The Northern Powerhouse Independent Economic Review

Workstream 3: Competitive Advantage and Sector Strengths – *Final* Report

1 May 2016

Contents

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1. Introduction

Context

1.1 In late October 2015, SQW Ltd and Cambridge Econometrics Ltd (CE), supported by Steer Davies Gleave Ltd (SDG), John Jarvis Consulting, and (as peer reviewers) Professors Philip McCann (Groningen), Ron Martin (Cambridge) and Roger Vickerman (Kent) were appointed by Transport for the North (TfN) on behalf of wider partners, to undertake **an Independent Economic Review (IER) of the Northern Powerhouse (NPh).**

1.2 Partners' intentions in commissioning the IER were threefold, namely to provide:

- **data, evidence, and intelligence to underpin TfN's Northern Transport Strategy in Spring 2016**, as an input to the Spring 2016 Budget, and subsequent proposals for transport investment.
- the evidence and arguments around **which the 'narrative' for the NPh** could be forged and developed.
- the **analytic bedrock on which subsequent NPh development**, – including, but not limited to, strategy and action planning – could be built and progressed for the future.

1.3 The work was undertaken between late-October 2015 and March 2016. It comprised five workstreams as follows:

- Workstream 1 – analysis of the **prosperity and productivity gaps in the North**, and the potential contribution role of different drivers, including (proxies for) transport connectivity, in closing these.
- Workstream 2 – a focused analysis of the **economies of the 11 Local Enterprise Partnership (LEP) areas, which together form the North**, including an assessment of local productivity performance and causes, sectoral specialisms, capabilities, and assets, and major investments planned/underway to address the causes of the performance gaps and realise sector opportunities.
- Workstream 3 – analysis of **distinctive competitive advantage and sectoral strengths, capabilities, and industrial potentials** of pan-Northern significance.
- Workstream 4 – **modelling future growth scenarios for the North, including growth consistent with NPh's aspirations**, and the role of agglomeration and transport in influencing the growth across the North.
- Workstream 5 – developing **suggested proposals for an Independent Panel** to act as the guardians of the IER's evidence base going forward.

What the Review was . . . and what it was not

1.4 The Review was seeking to characterise the North's economic position and the causes underpinning its performance, and to identify opportunities where 'pan-Northern' effort can

sensibly support existing 'local' activities. Whilst key elements of the work involved drilling down into transport specifics, the Review as a whole was intended to reflect on the wider 'ecosystem' in the North of England, of which transport is a part.

1.5 Importantly, the Review was not intended as a fully-dimensioned 'economic baseline' for the North, although in undertaking its work it ranging widely across a range of domains. Equally importantly, the IER was not about developing the NPh strategy or action plan, nor was it concerned with any NPh governance arrangements. Rather, it relied heavily on a review and synthesis of existing literature and evidence, with additional modelling work by Cambridge Econometrics, building on analysis of the North's 'prosperity' and 'productivity' gaps, and sectoral performance, as its key evidential foundations.

Workstream 3: Purpose and Approach

1.6 The **purpose of Workstream 3 was to analyse and to distil the North's principal sector strengths at present, and highlight future possibilities and potentials**. The approach took account of Smart Specialisation principles, and the imperative to focus on what makes the economy of the North distinctive in national and international contexts. Following on from this – as part of Workstream 4 – the IER explored the role these specialisms could play in achieving future aspirations for the North, the extent to which agglomeration and clustering might shape the growth trajectories of these specialisms, and the implications – in headline terms – for Transport, and the connectivity it provides.

1.7 A key aspect of this Workstream was to define what is meant by 'pan-Northern significance' in the context of sectors – and then to identify, based on the evidence gathered, propositions on what these sectors/capabilities might be. Informed by the IER's thinking, and guidance from those commissioning the work, this report took 'pan-Northern significance' as meaning:

- Existing and/or future potential **sectoral and capability specialisms** where the North is genuinely **differentiated and distinctive**, and can compete at **national and international scales**. Exporting activities are a focus, to avoid intra-North displacement, as are market-led sectors, alongside assets and expertise of national and international standing.
- Sectors that are important in **multiple City-Regions/local areas[1] across the North,** avoiding simplistic 'one sector per area' thinking.
- Highly productive sectors, where the North can (or has the potential to) offer a **comparative advantage in terms of productivity**, and so help to close the North's productivity gap with the wider economy.
- Sectors and areas of economic activity where there is a robust economic rationale for – and added value from – collaboration/connectivity at the pan-Northern level.

[1] For the purposes of this study, all "city regions" and "local areas" are defined on the basis of Local Enterprise Partnership (LEP) footprints, comprised of Local Authority Districts. There are 11 LEPs across the North, and together they form the Northern Powerhouse footprint.

Being clear on the Technicalities

1.8 Whilst this report was written with a wide readership in mind, it does rely on a number of key technical concepts and assumptions. These are summarised below, to help ensure subsequent parts of the report are clear and understood.

1.9 On geography, below the level of the North, analysis is at the level of the component 11 Local Enterprise Partnership Area (LEP) footprints, as follows:

- Cheshire and Warrington
- Cumbia
- Hull and Humber City Region
- Lancashire
- Leeds City Region
- Liverpool City Region
- Greater Manchester
- North East
- Sheffield City Region
- Tees Valley
- York, North Yorkshire and East Riding.

1.10 In a fast-changing economy, it is not always easy to define economic sectors and allocate unambiguously businesses to them. Official statistics provide only a partial picture of an economy's economic structure and of themselves tell little about niche specialisms, capabilities, assets and expertise *within* each sector – and how these come together *across* sectors – to create real competitive advantage. In response to these issues, this report combined an analysis of 'top down' Gross Value Added (GVA), employment and productivity data for 45 economic sectors with an analysis of 'bottom up' Local Enterprise Partnership (LEP) strategies, plans and evidence bases, (which help to identify the North's specific strengths and capabilities *within* sectors), to identify the North's main sectoral, technology and asset specialisms.

1.11 On terms:

- Gross Value Added (GVA), a workplace-based measure of economic output, represents the value of wages and profits that are generated by a sector in a specified geography. Typically, GVA is reported at the registered office address of the enterprises concerned.
- Jobs data are also workplace-based, and include full-time, part-time and self-employed job. They do not refer to the number of residents in employment.

- Specialisation was assessed using Location Quotients (LQs) for GVA and jobs. LQs compare the proportion of jobs by sector in the North to the proportion of jobs by sector for England excluding London. LQs have also been produced for GVA. A value of above '1' indicates a sector is over-represented or 'specialised' in the North, whereas a value of less than '1' indicates a sector is under-represented.

- Productivity is measured by GVA per job for each sector. This was benchmarked against two comparators:

  - The 'whole economy' average for 'the rest of England less London', to identify sectors with high productivity in an absolute sense; these have been highlighted on the bases that they could, in theory, increase the North's productivity if their presence in the North was increased. We have also, in appropriate places, compared the North to the rest of England including London.

  - The respective sector average for 'the rest of England less London'.

1.12 The data presented in Section 2 are based on Cambridge Econometrics' 45 sectors from their in-house Local Economic Forecasting Model (LEFM), built from detailed Standard Industrial Classification (SIC) codes. The use of 45 sectors has limitations; the sectors are somewhat broad, providing little information on the niche specialisms within the broad definitions. Furthermore, the structured SIC codes from which they are derived cannot identify wholly new or emerging sectors, nor the possibilities linked to disruptive technologies and innovation. They do, however, provide helpful future-facing sectoral perspectives on Gross Value Added (GVA) and jobs, which other more fine grained sources of data (such as BRES and IDBR[2]) cannot. This is particularly important for Workstream 4 of the Review, which has tested the contribution of sectors to achieving the North's overarching growth ambition.

Report Structure

1.13 **This report is the final output of Workstream 3.** It has been written to report fully on the content, findings, and conclusions of the Workstream. As such, it is designed as a self-standing output, but it should also be read in the context of the companion reports which have been produced for the other Workstreams.

1.14 The remainder of this report is as follows:

- Section 2: Summary of the underpinning evidence base for this Workstream, including:

  - 'Top-down' sector-based data, presenting **current sector specialisms at the level of the North**, **productivity performance**, both in relative to the whole economy and respective sector averages, and **sector scale and trends,** in terms of their relative weight in terms of GVA and employment, past trends and future projections.

[2] Business Register Employment Survey, Interdepartmental Business Register

- **Sector strengths identified 'bottom up' in local area[3] evidence**, including distinctive specialisms and niche capabilities *within* broad sector definitions, and supporting assets, together with wider market and technological trends.

- **Section 3: Profiles of pan-Northern 'Prime' and 'Enabling' capabilities,** including the rationale for identifying these capabilities, followed by a profile for each of the four *pan-Northern* 'Prime' capabilities and three *'Enabling' cap*abilities which, working in concert with the four 'Prime' capabilities, will be vital for the overall growth and productivity of the North.

- **Section 4: Conclusions,** providing a summary of the main findings.

1.15 The report is supported by four Annexes: Annex A presents the Workstream's bibliography; Annex B provides the detailed data analysis to that summarised in the main part of the report; Annex C maps Cambridge Econometrics' 45 sectors onto Standard Industrial Classification (SIC) codes; and Annex D provides more detailed 'asset registers' for the capabilities in Section 3. In addition, the narratives for the 11 LEP areas have been produced by Workstream 2, have been drawn on and worked in, particularly in respect of the sector strengths, specialisms, and assets identified locally. The scope and content of Workstream 2, and the associated bibliography, is reported separately in that Workstream's report.

[3] As defined by the 11 LEP areas across the North

2. The evidence on pan-Northern sectors and specialisms

2.1 This Section sets out the evidence base, which has informed the proposed pan-Northern capabilities set out in Section 3. It draws on two main sources of evidence: a 'top down' analysis of CE's sectoral data; and a 'bottom up' review of local (LEP) evidence on specialisms, capabilities, assets and businesses etc which sit within (and span across) these sectors.

Current sector strengths at the level of the North

2.2 Key messages from the data analysis are presented in the paragraphs that follow. A more detailed analysis of CE's sectoral data is provided in Annex A, and CE's 45 sectors are mapped against SIC codes in Annex B.

Specialisation

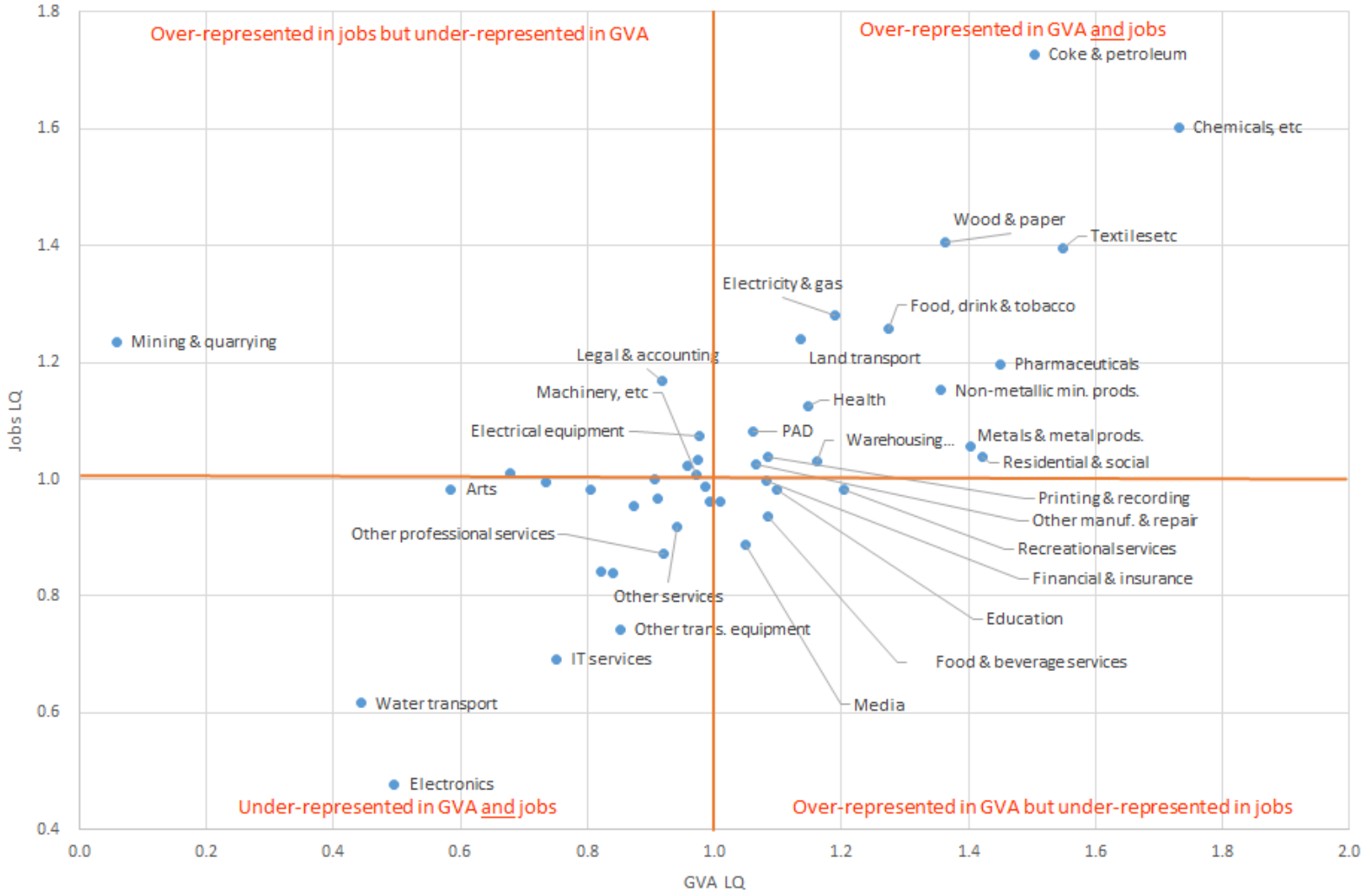
2.3 A number of sectors are **particularly specialised in the North, both in terms of GVA and jobs**. By specialised, we mean that the share of GVA and jobs in these sectors in the North is greater than the equivalent share across England (excluding London) as a whole. These sectors include, for example, Chemicals, Pharmaceuticals, Metal and Non-Metallic products, Electricity and Gas, Coke and Petroleum, Textiles, Health, and Food/Drink manufacture. As illustrated in Figure 2-1, some of these sectors have a particularly high LQ. Chemicals, for example, has a GVA LQ of 1.7 and a jobs LQ of 1.6 according to latest data available[4].

2.4 Other sectors are over-represented in terms of GVA but not jobs (such as Education, Financial and Insurance, Media, Other Manufacturing and Repair)[5].

2.5 The share of the North's jobs and GVA matches broadly the England (less London) average in sectors such as Machinery, Water/Sewerage/Waste, Architectural and Engineering Design, Retail, and Business Support Services); whereas jobs and GVA are under-represented in sectors such as other Professional Services, IT Services, Electronics, Head Offices, and Other Services.

[4] Throughout this report, the latest data available has been used for GVA (2013) and jobs (2014). For productivity, 2013 data is used for both GVA and jobs for consistency
[5] Only 'mining and quarrying' and 'legal and accounting' are over-represented in terms of jobs but not GVA

Figure 2-1: LQs for jobs and GVA, North compared to England less London



Source: SQW analysis of Cambridge Econometrics' data. Latest data available is 2013 for GVA and 2014 for jobs. Underpinning data is available in Annex B.

Sectors with above average productivity

2.6 Figure 2-2 presents productivity by sector for the North, compared to the 'rest of England (excluding London)' whole economy average of £43,400 pa in 2013[6]. Sectors where the North's productivity exceeds this benchmark are shaded in blue, and those falling short of the benchmark are highlighted in orange. The figure also identifies sectors which outperform, or are close to, the respective sector average (for 'rest of England excluding London' and 'England excluding London') by marking the sector label with an asterisk.

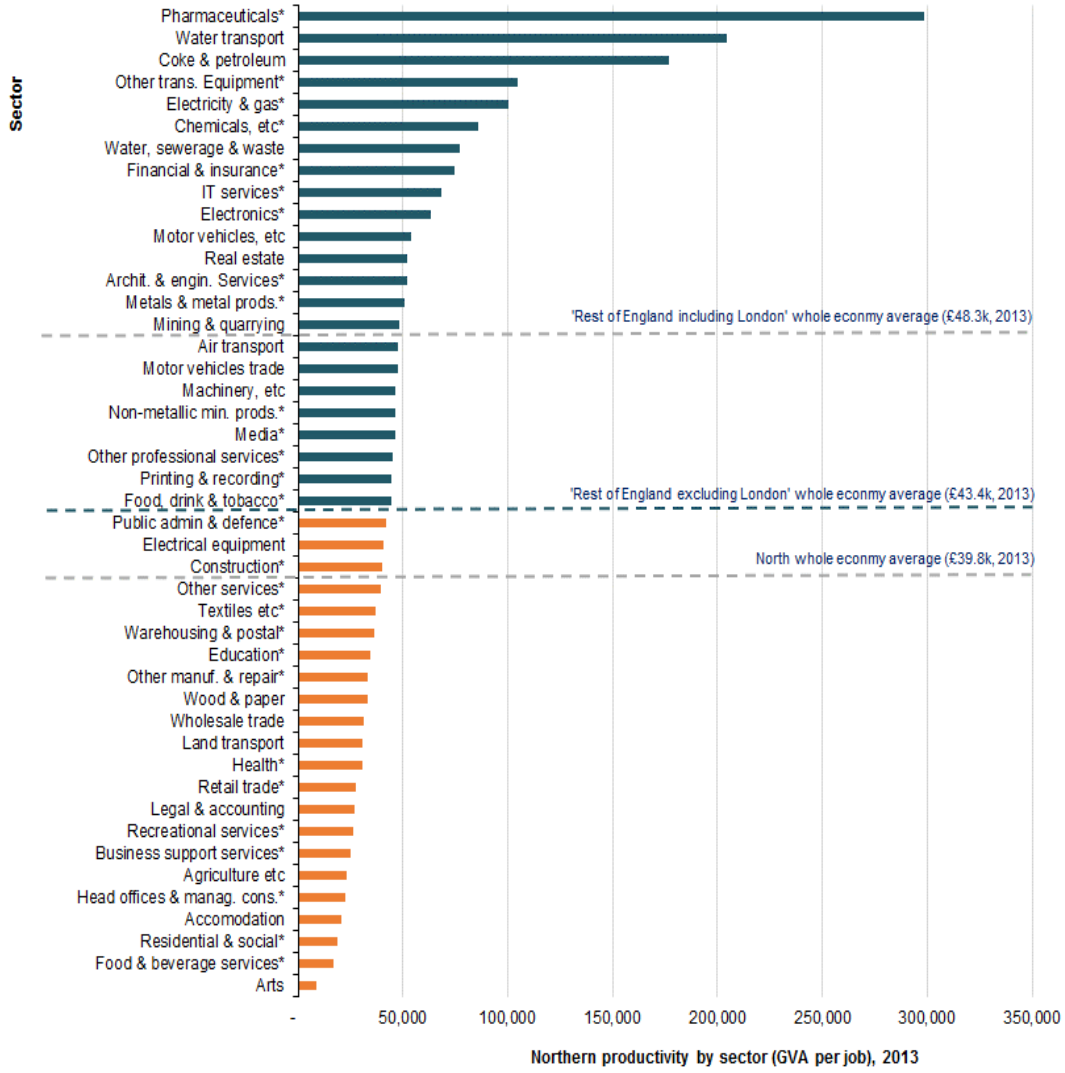
2.7 A number of sectors are high productivity (in an absolute sense) and perform well against national sectoral benchmarks for productivity. These include:

- **Manufacturing and Materials**: Pharmaceuticals, Chemicals, Other Transport equipment, Metals and Metal Products, Non-Metallic Mineral Products
- **Energy**: Electricity and Gas
- **Services**: Financial and Insurance, Architectural and Engineering Services, Other Professional Services
- **IT and electronics**: IT Services, Electronics
- **Others**: Media, Printing and Recording, and Food/Drink and Tobacco.

2.8 In addition to the sectors listed in paragraph 2.7, some sectors in the North have lower levels generally of productivity (in an absolute sense), but outperform or are close to[7] their peers in terms of productivity within the respective sector. These include some **Services** (e.g. Recreational Services, Business Support Services, Residential and Social, Health, Education, Retail Trade), **some aspects of Manufacturing** (e.g. Textiles, Other Manufacturing and Repair), and **Construction and Warehousing and Postal**.

[6] As a comparator, the whole economy average productivity for the rest of England (including London) was £48,341 in 2013.
[7] Within 90%-100% of the 'rest of England excluding London' and 'England excluding London' benchmarks

Figure 2-2: Productivity by sector for the North, 2013. (Note: sectors marked with * are above or close to the respective sector average for benchmarks[8])



Source: SQW analysis of Cambridge Econometrics' data

Bringing together Specialisation and Productivity

2.9 Based on the analysis above, CE's 45 sectors have been grouped into three broad categories (and sub-groups within these) in Figure 2-3 below:

- First, the box on the left shows sectors where the North is **specialised clearly in GVA terms** (and in some cases, jobs as well) **and productivity is high** (in an absolute sense, when compared to the whole economy average for 'the rest of England less London'). Sectors which perform particularly well against this measure include Coke and Petroleum, Chemicals, Pharmaceuticals, Materials (Metal and Non-Metallic Minerals), and Electricity and Gas, where LQs for jobs and GVA are high, and productivity is high. The North is also specialised in a number of other sectors (to a lesser degree), such as Media, Printing and Recording, Financial and Insurance, and

[8] Benchmarks are 'rest of England excluding London' and 'England excluding London'

Food, Drink and Tobacco manufacturing. The productivity performance of these sectors is more variable – financial and insurance is high, whereas the others are closer to the 'the rest of England less London' economy average.

- Second, the central box shows a mixed basket of sectors where the North:
  - Is **specialised and, while productivity is lower** than the whole economy average for 'the rest of England less London', the **sector itself outperforms or is close to sector benchmarks** (e.g. Education, Warehousing, Textiles, other Manufacturing Repair, and Health)
  - **Has 'average' representation** (i.e. LQ=1 for GVA and/or jobs), but **productivity is high in general** (i.e. lower than the whole economy average for 'the rest of England less London'), such as Machinery, Water, Sewage and Waste, Architectural and Engineering services)
  - **Is under-represented** in terms of GVA and jobs[9], but **productivity is high in general** (e.g. Other Transport Equipment, and IT Services)
- Third, the box on the right includes sectors that perform less well against both productivity benchmarks: **productivity is lower in an absolute sense** (i.e. lower than the whole economy average for 'the rest of England less London') **and lower than sectoral benchmarks.** This includes some sectors where the North currently has some specialisation (e.g. Wood and Paper, Public Administration) and sectors where the North has average/under-representation (e.g. Retail, Business Support Services, Accommodation, Arts, Agriculture).

[9] The exception is mining and quarrying, where the GVA LQ is 0.1, but the jobs LQ is 1.2

Figure 2-3: Sectoral specialisation and productivity across the North

Clearly specialised & high productivity

- **GROUP 1: Specialised in GVA (& in some cases jobs) & generally high productivity[1]**
  - Chemicals
  - Coke & Petroleum
  - Pharmaceuticals
  - Metals & Metal Products
  - Non-Metallic Mineral Products
  - Food, Drink, Tobacco
  - Electricity & Gas
  - Printing & Recording
  - Financial & Insurance
  - Media

Mixed picture

- **GROUP 2: Some specialisation, general productivity low[1] but above sector benchmarks[2]**
  - Residential & Social
  - Recreational Services
  - Warehousing & Postal
  - Education
- **GROUP 3: Some specialisation, general productivity low[1] but close to sector benchmarks[2]**
  - Health
  - Food & Beverage Services
  - Other manufacturing & Repair
  - Textiles
- **GROUP 4: Average representation (LQ=1)[3], generally high productivity[1]**
  - Architectural & Engineering Services
  - Machinery
  - Water, Sewage, Waste
  - Motor Vehicles Trade
  - Real Estate
  - Motor Vehicles etc
  - Air Transport
- **GROUP 5: Under-represented in GVA (and jobs) but generally high productivity[1]**
  - Other Professional Services
  - Other Transport Equipment
  - IT Services
  - Electronics
  - Water Transport
  - Mining & Quarrying

Poor performers

- **GROUP 6: Specialised, but general productivity low[1] & lower than sector benchmarks[2]**
  - Wood & Paper
  - Electrical Equipment
  - Land Transport
  - Public Administration & Defence
  - Legal & Accounting
- **GROUP 7: Average representation or not specialised, & lower productivity[1,2]**
  - Business Support Services
  - Construction
  - Retail Trade
  - Other Services
  - Accommodation
  - Wholesale Trade
  - Agriculture
  - Head Offices & management consultancy
  - Arts

Source: SQW analysis of Cambridge Econometrics' data. Benchmarks: (1) vs 'Rest of England (excl. London)' whole economy average; (2) vs respective sector average in 'rest of England (excl. London)' & 'England (excl. London)', (3) LQs compare North to 'England (excl. London). In each block, the sectors are ordered according to their GVA LQ value (highest first)

Scale, recent trends, and future projections

2.10 Figure 2-4 presents the share of GVA and jobs accounted for by the largest sectors across the North (i.e. those representing 1.5% or more of jobs and/or GVA). It is evident that some of the lower productivity sectors referenced above – such as Health, Retail, Public Administration, and Business Support Services – account for a relatively large share of the North's jobs and GVA; whereas higher productivity sectors such as Pharmaceuticals and architectural and engineering services account for lower share of the economy (especially in terms of a lower share of jobs).

2.11 A number of other sectors – especially those in manufacturing – are too small in their own right to appear on the graphic below but, when aggregated together, account for a relatively large share of the North's economy. For example, the manufacture of machinery, chemicals, textiles, motor vehicles, other transport equipment and other manufacturing and repair combined account for 6% of GVA and 4% of jobs.

2.12 Trends since 2000, and projections to 2030, are presented in Figure 2-5 for each sector in the North, grouped according to their specialisation and productivity performance (as shown in Figure 2-3). The analysis shows that:

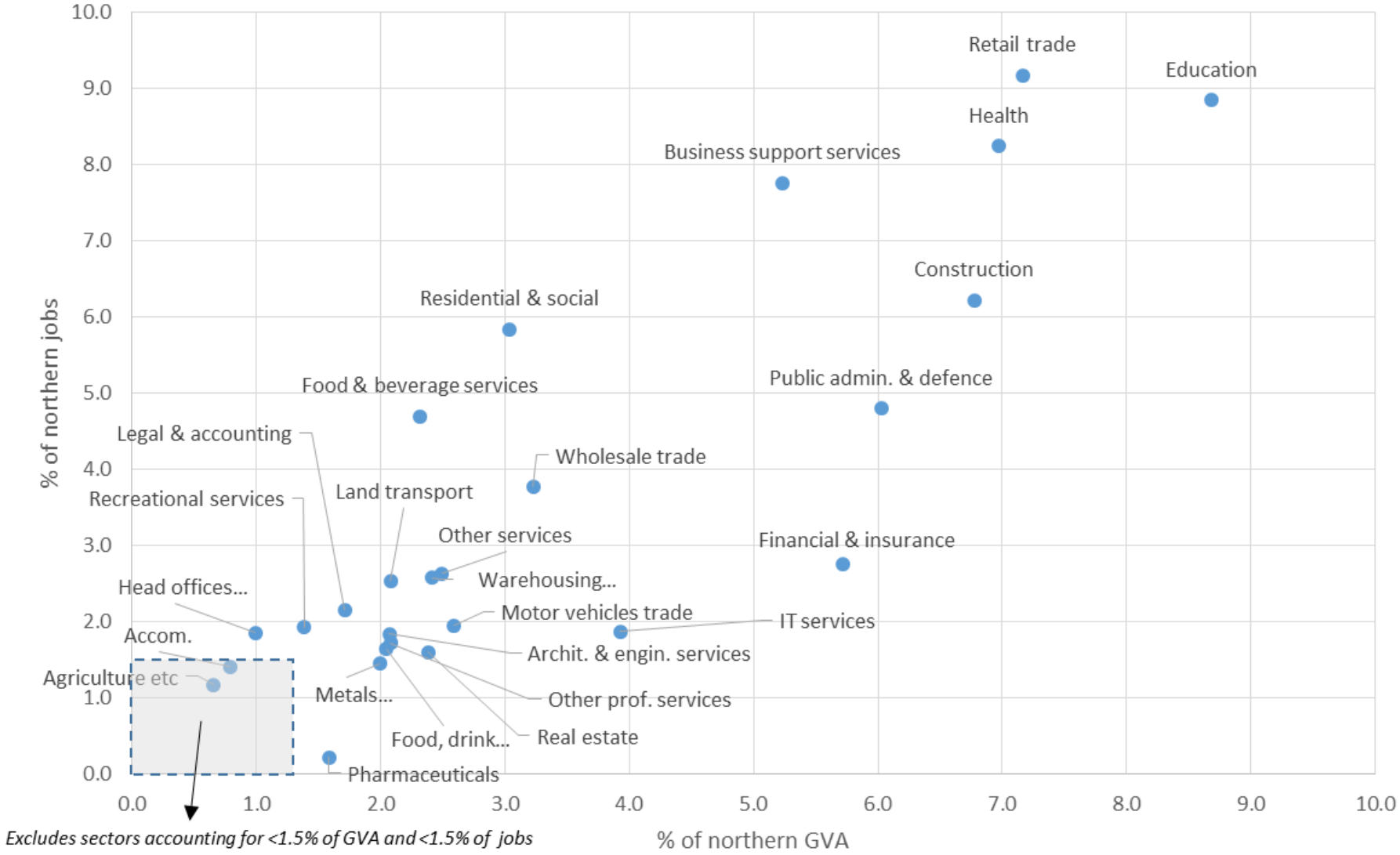
- For the first group of sectors that are specialised and productive, most are expected to grow in terms of GVA through to 2030, but many have seen a decline in jobs over recent years, and few are expected to see an uplift in jobs through to 2030. Of these sectors, Financial and Insurance performs relatively well in terms of scale and growth – it contributes a relatively large proportion of GVA to the Northern economy (5.7% in 2013) and is expected to experience strong GVA growth in future (although jobs growth is weaker). The picture is similar broadly for Groups 2 and 3, where the North is specialised but productivity is lower. Here, all sectors expect to see GVA growth and a number of sectors – including Warehousing, and Other Manufacturing/Repair – are also expected to grow in terms of jobs.

- In Groups 4 and 5, where productivity is high but the North has 'average or under-representation', a number of sectors have observed rapid recent growth – for example, GVA generated by Architecture and Engineering Services increased by 5.3% pa between 2000 and 2013, from a small base, and GVA in IT Services grew by 5.6% pa over the same period. These sectors are expected to experience continued strong GVA growth through to 2030.

- The largest growth in jobs between to 2030 is expected in Group 7, where the North has **average or under-representation, productivity is lower in an absolute sense** (i.e. lower than the whole economy average for 'the rest of England less London') **and below sector benchmarks**. A number of these sectors are currently large employers, and **the majority are projected to grow in terms of GVA and jobs** by 2030.

2.13 Throughout, the recession will have had an impact on the trends observed here.

Figure 2-4: Share of Northern GVA and jobs by sector (where the share of GVA and/or jobs is >1.5% of the North total)



Source: SQW analysis of Cambridge Econometrics' data. Latest data available is 2013 for GVA and 2014 for jobs

Figure 2-5: Sectoral trends and projections for the North, and scale of jobs

	Share of Northern GVA, 2013 (%)	Share of Northern jobs, 2014 (%)	Recent trends: GVA Growth 2000-13 (% pa)	Recent trends: Jobs Growth 2000-14 (% pa)	Future projections: GVA Growth 2015-2030 (% pa)	Future projections: Jobs Growth 2015-2030 (% pa)	Scale of jobs: Jobs in 2000 (000s)	Scale of jobs: Jobs in 2014 (000s)	Scale of jobs: Jobs in 2030 (000s)
1. Specialisation and high productivity									
Chemicals, etc	1.3	0.6	1.0	-1.5	1.7	-3.6	59	48	26
Coke & Petroleum	0.4	0.1	-4.8	12.0	-1.1	0.9	1	4	4
Pharmaceuticals	1.6	0.2	2.7	0.2	-0.1	-2.1	17	17	11
Metals & Metal products	2.0	1.5	1.2	-3.6	1.1	-1.8	183	110	81
Non-Metallic Mineral Products	1.3	1.0	-0.8	-3.0	1.6	-3.2	114	75	50
Food, Drink & Tobacco	2.0	1.6	-0.4	-1.6	1.8	-1.8	155	124	100
Electricity & Gas	1.4	0.5	0.0	4.1	1.2	0.5	21	37	43
Printing & Recording	0.5	0.4	0.0	-2.4	1.4	0.0	46	33	30
Financial & Insurance	5.7	2.8	1.4	0.0	2.5	0.6	208	209	229
Media	0.8	0.6	-0.1	-0.7	1.3	-0.2	52	47	44
2 & 3. Specialisation, low productivity in general but above/close to sector benchmarks									
Residential & Social	3.0	5.8	1.5	1.4	3.0	0.8	362	441	500
Recreational Services	1.4	1.9	2.6	2.7	0.4	0.0	100	146	147
Warehousing & Postal	2.4	2.6	-1.6	2.8	2.0	0.4	132	194	216
Education	8.7	8.8	0.1	1.3	1.4	0.0	556	667	671
Health	7.0	8.2	4.4	2.6	2.4	0.1	433	622	625
Food & Beverage Services	2.3	4.7	0.9	0.1	2.1	1.1	352	355	430
Other Manufacturing & Repair	1.1	1.0	-1.2	-3.2	3.0	0.5	120	77	89
Textiles etc	0.6	0.5	-4.0	-7.1	0.9	-3.0	109	39	25
4. Average representation, high productivity									
Archit. & Engineering Services	2.1	1.8	5.3	3.3	0.7	0.5	88	139	157
Machinery, etc	1.0	0.7	0.7	-1.7	1.9	-2.9	71	56	35
Water, Sewerage & Waste	1.3	0.6	0.0	1.3	2.5	0.5	41	49	53
Motor Vehicles Trade	2.6	2.0	2.4	0.0	1.0	0.2	148	148	154
Real Estate	2.4	1.6	7.9	5.0	2.1	0.2	61	121	124
Motor Vehicles, etc	0.8	0.5	-0.8	-3.6	1.5	-1.5	66	40	31
Air Transport	0.2	0.1	6.6	2.4	-1.2	-0.9	8	11	9
5. Under-representation, high productivity									
Other Professional Services	2.1	1.7	5.2	4.1	1.9	1.7	74	130	164
Other Transport Equipment	1.0	0.4	1.6	-2.5	0.7	-1.5	39	27	21
IT Services	3.9	1.9	5.6	0.8	3.8	1.3	127	142	177
Electronics	0.4	0.2	-5.5	-5.2	-1.6	-3.3	34	16	11
Water Transport	0.1	0.0	1.9	6.1	3.3	-1.4	1	2	1
Mining & Quarrying	0.2	0.1	-8.4	-5.5	-4.3	-3.1	17	8	6
6. Specialisation but low productivity in general and lower than sectoral benchmarks									
Wood & Paper	0.6	0.6	-1.3	-1.1	1.6	-2.0	55	48	36
Electrical Equipment	0.4	0.3	-2.2	-4.3	0.6	-0.8	43	23	21
Land Transport	2.1	2.5	0.1	1.0	2.0	-0.8	167	192	166
Public Administration & Defence	6.0	4.8	1.0	-0.3	2.3	0.9	378	362	399
Legal & Accounting	1.7	2.2	3.2	3.0	1.1	0.3	108	163	171
7. Average or under-representation, low productivity in general and lower than sectoral benchmarks									
Business Support Services	5.2	7.8	3.6	2.7	2.2	0.9	404	585	680
Construction	6.8	6.2	0.0	0.4	2.4	0.8	445	469	535
Retail Trade	7.2	9.2	2.0	-0.4	2.2	0.6	731	692	760
Other Services	2.5	2.6	-0.1	0.2	1.8	0.4	194	199	211
Accommodation	0.8	1.4	4.2	2.8	1.5	0.6	73	107	117
Wholesale Trade	3.2	3.8	-0.1	0.2	1.8	0.5	278	285	325
Agriculture etc	0.7	1.2	0.3	2.5	2.3	-1.5	63	89	64
Head Offices & Management Consultants	1.0	1.9	9.3	8.4	1.0	1.3	45	140	194
Arts	0.2	0.8	2.3	0.1	1.8	1.2	59	60	76
Total	**100.0**	**100.0**	**1.3**	**0.7**	**2.0**	**0.3**	**6,836**	**7,543**	**8,024**

Source: SQW analysis of Cambridge Econometrics' data.

Sector strengths identified in 'local area' evidence

2.14 In this sub-section, the headline findings of the Reviewer's analysis 'bottom up' local area evidence on sector strengths, specialisms and assets is presented. Documentation for each of the North's 11 LEP areas was gathered by the Reviewers, informed by a Call for Evidence among members of the Economic Reference Group[10], and included Strategic Economic Plans (SEPs), European Structural and Investment Fund (ESIF) proposals, and associated underpinning evidence bases (including, where available, Smart Specialisation strategies and/or wider sector research). This documentation was reviewed systematically and summarised by SQW in a short narrative for each area, which have been cross-checked with the respective leads from the Review's Economic Reference Group. The full narratives for each LEP area are available in the Workstream 2 report. These local area narratives are the Reviewer's own analysis of the evidence, and are an input to the IER, especially in relation to informing Workstream 3, the focus of this document.

2.15 Figure 2-6 summarises the local specialisms and capabilities in each LEP area, with a focus on the areas where the LEPs believe they have competitive advantage and the sectors are generally significant for the local area (in terms of GVA and/or jobs). This is underpinned by wide ranging evidence of each area's complementary assets, facilities, research expertise and business base (see Annex C for examples).

2.16 Looking across the LEPs, some specialisms appear across the Northern geography. For example:

- **Advanced Manufacturing and Materials**, which ranges from Automotives in the North East, Cheshire and Warrington and Liverpool City Region, Aerospace in Lancashire, Offshore Engineering in the Tees Valley and High Precision Engineering in Sheffield City Region, through to Chemicals in Cheshire and Warrington, Lancashire and Hull and Humber, marine engineering in Cumbria, graphene and advanced 2-D materials in Greater Manchester, and Advanced Manufacturing/Engineering Technical services in Sheffield City Region and Cheshire and Warrington.
- **Energy**, including Nuclear R&D in Greater Manchester, Cumbria, Cheshire and Warrington and Sheffield City Region, Biorenewables in North Yorkshire, Offshore Wind Technologies in Hull and Humber City Region, the North East and Liverpool City Region, Nuclear Processing in Cumbria and Lancashire, and supporting Consultancy Expertise in Leeds City Region and Greater Manchester.

2.17 Other specialisms are evident in a number of areas within – rather than across – the North. These include:

- **Life Sciences, including Pharmaceuticals,** for example in Cheshire and Warrington, Hull and Humber**,** Greater Manchester, and the North East

[10] This group was established by the study lead for the purposes of the Northern Powerhouse Independent Economic Review. It comprises the economic development/intelligence lead from each LEP area. Two meetings have been held with the Group to date: one in late October (to introduce the study and launch the call for evidence) and one in early December (to calibrate the draft findings of Workstreams 1 and 2).

- **Healthcare Technologies**, such as e-Health/Assisted Living in Liverpool, Medical devices in the Leeds and Sheffield City Regions, and Health Analytics and Clinical Research in Liverpool, Manchester and Sheffield
- **Digital,** e.g. Gaming and Satellite Communications in Leeds City Region, Big Data and Data Analytics in Leeds, Liverpool and Sheffield, and Computing and Software in Manchester, the North East, Tees Valley and Sheffield (including with links to Engineering Design).
- **Logistics,** e.g. Port Facilities at Liverpool, Tees Valley, Lancashire, and Hull and Humber, and Freight and Distribution activities across the wider North
- **Tourism,** which features across the North, but is highlighted by Cumbria, North Yorkshire, and Lancashire in particular as a priority sector.

2.18 Other sector specialisms are evident in the North, as illustrated in Figure 2-6, but appear to be less widespread across the North as a whole. Two key examples here are:

- **Agri-Tech, with links to Agri-Food**. This sector is identified as a strength/specialism in four of the LEP areas (York/North Yorkshire/East Riding, Cheshire and Warrington, Cumbria, and Hull and Humber), with national-level assets such as Fera in York.
- **Financial and Professional Services**. Leeds and Manchester are strong particularly in this sector (at scale), with further niche specialisms in Cheshire and Warrington (Legal and ICT Support) and Liverpool (Maritime Insurance and Wealth Management). However, while the sector is an important aspect of local economies more widely across the North, especially in terms of employment, much of this tends to serve local demand rather than being of national/international importance.

Figure 2-6: Local area sector strengths and specialisms

LEP Area	Sector strengths and specialisms (existing & future potential)	LEP Area	Sector strengths and specialisms (existing & future potential)
Cheshire & Warrington	• Life sciences, pharma • Chemicals • Energy – esp. Nuclear • Advanced engineering, incl. consultancy, automotives • Financial & professional services • Agri-tech	**Manchester**	• Health & life sciences pharma, biotech, health analytics, clinical, medical devices, cancer research • Professional & business services – legal, accounting, management consulting, real estate, financial services • Creative & digital – creative & new media, ICT & digital comms, incl computer engineering, software • Advanced materials, incl. graphene • 'Advanced' manufacturing, aircraft, engineering consultancy, food/drink • Low carbon, environmental goods/services, esp. nuclear
Cumbria	• Advanced manufacturing, esp. nuclear subs, biopharma • Nuclear • Agri-food • Tourism • Offshore wind		
York, North Yorkshire and East Riding	• Advanced manufacturing • Energy – biorenewables, energy generation • Agri-tech, food manufacturing • Potash mining • Tourism • Freight and distribution	**North East**	• Automotive manufacturing, incl. batteries • Life sciences & healthcare, incl. (bio) pharma • Subsea & offshore technology / vehicles / machinery • Digital & creative – software, games
Leeds	• Advanced manufacturing - textiles, bearings, gears, electric motors, metal • Financial & professional services – legal, monetary intermediation, insurance • Health & life sciences - medical devices • Digital & creative – gaming, data analytics, big data, satellite telecoms • Food & drink manufacture • Low carbon/environmental – consultancy, water, waste	**Sheffield**	• Advanced manufacturing & materials – incl. high precision engineering, metals, rail, automotives & aeronautical engineering, manufacturing services • Healthcare technologies – medical devices, advanced wound care, orthopaedics, clinical • Digital / computing – program engineering, software, analytics, data processing • Low carbon – nuclear research • Logistics
Hull & Humber	• Chemicals & petrochemicals – speciality gases, pharma, fibres, glass, biofuels, consulting services • Food / agri-tech • Engineering & manufacturing – marine, healthcare technologies • Energy – offshore wind, turbines • Logistics & ports	**Lancashire**	• Advanced manufacturing, esp. aerospace, automotives • Energy – offshore wind, nuclear • Chemicals • Legal/accountancy • Tourism
Liverpool	• Health & Wellbeing e.g. infectious disease, stratified health, pancreatic disease, paediatrics & e-health/assisted living • Advanced manufacturing – biologics, automotive, chemicals, food/drink, glass & ship building • Creative & digital – big data, virtual engineering, games, advertising & marketing, IoT & sensors • SuperPORT, freight & logistics, marine & maritime • Low Carbon – offshore wind & nuclear • Legal, maritime insurance & wealth management	**Tees Valley**	• Processing – petrochems, pharma, polymers, biotech, nuclear, steel • Advanced manufacturing – incl. in offshore/subsea engineering, automotives, rail • Low carbon – waste processing, renewable energy, hydrogen production • Digital – animation, textiles, film, engineering design • Materials – graphene • Logistics

Source: SQW review of local LEP-level evidence

2.19 Some – but not all – LEPs have explicitly adopted a 'Smart Specialisation' approach in their documentation. Many of the sectors identified under this approach align with those listed above, and demonstrate common specialities across the North in sectors such as Advanced Materials and Manufacturing, Energy and Creative and Digital. For example:

- Sheffield City Region is reported as a 'A world-lead in **Advanced Materials and Manufacturing** by harnessing our creativity in advanced engineering in support of the development of the emerging **Healthcare Technologies Sector**, and to use our strengths in **Software Testing, Data Analytics and simulation** to underpin the development of healthcare industries, and the growing digital sector in the region'.[11]
- In Liverpool, areas of Smart Specialisation listed in evidence include **Health** and Well-Being, **Advanced Manufacturing**, Solutions for Sustainable Growth (**SuperPORT** capabilities and **Low Carbon**), and **Creative and Digital**.
- In the North East, four areas are identified by local partners as potential foci for Smart Specialisation, based on their status as industry-led clusters with innovation and growth characteristics. These include **Passenger Vehicle Manufacturing**, **Life Sciences** and **Healthcare** (including Pharma), **Subsea and Offshore Technology**, and **Digital and Creative** industries (e.g. Games, Software).
- In Cheshire and Warrington, potential areas of Smart Specialisation include **R&D in Advanced Materials, Automotives**, **Engineering and Technical Consultancy**, together with **Chemicals**, **Energy** (with linkages to their emerging Hydrogen Fuel Cell cluster and existing expertise in Nuclear), **Financial Services** and support functions (especially in ICT and legal).
- In Greater Manchester, identified Smart Specialisation 'priorities' have been identified in **Advanced Manufacturing** with strengths in **Advanced Materials, Digital**, and **Financial and Professional Services** as important enablers of the advanced manufacturing and wider sectors.

Conclusion

2.20 The key findings from the data from Section 2 are summarised in the table below. We have drawn primarily on secondary data on sectors, combined with local evidence on sectoral strengths, across the North. In the next Section, we explore wider capabilities and assets associated with these strengths in more detail. Whilst it would be interesting to further understand the supply chain relationships within and across these sectors, this has not been part of the IER remit.

Table 2-1: Key findings from the 'top down' data and 'bottom up' local evidence

	Summary of evidence
Productivity and specialisation	• Strongest performance in performance productivity and specialisation in Petroleum, Chemicals, Pharmaceuticals, Materials (Metal and Non-Metallic Mineral Products), Electricity and Gas. Also relatively strong in Media, Printing/Recording, Financial and Insurance, and Food, Drink and Tobacco manufacture.

[11] Sheffield City Region Local Enterprise Partnership (2014) Sheffield City Region EU Investment Strategy 2014-20, pages 27-28

	Summary of evidence
	• Some specialisation but lower productivity performance in Warehousing, Education, Health, Other Manufacturing and Repair, Textiles, Recreation and Food/Drink services • Average or under-representation at present, but high productivity in manufacturing-support activities (e.g. Architectural and Engineering services, Machinery, Electronics, Motor Vehicles, Other Transport Equipment), Energy (Waste, Water, Sewerage), some services (e.g. IT Services, Other Professional Services) and Transport (Air, Water) • Poor productivity performance across some sectors, including some aspects of manufacturing (e.g. Wood and Paper) and many services (e.g. Public Administration, Legal, Business Support, and Tourism-Related sectors)
Scale and growth prospects	• Many of the North's specialised, high productivity sectors are expected to grow in terms of GVA, but less so on jobs – examples include Materials and Chemicals • A number of sectors where the North currently has average or under-representation have seen rapid recent growth from a small base, such as Architecture and Engineering Services, and IT Services • Sectors that have very low productivity are expected to account for a large share of future jobs growth, such as Business Support Services and Retail Trade.
Local area specialisms	• Widespread specialisms across the North in Advanced Manufacturing and Materials, and Energy – many of which feature in LEPs' references to Smart Specialisation • Reasonably widespread specialisms across the North in Life Sciences, Healthcare Technologies, Digital, Logistics and Tourism • Other specialisms relevant to a smaller number of LEP areas (in so far as their ability to compete on a national/international scale) include Agri-Tech/Food and Financial and Professional Services.

Source: SQW

3. From Sector Strengths to Economic Capabilities

3.1 The previous Section provided a data-driven picture of the North's economy, based on economic sector evidence from national data and Cambridge Econometrics, and evidence drawn from local strategies. Sectors were assessed in terms of productivity as measured by GVA per worker, the degree of specialisation in the North, and the prospects for GVA and employment growth. Essentially, it showed a Northern economy which is made of different elements:

- High productivity sectors with specialisation in the North
- High productivity sectors with 'average' or 'below average' representation in the North
- Lower productivity sectors with specialisation in the North
- Very low productivity sectors (with or without) specialisation in the North.

3.2 As noted in the Introduction, such a data-driven approach has its limitations. The traditional boundaries between sectors are breaking down (many 'manufacturing' firms now generate much of their revenue from the provision of 'services' and after-care), and new 'disruptive' technologies are changing the nature of most markets, business models, and national, regional and local economies. Further, the compartmentalised approach of sector-based data makes no provision for discussion of the relationships between sectors, their supply chain, and the technologies which underpin them.

3.3 Accordingly, to avoid being driven by what is captured in the data rather than taking account of the full economic picture, it is helpful to think about the connections and themes that run within and across sectors. The European Commission's thinking on Smart Specialisation is particularly useful here. One of the more succinct definitions of what Smart Specialisation involves says it is '*about generating unique assets and capabilities based on [a] region's distinctive industry structures and knowledge bases*'.[12] The term 'capabilities' in this instance, refers to long-standing sector-based specialisation (as depicted in Section 2), 'hard' assets (e.g. international class research and development facilities and institutions), and 'soft' assets (e.g. nationally and internationally recognised collaborations, networks, and interrelationships).

3.4 In thinking about the 'offer' at the level of the North, Smart Specialisation requires us to ask:

- Starting with our sectoral specialisms, but thinking more widely about the economy in the round, what distinctive assets and capabilities do we have, and how might these develop for the future?
- How do (or might) our distinctive assets and capabilities relate to technological and market change, recognising that there is little to be gained by excelling in areas which are going to be overtaken by technology and markets, or indeed competitors.

[12] Jucevicius R and Galbuogiene A, 2013, The Dimension of Smart Specialisation in the Business System

3.5 With this in mind, this Section is organised into three parts:

- A summary of global trends and, potentially, disruptive technologies, which are likely to shape the North's economy over the coming years
- Criteria for identifying pan-Northern economic capabilities, and the resulting list of economic capabilities which then flow from these
- More in-depth profiles of the identified capabilities, which are of two types – 'Prime' capabilities (those areas which, at the level of the North, the Review assess as genuinely expert and differentiated at national and international levels) and 'Enabling' capabilities (that is areas where the North has core absolute capabilities, and which are vital to the 'Prime' capabilities achieving their full potential).

Global trends and disruptive technologies

3.6 Whilst there are many uncertainties in life, one thing at least is sure; the North's economy will continue to experience relentless change. A number of global trends set the context in which economic development will occur, including those outlined in Table 3-1 below.

Table 3-1: Summary of key global trends

- **Demographic change** – in particular population growth due to increased life expectancy in developed economies, and high birth rates and declining infant mortality rates in developing countries
- **Increasing levels of urbanisation** – c.70% of the world's population is forecast to live in cities by 2045, with major implications for patterns of production and consumption, as well as the development of agglomeration effects, across the world
- **Resource-pressure** – the demands placed on resources, especially food and water, will increase as population size grows and income levels rise, potentially triggering increased mass migration
- **Environmental concerns** – increased demand on resources will strain the environment. Further, man-made climate change is forecast to increase the risk of extreme weather events and coastal erosion, which in turn could trigger further mass migration
- **Health** – while technological advances are likely to improve the provision of medicine and health care (e.g. improvements in diagnosis, therapeutic treatments, and disease prevention) public health issues (e.g. increasing levels of obesity and diabetes, and an increase in antimicrobial resistant pathogens) are likely to grow and pose new challenges
- **Transport** – technological advances are likely to transform transportation systems and affect mobility for individuals and society
- **Education** – rising levels of education across the world, a blurring of the line between online and offline learning, and the growth of lifelong learning will generate new markets and determine the ability of individuals' and whole economies to adapt to technological and economic change
- **Gender inequality** – leading to under-utilisation of women's skills and resources
- **Information** – advances in data acquisition, storage, and analysis, along with increases in computing power, will interact with other technological developments to transform everyday life and urban living
- **Corruption, cyber-crime and money** – alternative currencies, e.g. Bit Coin, may make international cooperation to control capital flows and sequester the proceeds of crime more difficult, while our growing dependence on information systems will increase vulnerabilities to cyber crime
- **Identity and the role of 'the state'** – resource pressures, climate change, high levels of migration and ongoing fiscal austerity could transform the nature of many nation-states – both in terms of social cohesion, and the mix/balance of services delivered by public, private and voluntary (or not-for-profit) sectors
- **Security and defence** – among other things, ideological and resource-based competition will affect the behaviour of state and non-state actors, affecting levels of spending on defence and

security and the development and maintenance of international alliances, including trading alliances; cyber-defence is also likely to become an increasingly significant area, as technological advances, such as the Internet of Things (see below), become increasingly embedded in everyday life[13].

Source: SQW

3.7 These global trends will be influenced by what are frequently termed 'disruptive technologies', again some of which are summarised below.

Table 3-2: Summary of disruptive technologies

- **Ubiquitous connectivity** via the mobile internet will lead to the creation of new products, services and processes in business and consumer markets, and public services
- **Cloud technology** will enable the growth of internet-based services by minimising the processing power and the storage capacity required on mobile devices
- **The Internet of Things,** where embedded sensors and actuators (for example, motors for moving or controlling mechanisms or systems) will join-up devices to exchange data and/or perform functions. This will increase the need for additional functionality in a wide range of items, thereby requiring their reinvention, as well as helping to generate new processes, products, and services
- **The automation of 'knowledge work'** will make it possible to automate tasks which were regarded previously as the sole domain of humans. Already, software engines can already draw data from company reports and accounts, and autonomously produce articles and assessments for trade journals and newspapers
- **Advanced Materials,** with a wide range of functions and properties coming into play. These are likely to include, self-healing, self-cleaning materials, 'memory metals' that can return to their original shape; piezoelectric ceramics and crystals (which convert pressure into energy), and advanced nanomaterials, e.g. graphene and carbon nanotubes, which are expected to help to create next-generation displays, super-efficient batteries, and solar cells
- **Advanced Robotics** will change production processes and logistics based on advances in machine vision, artificial intelligence, machine-to-machine communication, sensors and actuators
- **Autonomous and near-autonomous vehicles,** such as drones, submersibles, cars and trucks, have the potential to revolutionise transportation and logistics. There are likely to be profound consequences for related industries, such as insurance, given the changed risk profiles which autonomy will encourage
- **3D Printing** (or additive manufacturing) will allow on-demand production for consumers as well as business-to-business applications; 'bioprinted' organs will potentially revolutionise much medical practice
- **Next-Generation Genomics** will use big data analytics in the sequencing and modification of genetic material, helping to revolutionise human health care and animal/plant agriculture
- **Advanced Oil and Gas Exploration and Recovery,** which may make possible the extraction of oil and gas from previously unexploitable reserves
- **Renewable Energy** will enable energy generation without contributing to man-made climate change
- **Energy Storage** technologies, e.g. lithium-ion batteries and fuel cells, will transform the scope for electric and hybrid vehicles, and may transform the scale at which renewables are able to meet demand for electricity[14].

Source: SQW

3.8 The above suggests that while there is significant uncertainty about the nature of change and its implications for economic development, it is possible to identify some of the technologies (and their crossovers) with the capacity to transform economic and social life, they include: new materials; new production processes, e.g. unmanned systems; new ways to generate, store and distribute energy; increased computing power and data analysis; and new health technologies enabling the growth of personalised medicine. As is evident from the analysis in

[13] For more detail see Ministry of Defence, 2014, Global Strategic Trends - Out to 2045
[14] For more detail see McKinsey Global Institute, 2013, Disruptive technologies: Advances that will transform life, business, and the global economy and HM Government Industrial Strategy: Eight Great Technologies

Section 2, there is a relatively good 'read-across' from these technologies to the sectors – and associated economic capabilities – identified as relatively strong in the North. The next sub-section looks at how such a read-across might inform the identification of pan-Northern economic capabilities in these cutting-edge technologies and markets.

Pan-Northern economic capabilities

3.9 In order to situate pan-Northern economic capabilities and strengths, it is sensible to set out the national context in which this assignment sits. In April 2015, the Department for Business, Innovation and Skills submitted its Smart Specialisation Strategy to the EU. In addition to England's research and innovation assets, such as Catalyst Centres and Research and Innovation Campuses, the Strategy identified ten priority sectors: Aerospace, Automotive, Life Sciences, Offshore Wind Energy, Oil and Gas, Nuclear, Information Economy, Agri-tech, Professional and Business Services, and Construction. These sectors also feature in the UK Industrial Strategy (which also includes International Education).

3.10 Alongside these strategies, the UK has also prioritised the 'Eight Great Technologies' which relate to, but are slightly more specific, than the sectors listed above. These encompass Satellites and Commercial Applications of Space, Robotics and Autonomous Systems, Advanced Materials and Nanotechnology, Synthetic Biology, Regenerative Medicine, Energy and its storage, Big Data and Energy Efficient Computing, and Agri-science.

3.11 While it is important not to be bound by these national strategies, they should be borne in mind as pan-Northern strengths are identified – both as a 'sense check' and as a means of identifying potential policy synergies or clashes.

3.12 Against this background, the criteria for identifying pan-Northern economic capabilities have been based on the specification for this Review (and guidance from the Steering Group). This emphasises the importance of *pan-Northern* strengths (as opposed to *local* specialisms), which can contribute towards closing the North's productivity gap (as measured by GVA per job, and assessed in the review's Workstream 1 report) and have clear export capability (based not only on current behaviour, but also allowing for the potential size of global markets). The criteria need also to reflect the questions which underpin the process of Smart Specialisation outlined in paragraph 3.3.

3.13 On this basis, the following six challenges have been used as criteria for determining and framing pan-Northern economic capabilities:

- Are the economic capabilities specialised and distinctive at the level of the North?
- Are there supporting assets and facilities of national (and international) class in place to augment sectoral specialisation and expertise?
- Do the economic capabilities have the potential to lead and/or exploit global trends in market and technology change, this for the North's benefit?
- Are economic capabilities spread across the North (i.e. in multiple LEP areas), rather than being concentrated, as far as possible, this to try and support agglomeration at a larger spatial area.

- Do the economic capabilities perform well in terms of productivity, ideally with productivity above the average of that for England (excluding London)?
- Are the economic capabilities 'outward/market-facing', in so far as they have potential to generate exports and attract inward investment, as the North seeks to add additional value to the UK economic effort?

3.14 Having reviewed the sector-based data and evidence in Section 2, the local evidence from Workstream 2 on local assets and facilities, and significant global trends and disruptive technologies (earlier in this Section), the following four 'Prime' pan-Northern capabilities are proposed:

- **Advanced Manufacturing**, with a particular focus on materials and processes. This capability shows both broad and deep sectoral specialisation across the North, based on historic strengths, and a very strong endowment of pure and applied knowledge assets and facilities in business and higher education.
- **Energy,** in particular expertise around generation, storage, and low carbon technologies and processes. With a long-standing track record in Nuclear Energy, proven record in Offshore Wind Energy, and a growing expertise in battery technologies, the North is well-placed to seize the opportunity for Low/Zero Carbon energy, and Energy portability.
- **Health Innovation.** The North has long-established strengths in Life Sciences, Medical Technologies and Devices, and a growing competence in new and efficient service delivery models brought about by e-health and, crucially, the growing devolution of responsibilities for Health and Social Care.
- **Digital**, focusing in particular on high performance computing, cognitive computation, data analytics, simulation/modelling, and machine leaning but also including sector strengths, such as Media, which will provide a strong base from which the other 'Prime' economic capabilities may build.

3.15 The evidence suggests these capabilities meet the aforementioned criteria for being of pan-Northern significance in their own right, but they also come together to create a distinctive combined offer. As illustrated in Figure 3-3 below, there is a close relationship between Advanced Manufacturing and Energy, especially in the engineering of Low Carbon technologies and equipment ; strengths in Health Innovation complement Advanced Manufacturing/Materials, particularly in terms of Medical Technologies and Therapies; and Digital strengths in Computation, Big Data and Simulation/Modelling play an important role both in Advanced Manufacturing design and modelling and Health Innovation around e-health and personalisation.

3.16 In addition to these 'Prime' economic capabilities, three 'Enabling' economic capabilities which operate at the level of the North, have also been identified. These are:

- **Financial and Professional Services**, which provide essential services to the 'Prime' capabilities, while also possessing the potential to generate employment via 're-shoring' activities currently out-sourced abroad, and 'north-shoring' where services move to the North from London and the South East.

- **Logistics.** With major port developments in the Liverpool and Hull and Humber City Regions, plus developments at Manchester and Robin Hood Airports, logistics will be vital in allowing the proposed prime capabilities to realise their potentials in overseas markets.

- **Education** (primarily Higher Education), which not only provides the research capability and knowledge excellence that underpins the 'Prime' capabilities above, but also by virtue of its intrinsic quality offers serious potential for the internationalisation of activity, both through students, university-university links, and collaborations with global businesses.

3.17 Cutting across the capabilities above, **the North's Quality of Life is an underpinning asset** that supports its economic capabilities. It encompasses urban living, with lower housing costs than those found in London and the South East; varied sporting and cultural offers in venues including SportsCity Manchester, The Lowry in Salford, Tate Liverpool, SAGE Gateshead, Yorkshire Sculpture Triangle, City of York heritage centre; and access to the coast, e.g. Scarborough and Whitby, Blackpool and Morecombe Bay, and the countryside, e.g. four National Parks, namely, the Lake District, North York Moors, Yorkshire Dales and Northumberland. In 2008, Liverpool was the European City of Culture, and this accolade will be passed to Hull in 2017. Manchester will also be the European City of Science in 2016.

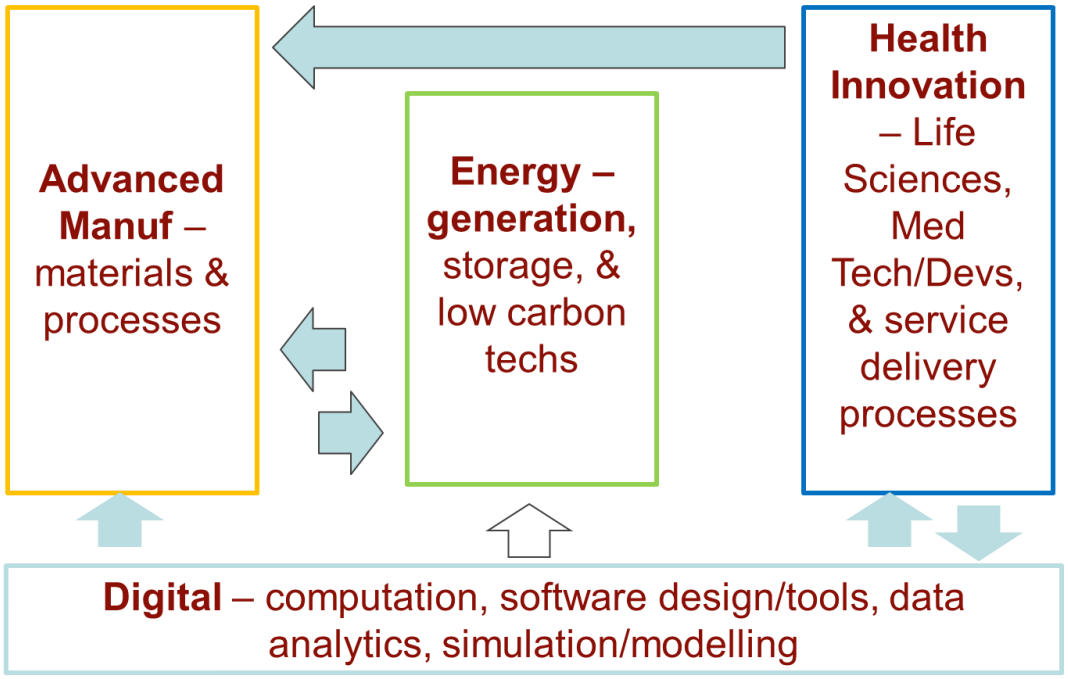
3.18 Quality of life is a critical factor in attracting and retaining skilled workers and inward investment to the North. In this context, there is a particularly strong rationale for a 'joined up' pan-Northern story on the North's quality of life offer. These assets – and the related sectors of Accommodation, Tourism, and Recreation etc – also contribute to the North's export income and are an important source of employment more generally.

3.19 The economic and employment impact of the Visitor Economy is far from straightforward to quantify, as it includes not just these areas of 'direct' employment, but areas where employment is supported by Visitor and Business Spend – for example, on transport, hotels/retail, other services. According to CE's data, there are around 250k jobs in the Accommodation and Recreation sectors in the North, which accounts for around 3% of all jobs. These sectors also account for 2.2% of GVA (c. £5.7bn). If the Food and Beverages sector is added to this mix, to form a proxy for the Tourism sector, the number of jobs rises to around 600k (8% of the north's total) and GVA rises to nearly £12bn (just over 5% of the total).[15] According to Visit Britain, the North of England received nearly 40 million visitors over the course of 2014, indicating the scale and popularity of the tourist offer[16].

[15] Source: CE data
[16] Source: Visit Britain

3.20 The mix of 'Prime' capabilities, enabling ones, and the wider importance of quality of life are brought together in the summary graphic below.

Figure 3-3: The North's 'Prime' economic capabilities and their inter-relationships



Source: SQW

Profiles of the North's 'Prime' Economic Capabilities

3.21 This sub-section provides brief summaries of each of the 'Prime' economic capabilities, in terms of their scope and niche specialisms, significant 'hard' and 'soft' assets, including international-class research facilities, research and business networks and companies, and key drivers and market opportunities that these capabilities could take advantage of[17]. The summaries draw on the above analyses and the local area narratives which have been produced as part of Workstream 2. Annex D provides more detailed descriptions of the assets and businesses that form part of each 'Prime' economic capability.

Advanced Manufacturing - Materials and Processes - Capability

3.22 The North's Advanced Manufacturing Capability is founded on longstanding industrial strengths in materials and textiles, engineering and manufacturing, research and design, and metal and non-metallic production processes. This has produced the North's specialisation in: Pharmaceuticals, Chemicals, Fuels, Metals, Textiles, Food/Beverages, Autos, Machinery, Other Manufacturing, Engineering Services, and aspects of Agri-tech. Running across these sectors are common sets of expertise including:

- The discovery and creation of new materials, such as graphene and the new generation of 2-dimensional materials

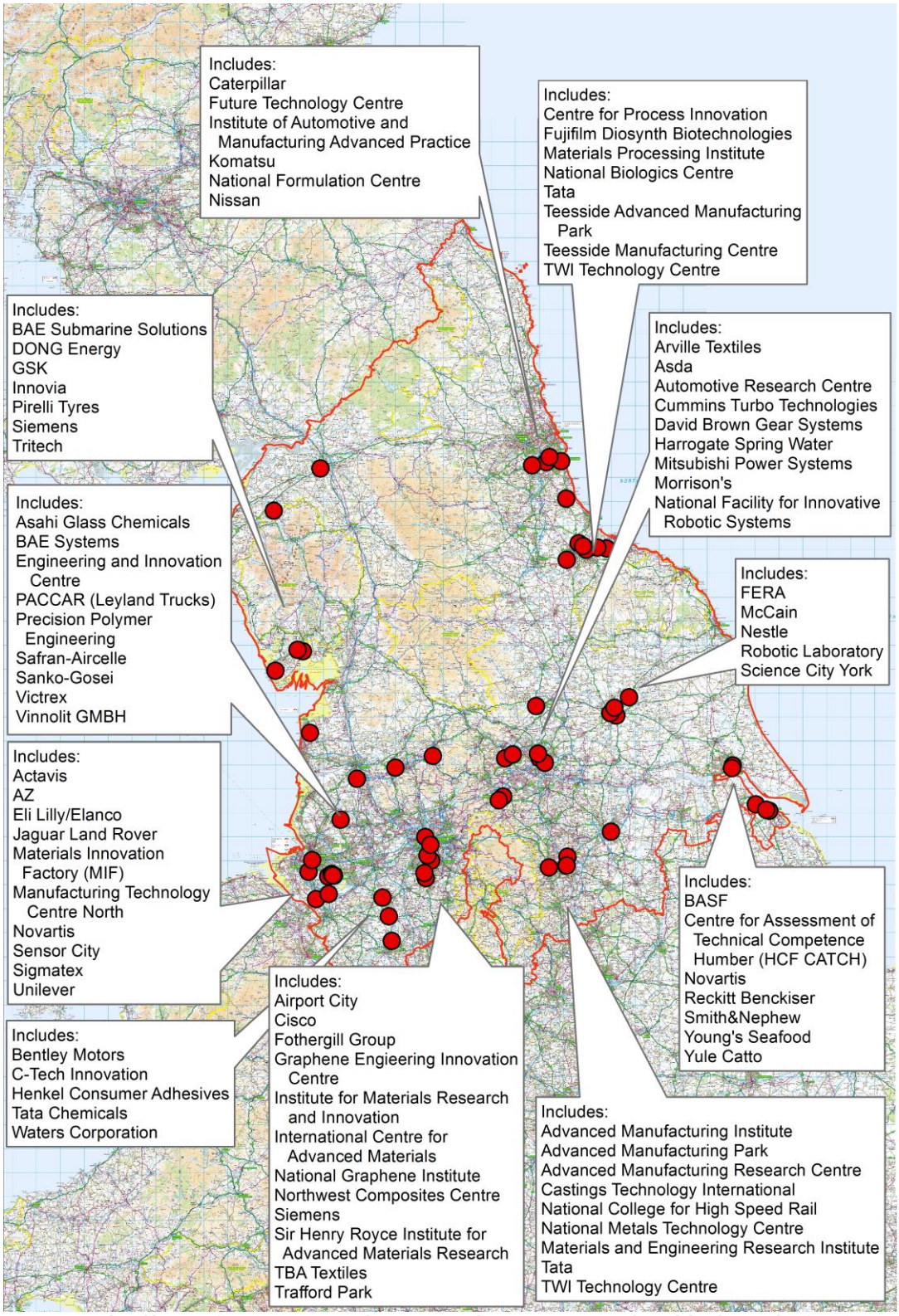
[17] Export data is not available at a sufficiently fine-grained level to provide a realistic picture of exports for the prime capabilities.

- The production of materials, such as smart materials that sense and respond to their environments
- The design of modern manufacturing methods, taking forward techniques such as rapid prototyping, open architecture control, and agile manufacturing
- The operation of advanced manufacturing processes, e.g. 3D manufacture and robotic systems.

3.23 The map below provides a summary of the geographic spread of the North's Advanced Manufacturing Capability. It shows the Advanced Manufacturing Capability is widespread, covering Cumbria, Cheshire and Warrington, Hull and Humber, Lancashire, Leeds City Region, Liverpool City Region, Greater Manchester, North Yorkshire, Sheffield City Region, and Tees Valley. As shown, the North has a number of significant, international-class assets that mark out Advanced Manufacturing as one its 'Prime' economic capabilities. These include:

- Materials
  - **The Sir Henry Royce Institute for Advanced Materials Research** and the Institute for Materials Research and Innovation (Greater Manchester)
  - **The National Graphene Institute** a**nd Graphene Engineering Innovation Centre** (Greater Manchester)
  - **The Textile Centre of Excellence, National Facility for Innovative Robotic Systems and York University's Robotic Laboratory** (Leeds City Region)
  - **BP's International Centre for Advanced Materials** (ICAM) (Greater Manchester
- Processes
  - **The Virtual Engineering Centre (VEC), and the Hartree Centre for High Performance Computing at Daresbury** (Liverpool City Region, Cheshire and Warrington). A new **Virtual Innovation Centre (VIC)** has recently been established in Liverpool to complement the work of the VEC
  - **The High Value Manufacturing Catapult,** including **the Nuclear Advanced Manufacturing Research Centre and the Advanced Manufacturing Research Centre with Boeing** (Sheffield City Region)
  - **The Centre for Process Innovation** (Tees Valley and North East City Region)
  - **Unilever's Advanced Manufacturing Centre and the North West Innovation Centre** due 2017 (Liverpool City Region)
  - **The Food and Environment Research Agency** the National Reference Laboratory for Chemicals in Foods, Pesticides, and Veterinary Drugs, and dioxins and PCBs in feeds (North Yorkshire).
  - **The N8 Research Partnership's** research themes on Agri-Food Science (operating across the North).

Figure 3-4: Asset mapping for the North's Advanced Manufacturing Capability (non-exhaustive)



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3.24 There are also a number of significant, international class companies, including: Arville Textiles Ltd, Asahi Glass Chemicals. BAE Systems, Baltex, Bentley Motors, Biscor Ltd, Bombardier, Chemfix Ltd, Cummins Turbo Technologies, Fothergills, Fujitsu, iTex Fabrics,

Mitsubishi Power Systems, Nissan, Rolls-Royce, Siemens, Sygmatex, TBA Textiles, Unilever, Vauxhall, and Vinnolit GMBH.

3.25 New technologies and environmental concern are generating opportunities for those who can create lighter, stronger components, and materials that sense and adjust to their environment. Discovery, development and exploitation of new and advanced materials will transform processes and products across a range of activities. The North has a successful track record in developing advanced and smart materials and textiles for application across a range of sectors including Medical, Engineering, Construction, Automotive and aerospace. Furthermore, the North is well-equipped to design and develop new robotic and unmanned systems across a range of sectors. The North is also well-placed to build on its capabilities in Engineering, Materials, Health/Genomics, Digital and Data to exploit its strengths in Agri-Tech and Agri-Foods.

3.26 Going forward, it is important that the North:

- Builds on its capability to develop new materials e.g. at nanoscale with the potential to transform entire sectors, such as electronics
- Develops its capability to translate its research expertise into commercial activity, e.g. as with graphene and the next generation of 2D materials
- Links-up its Advanced Manufacturing Capability with its:
  - Energy Capability, e.g. in the storage and distribution of energy using new materials, and the production of low carbon energy through advanced manufacturing processes
  - Health Capability, in terms of new devices and equipment, e.g. bespoke prosthetics from 3D manufacture, and telemedicine via wearable devices with sensors that transmit health data to carers and healthcare professionals
  - Digital Capability in supercomputing and data analytics, as smart materials and textiles capture and transmit data via the 'Internet of Things'.

3.27 This is where the North's communication and networking capability – person-to-person, business-to-business, online and offline – is vital if it is to realise its full economic potential.

Energy Capability

3.28 Energy generation, storage and distribution are essential elements of modern society. The pressures of man-made climate change mean that, along with greater energy efficiency through better designed production processes and products, new methods of low or zero carbon energy generation have to be developed and deployed.

3.29 Currently the North of England is a significant exporter of energy to the rest of the UK – the Leeds City Region alone supplies one-sixth of the UK's electricity.

3.30 The North has specific, distinctive sectoral specialisation in:

- Nuclear research (e.g. Manchester and Sheffield City Regions and Cumbria), nuclear processing (in Cheshire and Warrington, and Cumbria), nuclear power (Cumbria),

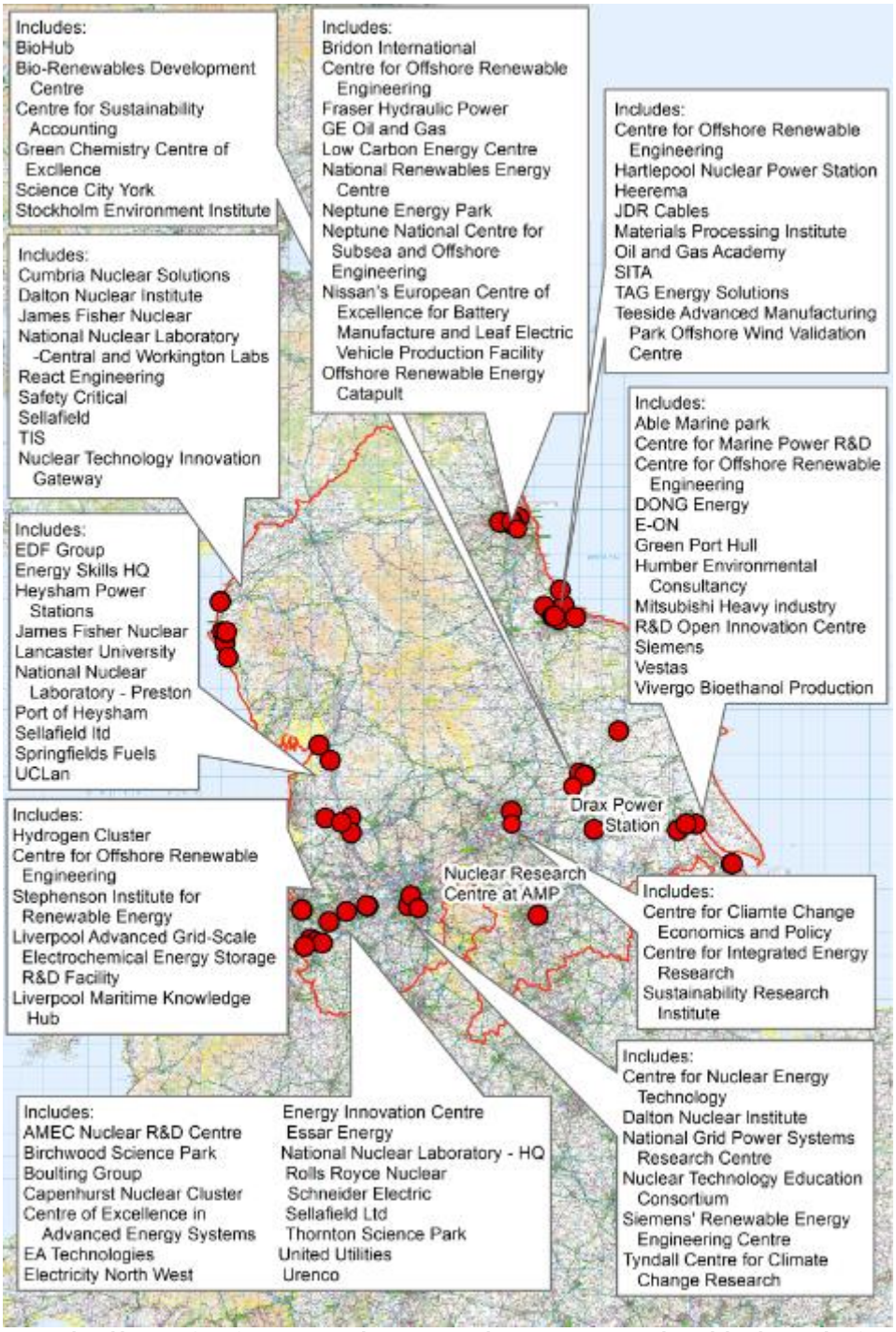
and nuclear de-commissioning and nuclear design-and-construction across a number of LEPs

- Offshore wind energy, with arrays off the East and West Coasts, manufacturing and assembly facilities (including in Hull and Humber, Liverpool, North East, and Tees Valley City Regions) and supply chain capabilities (including in Leeds and Sheffield City Regions)
- A range of technologies, including Waste to Energy (Tees Valley), Biomass (e.g. Leeds City Region and Tees Valley), Hydrogen production (Liverpool City Region and Tees Valley), and small hydro, as well as Onshore Wind, across the North
- Electricity distribution and control apparatus (Leeds City Region)
- Offshore/Subsea Engineering (Cheshire and Warrington, Tees Valley, and the Hull and Humber, Liverpool, and North East City Regions)
- Environmental, energy, engineering consultancy and business services (Lancashire, Hull and Humber City Region and Leeds City Region).

3.31 Thus, the North has a long-standing sectoral strength in Energy and has adapted to changing technologies and regulatory requirements. The North's Energy Capability is bolstered by its Advanced Manufacturing Capability, which means that many of the elements in the Energy sector's supply chain are located in the North.

3.32 The map below provides a summary of the geographic spread of the North's Energy Capability. It shows the Energy Capability is widespread, covering Cumbria, Cheshire and Warrington, Hull and Humber, Lancashire, Leeds City Region, Liverpool City Region, Greater Manchester, North Yorkshire, Sheffield City Region, and Tees Valley.

Figure 3-5: Asset mapping for the North's Energy Capability (non-exhaustive)



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3.33 In support of the capability, the North has a number of significant, international-class assets in Energy, including:

- **The Dalton Nuclear Institute** (Cumbria and Greater Manchester)
- The **National Nuclear Laboratory** (Cumbria)
- The **Urenco/Capenhurst** Uranium enrichment plant (Cheshire and Warrington)

- The **Nuclear Research Centre at the Advanced Manufacturing Park** (Sheffield City Region)
- The **Centre for Integrated Energy Research** (Leeds City Region)
- The **Stephenson Institute for Renewable Energy** (Liverpool City Region)
- **Centres for Offshore Renewable Engineering** (Hull and Humber, Liverpool, North East, Tees Valley City Regions)
- Mobile energy technology, including Nissan's European Centre of Excellence for battery manufacture and Leaf Electric Vehicle Production Facility (in the North East City region)
- **The National Renewable Energy Centre** which is part of the Offshore Renewable Energy Catapult (North East City Region).

3.34 A number of significant companies are located in the North, including: Air Products, Amec Nuclear Ltd, Ceres Power, DONG Energy, EDF, GE Oil and Gas, Sellafield Ltd, Siemens, Springfield Fuels, United Utilities and Vivergo.

3.35 Thus, the North has the core capabilities and the associated complementary capabilities required to respond to the structural changes which are taking place in the Energy sector. However, it has to be recognised that the sector's development is in many ways driven by forces outside the North's control, e.g. regulation of the sector; policies on taxation and subsidies; public procurement; and international oil and gas prices, which are themselves affected by geopolitical as well as economic, technological and regulatory considerations. In order for the North to realise its potential in this area, less uncertainty in these wider drivers of change will be required; therefore the assistance requested from central government may be of a different order to that requested for the other Capabilities.

Health Innovation Capability

3.36 The North has a number of Health Sector specialisms, which mean it is well-placed to generate and deploy health innovation and technologies. These are founded on long-standing research strengths in Life Sciences, combined with long-established strengths in manufacturing, including Pharmaceuticals (in Manchester, Cheshire and Warrington, Tees Valley and the Liverpool City Regions, and Cumbria) and Medical Devices (in the Leeds City Region). The North also has international-class capabilities in drug discovery (e.g. in the Manchester and Liverpool City Regions), clinical trials (e.g. in Greater Manchester, and the Leeds and Liverpool City Regions); and specialisms in ageing, cancer, paediatrics, orthopaedics, advanced wound care, biologics and biotechnology. The North, under new devolution arrangements for Health and Social Care budgeting, is also very well-placed to explore new delivery models for providing and personalising health services.

3.37 The map overleaf provides a summary of the geographic spread of the North's Health Innovation Capability. It shows the Health Innovation Capability is widespread, including Cheshire and Warrington, Leeds City Region, Liverpool City Region, Greater Manchester, Sheffield City Region, North East City Region, and Tees Valley.

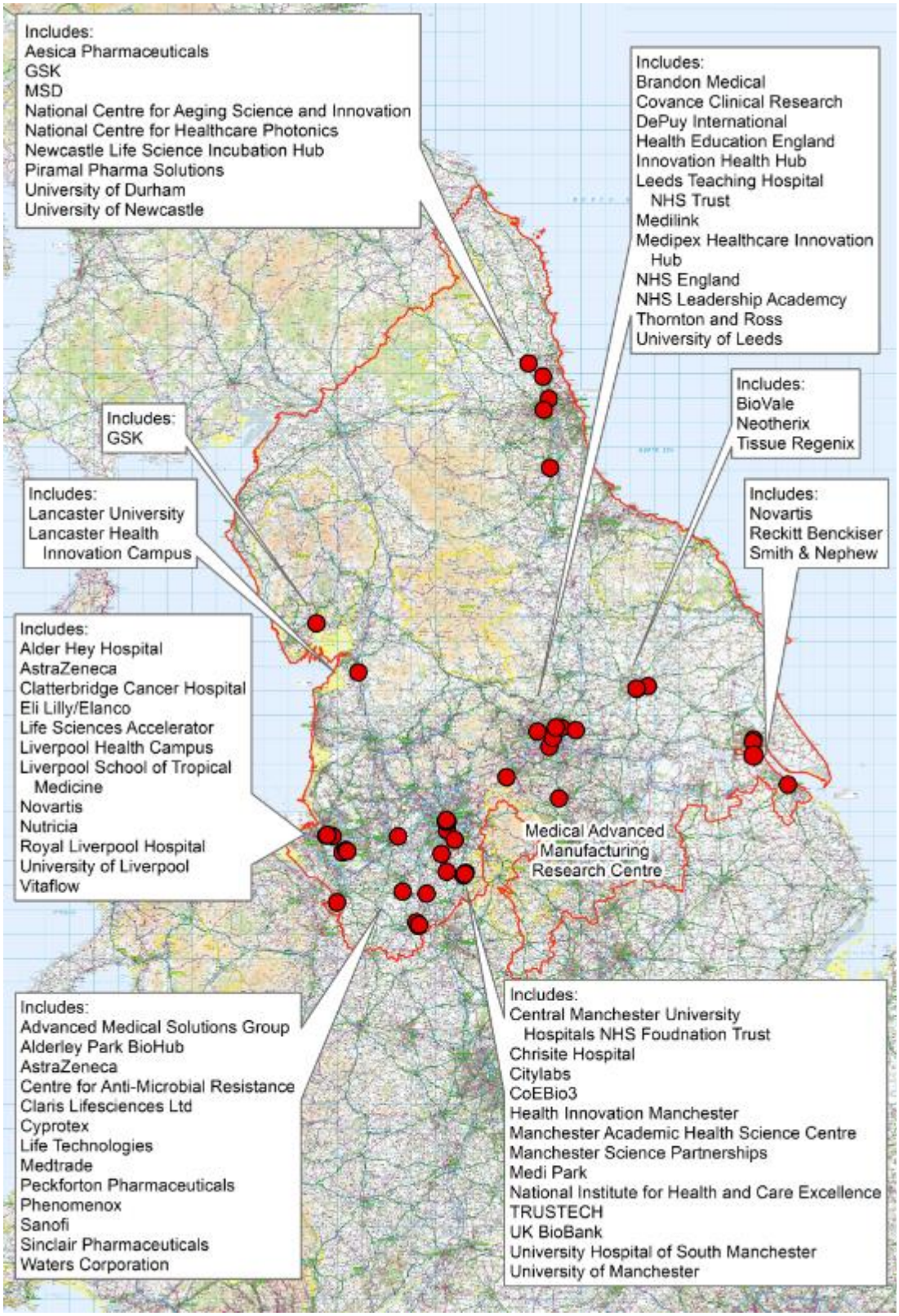
3.38 In addition to its international-class teaching hospitals, the North has a number of key assets that underpin this capability, including:

- **The Manchester Life Sciences Corridor**, including Manchester University, Christie Hospital (Europe's largest single-site cancer centre), the UK BioBank, one of only two UK Proton Beam Therapy Facilities (due 2018) and a number of health charities (Greater Manchester), which links onto the **Alderley Park Campus** (Cheshire and Warrington) and its **new proposed international centre of expertise in Anti-Microbial Resistance (AMR)**
- **Liverpool University's School of Tropical Medicine**, and the Liverpool biologics cluster (Liverpool City Region)
- NHS England HQ, Medical Technologies Innovation and Knowledge Centre, Medipex Healthcare Innovation Hub and Medilink (Leeds City Region)
- The **Medical Advanced Manufacturing Research Centre** (Sheffield City Region)
- **Durham University's Biophysical Sciences Institute**, **Newcastle University's Campus for Ageing and Vitality, the National Centre for Ageing Science and Innovation, the Institute for Ageing,** and **National Biologics Manufacturing Centre** (North East City Region)
- **The Wolfson Research Institute for Health and Wellbeing** (Tees Valley)
- **The N8 Research Partnership's** research themes on Life Sciences and Regenerative Medicine (across the North)
- **Running across these are the activities and capabilities of the Northern Health Science Alliance (NHSA).**

3.39 A number of significant businesses operating in the health innovation field are located in the North, including: Actavis, Advanced Medical Solutions Group, AstraZeneca, Bionow. Claris Lifescience, Cyprotex, Eli Lilly/Elanco, GSK, Merck, Phenomenex, Life Technologies, Lupin Europe Ltd, Medtrade, Novartis, Peckforton Pharmaceuticals, Sanofi, Sanofi-Avensis, Sinclair Pharmaceuticals, Smith and Nephew, and Waters Corporation.

3.40 As noted above, the Health sector is facing long-term social trends (e.g. ageing populations in developed economies and the growth of antimicrobial resistant pathogens). At the same time it is experiencing rapid technological advances in computing and data analytics that affect public health, drug discovery and development, and the personalisation of medicine. And it is also exploiting new manufacturing processes, e.g. 3D printing for prosthetic limbs and organs. Given the North's complementary capabilities in Big Data, Robotics, Synthetic Biology, and new Advanced Materials, it is in a strong position to undertake world-leading health innovation.

Figure 3-6: Asset mapping for the North's Health Innovation Capability (non-exhaustive)



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Digital Capability

3.41 The digitisation of everyday life is moving apace and transforming the way people live, how they do business, and the manner in which research is conducted. Digital Capability – from 'hard' infrastructures with computation strength to permit modelling and simulation and to unlock the 'big data opportunity' in all its forms to 'soft' infrastructure of clusters of research institutions and businesses – is now a necessary condition for economic success.

3.42 The North has long-established strengths in Computer Engineering, Hardware and Programming (e.g. in the Liverpool, Manchester, and Sheffield City Regions and Tees Valley) and Telecommunications and Satellites (e.g. in the Leeds, Manchester and Sheffield City Regions); plus more recent specialisms in Big Data, Data Analytics, Interactive Media/simulation and Software Development (e.g. in the Leeds, Liverpool, Manchester and North East City Regions) and Smart Sensors, Detectors, and Autonomous Systems (e.g. in the Liverpool City Region and Greater Manchester). Furthermore, one of the UK's three standalone internet exchanges is in Leeds, and The Hartree Centre for high performance computing at Daresbury is home to the world's 30th most powerful computer.

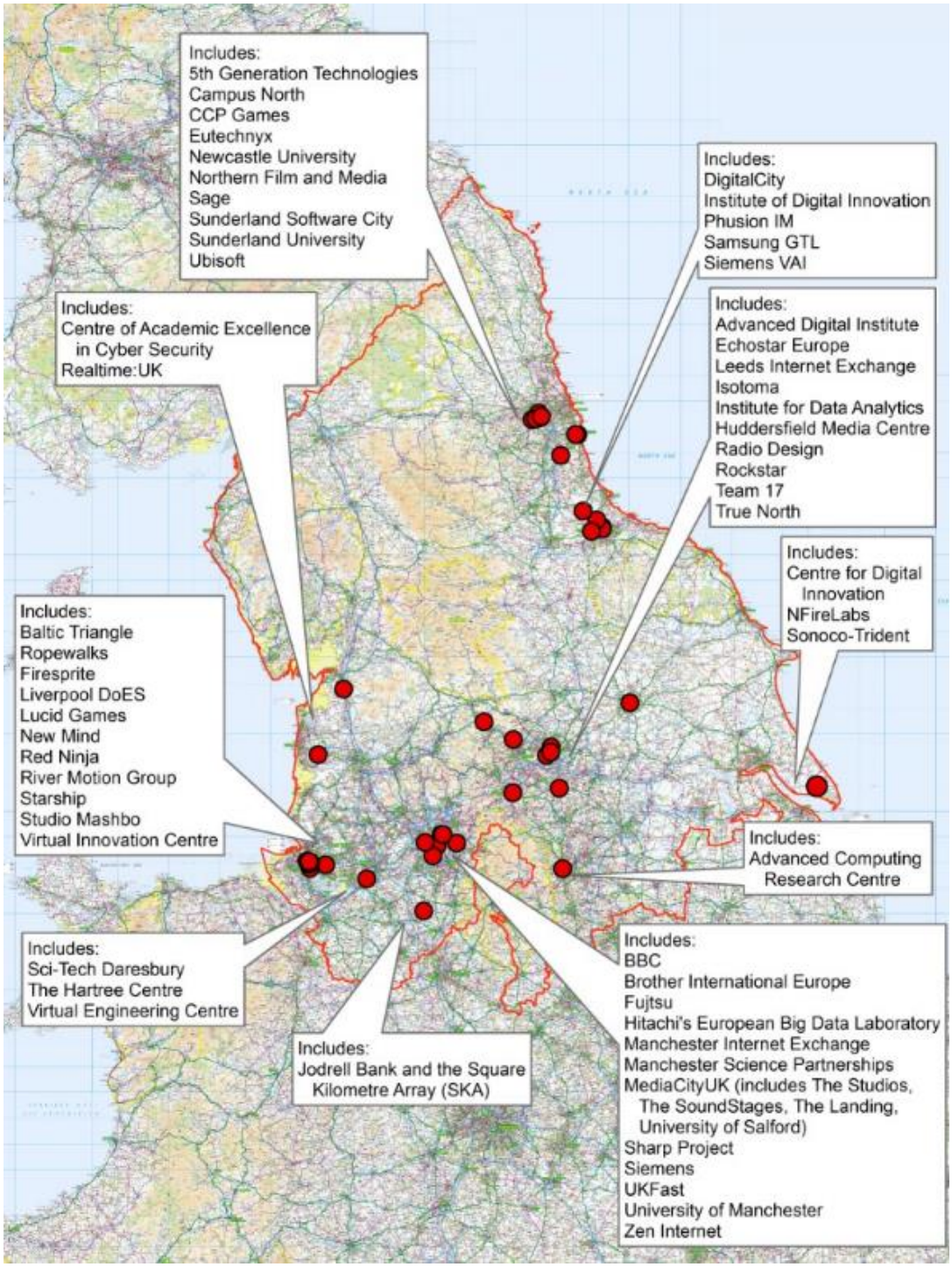
3.43 The map overleaf provides a summary of the geographic spread of the North's Digital Capability. It shows that Digital Capability is widespread, including Cheshire and Warrington, Leeds City Region, Liverpool City Region, Greater Manchester, Sheffield City Region, North East City Region, and Tees Valley.

3.44 The North has nationally and internationally significant assets underpinning its Digital Capability, including:

- **The Hartree Centre for High Performance Computing** (Cheshire and Warrington, and the Manchester and Liverpool City Regions). The Hartree Centre also hosts **IBM's UK Research Office,** which provides UK access to £200m of IBM's intellectual property
- The **Advanced Computing Research Centre** (Sheffield City Region)
- Hitachi's **European Big Data Laboratory** and **MediaCity** and its production facilities including The Studios, Soundstages at the Pie Factory, and **The Landing** (Greater Manchester)
- Leeds' **Institute for Data Analytics and Advanced Digital Institute** (Leeds City Region)
- Lancaster University's **Centre of Academic Excellence in Cyber Security** (Lancashire)
- **Sunderland Software City and Campus North** (North East City Region)
- **The Institute of Digital Innovation** (Tees Valley).

3.45 A number of significant businesses operating in the digital economy are located in the North, including: the headquarters of Brother International Europe, Echostar Europe, Eutechnyx, Fujitsu, Intel, Isotoma, OCF, Optis, Phusion, Red Ninja, Rockstar, Sage, Samsung GTL, Siemens, Starship, Team 17, Ubisoft and Umbrella Studio. On the back of investment in The Hartree Centre at Daresbury, IBM is locating its UK centre for research at the facility.

Figure 3-7: Asset mapping for the North's Digital Capability (non-exhaustive)



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3.46 As noted above, Big Data and data analytics, in conjunction with other capabilities, e.g. sensors, and robotics (Advanced Manufacturing), and the opportunities being created in health devolution (Health Innovation), will drive fascinating new process, product innovations, and service delivery models. These cross overs and synergies will generate cost efficiencies in design/modelling/prototyping and delivery, and promote increased productivity in a range of sectors. The North is ideally placed to build on its strengths and generate the discoveries that will drive productivity improvements across the whole economy.

Profiles of the North's 'Enabling' Economic Capabilities

3.47 This sub-section provides short profiles of the North's 'Enabling' economic capabilities; which, both in their own rights and through interactions with firms and organisations in the 'Prime' economic capabilities will exert significant influence over the North's long-term economic development.

Financial and Professional Services Capability

3.48 As noted in Section 2, the Financial and Professional Services sector operates at scale in Leeds City Region and Greater Manchester where there are strengths in Finance and Banking, Insurance, Legal, Accounting and Real Estate. There are also niche specialisms in Cheshire and Warrington (Legal and ICT Support) and Liverpool (Maritime Insurance and Wealth Management). This recognised, much of the sector in the North serves local markets.

3.49 The North has a number of research assets which support and enhance its capability in Financial and Professional Services, including the Credit Management Research Centre and the Institute of Banking and Investment (at Leeds University Business School) and the Centre for the Analysis of Investment Risk (at Alliance Manchester Business School).

3.50 The head offices of a number of major financial institutions are also located in the North, including the Co-operative Bank in Greater Manchester, Virgin Money and Tesco Bank in Newcastle, and First Direct, and Skipton, Yorkshire, and Leeds Building Societies in the Leeds City Region.

Logistics Capability

3.51 While Warehousing and Distribution are general low added value services, moves to increasingly sophisticated business models, built on 'smart' logistics technologies offer the scope for increased value added going forward. Above and beyond logistics 'as a sector', the enabling ability to move goods and product within the North, across the UK, and internationally is vital, with resilient and effective logistics (and transport) key to the 'Prime' capabilities' ability to trade in export markets.

3.52 The North has particular strengths in Freight, Logistics, and Warehousing e.g. in Hull and Humber, the Leeds, Liverpool, Manchester, and Sheffield City Regions, as well as in North Yorkshire, Tees Valley, and Cheshire and Warrington. Reflecting its unique geography, the North is well-served by sea ports. Immingham – with bulk handling, Roll-On Roll-Off and Load-On Load-Off capability – is the largest port in the UK by tonnage. Hull has the UK's first fully-enclosed cargo-handling facility providing all-weather working. Grimsby is a major car import and export gateway; while Goole is an inland port increasingly specialising in Logistics. Furthermore, Able Humber Port, on the South Bank of the Humber, is under development. TeesPort handles over 5,000 vessels a year and around 40m tonnes of cargo. Its estate covers around 800 acres and forms part of a wider industrial area. It is an important part of the infrastructure that allows the North East to be a net-exporting region.

3.53 The ports in Liverpool City Region, which already play a significant role in the North's economy, are undergoing major investment currently, in the form of Liverpool SuperPort, which will have Post-Panamax and associated capabilities, capacity to accommodate two

13,500 TEU ships at the same time, and the capability to handle 95% of the world's container vessels. Furthermore, Manchester Ship Canal allows shipping lines and cargo owners to connect deep-sea cargo with the inland container hubs, providing a cost- and carbon- efficient route to market for the North.

3.54 The North of England also accounts for a substantial proportion of British freight transport, in particular rail, with 56% of total rail freight lifted to, from or within the region. A significant volume of rail freight is moved within Yorkshire and the Humber. Links to ports are particularly important and the Port of Immingham, in South Humberside, is the single largest source of UK rail freight, generating about 25% of the national total. This is largely coal imported through Immingham and moved to the Aire Valley power stations, and iron ore moved to Scunthorpe steel works.

3.55 In addition, major international airports – such as Manchester, Liverpool, Newcastle and Leeds/Bradford – play an important role as international gateways to the North, key for both product and service trading. Manchester Airport is one of only two airports with two-runway capability in the UK. There are also major warehousing and distribution centres in Cheshire and Warrington, Leeds, Liverpool, Manchester, and Sheffield City Regions. Airport City (covering up to 5m ft^2 of hotels, offices, Advanced Manufacturing, Logistics facilities and Retail space) adjacent to Manchester Airport will make a significant contribution to the logistics offer in the North.

3.56 Combined, the North's logistics assets have the potential to provide increasingly important capacity for the UK, especially in the context of growing levels of trade entering the UK via ports (and increasing pressure on the South's capacity in this respect).

Education Capability

3.57 There are 32 higher education providers in the North (in, Bradford, Chester, Cumbria, Durham, Huddersfield, Hull, Lancashire x3, Leeds x4, Liverpool x5, Greater Manchester x6, Newcastle x2, Sheffield x2, Sunderland, Teesside, and York x2) with over 520k students (or 28% of England's total)[18]. The research-intensive universities of Durham, Lancaster, Leeds, Liverpool, Manchester, Newcastle, Sheffield, and York scored higher than three out of four in the most recent Research Excellence Framework (REF) exercise. In addition, two of these Universities, Manchester and Leeds, rank in the top ten in the country in terms of their overall 'Power' score, a measure of research capability and quality[19], and three, Sheffield, York and Manchester, rank in the top 20 for research capability/quality per member of staff [20]. All of the aforementioned Universities work together under the umbrella organisation The N8 Research Partnership.

3.58 As highlighted in the profiles above, the research capabilities of the North's universities provide a vital contribution to its 'Prime' economic capabilities with significant research capability and facilities. Analysing research capability and quality data (REF Power and GPA

[18] Defined with reference to HESA 2013/14 student data and addition of Liverpool School of Tropical Medicine
[19] The total quality assessment of an institution, incorporating volume and capability aspects of research. It is essentially a measure of total capability.
[20] GPA is Power divided by number of staff submitted, giving an indication of the overall quality of the Institution's research capability.

performance data) for departments relevant to the North's 'Prime' capabilities at the eight Universities listed above indicates strengths in the following areas:

- **Advanced Manufacturing** – relatively high performance in Engineering-related disciplines, including the University of Lancaster's mathematical science department ranked fifth out of 53 in mathematical sciences, and the universities of Manchester and Leeds ranked highly for GPA and Power in Aeronautical, Mechanical, Chemical and Manufacturing Engineering and Electrical and Electronic Engineering, Metallurgy and Materials.

- **Energy** – the University of Liverpool has the second highest GPA (out of a total of 37 Universities) in Chemistry, The Universities of Manchester and Durham rank highly for Physics based on both GPA and Power measures, and the University of Leeds has the second highest Power ranking and fifth highest GPA ranking in Earth Systems and Environmental Sciences.

- **Health Innovation** – in Biological Sciences, the University of Manchester ranks fourth out of 44 for Power, while the University of Sheffield and Newcastle rank joint fifth for GPA.

- **Digital** – the Universities of Manchester and York both rank highly in the area of Computer Science and Informatics in both GPA and Power terms. BlueGene/Joule at The Hartree Centre, a major digital infrastructure asset for the North, is one of the world's most powerful computational facilities.

3.59 **Higher Education in the North also generates significant export income via overseas students**: in 2013/14, there were almost 90k non-UK students studying at HEIs in the North[21]. Two Northern universities are in the top five in England for foreign student numbers: the University of Manchester is second with 12k foreign students, and the University of Sheffield is fourth with 8k. Other significant contributors to education exports from the North are the Universities of Leeds, Liverpool, Newcastle and Sunderland, who all have roughly 6k foreign students so rank in the top 20 in England. Overall, the value of Northern HEI exports could be around £0.5bn per year in tuition fees alone[22]. Importantly, **the international business activities of the North's universities are not only remunerative, but they provide access to international alumni, and through these provide the North with access to wider networks overseas.** The North's universities links, through R&D collaborations, with private sector businesses, are a further asset with which the North can position itself as an integral part of the global economy, with key expertise in its 'Prime' capabilities.

3.60 More widely, the sector also helps to **generate the skilled workforce** (if retained in the North) that should attract and retain employers; thereby contributing to the development of agglomeration effects within City Regions and also at the level of the North.

[21] Source: HESA

[22] A research paper from the Department for Business Innovation and Skills, "Estimating the value to the UK of Education Exports" (June 2011) estimated that in 2008-09, HE tuition fee income to the UK from foreign students was worth around £2.5 billion. Based on HESA data on student enrolments by HE provider in 2014/15, around 20% of foreign students were studying at a HEI in the North of England, suggesting that around one fifth of the total HE tuition fee income to the UK can be attributed to HEIs in the North.

Quantifying the scale of the 'Prime' and 'Enabling' capabilities

3.61 Whilst the 'Prime' and 'Enabling' capabilities are very much more than sectors alone – in essence, they are bundles of sectoral specialisms linked with hard and soft knowledge and innovation assets in the North's wider economy - it is possible to provide a very broad estimate of scale by building up from 'best fit' 4-digit sector SIC codes in CE's model. This is not a precise measure – some of the capabilities are narrower than the SIC codes allow, others will be absorbed by much broader SIC codes; and some SIC codes contain a combination of higher and lower productivity activities which the Reviewers are not able to disaggregate further in the SIC coding system. The figures presented in Table 3-1 should therefore be treated with caution. **Overall, the 'Prime' and 'Enabling' capabilities account for somewhere in the region of 2.1m jobs and just over £100bn in GVA, representing around 30% of all jobs in the north and just over 35% of GVA.**

Table 3-1: Approximate scale of 'Prime' and 'Enabling' capabilities in GVA and jobs, 2013

	GVA, £2011m, 2013	% of all Northern GVA	Jobs, 2013	% of all Northern jobs
Advanced Manufacturing[23]	31,500	10.9%	520,000	7.2
Energy[24]	9,200	3.2%	111,000	1.5
Health Innovation[25]	16,700	5.8%	540,000	7.4
Digital[26]	8,400	2.9%	129,000	1.8
'Primes' sub-total	**65,700**	**23%**	**1,300,000**	**18**
Financial and Professional Services[27]	19,500	6.8%	368,000	5.1
Logistics[28]	12,700	4.4%	364,000	5.0
Education[29]	3,700	1.3%	109,000	1.5
'Enablers' sub-total	**36,000**	**12%**	**841,000**	**12**
'Primes' and 'Enablers' Grand Total	**101,600**	**35.3%**	**2,140,000**	**29.6**

Source: SQW analysis of Cambridge Econometrics' data

[23] This includes, for example, Chemicals, Pharmaceuticals, Manufacture of Basic metals and Machinery, Engineering Activities and related Technical Consultancy, and other Research and Experimental Development on Natural Sciences and Engineering, but not sub-sectors such as the Manufacture of Clothes, Rubber, Ceramics etc.
[24] This includes some Mining, Extraction of Petroleum and Gas and Supporting Activities, Manufacture of Coke and Refined Petroleum Products, Manufacture of Batteries, Electricity and Gas, Water, Waste, Sewerage, and Environmental Consulting activities.
[25] This includes, for example, Manufacture of Medical and Dental Instruments and Supplies, Research and Experimental Development on Biotechnology, Hospital Activities, Specialist Medical Practice Activities, but not, for example, Residential Care and Social Work
[26] This includes, for example, Software Publishing, Wireless and Satellite Telecommunications, Computer Programming, Consultancy and Related Activities, and Data Processing, but not, for example, Publishing of Books, Periodicals and other Publishing Activities
[27] This includes, for example, financial service activities and insurance, and associated auxiliary services, and legal, but not, for example, architectural activities, advertising or management consultancy activities
[28] This includes, for example, land, water and air transport, warehousing, and postal activities
[29] This relates to Higher Education

Conclusion

3.62 This Section has outlined some of the major economic, social and environmental trends that will drive change over the coming years. It has identified four 'Prime' economic capabilities – Advanced Manufacturing, Energy, Health Innovation, and Digital – based on established sectoral specialisms, hard and soft assets and facilities, and technological and market trends. It has also identified three 'Enabling' capabilities – Financial and Professional Services, Logistics, and Education – which are not only have significant economic impact in their own right but which will support the development and growth of the 'Prime' economic capabilities. And it has highlighted the underpinning capability of the North's Quality of Life.

4. Conclusions

4.1 This closing Section summarises the key findings to date and highlights some of the early considerations for policy-makers.

Summary of Findings

The Evidence Base

4.2 The North is home to a number of high productivity specialisms that are evident in both the 'top down' data and the 'bottom up' local evidence and widespread across the geography. These include Manufacturing, Chemicals, Pharmaceuticals, Materials and Energy. Other sectors where the North is specialised (according to data) do not perform as well in terms of productivity – these including Health and Education – but as illustrated in the local evidence, the North has some key strengths within these sectors that are much higher value added activities, such as Healthcare Technologies and Medical Devices.

4.3 Media and IT services perform well in terms of productivity. The North has some specialisations within these sectors (such as Computing Software, Data Analytics and Big Data which are highlighted in local evidence), and GVA generated by IT Services in particular is expected to grow rapidly in future (from a relatively large base in the North). Other sectors which are prioritised by some LEP areas and offer productivity advantage, but are less widespread across the North (in terms of their national/international strengths) include: Agri-Tech, which links in various ways to wider strengths in Engineering, Chemicals and Digital; and Financial and Professional Services, where some LEPs have niche specialism but elsewhere the sector primarily serves local demand.

The proposed pan-Northern 'Prime' and 'Enabling' capabilities

4.4 Based on the analysis of the 'top down' data on specialisms and productivity performance, combined with 'bottom up' local evidence on wider knowledge and innovation assets (both hard and soft), four 'Prime' capabilities emerge, largely self-evidently. These have been identified based on the fact that they are specialised and distinctive across the North, are nationally and internally competitive, offer export and inward opportunities, and are high productivity activities (and, so, growth in these areas should contribute towards closing the North's productivity gap).

4.5 The four 'Prime' capabilities are:

- **Advanced Manufacturing**, with a particular focus on materials and processes
- **Energy,** in particular expertise around generation, storage, and low carbon technologies and processes, especially in nuclear and offshore wind
- **Health Innovation,** with a focus on Life Sciences, Medical Technologies and Devices, and a growing competence in new service delivery models brought about by e-health and devolution in Health and Social Care funding

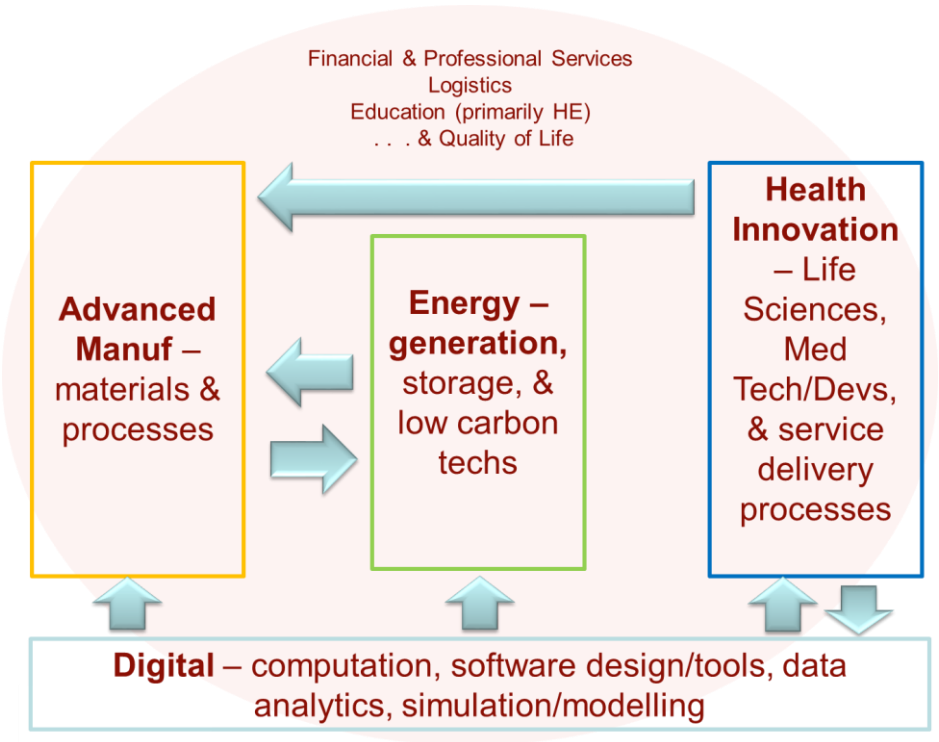
- **Digital**, focusing in particular on computation, software tools/design and content, data analytics, and simulation/modelling, and wider strengths in media.

4.6 They are supported by three 'Enabling' capabilities which will play a critical role in supporting the growth and development of the 'Prime' capabilities. These are:

- **Financial and Professional Services**, which provide essential services to businesses in the 'Prime' economic capabilities, and offer opportunities in terms employment growth via 're-shoring' activities.
- **Logistics**, particularly linked to port activity and airport development, recognising the criticality of resilient logistics capability and good transport to enable the 'Prime' capabilities to perform in overseas markets.
- **Education** (primarily Higher Education), which offers research capability and technical expertise that underpins the 'Prime' capabilities above, provides access to global networks, and also provides a supply of skilled labour and export strengths in its own right.

4.7 The capabilities combine to create a distinctive combined offer for the North. As illustrated in Figure 4-1, there are interplays between Advanced Manufacturing and Energy (e.g. in the engineering of Low Carbon technologies and kit) and Health Innovation (e.g. Medical Devices), and Digital strengths in Computation, Big Data and Simulation/Modelling play an important role both in Advanced Manufacturing design and Health Innovation specialisms around precision medicine and service personalisation . Cutting across these economic capabilities, **the North's Quality of Life is an underpinning asset** that supports its economic capabilities, particularly in providing an attractive place for people to work, invest in, and visit.

Figure 4-1: The North's 'Prime' and 'Enabling' economic capabilities and their inter-relationships



Source: SQW

Consequences for Consideration

4.8 The proposed 'Prime' and 'Enabling' sectors stack-up against the criteria for specialisms of Pan-Northern significance – they are genuinely specialised and distinctive, strong on productivity and export potential, and are prevalent generally across the North. They have been received positively during the series of presentations to stakeholders – Northern and national during December 2015 and January 2016 the 'Shop Window' of the North's current and future potential excellence. However, they do pose a number of considerations for the Review, which Workstream 4 will reflect on further. Specifically:

- Many of the relatively specialised sectors in the 'Prime' capabilities' have projected GVA growth and export potential, but are more limited in terms of future jobs growth. This raises questions around how the North can increase (high value) jobs in these areas, as well as GVA, with implications for policy around skills development, the supply of labour, enhancing entrepreneurship, and supporting wider supply chains in particular.

- As illustrated above, there is scope to enhance and better integrate linkages *within* and *across* capabilities across the Northern economy, which could play an important role in realising the North's aspirations. This will inevitably have implications for the wider economy ecosystem, especially in terms of the labour market, knowledge base etc.

- Outside of the proposed capabilities, much of the projected job growth in the North's economy is in lower productivity service sectors which lack distinctiveness (the North does not look particularly different from anywhere else) or export potential, but are important job creating sectors, including at lower skills/entry levels. These sectors are therefore an important part of the economic solution going forward, especially in light of the emerging findings from Workstream 1 which suggest the North's underperformance in employment rates accounts for a relatively large share of the North's prosperity gap. This has implications for policy related to business support, transport connectivity and skills development that can help to raise the efficiency (and productivity) performance of these sectors.

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Annex B: Detailed Data Analysis

Sectoral Strength

GVA

B.1 In the table below, the North's Location Quotient (LQ) is presented for GVA, whereby the share of GVA generated in each sector in the North is compared to the equivalent share across England (excluding London) as a whole. A value of 1 means that the sector is as represented in the North as England excluding London; a value of above 1 indicates a sector is over-represented or 'specialised' in the North compared to England excluding London; and a value of less than 1 indicates a sector is under-represented in the North compared to England excluding London. The table then presents changes in specialisation between 2000 and 2013, and expected changes through to 2030.

Table B-1: Northern GVA – LQs and changes in specialisation

	LQ, 2013 (1.0 = same as England excl. London)	**Change in LQ 2000/13**	**Change in LQ 2015/30**
LQ > 1			
8 Chemicals, etc.	**1.7**	0.2	-0.4
4 Textiles etc.	**1.5**	-0.1	0.0
7 Coke & Petroleum	**1.5**	-0.7	0.0
9 Pharmaceuticals	**1.4**	0.2	0.0
42 Residential & Social	**1.4**	-0.2	-0.2
11 Metals & Metal Prods.	**1.4**	0.1	-0.1
5 Wood & Paper	**1.4**	-0.1	0.0
10 Non-Metallic Min. Prods.	**1.4**	0.1	-0.2
3 Food, Drink & Tobacco	**1.3**	-0.1	0.0
44 Recreational Services	**1.2**	0.1	0.0
18 Electricity & Gas	**1.2**	-0.1	0.0
27 Warehousing & Postal	**1.2**	0.0	0.0
41 Health	**1.1**	0.0	0.0
24 Land Transport	**1.1**	-0.1	0.0
40 Education	**1.1**	-0.1	0.0
6 Printing & Recording	**1.1**	0.1	-0.1
29 Food & Beverage Services	**1.1**	-0.1	-0.1
32 Financial & Insurance	**1.1**	0.0	0.1
17 Other Manuf. & Repair	**1.1**	0.0	0.0
39 Public Admin & Defence	**1.1**	0.1	0.1
30 Media	**1.1**	-0.1	0.0
LQ = 1			

	LQ, 2013 (1.0 = same as England excl. London)	**Change in LQ 2000/13**	**Change in LQ 2015/30**
38 Business Support Services	**1.0**	0.0	0.0
20 Construction	**1.0**	-0.1	-0.1
23 Retail Trade	**1.0**	-0.1	0.0
13 Electrical Equipment	**1.0**	-0.1	0.0
36 Archit. & Engin. Services	**1.0**	0.0	0.0
14 Machinery, etc.	**1.0**	0.0	0.0
19 Water, Sewerage & Waste	**1.0**	-0.2	0.0
LQ <1			
45 Other Services	**0.9**	-0.1	0.0
37 Other Professional Services	**0.9**	0.2	0.1
34 Legal & Accounting	**0.9**	-0.2	0.0
28 Accommodation	**0.9**	0.1	0.0
21 Motor Vehicles Trade	**0.9**	-0.1	0.0
22 Wholesale Trade	**0.9**	-0.1	0.0
16 Other Trans. Equipment	**0.9**	-0.4	0.0
1 Agriculture etc.	**0.8**	-0.1	0.0
35 Head Offices & Manag. Cons.	**0.8**	0.2	0.0
33 Real Estate	**0.8**	0.2	0.0
31 IT Services	**0.8**	0.1	0.0
15 Motor Vehicles, etc.	**0.7**	-0.2	0.0
26 Air Transport	**0.7**	0.3	0.0
43 Arts	**0.6**	-0.2	-0.1
12 Electronics	**0.5**	-0.2	0.0
25 Water Transport	**0.4**	0.0	0.0
2 Mining & Quarrying	**0.1**	0.0	0.0

Employment

B.2 In the table below, the North's Location Quotient (LQ) is presented for jobs, whereby the share of jobs in each sector in the North is compared to the equivalent share across England (excluding London) as a whole. A value of 1 means that the sector is as represented in the North as England excluding London; a value of above 1 indicates a sector is over-represented or 'specialised' in the North compared to England excluding London; and a value of less than 1 indicates a sector is under-represented in the North compared to England excluding London. The table then presents changes in specialisation between 2000 and 2014, and expected changes through to 2030.

Table B-2: Jobs by sector – LQ (North vs England excl. London) and changes in specialisation

	LQ, 2014 (1.0 = same as England excl. London)	**Change in LQ 2000/14**	**Change in LQ 2015/30**
LQ > 1			
7 Coke & Petroleum	**1.7**	1.4	0.0
8 Chemicals, etc.	**1.6**	0.2	-0.4
5 Wood & Paper	**1.4**	0.2	0.1
4 Textiles etc.	**1.4**	0.0	0.0
18 Electricity & Gas	**1.3**	0.2	0.0
3 Food, Drink & Tobacco	**1.3**	0.0	-0.1
24 Land Transport	**1.2**	0.1	0.1
2 Mining & Quarrying	**1.2**	-0.3	0.1
9 Pharmaceuticals	**1.2**	0.3	0.0
34 Legal & Accounting	**1.2**	0.2	0.0
10 Non-Metallic Min. Prods.	**1.2**	0.1	-0.1
41 Health	**1.1**	0.1	0.0
39 Public Admin & Defence	**1.1**	0.1	0.1
13 Electrical Equipment	**1.1**	0.0	0.1
11 Metals & Metal Prods.	**1.1**	-0.1	0.0
LQ = 1			
6 Printing & Recording	**1.0**	0.1	0.0
42 Residential & Social	**1.0**	-0.1	0.0
36 Archit. & Engin. Services	**1.0**	0.0	0.0
27 Warehousing & Postal	**1.0**	0.0	0.0
17 Other Manuf. & Repair	**1.0**	0.0	0.0
19 Water, Sewerage & Waste	**1.0**	-0.1	0.0
26 Air Transport	**1.0**	0.6	-0.1
14 Machinery, etc.	**1.0**	0.1	0.1
21 Motor Vehicles Trade	**1.0**	0.0	0.0
32 Financial & Insurance	**1.0**	0.0	0.1
15 Motor Vehicles, etc.	**1.0**	0.0	0.1
23 Retail Trade	**1.0**	-0.1	0.0
40 Education	**1.0**	0.0	0.0
43 Arts	**1.0**	0.0	0.0
44 Recreational Services	**1.0**	0.1	0.0
33 Real Estate	**1.0**	0.1	0.0
28 Accommodation	**1.0**	0.2	0.0
38 Business Support Services	**1.0**	0.1	0.0
20 Construction	**1.0**	0.0	0.0

	LQ, 2014 (1.0 = same as England excl. London)	**Change in LQ 2000/14**	**Change in LQ 2015/30**
22 Wholesale Trade	**1.0**	0.0	0.0
LQ < 1			
29 Food & Beverage Services	**0.9**	-0.1	0.0
45 Other Services	**0.9**	-0.1	0.0
30 Media	**0.9**	0.0	0.1
37 Other Professional Services	**0.9**	0.2	0.1
35 Head Offices & Manag. Cons.	**0.8**	0.1	0.0
1 Agriculture etc.	**0.8**	0.2	0.0
16 Other Trans. Equipment	**0.7**	-0.3	-0.1
31 IT Services	**0.7**	0.0	0.0
25 Water Transport	**0.6**	0.4	0.1
12 Electronics	**0.5**	-0.1	0.2

Productivity

B.3 The table below is ranked by the North's productivity by sector (highest to lowest). In column Ai, sectors are highlighted in red where North's sectoral productivity is above '*rest of England excluding London'* whole economy average (of £43.4k). In columns Bii and Cii, sectors are highlighted in **Red** if they exceed the respective sector average for the benchmark, and in **Orange** if they are 90%-100% of the respective sector average for the benchmark.

Table B-3: North productivity by sector vs rest of England (excl. London) vs England (excl. London), 2013

	Ai: North productivity, £k, 2013	**Aii: North productivity as % of Rest of England (Excluding London) whole economy average of £43.4k**	**Bi: Rest of England (Excluding London) productivity, £k, 2013**	**Bii: North productivity as % of Rest of England (Excluding London) benchmark for sector**	**Ci: England excl. London productivity, £k, 2013**	**Cii: North productivity as % of England (Excluding London) benchmark for sector**
North's productivity is above 'rest of England excluding London' whole economy average (of £43.4k)						
9 Pharmaceuticals	**298.7**	688%	237.9	126%	261.9	114%
25 Water Transport	**204.3**	470%	327.8	62%	303.1	67%
7 Coke & Petroleum	**176.6**	407%	331.1	53%	238.5	74%
16 Other Trans. Equipment	**105.0**	242%	95.3	110%	97.7	107%
18 Electricity & Gas	**100.3**	231%	113.0	89%	108.7	92%
8 Chemicals, etc.	**86.0**	198%	85.1	101%	85.6	100%
19 Water, Sewerage & Waste	**77.3**	178%	93.7	83%	88.6	87%
32 Financial & Insurance	**74.5**	172%	74.9	99%	74.8	100%

	Ai: North productivity, £k, 2013	Aii: North productivity as % of Rest of England (Excluding London) whole economy average of £43.4k	Bi: Rest of England (Excluding London) productivity, £k, 2013	Bii: North productivity as % of Rest of England (Excluding London) benchmark for sector	Ci: England excl. London productivity, £k, 2013	Cii: North productivity as % of England (Excluding London) benchmark for sector
31 IT Services	**68.4**	158%	75.9	90%	74.2	92%
12 Electronics	**63.1**	145%	66.0	96%	65.6	96%
15 Motor Vehicles, etc.	**53.8**	124%	91.9	59%	79.3	68%
33 Real Estate	**52.3**	120%	84.1	62%	73.3	71%
36 Archit. & Engin. Services	**51.9**	120%	58.2	89%	56.3	92%
11 Metals & Metal Prods.	**51.1**	118%	35.5	144%	40.7	125%
2 Mining & Quarrying	**48.4**	111%	85.6	56%	73.7	66%
26 Air Transport	**47.9**	110%	97.4	49%	80.4	60%
21 Motor Vehicles Trade	**47.7**	110%	61.7	77%	57.2	83%
14 Machinery, etc.	**46.6**	107%	55.0	85%	52.2	89%
10 Non-Metallic Min. Prods.	**46.5**	107%	41.0	113%	42.9	108%
30 Media	**46.2**	106%	46.5	99%	46.5	99%
37 Other Professional Services	**45.0**	104%	46.6	96%	46.0	98%
6 Printing & Recording	**44.7**	103%	45.3	99%	44.9	100%
3 Food, Drink & Tobacco	**44.4**	102%	49.8	89%	47.7	93%
North's productivity is below 'rest of England excluding London' whole economy average (of £43.4k)						
39 Public Admin & Defence	42.2	97%	49.3	86%	46.8	90%
13 Electrical Equipment	40.9	94%	56.2	73%	50.5	81%
20 Construction	39.9	92%	41.9	95%	41.3	97%
45 Other Services	39.3	91%	38.6	102%	38.9	101%
4 Textiles etc.	37.0	85%	37.7	98%	37.4	99%
27 Warehousing & Postal	36.3	84%	32.4	112%	33.7	108%
40 Education	34.4	79%	33.4	103%	33.8	102%
17 Other Manuf. & Repair	33.5	77%	37.1	90%	35.9	93%
5 Wood & Paper	33.3	77%	40.7	82%	37.3	89%
22 Wholesale Trade	31.2	72%	39.2	79%	36.7	85%
24 Land Transport	30.8	71%	37.7	82%	35.0	88%
41 Health	30.8	71%	33.5	92%	32.4	95%

	Ai: North productivity, £k, 2013	Aii: North productivity as % of Rest of England (Excluding London) whole economy average of £43.4k	Bi: Rest of England (Excluding London) productivity, £k, 2013	Bii: North productivity as % of Rest of England (Excluding London) benchmark for sector	Ci: England excl. London productivity, £k, 2013	Cii: North productivity as % of England (Excluding London) benchmark for sector
23 Retail Trade	27.5	63%	30.3	91%	29.4	93%
34 Legal & Accounting	27.0	62%	43.4	62%	37.3	72%
44 Recreational Services	26.6	61%	23.7	112%	24.7	108%
38 Business Support Services	24.9	57%	26.9	93%	26.3	95%
1 Agriculture etc.	23.0	53%	28.3	81%	26.9	86%
35 Head Offices & Manag. Cons.	22.7	52%	24.2	94%	24.0	95%
28 Accommodation	20.8	48%	28.5	73%	25.9	80%
42 Residential & Social	19.1	44%	12.7	150%	14.9	128%
29 Food & Beverage Services	17.0	39%	17.4	98%	17.3	99%
43 Arts	8.8	20%	21.9	40%	17.3	51%

Scale and Spatial Representation

B.4 The tables below present the scale of GVA and employment in each sector across the North, and then the spatial breakdown of this across the North's 11 LEP areas.

Table B-4: Northern GVA by sector, and spatial distribution across the Northern LEPs

			% of Northern GVA by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)										
	Northern GVA, 2013 (£2011m)	Share of Northern GVA, 2013 (%)	Cheshire and Warrington	Cumbria	Greater Manchester	Hull and Humber City Region	Lancashire	Leeds City Region	Liverpool City Region	North East City Region	North Yorkshire	Sheffield City Region	Tees Valley
1 Agriculture etc	1,720	0.7	10%	9%	3%	13%	12%	14%	4%	11%	31%	7%	3%
2 Mining & quarrying	420	0.2	6%	4%	1%	11%	14%	17%	1%	10%	22%	18%	16%
3 Food, drink & tobacco	5,360	2.0	5%	5%	16%	13%	10%	22%	6%	7%	12%	12%	2%
4 Textiles etc	1,500	0.6	4%	4%	23%	3%	12%	33%	6%	6%	4%	7%	1%
5 Wood & paper	1,607	0.6	5%	11%	15%	8%	11%	15%	6%	17%	7%	7%	4%
6 Printing & recording	1,198	0.5	4%	1%	17%	8%	7%	35%	10%	5%	7%	11%	0%
7 Coke & petroleum	956	0.4	29%	0%	4%	25%	2%	17%	10%	1%	1%	5%	9%
8 Chemicals, etc	3,524	1.3	9%	2%	19%	11%	9%	13%	12%	11%	5%	3%	10%
9 Pharmaceuticals	4,151	1.6	24%	4%	8%	13%	3%	7%	25%	14%	4%	1%	0%
10 Non-metallic min. prods.	3,394	1.3	5%	6%	15%	9%	10%	18%	11%	10%	5%	15%	2%
11 Metals & metal prods.	5,227	2.0	4%	15%	10%	8%	8%	15%	5%	11%	5%	19%	4%
12 Electronics	1,048	0.4	5%	5%	24%	3%	8%	15%	7%	18%	7%	10%	4%
13 Electrical equipment	1,042	0.4	2%	4%	14%	4%	6%	23%	11%	21%	8%	11%	2%
14 Machinery, etc	2,535	1.0	4%	2%	15%	6%	8%	26%	5%	19%	4%	12%	4%
15 Motor vehicles, etc	2,179	0.8	22%	1%	9%	5%	13%	5%	23%	17%	4%	4%	1%
16 Other trans. equipment	2,732	1.0	1%	20%	3%	7%	36%	2%	4%	12%	8%	3%	10%
17 Other manuf. & repair	2,828	1.1	5%	4%	14%	9%	11%	22%	8%	9%	8%	13%	4%
18 Electricity & gas	3,644	1.4	7%	1%	16%	10%	6%	26%	3%	18%	14%	5%	6%
19 Water, sewerage & waste	3,519	1.3	6%	3%	16%	3%	9%	22%	8%	12%	3%	14%	6%

			% of Northern GVA by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)											
	Northern GVA, 2013 (£2011m)	**Share of Northern GVA, 2013 (%)**	**Cheshire and Warrington**	**Cumbria**	**Greater Manchester**	**Hull and Humber City Region**	**Lancashire**	**Leeds City Region**	**Liverpool City Region**	**North East City Region**	**North Yorkshire**	**Sheffield City Region**	**Tees Valley**
20 Construction	17,759	6.8	6%	4%	18%	6%	10%	19%	9%	11%	7%	12%	4%
21 Motor vehicles trade	6,793	2.6	8%	4%	18%	6%	11%	21%	7%	10%	7%	12%	3%
22 Wholesale trade	8,461	3.2	6%	2%	21%	5%	11%	24%	8%	7%	7%	11%	2%
23 Retail trade	18,798	7.2	7%	3%	20%	5%	9%	20%	9%	11%	7%	11%	4%
24 Land transport	5,454	2.1	6%	4%	17%	6%	8%	22%	13%	8%	12%	10%	4%
25 Water transport	376	0.1	2%	12%	4%	23%	1%	12%	21%	11%	15%	8%	3%
26 Air transport	534	0.2	4%	0%	58%	1%	5%	6%	9%	16%	0%	1%	0%
27 Warehousing & postal	6,330	2.4	7%	2%	18%	6%	6%	23%	11%	9%	7%	13%	5%
28 Accomodation	2,062	0.8	7%	12%	15%	4%	12%	15%	7%	11%	15%	7%	3%
29 Food & beverage services	6,073	2.3	7%	4%	19%	5%	10%	19%	11%	11%	10%	9%	3%
30 Media	2,190	0.8	3%	2%	19%	4%	4%	34%	11%	9%	8%	10%	3%
31 IT services	10,295	3.9	8%	1%	24%	2%	8%	18%	10%	12%	4%	11%	4%
32 Financial & insurance	14,986	5.7	11%	1%	25%	2%	5%	28%	8%	9%	6%	7%	4%
33 Real estate	6,248	2.4	6%	2%	24%	4%	7%	23%	11%	10%	7%	9%	3%
34 Legal & accounting	4,490	1.7	8%	3%	28%	3%	9%	22%	15%	4%	6%	6%	1%
35 Head offices & manag. cons.	2,603	1.0	13%	2%	35%	2%	6%	16%	13%	5%	4%	5%	3%
36 Archit. & engin. services	5,422	2.1	11%	4%	20%	4%	5%	20%	11%	12%	7%	7%	7%
37 Other professional services	5,456	2.1	12%	3%	18%	3%	7%	24%	11%	8%	9%	8%	3%
38 Business support services	13,713	5.2	9%	2%	24%	4%	8%	20%	9%	11%	5%	9%	3%
39 PAD	15,814	6.0	4%	3%	15%	6%	8%	19%	10%	17%	9%	12%	4%

			% of Northern GVA by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)											
	Northern GVA, 2013 (£2011m)	**Share of Northern GVA, 2013 (%)**	**Cheshire and Warrington**	**Cumbria**	**Greater Manchester**	**Hull and Humber City Region**	**Lancashire**	**Leeds City Region**	**Liverpool City Region**	**North East City Region**	**North Yorkshire**	**Sheffield City Region**	**Tees Valley**
40 Education	22,772	8.7	4%	3%	18%	5%	9%	21%	10%	12%	7%	12%	5%
41 Health	18,276	7.0	4%	2%	15%	6%	8%	19%	10%	16%	7%	14%	6%
42 Residential & social	7,949	3.0	7%	5%	22%	5%	15%	15%	16%	4%	7%	8%	2%
43 Arts	589	0.2	3%	4%	12%	4%	5%	26%	7%	19%	11%	13%	5%
44 Recreational services	3,636	1.4	6%	3%	21%	4%	11%	18%	12%	12%	6%	7%	4%
45 Other services	6,538	2.5	9%	3%	22%	4%	8%	20%	11%	10%	7%	10%	3%

Table B-5: Northern jobs by sector, and spatial distribution across the Northern LEPs

			% of Northern jobs by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)										
	Northern jobs, 2014 (£2011m)	**Share of Northern jobs, 2014 (%)**	**Cheshire and Warrington**	**Cumbria**	**Greater Manchester**	**Hull and Humber City Region**	**Lancashire**	**Leeds City Region**	**Liverpool City Region**	**North East City Region**	**North Yorkshire**	**Sheffield City Region**	**Tees Valley**
1 Agriculture etc	88.6	1.2	10%	12%	9%	8%	12%	16%	4%	10%	20%	8%	3%
2 Mining & quarrying	7.6	0.1	4%	3%	2%	13%	4%	22%	2%	10%	22%	17%	18%
3 Food, drink & tobacco	124.1	1.6	5%	4%	16%	12%	12%	22%	5%	7%	12%	12%	2%
4 Textiles etc	38.9	0.5	4%	4%	29%	2%	16%	25%	5%	6%	3%	6%	2%
5 Wood & paper	47.6	0.6	5%	7%	14%	10%	11%	21%	5%	15%	9%	10%	3%
6 Printing & recording	32.5	0.4	4%	1%	15%	7%	8%	34%	7%	11%	7%	9%	2%
7 Coke & petroleum	4.1	0.1	21%	0%	4%	21%	2%	10%	7%	13%	1%	4%	18%

			% of Northern jobs by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)											
	Northern jobs, 2014 (£2011m)	**Share of Northern jobs, 2014 (%)**	**Cheshire and Warrington**	**Cumbria**	**Greater Manchester**	**Hull and Humber City Region**	**Lancashire**	**Leeds City Region**	**Liverpool City Region**	**North East City Region**	**North Yorkshire**	**Sheffield City Region**	**Tees Valley**
8 Chemicals, etc	47.7	0.6	9%	1%	19%	11%	10%	16%	11%	11%	5%	4%	8%
9 Pharmaceuticals	17.1	0.2	14%	2%	8%	18%	5%	13%	18%	18%	8%	3%	1%
10 Non-metallic min. prods.	74.9	1.0	5%	4%	15%	8%	10%	18%	8%	15%	6%	14%	3%
11 Metals & metal prods.	109.9	1.5	4%	10%	11%	8%	8%	17%	5%	9%	6%	22%	5%
12 Electronics	16.2	0.2	9%	5%	24%	2%	9%	15%	6%	15%	6%	9%	3%
13 Electrical equipment	23.1	0.3	2%	3%	10%	5%	6%	30%	7%	19%	12%	15%	2%
14 Machinery, etc	56.2	0.7	4%	1%	15%	5%	8%	28%	4%	20%	4%	11%	4%
15 Motor vehicles, etc	39.6	0.5	17%	0%	6%	6%	8%	8%	16%	31%	6%	5%	1%
16 Other trans. equipment	27.5	0.4	2%	20%	6%	3%	48%	1%	8%	3%	4%	4%	4%
17 Other manuf. & repair	76.5	1.0	6%	3%	18%	8%	14%	24%	7%	5%	8%	13%	2%
18 Electricity & gas	36.6	0.5	7%	2%	21%	7%	8%	22%	4%	17%	6%	7%	5%
19 Water, sewerage & waste	49.0	0.6	8%	3%	18%	6%	11%	19%	8%	10%	5%	12%	4%
20 Construction	469.3	6.2	6%	4%	18%	6%	11%	19%	9%	11%	8%	11%	4%
21 Motor vehicles trade	147.5	2.0	7%	4%	13%	8%	9%	22%	6%	12%	9%	13%	5%
22 Wholesale trade	284.8	3.8	7%	3%	22%	5%	11%	21%	10%	7%	7%	11%	2%
23 Retail trade	691.8	9.2	7%	4%	18%	6%	9%	18%	10%	12%	8%	11%	4%
24 Land transport	191.9	2.5	6%	4%	17%	7%	9%	21%	10%	9%	11%	10%	4%
25 Water transport	1.8	0.0	6%	18%	14%	16%	6%	9%	24%	4%	8%	2%	1%
26 Air transport	10.6	0.1	3%	0%	50%	2%	2%	19%	8%	14%	0%	2%	0%
27 Warehousing & postal	194.4	2.6	9%	2%	23%	6%	7%	20%	10%	8%	5%	12%	3%

			% of Northern jobs by LEP area (NB. This will not sum to 100% because some LADs are in more than 1 LEP area)										
	Northern jobs, 2014 (£2011m)	**Share of Northern jobs, 2014 (%)**	**Cheshire and Warrington**	**Cumbria**	**Greater Manchester**	**Hull and Humber City Region**	**Lancashire**	**Leeds City Region**	**Liverpool City Region**	**North East City Region**	**North Yorkshire**	**Sheffield City Region**	**Tees Valley**
28 Accomodation	106.7	1.4	8%	12%	14%	5%	12%	17%	7%	10%	17%	7%	3%
29 Food & beverage services	354.5	4.7	8%	4%	18%	5%	9%	18%	9%	14%	9%	10%	4%
30 Media	47.2	0.6	6%	4%	26%	3%	8%	21%	9%	10%	5%	8%	4%
31 IT services	141.7	1.9	9%	1%	21%	4%	9%	21%	8%	12%	7%	12%	3%
32 Financial & insurance	208.7	2.8	12%	1%	24%	2%	6%	24%	9%	10%	6%	8%	4%
33 Real estate	120.9	1.6	7%	4%	25%	4%	9%	18%	10%	12%	7%	7%	3%
34 Legal & accounting	163.2	2.2	9%	3%	27%	3%	11%	17%	11%	9%	6%	7%	3%
35 Head offices & manag. cons.	140.0	1.9	11%	3%	28%	3%	6%	20%	7%	8%	6%	9%	4%
36 Archit. & engin. services	139.1	1.8	12%	4%	22%	4%	7%	19%	9%	9%	7%	9%	7%
37 Other professional services	130.2	1.7	12%	3%	18%	4%	8%	23%	7%	10%	11%	8%	4%
38 Business support services	585.2	7.8	9%	2%	23%	5%	8%	21%	9%	9%	6%	11%	3%
39 PAD	362.2	4.8	4%	3%	15%	7%	9%	19%	10%	16%	8%	11%	4%
40 Education	667.1	8.8	6%	3%	18%	6%	10%	22%	9%	11%	8%	12%	4%
41 Health	621.8	8.2	6%	3%	18%	5%	10%	17%	10%	14%	6%	12%	5%
42 Residential & social	440.6	5.8	6%	4%	16%	6%	11%	18%	11%	12%	8%	11%	5%
43 Arts	59.5	0.8	6%	4%	17%	4%	8%	21%	9%	15%	11%	9%	4%
44 Recreational services	145.6	1.9	8%	3%	17%	5%	10%	20%	9%	12%	8%	11%	4%
45 Other services	199.1	2.6	8%	4%	19%	4%	10%	16%	9%	15%	7%	10%	4%

Source: SQW analysis of Cambridge Econometrics' data

Trends Over Time

GVA

B.5 The North's sectors are grouped into four categories in the table below.

- Recent growth and future projected growth
- Recent growth but future projected decline
- Recent decline but future projected growth
- Recent decline and future projected decline

Table B-6: Northern GVA by sector – recent trends, future projections, and scale in 2013 and 2030

	GVA growth 2000-13 (% pa)	**GVA growth 2015-2030** (% pa)	**GVA, 2013** (£2011m)	**GVA, 2030** (£2011m)	**Absolute change, 2013-2030** (£2011m)
Recent growth and future projected growth					
35 Head offices & manag. cons.	9.3	1.0	2,603	3,578	975
33 Real estate	7.9	2.1	6,248	9,289	3,042
31 IT services	5.6	3.8	10,295	19,533	9,238
36 Archit. & engin. services	5.3	0.7	5,422	6,961	1,539
37 Other professional services	5.2	1.9	5,456	7,862	2,407
41 Health	4.4	2.4	18,276	26,907	8,630
28 Accommodation	4.2	1.5	2,062	2,984	922
38 Business support services	3.6	2.2	13,713	21,402	7,689
34 Legal & accounting	3.2	1.1	4,490	5,792	1,302
44 Recreational services	2.6	0.4	3,636	4,009	373
21 Motor vehicles trade	2.4	1.0	6,793	9,173	2,380
43 Arts	2.3	1.8	589	755	167
23 Retail trade	2.0	2.2	18,798	28,051	9,253
25 Water transport	1.9	3.3	376	632	256
16 Other trans. equipment	1.6	0.7	2,732	3,223	490
42 Residential & social	1.5	3.0	7,949	12,714	4,765
32 Financial & insurance	1.4	2.5	14,986	21,665	6,678
11 Metals & metal prods.	1.2	1.1	5,227	6,412	1,185
8 Chemicals, etc	1.0	1.7	3,524	4,802	1,278
39 PAD	1.0	2.3	15,814	20,943	5,129
29 Food & beverage services	0.9	2.1	6,073	8,690	2,618
14 Machinery, etc	0.7	1.9	2,535	3,077	542

	GVA growth 2000-13 (% pa)	**GVA growth 2015-2030** (% pa)	**GVA, 2013** (£2011m)	**GVA, 2030** (£2011m)	**Absolute change, 2013-2030** (£2011m)
1 Agriculture etc	0.3	2.3	1,720	2,443	723
40 Education	0.1	1.4	22,772	27,762	4,990
24 Land transport	0.1	2.0	5,454	8,322	2,869
20 Construction	0.0	2.4	17,759	27,922	10,163
6 Printing & recording	0.0	1.4	1,198	1,405	207
19 Water, sewerage & waste	0.0	2.5	3,519	5,108	1,589
18 Electricity & gas	0.0	1.2	3,644	4,098	454
Recent growth but future projected decline					
26 Air transport	6.6	-1.2	534	467	-67
9 Pharmaceuticals	2.7	-0.1	4,151	3,886	-265
Recent decline but future projected growth					
22 Wholesale trade	-0.1	1.8	8,461	11,889	3,428
45 Other services	-0.1	1.8	6,538	9,138	2,600
30 Media	-0.1	1.3	2,190	2,622	432
3 Food, drink & tobacco	-0.4	1.8	5,360	7,304	1,943
15 Motor vehicles, etc	-0.8	1.5	2,179	3,082	903
10 Non-metallic min. prods.	-0.8	1.6	3,394	4,837	1,443
17 Other manuf. & repair	-1.2	3.0	2,828	4,576	1,749
5 Wood & paper	-1.3	1.6	1,607	2,115	508
27 Warehousing & postal	-1.6	2.0	6,330	8,988	2,658
13 Electrical equipment	-2.2	0.6	1,042	1,130	88
4 Textiles etc	-4.0	0.9	1,500	1,630	130
Recent decline and future projected decline					
7 Coke & petroleum	-4.8	-1.1	956	703	-254
12 Electronics	-5.5	-1.6	1,048	846	-202
2 Mining & quarrying	-8.4	-4.3	420	247	-173

Employment

B.6 The North's sectors are grouped into four categories in the table below.

- Recent growth and future projected growth
- Recent growth but future projected decline
- Recent decline but future projected growth
- Recent decline and future projected decline

Table B-7: Northern jobs by sector – recent trends, future projections, and scale in 2014 and 2030

	Growth 2000-14 (% pa)	Growth 2015-2030 (% pa)	Jobs in 2014 (000s)	Jobs in 2030 (000s)	Absolute change (000s) 2013-2030
Recent growth in jobs and future projected growth in jobs					
7 Coke & petroleum	12.0	0.9	4.1	4.5	0.4
35 Head offices & manag. cons.	8.4	1.3	140.0	194.4	54.3
33 Real estate	5.0	0.2	120.9	124.0	3.1
37 Other professional services	4.1	1.7	130.2	163.7	33.5
18 Electricity & gas	4.1	0.5	36.6	42.8	6.3
36 Archit. & engin. services	3.3	0.5	139.1	157.4	18.3
34 Legal & accounting	3.0	0.3	163.2	171.0	7.7
27 Warehousing & postal	2.8	0.4	194.4	215.9	21.5
28 Accommodation	2.8	0.6	106.7	116.5	9.8
44 Recreational services	2.7	0.0	145.6	147.3	1.7
38 Business support services	2.7	0.9	585.2	680.1	94.8
41 Health	2.6	0.1	621.8	625.4	3.6
42 Residential & social	1.4	0.8	440.6	500.1	59.5
40 Education	1.3	0.0	667.1	671.4	4.2
19 Water, sewerage & waste	1.3	0.5	49.0	52.7	3.7
31 IT services	0.8	1.3	141.7	177.4	35.8
20 Construction	0.4	0.8	469.3	534.8	65.5
45 Other services	0.2	0.4	199.1	210.9	11.8
22 Wholesale trade	0.2	0.5	284.8	324.6	39.8
43 Arts	0.1	1.2	59.5	76.5	17.0
29 Food & beverage services	0.1	1.1	354.5	430.1	75.6
32 Financial & insurance	0.0	0.6	208.7	228.8	20.1
Recent growth in jobs but future projected decline in jobs					
25 Water transport	6.1	-1.4	1.8	1.2	-0.7
1 Agriculture etc	2.5	-1.5	88.6	64.3	-24.3
26 Air transport	2.4	-0.9	10.6	9.2	-1.4
24 Land transport	1.0	-0.8	191.9	166.4	-25.6
9 Pharmaceuticals	0.2	-2.1	17.1	11.4	-5.7
Recent decline in jobs but future projected growth in jobs					
21 Motor vehicles trade	0.0	0.2	147.5	153.7	6.2
39 PAD	-0.3	0.9	362.2	399.4	37.3
23 Retail trade	-0.4	0.6	691.8	760.5	68.6
6 Printing & recording	-2.4	0.0	32.5	29.6	-3.0

	Growth 2000-14 (% pa)	Growth 2015-2030 (% pa)	Jobs in 2014 (000s)	Jobs in 2030 (000s)	Absolute change (000s) 2013-2030
17 Other manuf. & repair	-3.2	0.5	76.5	89.4	12.9
Recent decline in jobs and future projected decline in jobs					
30 Media	-0.7	-0.2	47.2	43.8	-3.5
5 Wood & paper	-1.1	-2.0	47.6	35.5	-12.0
8 Chemicals, etc	-1.5	-3.6	47.7	26.3	-21.4
3 Food, drink & tobacco	-1.6	-1.8	124.1	100.4	-23.8
14 Machinery, etc	-1.7	-2.9	56.2	35.0	-21.2
16 Other trans. equipment	-2.5	-1.5	27.5	21.4	-6.0
10 Non-metallic min. prods.	-3.0	-3.2	74.9	50.4	-24.6
15 Motor vehicles, etc	-3.6	-1.5	39.6	31.5	-8.1
11 Metals & metal prods.	-3.6	-1.8	109.9	81.0	-28.9
13 Electrical equipment	-4.3	-0.8	23.1	21.5	-1.6
12 Electronics	-5.2	-3.3	16.2	10.9	-5.3
2 Mining & quarrying	-5.5	-3.1	7.6	6.3	-1.3
4 Textiles etc	-7.1	-3.0	38.9	25.0	-13.8

Summary

B.7 The table overleaf provides a summary of the North's specialisation across CE's 45 sectors, productivity levels compared to benchmarks, their scale, recent trends and future projections.

Figure B-1: Summary of data analysis

	Specialisation				Productivity		Scale		Trends			
	GVA LQ > 1	GVA LQ = 1	Jobs LQ > 1	Jobs LQ = 1	High productivity i.e. > comparator average for whole economy	High productivity i.e. c.90%+ of comparator* sector average)	GVA scale (>2% of northern total)	Jobs scale (>2% of northern total)	Recent growth in GVA	Future projected growth in GVA	Recent growth in jobs	Future projected growth in jobs
1 Agriculture etc	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No
2 Mining & quarrying	No	No	Yes		Yes	No	No	No	No	No	No	No
3 Food, drink & tobacco	Yes		Yes		Yes	Yes	Yes	No	No	Yes	No	No
4 Textiles etc	Yes		Yes		No	Yes	No	No	No	Yes	Yes	Yes
5 Wood & paper	Yes		Yes		No	No	No	No	No	Yes	No	No
6 Printing & recording	Yes			Yes	Yes	Yes	No	No	Yes	Yes	No	Yes
7 Coke & petroleum	Yes		Yes		Yes	No	No	No	No	No	Yes	Yes
8 Chemicals, etc	Yes		Yes		Yes	Yes	No	No	Yes	Yes	No	No
9 Pharmaceuticals	Yes		Yes		Yes	Yes	No	No	Yes	No	Yes	No
10 Non-metallic min. prods.	Yes		Yes		Yes	Yes	Yes	No	No	Yes	No	No
11 Metals & metal prods.	Yes		Yes		Yes	Yes	No	No	Yes	Yes	No	No
12 Electronics	No	No	No	No	Yes	Yes	No	No	No	No	No	No
13 Electrical equipment		Yes	Yes		No	No	No	No	No	Yes	No	No
14 Machinery, etc		Yes		Yes	Yes	No	No	No	Yes	Yes	No	No
15 Motor vehicles, etc	No	No		Yes	Yes	No	No	No	No	Yes	No	No
16 Other trans. equipment	No	No	No	No	Yes	Yes	No	No	Yes	Yes	No	No
17 Other manuf. & repair	Yes			Yes	No	Yes	No	No	No	Yes	No	Yes
18 Electricity & gas	Yes		Yes		Yes	Yes	No	No	Yes	Yes	Yes	Yes
19 Water, sewerage & waste		Yes		Yes	Yes	No	No	No	Yes	Yes	Yes	Yes
20 Construction		Yes		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21 Motor vehicles trade	No	No		Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
22 Wholesale trade	No	No		Yes	No	No	Yes	Yes	No	Yes	Yes	Yes
23 Retail trade		Yes		Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
24 Land transport	Yes		Yes		No	No	Yes	Yes	Yes	Yes	Yes	No
25 Water transport	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No
26 Air transport	No	No		Yes	Yes	No	No	No	Yes	No	Yes	No
27 Warehousing & postal	Yes			Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
28 Accomodation	No	No		Yes	No	No	No	No	Yes	Yes	Yes	Yes
29 Food & beverage services	Yes		No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
30 Media	Yes		No	No	Yes	Yes	Yes	No	No	Yes	No	No
31 IT services	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
32 Financial & insurance	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
33 Real estate	No	No		Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes
34 Legal & accounting	No	No	Yes		No	No	No	Yes	Yes	Yes	Yes	Yes
35 Head offices & manag. cons.	No	No	No	No	No	Yes	No	No	Yes	Yes	Yes	Yes
36 Archit. & engin. services		Yes		Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
37 Other professional services	No	No			Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
38 Business support services		Yes		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
39 PAD	Yes		Yes		No	Yes	No	Yes	Yes	Yes	No	Yes
40 Education	Yes			Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
41 Health	Yes		Yes		No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
42 Residential & social	Yes			Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
43 Arts	No	No		Yes	No	No	No	No	Yes	Yes	Yes	Yes
44 Recreational services	Yes			Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
45 Other services	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

* England excl. London or Rest of England excl. London

Source: SQW analysis of CE data

Annex C: Mapping Cambridge Econometrics' 45 LEFM Sectors against SIC codes

Table C-1: Comparing CE's 45 sectors to SIC 2007 codes

CE sectors	SIC 2007 codes	Details of SIC codes
1. Agriculture, Forestry and Fishing	01-03	01 Crop and animal production, hunting and related service activities 02 Forestry and logging 03 Fishing and aquaculture
2. Mining and Quarrying	05-09	05 Mining of coal and lignite 06 Extraction of crude petroleum and natural gas 07 Mining of metal ores 08 Other mining and quarrying 09 Mining support service activities
3. Food, drink & tobacco	10-12	10 Manufacture of food products 11 Manufacture of beverages 12 Manufacture of tobacco products
4. Textiles etc	13-15	13 Manufacture of textiles 14 Manufacture of wearing apparel 15 Manufacture of leather and related products
5. Wood & paper	16-17	16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials 17 Manufacture of paper and paper products
6. Printing & recording	18	18 Printing and reproduction of recorded media
7. Coke & petroleum	19	19 Manufacture of coke and refined petroleum products
8. Chemicals	20	20 Manufacture of chemicals and chemical products
9. Pharmaceuticals	21	21 Manufacture of basic pharmaceutical products and pharmaceutical preparations
10. Non-metallic mineral products	22-23	22 Manufacture of rubber and plastic products 23 Manufacture of other non-metallic mineral products
11. Metals & metal products	24-25	24 Manufacture of basic metals 25 Manufacture of fabricated metal products, except machinery and equipment
12. Electronics	26	26 Manufacture of computer, electronic and optical products
13. Electrical equipment	27	27 Manufacture of electrical equipment

CE sectors	SIC 2007 codes	Details of SIC codes
14. Machinery	28	28 Manufacture of machinery and equipment n.e.c.
15. Motor vehicles	29	29 Manufacture of motor vehicles, trailers and semi-trailers
16. Other transport equipment	30	30 Manufacture of other transport equipment
17. Other manufacturing & repair	31-33	31 Manufacture of furniture 32 Other manufacturing 33 Repair and installation of machinery and equipment
18. Electricity & gas	35	35 Electricity, gas, steam and air conditioning supply
19. Water, sewage & waste	36-39	36 Water collection, treatment and supply 37 Sewerage 38 Waste collection, treatment and disposal activities; materials recovery 39 Remediation activities and other waste management services
20. Construction	41-43	41 Construction of buildings 42 Civil engineering 43 Specialised construction activities
21. Motor vehicles trade	45	45 Wholesale and retail trade and repair of motor vehicles and motorcycles
22. Wholesale trade	46	46 Wholesale trade, except of motor vehicles and motorcycles
23. Retail trade	47	47 Retail trade, except of motor vehicles and motorcycles
24. Land transport	49	49 Land transport and transport via pipelines
25. Water transport	50	50 Water transport
26. Air transport	51	51 Air transport
27. Warehousing & postal	52-53	52 Warehousing and support activities for transportation 53 Postal and courier activities
28. Accommodation	55	55 Accommodation
29. Food & beverage services	56	56 Food and beverage service activities
30. Media	58-60	58 Publishing activities 59 Motion picture, video and television programme production, sound recording and music publishing activities 60 Programming and broadcasting activities
31. IT services	61-63	61 Telecommunications 62 Computer programming, consultancy and related activities 63 Information service activities

CE sectors	SIC 2007 codes	Details of SIC codes
32. Financial & insurance	64-66	64 Financial service activities, except insurance and pension funding 65 Insurance, reinsurance and pension funding, except compulsory social security 66 Activities auxiliary to financial services and insurance activities
33. Real estate	68	68 Real estate activities
34. Legal & accounting	69	69 Legal and accounting activities
35. Head offices & management consultancies	70	70 Activities of head offices; management consultancy activities
36. Architectural & engineering services	71	71 Architectural and engineering activities; technical testing and analysis
37. Other professional services	72-75	72 Scientific research and development 73 Advertising and market research 74 Other professional, scientific and technical activities 75 Veterinary activities
38. Business support services	77-82	77 Rental and leasing activities 78 Employment activities 79 Travel agency, tour operator and other reservation service and related activities 80 Security and investigation activities 81 Services to buildings and landscape activities 82 Office administrative, office support and other business support activities
39. Public Administration & Defence	84	84 Public administration and defence; compulsory social security
40. Education	85	85 Education
41. Health	86	86 Human health activities
42. Residential & social	87-88	87 Residential care activities 88 Social work activities without accommodation
43. Arts	90-91	90 Creative, arts and entertainment activities 91 Libraries, archives, museums and other cultural activities
44. Recreational services	92-93	92 Gambling and betting activities 93 Sports activities and amusement and recreation activities
45. Other services	94-96	94 Activities of membership organisations 95 Repair of computers and personal and household goods 96 Other personal service activities

Annex D: Detailed Asset registers for the North's 'Prime' and 'Enabling' capabilities

D.1 The following tables provide more detail on the sector specialisms, assets and businesses under each of the 'Prime' and 'Enabling' capabilities. The material is drawn from the local area narratives produced for each of the North's 11 LEP areas, which have been cross-checked with the Economic Reference Group lead for each area. The tables below are designed to be as comprehensive as possibly but are not completely exhaustive.

Table D-1: Asset register for Advanced Manufacturing Capability

	Details
City regions/local areas involved	Cheshire and Warrington, Cumbria, Hull and Humber CR, Lancashire, Leeds CR, Liverpool CR, Manchester CR, North East CR, Sheffield CR, Tees Valley CR, York, North Yorkshire and East Riding
Sector strengths, specialisms and capabilities	• Automotive, e.g. Cheshire and Warrington, Lancashire, Liverpool CR, North east CR, Sheffield CR, Tees Valley CR • Food and Drink, e.g. Cumbria, Hull and Humber CR, Liverpool CR, Leeds CR, Manchester CR, York, North Yorkshire and East Riding • Pharmaceuticals/biopharmaceuticals, e.g. Cheshire and Warrington, Cumbria, Hull and Humber CR, Liverpool CR, Manchester CR, North East CR • Advanced/high performance materials, e.g. Lancashire, Liverpool CR, Manchester CR, Sheffield CR • Chemicals, e.g. Cheshire and Warrington, Hull and Humber CR, Lancashire, Liverpool CR • Engineering and technical consulting, Cheshire and Warrington, Hull and Humber, Manchester CR, Tees Valley CR • Marine/subsea, e.g. Cumbria, Hull and Humber CR, Liverpool CR, Tees Valley CR • Aerospace/Aeronautical, e.g. Lancashire, Manchester CR, Sheffield CR • Glass, e.g. Hull and Humber, Leeds CR, Liverpool CR • Machinery manufacture, e.g. Cheshire and Warrington, Leeds CR, Sheffield CR • Nuclear materials/reactors, e.g. Cumbria, Manchester CR, Tees Valley CR • Paint/coatings, e.g. Lancashire, Manchester CR, Hull and Humber CR • Agri-Tech, e.g. Cheshire and Warrington, York, North Yorkshire and East Riding • Fibres and Textiles, e.g. Hull and Humber CR, Leeds CR • Polymers, e.g. Lancashire, Tees Valley CR • Rail, e.g. Sheffield CR, Tees Valley CR • Petrochemicals, e.g. Cheshire and Warrington, Tees Valley CR • Process Industries, e.g. Tees Valley CR • Bearings, gears, taps and valves, e.g. Leeds CR • Biofuels/Biomass processing, e.g. Hull and Humber CR • Caravan bodies, e.g. Hull CR • Electric motors, generators and transformers, e.g. Leeds CR • High precision engineering, e.g. Sheffield CR • Hydraulics, e.g. Sheffield CR • Industrial Biotech, e.g. Tees Valley CR

	Details
	• Manufacture of computers, electronic and optical products, e.g. Manchester CR • **Medical/dental devices, e.g. Leeds CR** • Metals and Alloy Projection, e.g. Sheffield CR • Personal care products, e.g. Hull and Humber CR • Specialty gases e.g. Hull and Humber CR • Steel, e.g. Tees Valley CR • Tyres, e.g. Cumbria
Current assets and major businesses	• Air Products, Amec, Aviagen, Bentley Motors, Bolesworth Estate, Bombardier, British Salt, Britton Taco, Centrec International, Chester Zoo, Cogent, C-Tech Innovation, EA Technology, Essar Energy, Flexifilm, Genesys International, Genus ABS, Growhow, Harman technology, Harthill Stud, Henkel Consumer Adhesives, Land and Marine Project Engineering, MWH, PennWhite, PQ Silicas, Reaseheath College, RSK, Salt Union, Stanlow Refinery, Tata, Tata Chemicals, Thor Specialities, Unilever, United Phosphorous, Vauxhall, Waters Corporation, Wheatsheaf (Cheshire and Warrington) • BAE Submarine Solutions, DONG Energy, GSK, Pirelli Tyres, Siemens, Tritech (Cumbria) • AAK UK, Air Products, Aunt Bessie's, BASF, BP Chemicals, British Agri-Food Consortium, Centre for Assessment of Technical Competence Humber, Coldwater, Country Style, Cranswick, Cristal, Croda, Findus, Golden Wonder, Greencore, Humber Seafood Institute, Kemira, Knauf, Lincoln & York, Nippon Gohesi, BOC (LINDE), Novartis, Pipers Crisps, Reckitt Benckiser, Saxon Quality Food, Smith & Nephew, Syngenta, Tata, Total, Tranfield, TSC Foods, William Jackson Food Group, Young's Seafood, Yule Catto (Hull and Humber CR) • AGC Chemicals, Asahi Glass Chemicals, Assytem, BAE Systems, Clean Air Power, Erlson, Kaman, PACCAR (Leyland Trucks), Precision Polymer Engineering, Rolls Royce, Safran-Aircelle, Sanko-Gosei, Scorpion Adventure, Spirit Aero Systems, Torotrack, Victrex, Vinnolit GMBH (Lancashire) • Asda, Automotive Research Centre, Betty's & Taylor's, Brandon Medical, Coca Cola, Cummins Turbo Technologies, David Brown Gear Systems, DePuy International, Dr Oetker, FabLab Airedale, FERA, Fujitsu, Haribo, Harrogate Spring Water, McVities, Mitsubishi Power Systems, Morrison's, National Facility for Innovative Robotic Systems, Nestle, Robotic Laboratory, School of Food Science and Nutrition at Leeds University, Science City York, Seabrook Crisps, Smith & Nephew, Warburton's, Yorkshire Tea (Leeds CR) • ABB, Actavis, AZ, BAC Mono, Cammell Laird, Eli Lilly/Elanco, Getrag Ford, Jaguar Land Rover, Johnson Controls, NGF Europe, Novartis, Sigmatex, Unilever, United Automation, United Biscuits (Liverpool CR) • BP's International Centre for Advanced Materials, Cisco, Costain Oil, Gas and Process Ltd, Heinz, Jacobs Engineering, Kellogg's, Morson Projects, National Graphene Institute, Siemens (Manchester CR) • Caterpillar, Future Technology Centre, Hitachi, Institute of Automotive and Manufacturing Advanced Practice, Komatsu, Nissan, Sevcon, Smith's Electric Vehicles (North East CR) • Advanced Manufacturing Park, Advanced Manufacturing Research Centre, Castings Technology International, National Metals Technology Centre, Materials and Engineering Research Institute, Outokumpu, Rolls Royce, Sheffield Forgemasters, Tata, The Welding institute Technology Centre (Sheffield CR) • Airbus, Boeing, Centre for Process Innovation, Cummins Turbo Technologies, Elring Klinger, Fine Industries, Fujifilm Diosynth Biotechnologies, Huntsman, INEOS, Jacobs Engineering, Johnson Matthey, Materials Processing Institute, Mitsubishi Chemical Corporation, Mitsubishi Power Systems, National Biologics Centre, Nifco, Tata, Teesside Advanced

	Details
	Manufacturing Park, Teesside Manufacturing Centre, The Welding Institute's Technology Centre (Tees Valley CR) • FERA, McCain, Nestle, Wensleydale Cheese (York, North Yorkshire and East Riding)
Planned developments	• Agri-Tech, Food and Life Science Facility - Reaseheath College, (Cheshire and Warrington) • Advanced Manufacturing Technology Centre (Cumbria) • Engineering and Innovation Centre, Making Rooms (Lancashire) • Manufacturing Technology Centre North, Materials Innovation Factory, Sensor City and LCR 4.0 Infrastructure (Liverpool CR) • Airport City, Graphene Engineering Innovation Centre, Sir Henry Royce Institute for Materials Research and Innovation (Manchester CR) • National Formulation Centre (North East CR) • Factory 2050, National College for High Speed Rail (Sheffield CR) • Applied Graphene Materials (Tees Valley CR) • National Agri-Food Innovation Campus, Sirius Minerals Potash Mining (York, North Yorkshire and East Riding)

Table D-2: Asset register for Energy Capability

	Details
City regions/local areas involved	Cheshire and Warrington, Cumbria, Hull and Humber CR, Lancashire, Leeds CR, Liverpool CR, Manchester CR, North East CR, Sheffield CR, Tees Valley CR, York, North Yorkshire and East Riding
Sector strengths, specialisms and capabilities	• Low carbon electricity (wind, alternative fuels and nuclear), e.g. Cheshire and Warrington, Cumbria, Hull and Humber CR, Lancashire, Liverpool CR, Manchester CR, Sheffield CR, Tees Valley CR • Offshore/subsea engineering, e.g. Hull and Humber CR, North East CR, Tees Valley CR and Liverpool CR • Waste (water) treatment, e.g. Leeds CR, Tees Valley CR • Hydrogen Production, e.g. Liverpool CR, Tees Valley CR • Electricity distribution and control apparatus, e.g. Leeds CR • Energy management and efficiency, e.g. Leeds CR, • Environmental consultancy, e.g. Leeds CR, • Engineering design and business services, e.g. North East CR • Utilities Supply, e.g. Cheshire and Warrington
Current assets and major businesses	• AMEC Nuclear R&D Centre, Birchwood Science Park, Boulting Group, Capenhurst Nuclear Cluster, EA Technologies, Electricity North West, Energy Innovation Centre, Essar Energy, National Nuclear Laboratory – HQ, Rolls Royce Nuclear, Schneider Electric, Sellafield Ltd, Thornton Science Park, United Utilities, Urenco (Cheshire and Warrington CR) • Dalton Nuclear Institute, James Fisher Nuclear, National Nuclear Laboratory - Central Laboratory, National Nuclear Laboratory - Workington Lab, React Engineering, Safety Critical, Sellafield Nuclear Power Station, TIS – (Cumbria) • Centre for Offshore Renewable Engineering, DONG Energy, E-ON, Siemens, (Hull and Humber CR) • Advanced Uranium Asset Management, Amec, Ceres Power, EDF Group, Energy Lancaster, Heysham Power Stations, James Fisher Nuclear, Lancaster University, National Nuclear Lab - Preston Lab, Port of Heysham, Sellafield Ltd, Springfields Fuels, University of Central Lancashire (Lancashire)

	Details
	• Centre for Climate Change Economics and Policy at Leeds, Centre for Integrated Energy Research, Centre for Sustainability Accounting, Green Chemistry Centre of Excellence, Science City York, Stockholm Environment Institute at York, Sustainability Research Institute (Leeds CR) • Centre for Offshore Renewable Engineering, Hydrogen Cluster, Stephenson Institute for Renewable Energy and the National Oceanography Centre (Liverpool CR) • Centre for Nuclear Energy Technology, Dalton Nuclear Institute, Nuclear Technology Education Consortium, Siemens' Renewable Energy Engineering Centre, Tyndall Centre for Climate Change Research (Manchester CR) • Bridon International, Centre for Offshore Renewable Engineering, Fraser Hydraulic Power, GE Oil and Gas, National Renewables Energy Centre, Neptune Energy Park, Offshore Renewable Energy Catapult (North East CR) • Nuclear Research Centre at AMP (Sheffield CR) • Air Products, Centre for Offshore Renewable Engineering, Hartlepool Nuclear Power Station, Heerema, JDR Cables, SembCorp, SITA, TAG Energy Solutions (Tees Valley CR) • Bio-Renewables Development Centre, Centre for Novel Agricultural, Drax Power Station, Green Chemistry Centre of Excellence (York, North Yorkshire and East Riding)
Planned developments	• Centre of Excellence in Advanced Energy Systems (Cheshire and Warrington) • Moorside Nuclear Power Station, Nuclear Technology Innovation Gateway (Cumbria) • Able Marine Park, Centre for Marine Power R&D, Mitsubishi Heavy Industry and Vestas Development (Hull and Humber CR) • Energy Skills HQ (Lancashire) • Liverpool Advanced Grid-Scale Electrochemical Energy Storage R&D Facility, Liverpool Maritime Knowledge Hub (Liverpool CR) • Low Carbon Energy Centre at Newcastle Science Central, Neptune National Centre for Subsea and Offshore Engineering (North East CR) • Materials Processing Institute, Oil and Gas Academy, Teesside Advanced Manufacturing Park Offshore Wind Validation Centre (Tees Valley CR) • York BioHub (York, North Yorkshire and East Riding)

Source: SQW

Table D-3: Asset register for Health Innovation Capability

	Details
City regions/local areas involved	Cheshire and Warrington, Cumbria, Hull and Humber CR, Lancashire, Leeds CR, Liverpool CR, Manchester CR, North East CR, Sheffield CR, Tees Valley CR,
Sector strengths, specialisms and capabilities	• Medical devices, e.g. Hull and Humber CR, Lancashire, Leeds CR, Liverpool CR, Manchester CR, North East CR, Sheffield CR, • Pharmaceuticals/biopharmaceuticals, e.g. Cheshire and Warrington, Cumbria, Hull and Humber CR, Liverpool CR, Manchester CR, North East CR • Digital/E-health Liverpool CR, Lancashire, Manchester CR, Sheffield CR • Cancer research/treatment e.g. Liverpool CR, Manchester CR • Ageing e.g. Lancashire, North East CR, • Drug discovery, e.g. Liverpool CR, Manchester CR, North East CR, • Stratified medicine e.g. Liverpool CR and Manchester CR • Advanced wound care e.g. Sheffield CR • Bioprocessing e.g. North East CR

	Details
	• Biotech e.g. Manchester CR • Clinical research e.g. Sheffield CR • Clinical trials e.g. Manchester CR • Diagnostics e.g. Manchester CR • Infectious disease e.g. Liverpool CR • Medtech e.g. North East CR • Nutraceuticals e.g. Liverpool CR • Orthopaedics e.g. Sheffield CR • Paediatrics e.g. Liverpool CR • Pancreatic disease e.g. Liverpool CR
Current assets and major businesses	• Advanced Medical Solutions Group, Alderley Park BioHub, AZ, Claris lifescience, Cyprotex, Life Technologies, Lupin, Medtrade, Peckforton Pharmaceuticals, Phenomenox, Sanofi, Sinclair Pharmaceuticals, Waters Corporation (Cheshire and Warrington) • GSK (Cumbria) • Novartis, Reckitt Benckiser, Smith&Nephew (Hull and Humber CR) • Centre for Ageing Research (Lancashire) • BioVale, Brandon Medical, Covance, DePuy International, Galpharm, Health and Social Care Information Centre, Health Education England, Innovation Health Hub, Leeds Teaching Hospital NHS Trust, Medical Technologies Innovation and Knowledge Centre, Medilink, Mediplex Healthcare Innovation Hub, Neotherix, NHS England, NHS Leadership Academy, Smith&Nephew, Thornton and Ross, Tissue Regenix, Unilabs (Leeds CR) • Actavis, Alder Hey Hospital, Royal Liverpool and Broadgreen University Hospitals, Clatterbridge Cancer Centre, Liverpool School of Tropical Medicine, AstraZeneca, Department of Molecular and Clinical Cancer Medicine, Eli Lilly/Elanco, Medicines for Children Research Network, NHS Chair in Personalised Medicine, Novartis/CSL, Nutricia, Pancreas Biomedical Research Unit, Vitaflo, Wolfson Centre for Personalised Medicine and Baxter Healthcare (Liverpool CR) • Cancer Research UK, Central Manchester University Hospitals NHS Foundation Trust, Christie Hospital, Citylabs, Core Technology Facility, Health eResearch Centre, MAHSC, Manchester Cancer Research Centre, Manchester Science Park, MedTECH Centre, NICE, The Corridor, UK BioBank, University Hospital of South Manchester, University of Manchester, Wolfson Molecular Imaging Centre (Manchester CR) • Aesica Pharmaceuticals, Biophysical Sciences Institute, Faculty of Medical Sciences, GSK, International Centre for Life Science, MSD, Piramal Pharma Solutions (North East CR) • Medical Advanced Manufacturing Research Centre (Sheffield CR) • Wolfson Research Institute for Health and Wellbeing, Fujifilm Diosynth Biotechnologies (Tees Valley CR)
Planned developments	• Agri-Tech, Food and Life Science Facility at Reaseheath College, Centre for Anti-Microbial Resistance (Cheshire and Warrington) • Lancaster Health Innovation Campus (Lancashire) • Bradford University - BT Digital health Zone (Leeds CR) • Liverpool Health Campus (including new Clatterbridge Cancer Hospital, Life Sciences Accelerator and Royal Liverpool Hospital) (Liverpool CR) • MediPark, Proton Beam Therapy (Manchester CR) • National Centre for Ageing Science and Innovation, National Centre for Healthcare Photonics, Newcastle Life Sciences Incubation Hub (North East CR) • Advanced Wellbeing Research Centre (Sheffield CR) • Billingham Bio Pharmaceutical Campus (Tees Valley CR)

Table D-4: Asset register for Digital Capability

	Details
City regions/local areas involved	Lancashire, Leeds CR, Liverpool CR, Manchester CR, North East CR, Sheffield CR, Tees Valley CR
Sector strengths, specialisms and capabilities	• Software Development and Consultancy, e.g. Leeds CR, Liverpool CR, Manchester CR, Tees Valley CR • Data analytics, e.g. Leeds CR, Liverpool CR, Manchester CR • Games, e.g. Liverpool CR, North East CR, Sheffield CR • Publishing, e.g. Leeds CR, Liverpool CR, Manchester CR • Telecommunications (satellite), e.g. Leeds CR, Manchester CR, Sheffield CR • (Interactive) Media, e.g. Leeds CR, Liverpool CR, Manchester CR, Sheffield CR • Software, e.g. Liverpool CR, Sheffield CR • Animation, e.g. Tees Valley CR • Computer Engineering, e.g. Manchester CR • Computer Programming, e.g. Sheffield CR • Cyber Security, e.g. Lancashire • Data Processing, e.g. Sheffield CR • E-learning, e.g. Sheffield CR • Engineering and Technical Design Services, e.g. Tees Valley CR • Hardware and Software Consultancy, e.g. Manchester CR • Internet of Things, e.g. Liverpool CR • Multi-platform Content, e.g. Liverpool CR
Current assets and major businesses	• Centre of Academic Excellence in Cyber Security, Realtime:UK (Lancashire) • Advanced Digital institute, Echostar Europe, Leeds Internet Exchange, Isotoma Leeds Institute for Data Analytics, Radio Design, Rockstar, Team 17, True North (Leeds CR) • The Hartree Centre, Baltic Triangle digital SME cluster, Conker Media, Draw+Code, Firesprite, Liverpool DoES, Lucid Games, Milky Tea, New Mind, Ropewalks, Red Ninja, River Motion Group, Starship, Studio Mashbo, Umbrella Studio, Uniform, Virtual Engineering Centre (Liverpool CR) • Brother International Europe, Fujtsu, Hitachi's European Big Data laboratory, MediaCityUK, Sharp Project, Siemens (Manchester CR) • 5th Generation Technologies, Campus North, CCP Games, Eutechnyx, Newcastle University, Northern Film and Media, Sage, Sunderland Software City, Sunderland University, Ubisoft (North East CR) • Advanced Computing Research Centre (Sheffield CR) • DigitalCity, Institute of Digital Innovation, Phusion, Samsung GTL, Siemens VAI (Tees Valley CR)
Planned developments	• Sensor City Incubator (Liverpool CR)

Table D-5: Asset register for Financial and Professional Services Capability

Name of sector	**Financial and Professional Services**
City regions/local areas involved	Cheshire and Warrington, Leeds CR, Liverpool CR, Manchester CR
Sector strengths,	Financial services, Cheshire and Warrington, Manchester CR

Name of sector	Financial and Professional Services
specialisms and capabilities	• Head office activities, e.g. Cheshire and Warrington, Leeds CR • Legal and accounting, e.g. Leeds CR, Liverpool CR, Manchester CR • Advertising, e.g. Leeds CR • Activities auxiliary to insurance and pension funding, e.g. Leeds CR • Management consultancy, e.g. Manchester CR • Real estate, e.g. Manchester CR • Business Process Outsourcing, e.g. Lancashire • Wealth Management e.g. Liverpool CR
Current assets and major businesses	• Asics, Bank of America, Barclays, Goldtree Financial Services, Holidaybreak, Lightcatch, LJ Financial Planning, M&S Money, Marlowe Holdings, MBMA, MWH, New Balance, NWF Group, Phonak, Tuxedo Money Solutions (Cheshire and Warrington) • CAP Gemini, Capita, Carphone warehouse, Co-operative Bank, Guardian Financial Group, HCL Technologies, HGS, NS&I (Lancashire) • Aviva, Bank of England, Credit Management Research Centre, First Direct, Hiscox, Institute of Banking and Investment, Leeds Building Society, Skipton Building Society, Yorkshire Building Society (Leeds CR) • Barclays, BNY Mellon, Deloitte, Ernst & Young, KPMG, NBrown, PWC, RBS, Spinningfields, The Peel Group (Manchester CR) • Hill Dickinson, Brabners, DLA Piper, DWF, Weightmans, Quilter Cheviot, Tilney Bestinvest, Rathbone Investment Management Limited, Investec Wealth and Investment and Coutts Wealth Management, (Liverpool CR)

Table D-6: Asset register for Logistics Capability

Name of sector	Logistics
City regions/local areas involved	Cheshire and Warrington, Cumbria, Hull and Humber CR, Lancashire, Liverpool CR, Manchester CR, Sheffield CR
Sector strengths, specialisms and capabilities	• Ports, e.g. Hull and Humber CR, Lancashire, Liverpool CR • Airports, e.g. Liverpool CR, Manchester CR, Sheffield CR, • Logistics/freight firms, e.g. Cheshire and Warrington, Cumbria, Liverpool CR
Current assets and major businesses	• Omega (Cheshire and Warrington) • Stobart Group (Cumbria) • Able Humber Port, Goole Inland Port, Grimsby Port, Hull Port, Immingham Port (Hull and Humber LEP) • Port of Heysham (Lancashire) • ACL, Associated British Ports, Bibby Group, CMA CGM, Liverpool John Lennon Airport, Maersk, Peel Ports, Stobart Group and Mersey Multi-Modal Gateway (3MG) (Liverpool CR) • Manchester Airport (Manchester CR) • Amazon, ASOS, TNT, Robin Hood Airport (Sheffield CR)
Planned developments	• Port Warrington (Cheshire and Warrington) • Liverpool2 and Parkside Strategic Rail Freight Interchange (Liverpool CR) • Airport City (Manchester CR) • Doncaster iPort (Sheffield CR)

D.2 An asset register has not been provided for Education: HE-led research facilities/assets relating to the 'Prime' capabilities are covered above.