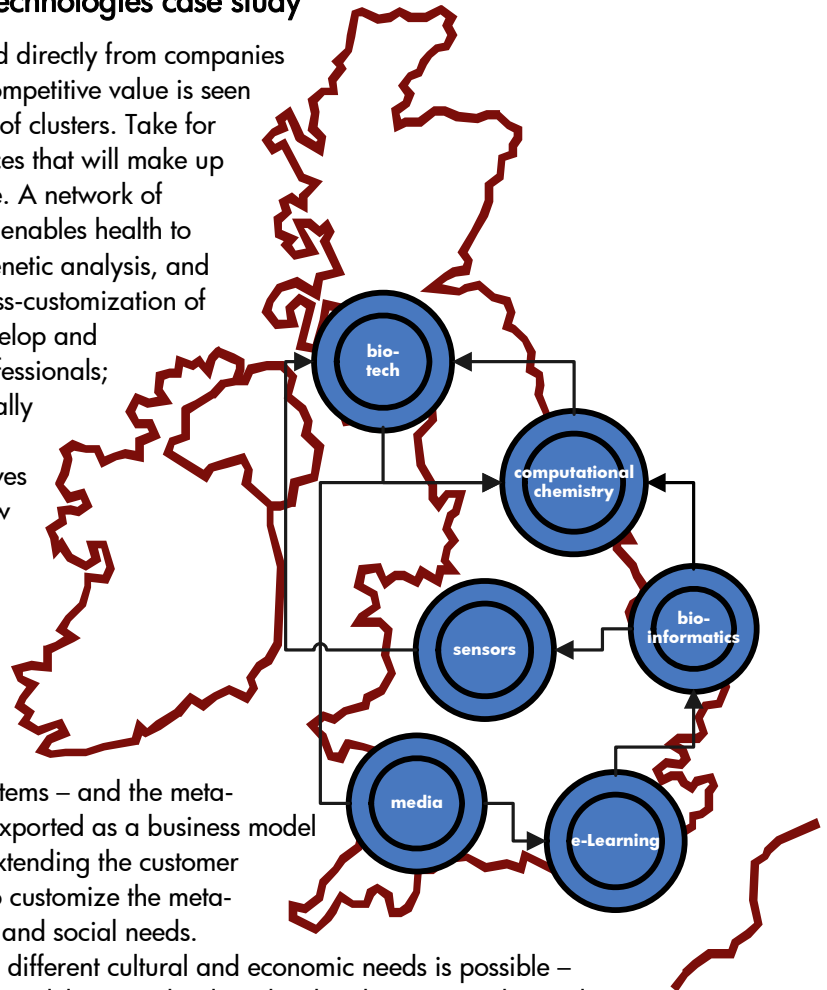


Services Composition: Assistive Technologies case study

While high-value services can be offered directly from companies that inhabit these clusters, the greater competitive value is seen with the formation of complex networks of clusters. Take for example provision of the range of services that will make up 'assistive technologies' in the near future. A network of specialist high margin service providers enables health to be managed pro-actively, combining genetic analysis, and active sensors and data fusion, with mass-customization of drug treatments. E-learning services develop and propagate training material to care professionals; re-using media services that co-incidentally provide visualization services for the computational chemistry which itself drives rapid formulation and production of new compounds as well as their testing in 'virtualized' patients, models of whom have been customized with population-specific genetic information. Clusters grow and combine to meet changing needs. Many of the clusters export their services – mediated by advanced telecommunications and information systems – and the meta-service – assistive healthcare – is itself exported as a business model further encouraging cluster growth by extending the customer base whilst still retaining the flexibility to customize the meta-service to meet local economic, political and social needs.

Taking the service and specialising it for different cultural and economic needs is possible – locally in new markets, much of the human delivery is developed within the country, the analysis and service provision mediated through ICT systems is retained within the UK.

The formation and growth of these networks and clusters is intimately connected to their ability to identify service partners, form and manage contracts, share standards, protection and manage the growth of the intellectual property portfolio. These clusters are essentially providing the equivalent of high-value 'back office' facilities that support many conventional businesses. Unlike many of those activities which can be relatively easily moved offshore, these activities represent the bulk of the high margin value for services, and moreover, are difficult to move away from their local supporting cluster.



R&D activities, outcomes, and timescales

The range of R&D activities envisaged for the Institute is suggested below.

- Commission industrial-academic collaborative research and development projects. For example,
 - Customer maturity models for developing rational outsourcing and insourcing strategies and processes;
 - Models of the value of privacy, trust, and security in services provision;
 - Predictive models of customer/user perception of value and quality;
 - Procurement standards and process for shared services;
 - Establishment of technology for assessing economic value of structures for services investment;
 - Technologies and methodologies for services composition to accelerate market access for SMEs;
 - Assessment, design and management of services structures in the face of disruptive events.
- Development and establishment of UK public standards in services delivery.
- An advisory, brokerage, mediation, and training service to government (central and local) and business.
- A services sciences and engineering journal: *Services Industry: Science and Engineering*.
- Curriculum development for UK universities.
- A secondment programme which can establish a critical mass of industrial and academic expertise.
- A range of media presentations (radio, television, press, web) to begin to shift public and governmental understanding of the nature and value of services industries.
- Sequence of academic-industrial-governmental meetings, across the regions, including Royal Society, Royal Academy of Engineering, UK Institute of Management, and RDA focused workshops.

A suitable initial timescale is suggested as follows:

9 months	Set up Institute hub with 3 to 5 spokes Establish academic-industrial secondment programme Deliver a sequence of regional start-up meetings Formulate R&D objectives and metrics
18 months	Commissioned a collection of projects to set up additional spokes 5 to 6 academic-industrial projects in areas such as economic value, procurement, and maturity models
36 months	Demonstrable ecosystem of co-operating services clusters New business generation based upon regional cluster-combination model

Conclusions

Services have a bad reputation. Associated with either low skilled employment (such as burger flipping) or easily off-shoreable industries (such as call centres and other business process outsourcing) politicians and public alike often dismiss 'services' as flimsy activities that confer little stability on the economy. Nothing could be further from the truth.

'Servicification' can support the development of high value IP intensive businesses – biotechnologies, medical science, advanced chemistry and pharmaceuticals to name but a few and to make it attractive to not only retain these within the UK, but to grow the UK's capabilities and exploit the countries demonstrated strengths in continuous innovation. Such industries – as apparently unrelated as biotechnology, telemedicine, new media and design for the built environment are growing rapidly. Existing service cluster strengths – Finance being an obvious example – can only benefit through an improved ability to innovate and offer new hybrid products both within the UK and for wider consumption. So much is evident, and our national competitors, including the wider EU, the US, China and India have observed as much and are investing heavily in these areas.

Whilst the UK and the regions can continue to promote the growth of these valuable industries there are two opportunities that need to be embraced. The first is the multi-disciplinary development of shared service understanding, infrastructure, education and training that can be used to accelerate the profitable growth of services rich industry clusters around the UK. The second is the opportunity to consolidate existing clusters and grow new ones by enabling cluster combination to service markets at home and overseas.

The challenge should not be underestimated. There is a requirement to change the ways in which industrial and academic researchers interact, to broaden the contributions from the 'traditional' technology centric disciplines to those of economics and social sciences, and to integrate the results rapidly. While the proposal will draw heavily on existing Research Council investments in the social, mathematical and engineering sciences, it should be seen as a distinct opportunity to innovate across disciplines.

This discussion paper, developed by three of the UK's largest complex services organizations, all of whom invest heavily in basic research in these areas, highlights an opportunity and proposes a mechanism – the UK Services Innovation Network – to exploit this opportunity.