



BIG INNOVATION CENTRE

A National Innovation Audit

The Vision

- To create an ambitious and trusted **21st Century UK data infrastructure**, which supports the growth of the economy to benefit the private and public sector alike.
- This means **integration of public and private data collection sources on one platform** (information system), an **upgraded focus on innovation and intangible asset data**, and direct link with **stakeholder use and purpose**.

The Problem / Opportunity

- **There is a lack of data input** to the Office of National Statistics, Companies House, Treasury, and Bank of England. Data supplied by large multinationals are better captured, but data collected from SMEs and Public Sector organisations are missing or incomplete. The same can be said for data collections from EU data (CIS) and the OECD. Problems are especially around the missing 'innovation systems and intangible asset' data.
- **Data are not collected for a specific purpose.**
- **The design of collection structures is not fit for purpose.** (Segmented, High transaction costs, Analogue, Gaps)
- **The industrial strategy** is operating **without diagnostic tools or proper context**. Same for regional strategy and LEPs.
- **Economic analytics models are outdated:** firstly, they are modelled on the features of a past economy and secondly, they not taking advantage of the internet and artificial intelligence.
- **Reports are non-interactive** and fixed (not allowing deep dives). They are not taking advantage of the online internet.

The Solution

- **Standardised 'diagnostic tools'** so innovation audits of firms, sectors, places can be done automatically in real-time using public and proprietary data.

- A complete **annual national innovation audit** that can inform both regional players and national growth policy.
- Online soft reports which are **live updated in real-time** as new data emerge – both figures, tables, graphs and text.

The Stakeholders

- Government agents (national and regional), local businesses, universities, property developers, and investors.

The ‘Opening up of the system’ approach

We propose an ‘Opening up of the system’ for regional and economic development of the entire UK, and also to focus on priority areas (North of England and the Midlands). This requires the building of a sound innovation ecosystem in key areas. Note the emphasis on **systems**:

1. **Modern industrial system** (e.g. big industries, emerging industries, related: what is unique/special about regions, sectors and places.)
2. **Entrepreneurship and innovative start-up system** (e.g. entrepreneurs, birth and growth of firms, incubators, accelerators, science parks, business support)
3. **Innovation talent system** (e.g. university research, fields of talent, links to industry)
4. **Capable global system** (e.g. import, export, out sourcing, in sourcing, foreign direct investment, foreign travel)
5. **People’s livelihood system** (e.g. unemployment, living standards, Jobs: employment security, deprivation, crime, health, housing, access to culture and education, infrastructure: International schools, hotels, shopping and entertainment)
6. **Modern urban and regional system** (e.g. transport, buildings and land-use, sustainability)
7. **Modern management system** (e.g. intellectual property right agents, access to consultancy, specialized banks (international, regional, development), LEPs, Local presence of InnovateUK, Think Tanks, design agents)
8. **Regional demonstration system** (e.g. Catapults, prototyping zones, museums, expo-centres)

Only complete systems construction within a region or for a sector or place will generate economic growth. With data, we can demonstrate what we have, identify gaps and new opportunities for improvement, investment or growth strategies.

*This ‘Opening up of the system’ approach is borrowed from China – see **APPENDIX 1**. The success of this type of systems approach is also noted in a book “The Smartest places on earth – Why Rustbelts are the emerging Hotspots of Global Innovation (by Antoine van Agtmael and Fred Bakker)*

The data

To provide some context as to the scope of our data analytics, records from all public data sources are utilised and linked to the entire UK, including (not limited to!):

- Research Councils UK
- Higher Education Statistics Agency
- European Patent Office
- Land datasets: OSM, Geo data, Heritage datasets
- Research publication data from over 6,000 institutional repositories world-wide
- Office of National Statistics
- Companies House
- HM Revenue and Customs
- Import-export data
- Travel data (sea, air, road/bus, train)
- We are also analysing data from a complete list of incubators, accelerators, business support units, innovation centres, science parks, Secondary Schools Performance Data, infrastructure data, travel to work areas, identification of amenities, green spaces, and other datasets to not only create a factual picture of activity, but to provide the context within which this activity grows and thrives.
- Data also includes analytics on deprivation, employment, health, disability, crime, housing, living environment and much more.
- Plus we 'scrape' the Internet (twitter, google search, company reports and more)

A key feature of all of the data is that wherever possible, we link their record to a location, which enables either very focused research on activities to be undertaken, or widened out to national or international views of activity, trends and interactions.

In all cases, the data quality is tested for errors, duplication and missing information, and where identified, we fix or fill the gaps. This provides a high-quality source of validated information that is ready for extraction and analysis to identify new trends and features that are used to build both descriptive summaries of an area (from a postcode to a country), as well generate new potential diagnostic indicators of activity in an area compared with others. Locations are mapped most frequently to businesses and/or people's place of work.

Diagnostic tools

We have developed diagnostic tools to map the 8 above innovation systems across all sectors and places in the UK.

The diagnostic tools are built upon identifying

- What we looking to know about
- Key questions
- Measures and indicators
- Data Sources
- Best analytics
- Visualisation methods of results

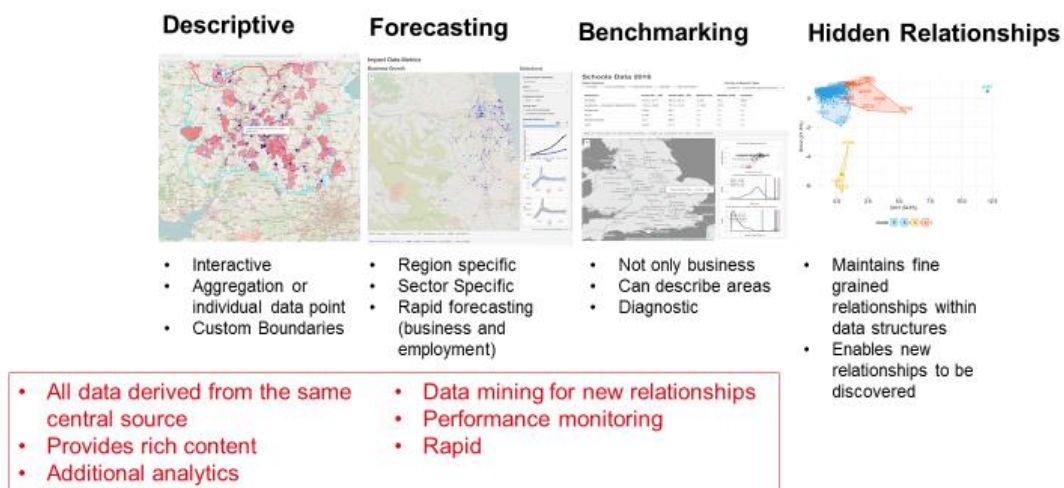
Using artificial intelligence tools, we are mapping the results online and in real-time:

- All data derived from the same central information we have built
- Provides rich content

- Additional analytics
- Data mining for new relationships
- Performance monitoring
- Rapid updates

Online soft reports are live updated in real-time – both figures, tables and text.

Types of analytics



There are hundreds of online, interactive and live visualisations of the innovation systems including

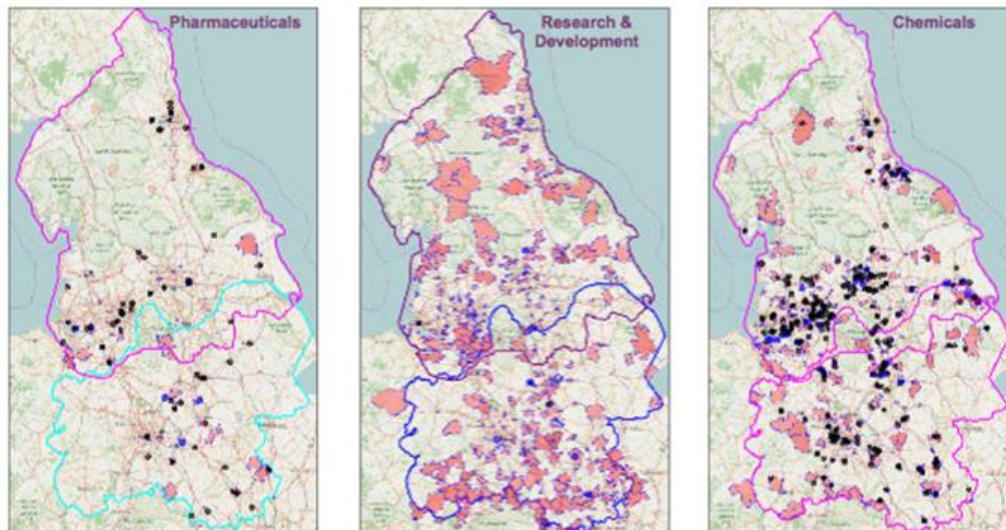
- Geo. maps
- Tile maps
- Text mining maps
- Tree diagrams
- Bars, plots and more

The illustrations are capable of deep dives by the users looking for further information.

Examples

Industrial System

What is the distribution of businesses?



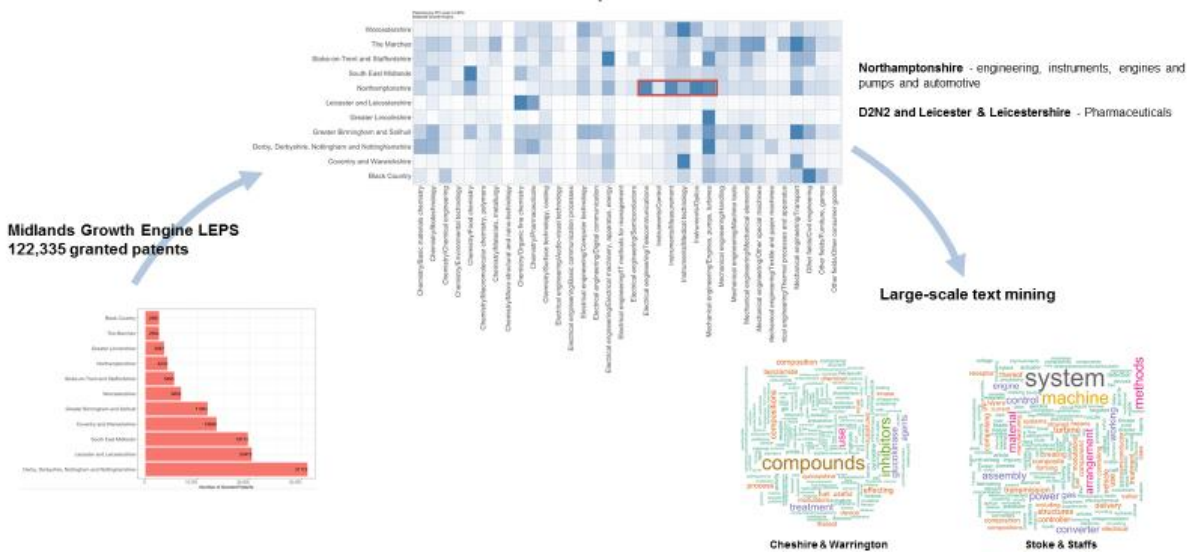
Industrial System

Which sectors are strongest in which LEPs?

	York and North Yorkshire	Teesside	Sheffield City Region	North East	Liverpool City Region	Leeds City Region	Lancashire	Humber	Greater Manchester	Cumbria	Cheshire and Warrington
Admin & Support Services	0.32	0.68	0.7	0.69	0.28	0.47	0.56	0.63	0.5	0.42	0.54
Aerospace	0	0.21	0.15	0.08	0.44	0.21	0	0	0	0	0
Automotive	0.89	0.42	1	0.94	1	0.95	1	0.94	1	1	0.75
Business Services	0.25	0.21	0.3	0	0.26	0.42	0.37	0.28	0.44	0.37	0.34
Chemicals	0.59	0.53	0.15	0	0.72	0.42	0.42	0.28	0.35	0.42	0.47
Communications	0.54	0.21	0.7	0.62	0.78	0.68	0.68	0.58	0.83	0.74	0.82
Construction	0.58	1	0.65	0.54	0.3	0.74	0.83	0.58	0.78	0.42	0.85
Community, Social & Personal Services	0.16	0.89	0.7	0	0.28	0.16	0.21	0.47	0.17	0.18	0.24
Digital, Creative & Information Services	0.45	0.66	0.6	1	0.96	1	0.58	1	0.79	1	0.3
Education	0.47	0	0	0.15	0	0	0.37	0.47	0.17	0.32	0
Financial Services	1	0.88	0.55	1	0.68	0.74	0.58	0.37	0.89	0.58	0.83
Food, Beverages & Tobacco	0.4	0.65	0.35	0.56	0.63	0.32	0	0.25	0.35	0.83	0.65
Health & Social Care	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Hotels & Restaurants	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
ICT & Precision Instruments	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Machinery, Electrical & Transport Equipment	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Metal, Plastic and Non-metallic products	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Mineral Fuel Extraction	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Mining and Quarrying	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Other Manufacturing	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Pharmaceuticals	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Public Admin & Defence	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Real Estate	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Renewable Resources	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Research & Development	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Retail	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Shipbuilding	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Transport, Storage & Distribution	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53
Utilities	0.75	0.18	0.93	0.17	0.32	0.42	0.41	0.35	0.6	0.22	0.53

Talent System

What is the human talent pool in each area?

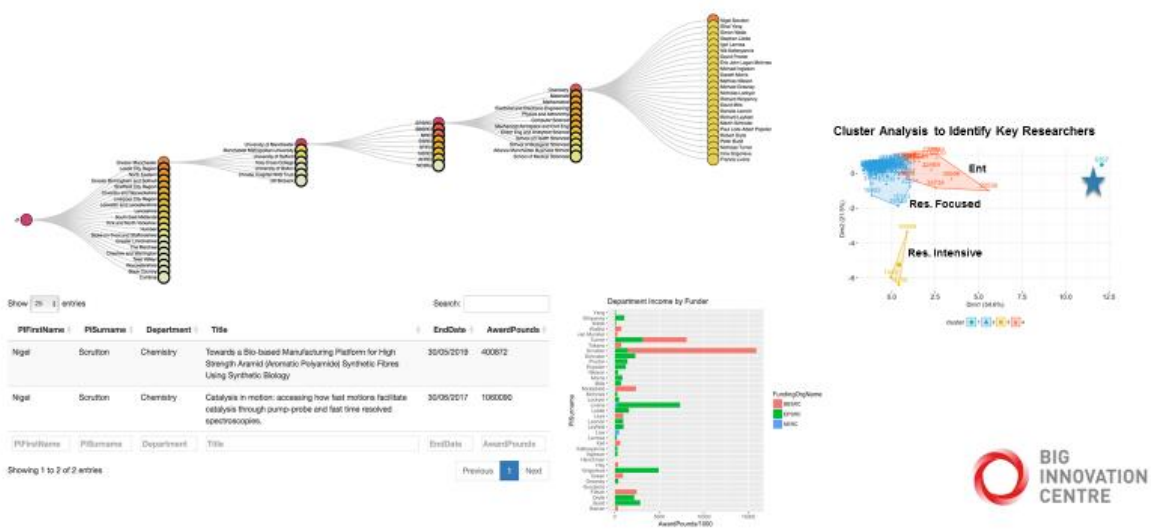


Talent System

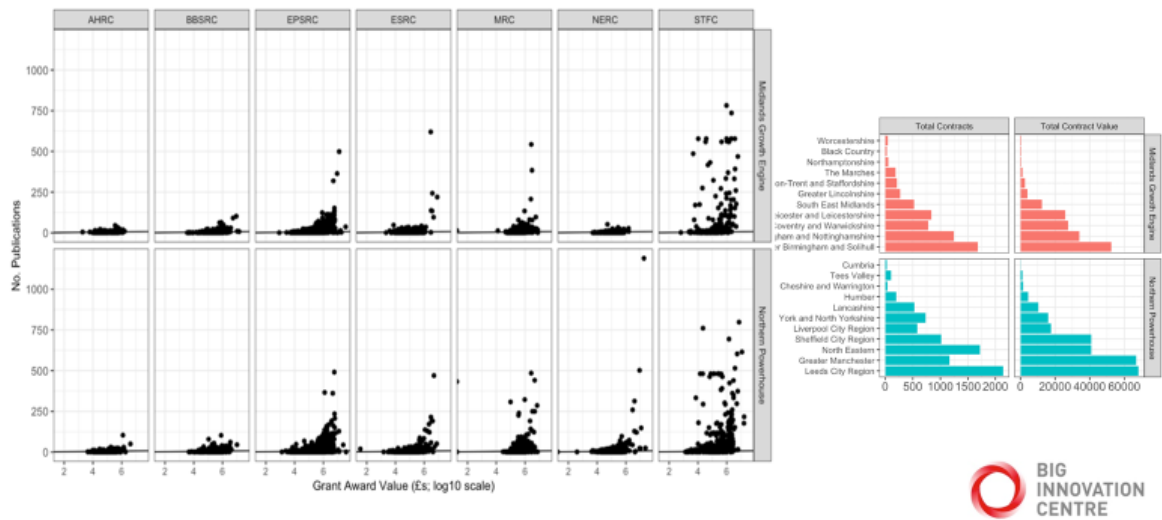
Who – what – where ?

HEI Grants

[1] "Greater Manchester University of Manchester EPSRC Chemistry Rigol Scrutiny"



Publication productivity of research grants and contract research



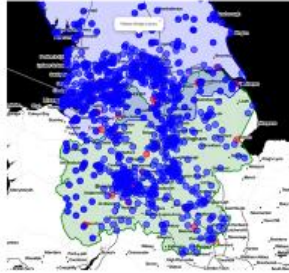
What is the general socio-economic status of an area?



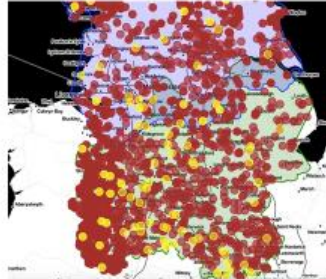
Livelihood System

What is the general socio-economic status of an area?

Libraries and Zoos



Castles and National Trust Properties



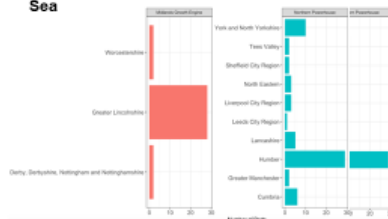
Football Grounds and Universities



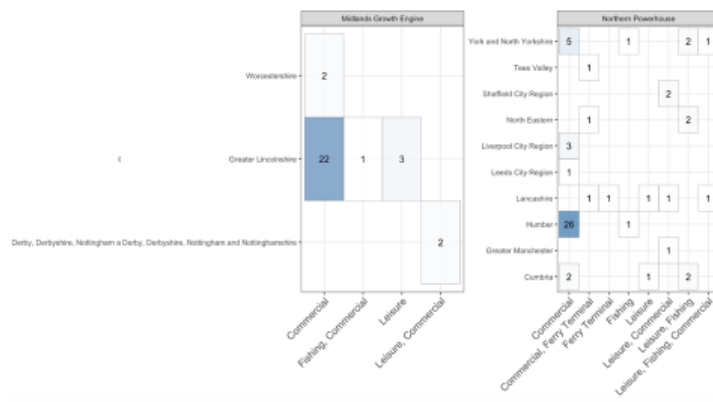
Capable Global System

How easy is it to travel and move goods around?

Sea

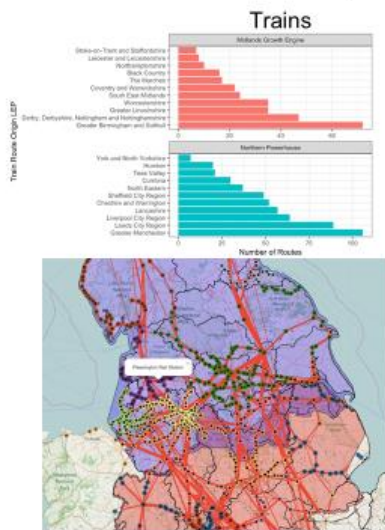


Air



Urban & Regional System

How easy is it to travel around within the areas?



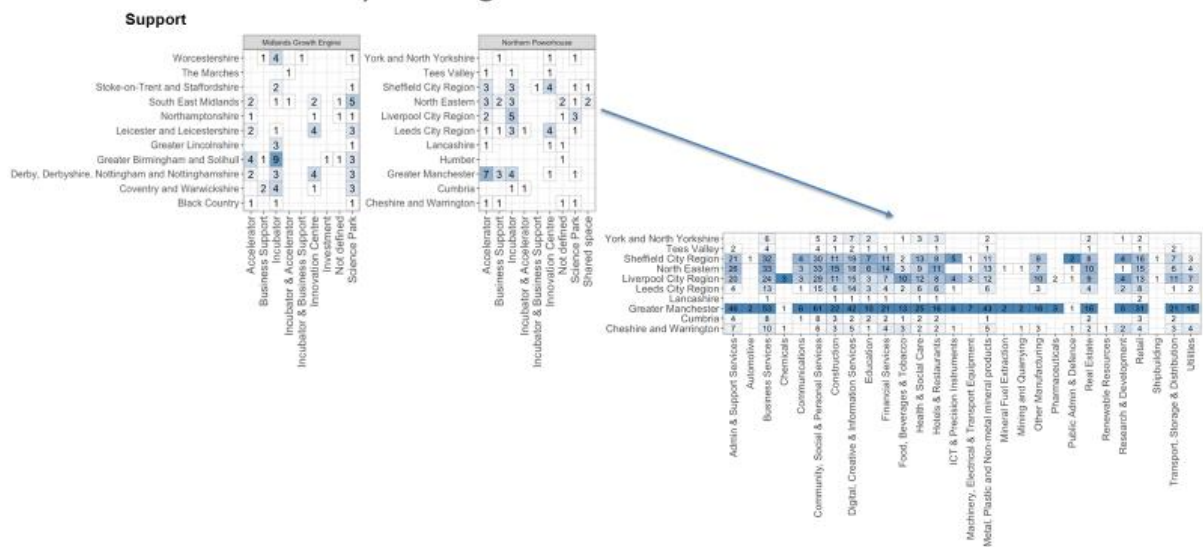
Buses

Area	LEP	Number of Bus Stops	Bus Stops per 10,000 people
Midlands Growth Engine	Coventry and Warwickshire	5,523	64.0
	Derby, Derbyshire	4,348	54.3
	Nottingham and Nottinghamshire	15,554	80.4
	Sheffield and South Yorkshire	7,791	71.0
	Northamptonshire	4,348	62.6
	The Males	6,196	74.3
Leicester and Leicestershire	Grover Birmingham and Solihull	11,258	56.8
	South East Midlands	15,488	61.2
	Grover Lincolnshire	8,880	65.3
	Black Country	6,613	58.0
	Worcestershire	4,153	73.8
	Leicester and Leicestershire	5,590	61.1



Start-up System

How easy is it to grow a business the areas?



APPENDIX

Lessons learned: Copying what works in China

Transforming our regions and our supply chains to become innovation hubs like Silicon Valley, Boston or Bangalore is a major aspiration for the United Kingdom. There are global examples of what works. Whereas Silicon Valley and Boston developed with close links around world class Universities, Bangalore developed with close global supplier links to Silicon Valley until it became a thriving hub in its own right. Eindhoven, located in a much smaller provincial part of Europe, took a different route with Philips Electronics (a big corporate) as the hub – but with a good-enough local university and looking to outsource IP and technology to an innovative supplier network. Philips Electronics crowded in expertise from world class academics – often created a link to the local university - and opened space for entrepreneurs to co-create with them locally. They invested in new buildings and converted outdated factory space 'not fit for purpose'. All the approaches created opportunities for the local regions to upgrade. However British regions have few comparable assets, nor have our own efforts so far shown much success.

China has taken a different, more **systemic approach** – what it characterises as an 'Opening up of the system' approach for regional and economic development, transforming regions and cities with high-tech clusters, industrial parks, and taken millions of people out of poverty. Big Innovation Centre's CEO visited six Chinese regions and believes there are lessons to be learned. (The photos below are from her visit)



Economic and technology development zones:

Shanghai – Nanjing – Hangzhou –
Zhengzhou – Beijing

Hangzhou Smart e-valley



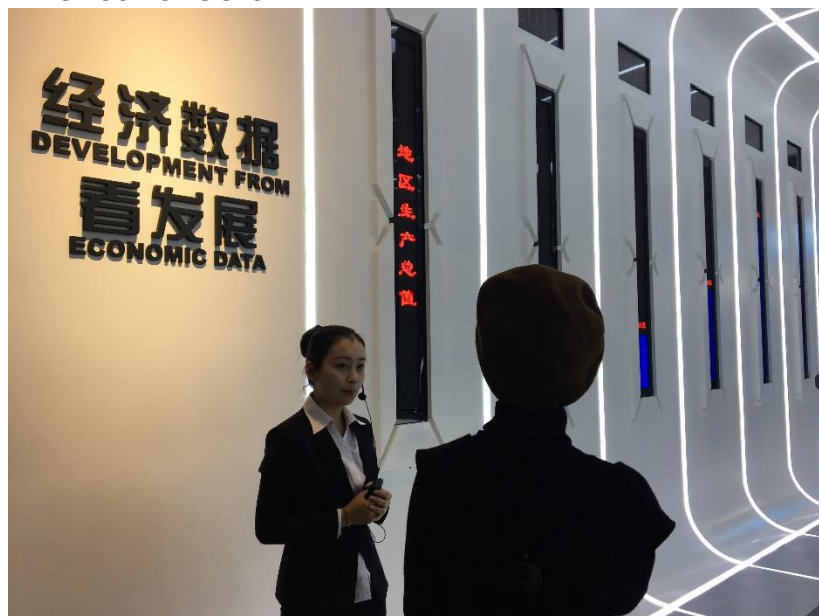
Borrowing from the Chinese 'Opening up of the system' approach, we can map the same categories and diagnostic tools on the UK regions, sectors and places.

Neither the method nor the data are readily available: this based upon frontier research and development.

OPENING UP THE SYSTEM: DEMONSTRATION OF STRATEGY



OPENING UP THE SYSTEM: DEMONSTRATION OF THE USE OF ECONOMIC DATA FOR DIAGNOSTIC TOOLS



Benchmarking and “achievements from system construction” (as the Chinese call their Key Performance Indicators) will be developed from these categories

EXAMPLES OF “ACHIEVEMENTS FROM SYSTEM CONSTRUCTION”



EXAMPLES OF ECONOMIC AND TECHNOLOGY DEVELOPMENT ZONES USING THIS APPROACH

