

Appendix F



The Lancs Innovation Plan SWOT-ing Lancs' Innovation Ecosystem

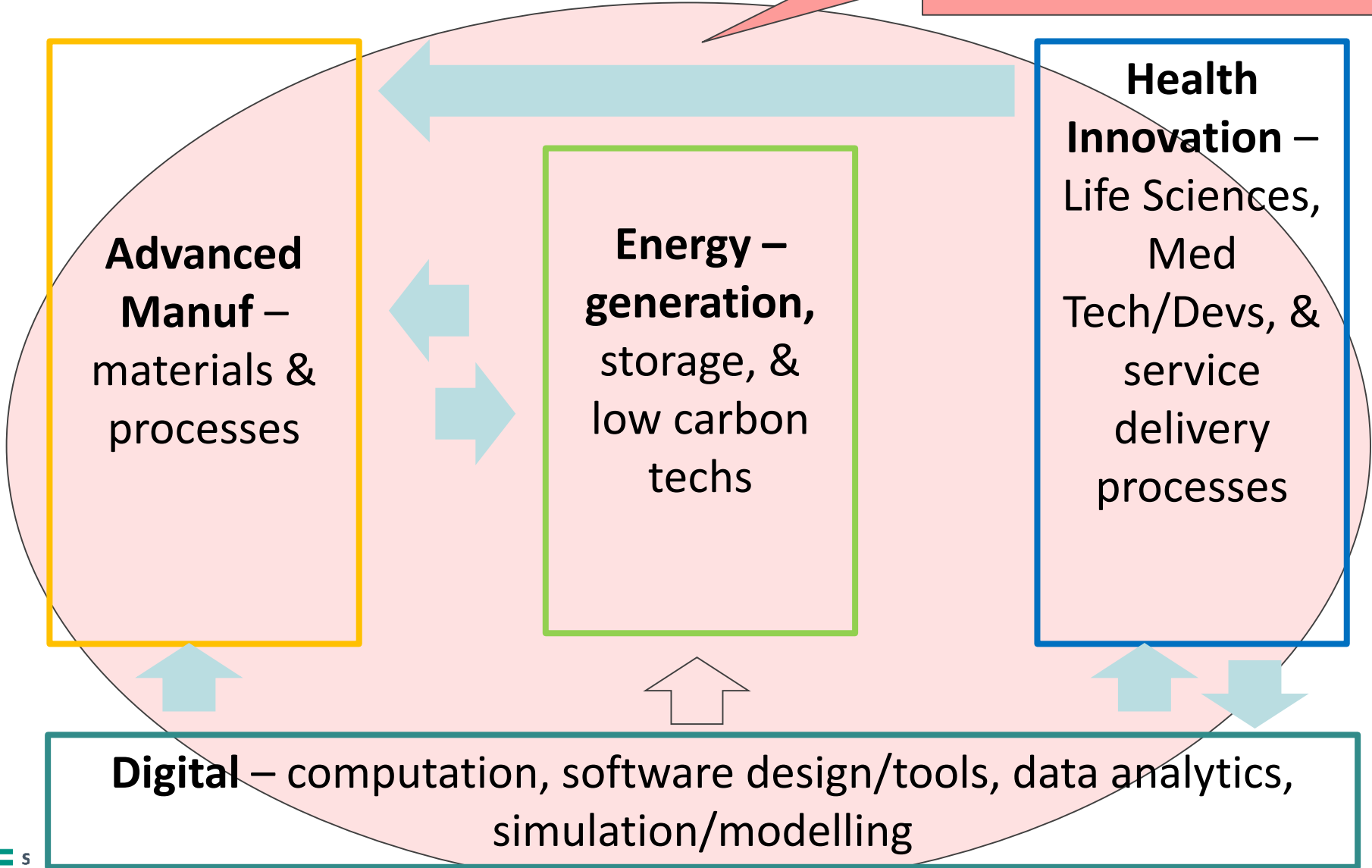
22 August 2017

Purposes

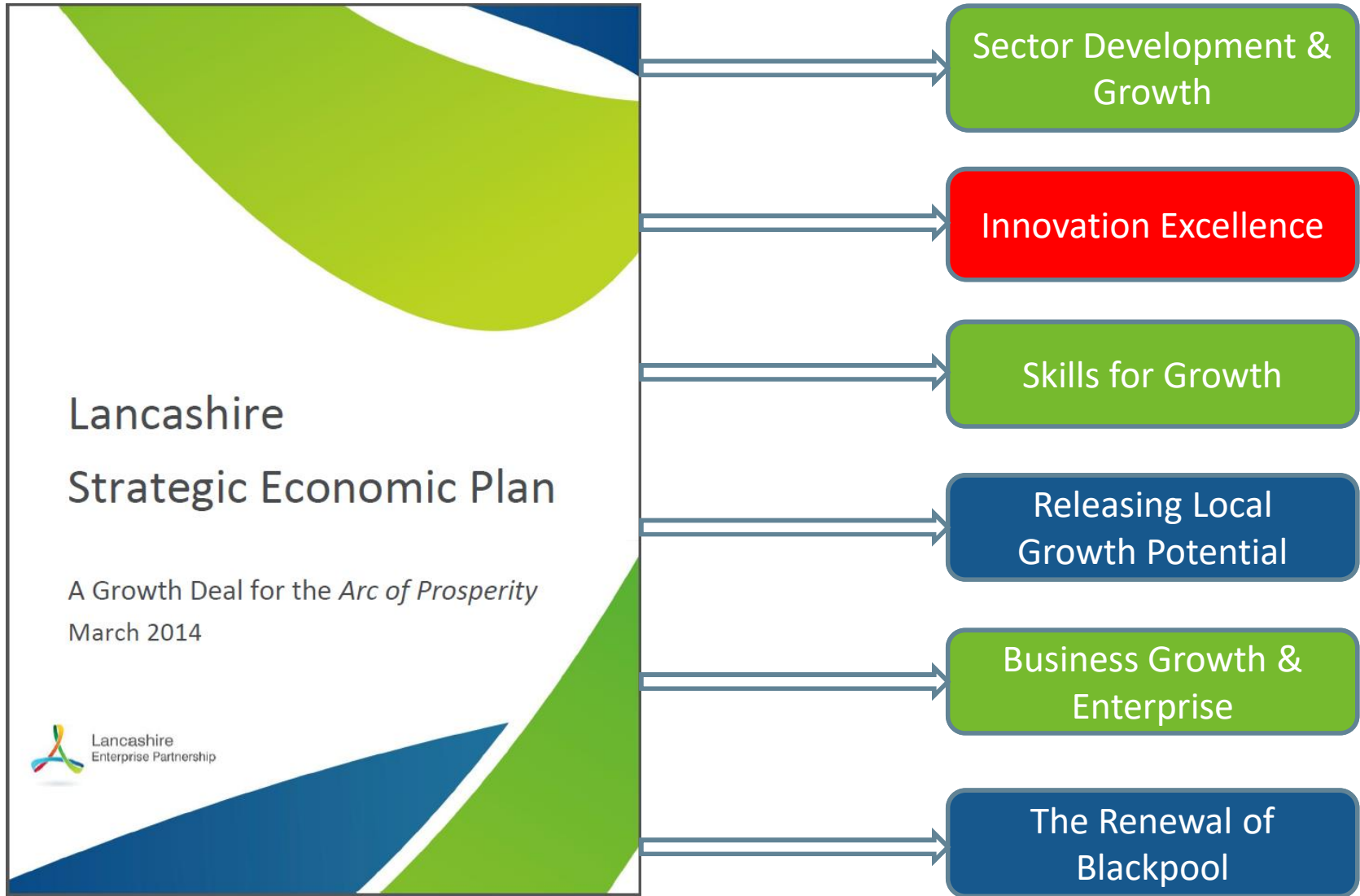
- **For the study overall**
 - The need for a more competitive, dynamic, & larger 'innovation economy' in Lancs
 - Evidence-based Innovation Plan (& process) for LEP & partners - clear objectives & priorities for action
 - Owned by, & committed to, by us all

Building on Foundations - NPh IER

Financial & Professional Servs
Logistics
Education (primarily HE)
... & Quality of Life



Building on Foundations - SEP



Building on Foundations – SIA

Vision

- Creating a “Northern AdvMan Innovation Corridor”
- Bringing existing, emerging & new science/innovation assets & programmes into collaboration with industry
- Driving productivity growth in AdvMan & key linked sectors across the region to world-class levels



Recommendations:

Building on Success:

- NW AMRC in Salmesbury
- BAE Systems/TWI/ Lancaster Joining Tech Centre
- Development of AdvMan Innovation Districts

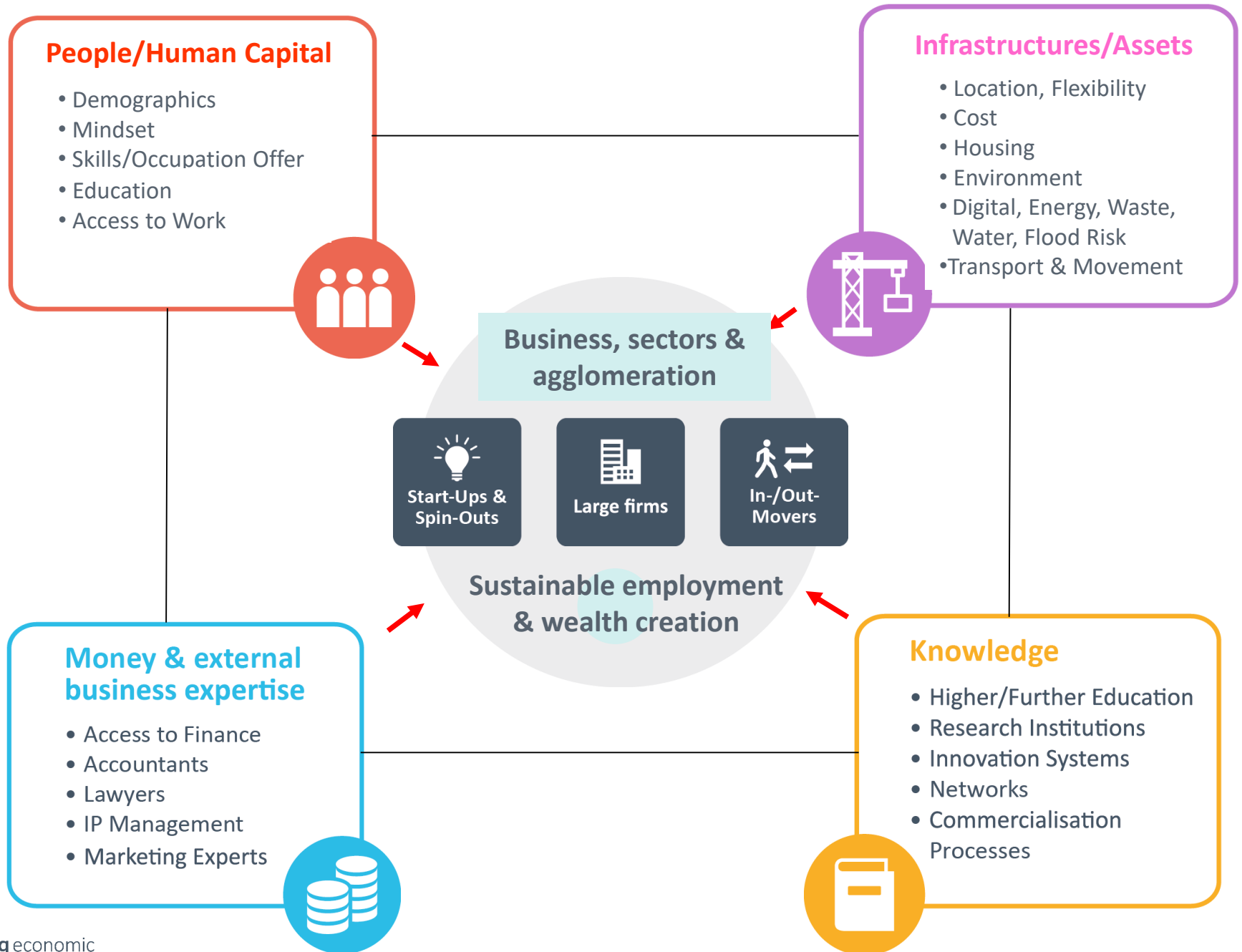
Scaling Up:

- Skills for manufacturing in digital era
- Northern Powerhouse Productivity Academy
- Collective Innovation Programmes
- Northern Powerhouse nuclear supply chain
- Internationalisation

Workplan & Milestones



Our thinking framework



Work Done

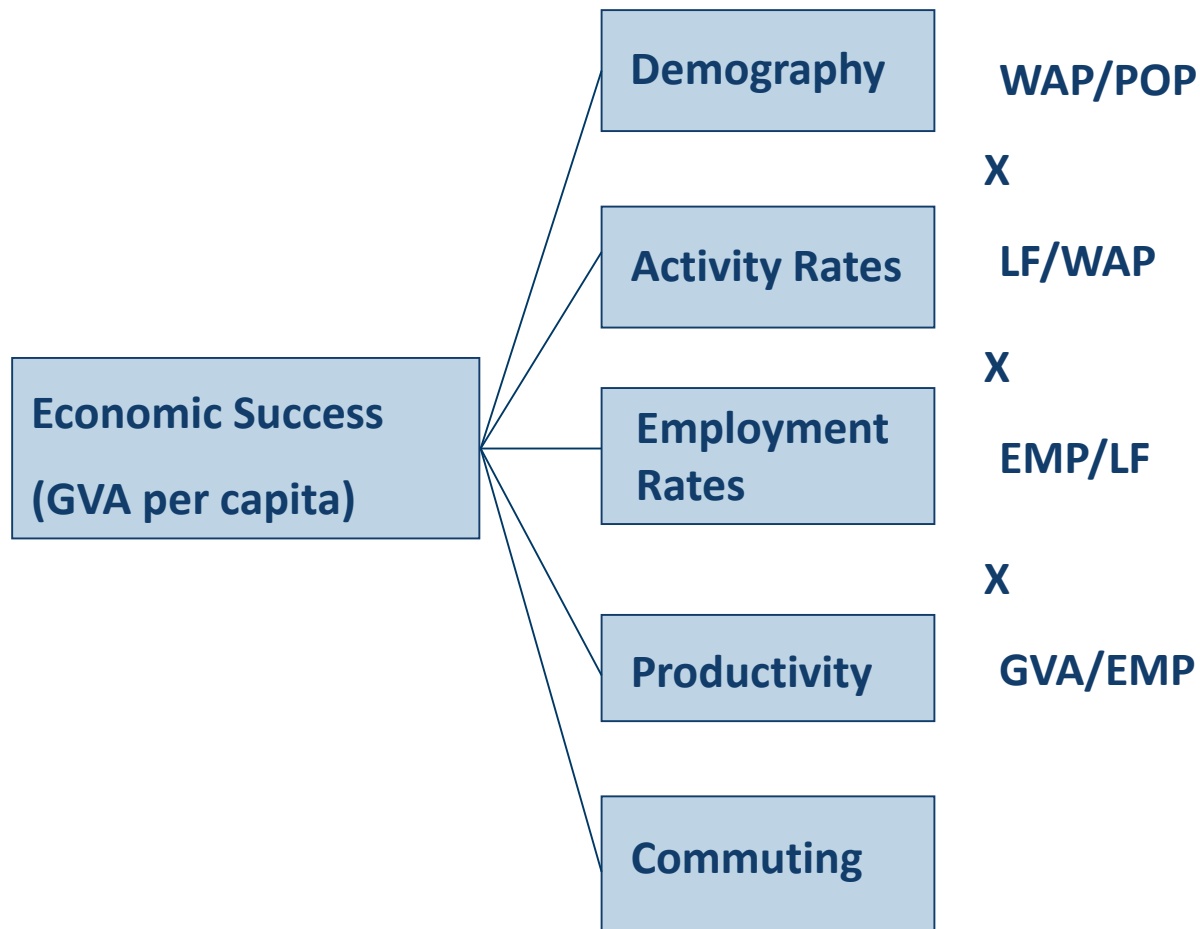
- Inception
- Scoping Calls
 - 12 semi-structured interviews with key stakeholders from a cross-section of industry, public sector, & academia
- Call for Evidence
 - Review of c.40 documents reviewed through 4 lenses of:
 - Businesses, sectors & agglomeration
 - People/Human Capital
 - Infrastructures/assets
 - Knowledge
- Secondary Data
 - Time-series analysis & review across all domains of the innovation ecosystem
- Econometric Projections
 - Historical & future analyses of GVA/employment using GMFM data

1. Talking terms . . .

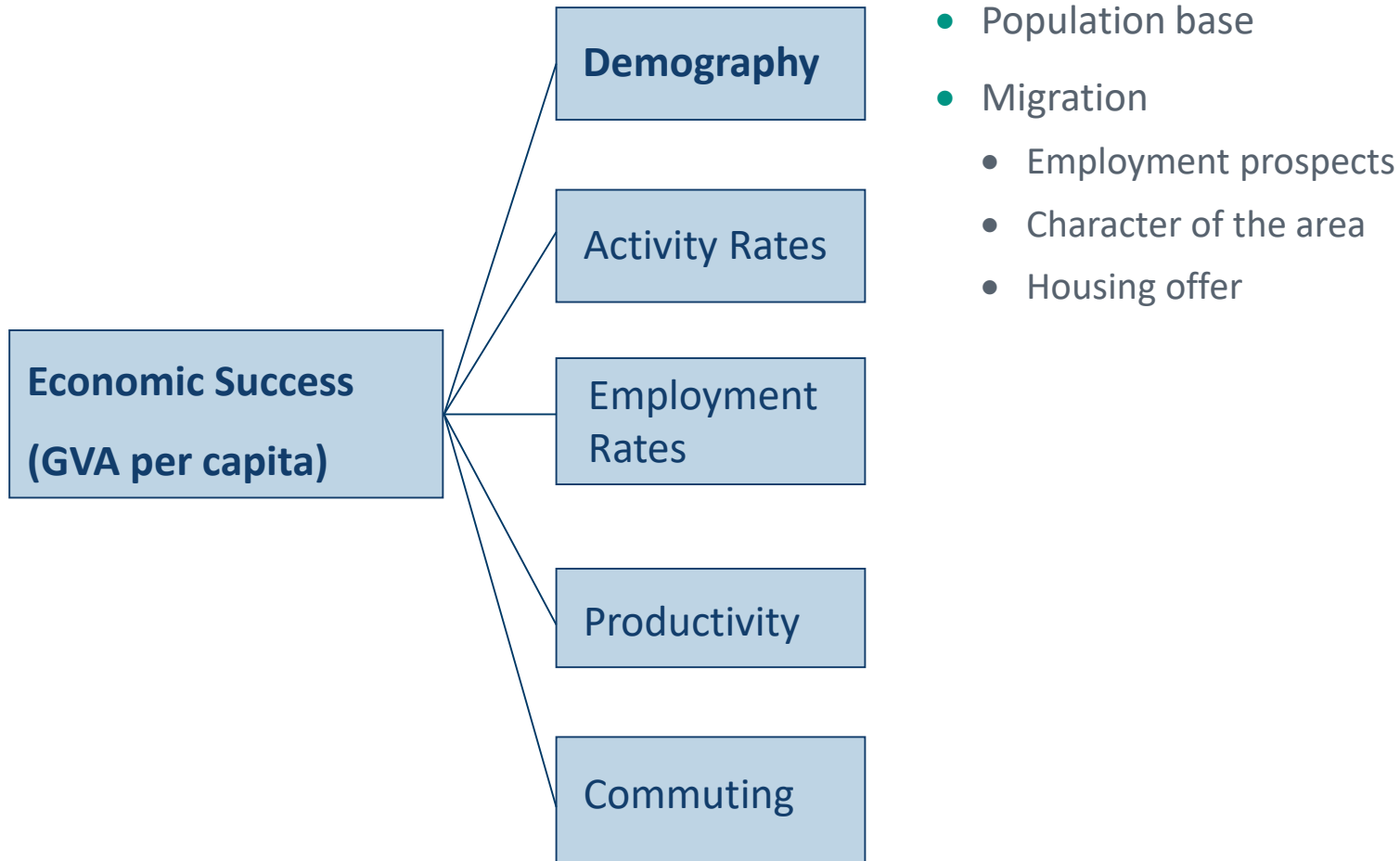
Talking Terms . . .

- Informed by Nesta, SDG's starting point
 - Innovation is . . . the successful exploitation of new ideas, recognising that
 - Innovation need not derive from an advance in science or technology . . . but radical innovation often does
 - Innovation that does derive from an advance in the S&T base needs more than this to achieve (commercial) success
 - Innovation applies equally to product, process, service, & business models
 - Innovation is appropriate . . . & needed . . . equally in the public & ComVol sectors

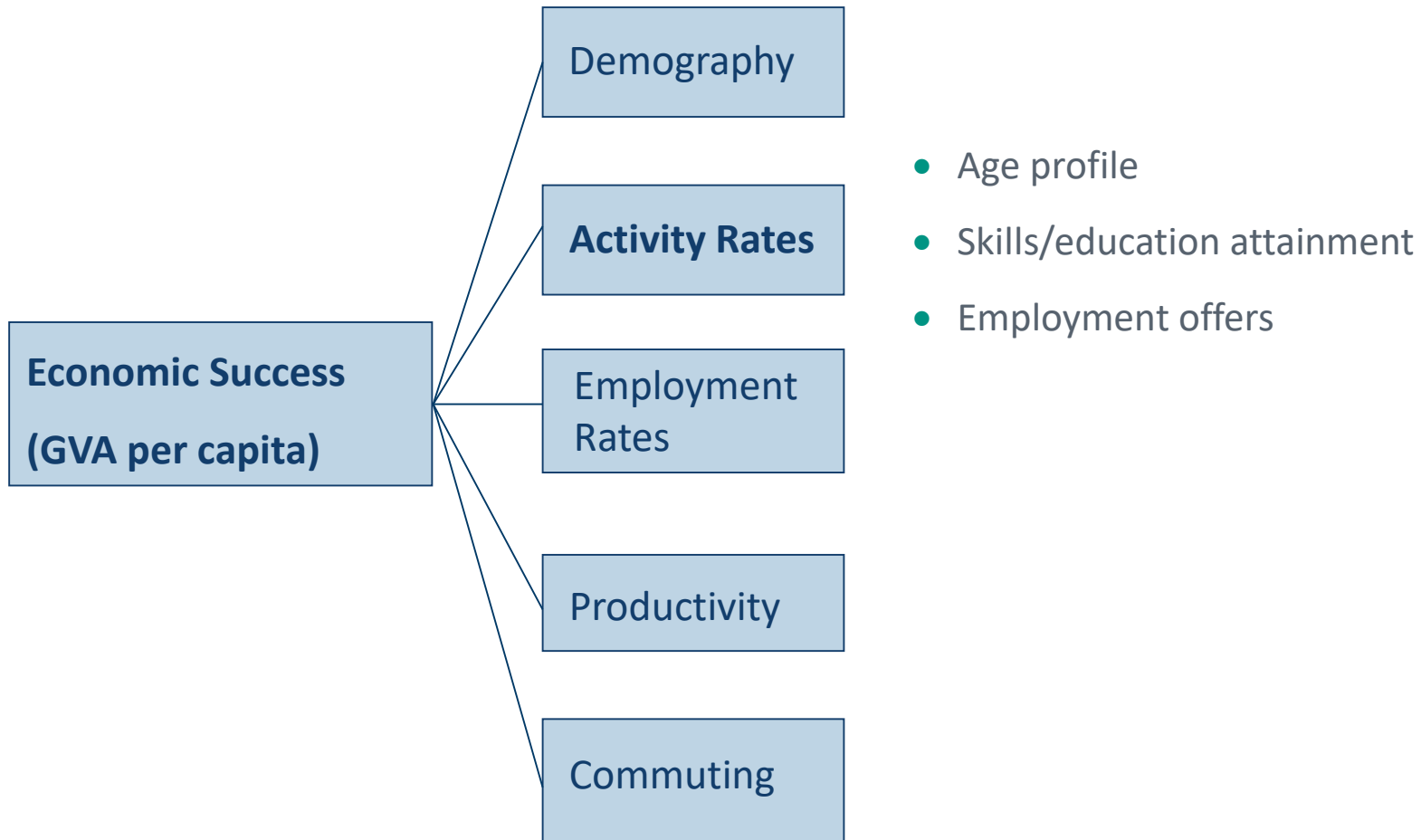
The Core Determinants of Economic Success



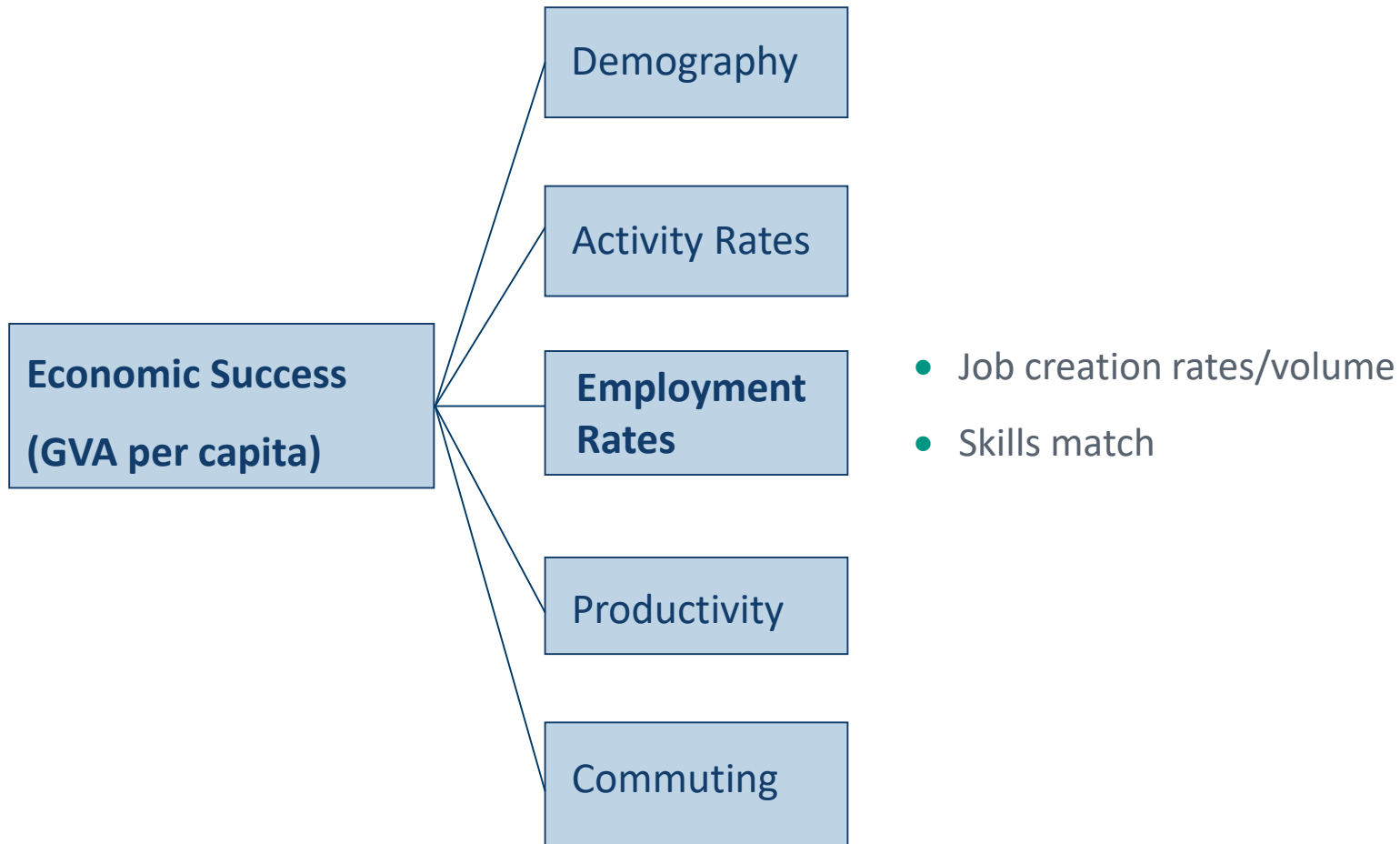
The Core Determinants of Economic Success



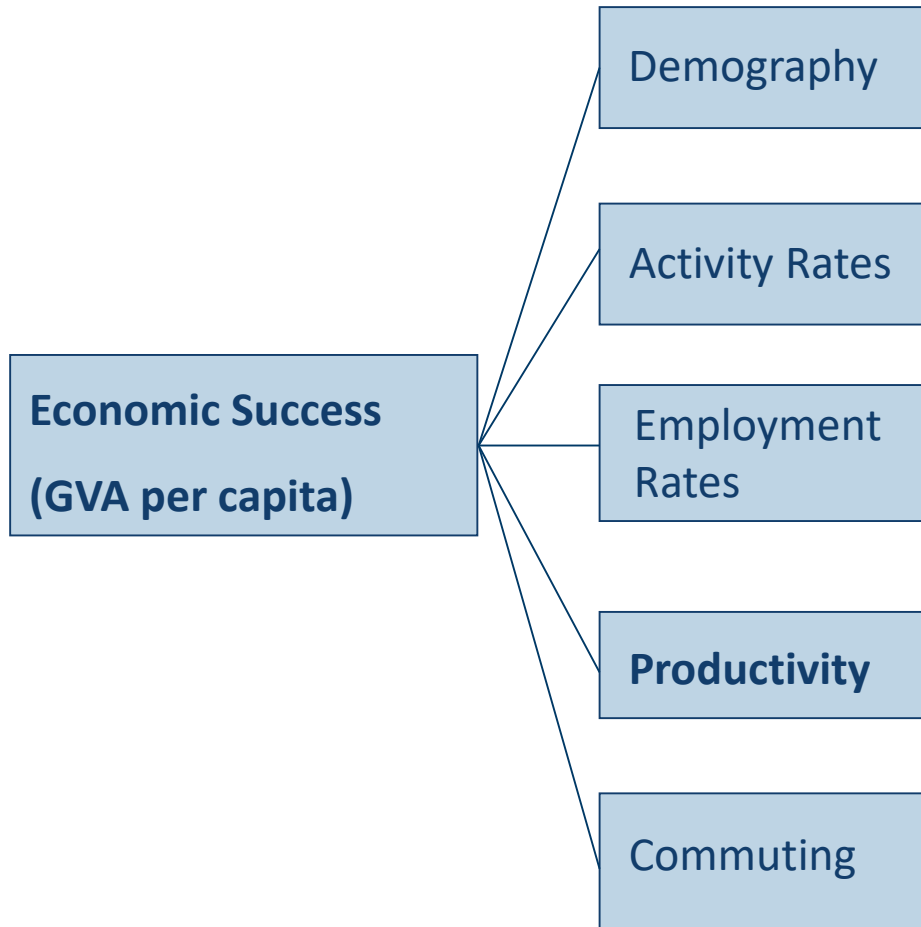
The Core Determinants of Economic Success



The Core Determinants of Economic Success

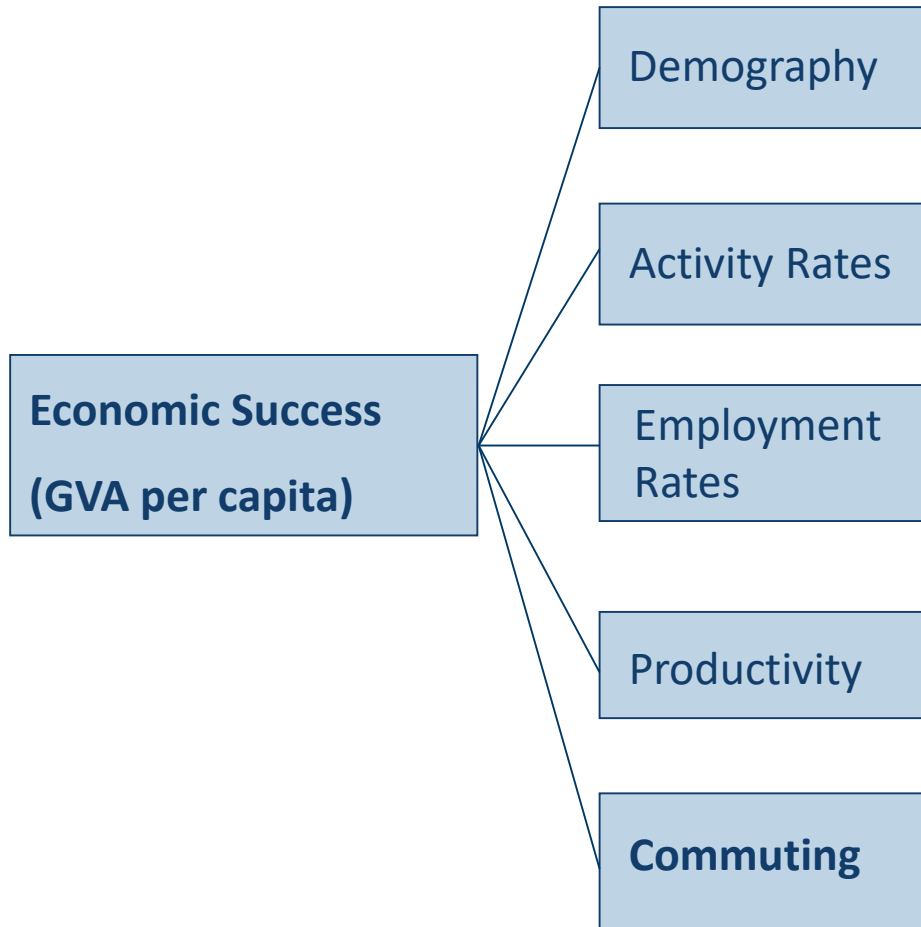


The Core Determinants of Economic Success



- Treasury 'drivers'
 - Skills
 - Enterprise
 - Investment
 - **Innovation**
- Nature of employment
 - sectors, markets, occupations

The Core Determinants of Economic Success



- Relative Employment prospects
- Role within wider economy

*'Did you ever think that making a speech on economics is a lot like p***** down your leg? It seems hot to you . . . but it never does to anyone else'*

LBJ

2. Setting the scene – the headline data messages

Simon Pringle

Our Place – in a Nutshell

	Indicator		Lancs LEP	North West	UK	Source/Date
	Working- age Population (WAP)	N/A	914.5k	4.5m	41.4m	APS/2016
Population & Employment	Working-age Population (WAP) (%)		62%	63%	63%	APS/2016
	Economic Activity Rate (WAP)		78%	76%	78%	APS/2017
	Employment Rate (WAP)		74%	72%	74%	APS/2017
	Employment Growth (WAP) (+/- since 2007)		+3%	+6%	+8%	BRES/2015
	Total number of jobs		633k			
Productivity & Wealth	GVA per head		£19.6k	£21.8k	£29.0k	ONS/2015
	GVA per employee		£42.1k	£45.5k	£50.8k	ONS/2015
	GVA (+/- since 1997)		+39%	+45%	+49%	ONS/2015
	Average Weekly Earnings		£480pw	£502pw	£541pw	ASHE/2014
	Average House Prices		£135.6k	£152.0k	£219.5k	UKHPI/2015
Enterprise	Total Active Enterprises	N/A	43.3k	259.7k	2.6m	BD/2015
	Business Birth Rate		12%	14%	14%	BD/2015
	Business Death Rate		9%	10%	9%	BD/2015
	Employment in Manufacturing (% of all jobs)		13%	9%	8%	BRES/2015
Skills	NVQ levels (% with L4+)		33%	34%	38%	APS/2016
	NVQ levels (% with no qualifications)		8%	10%	8%	APS/2016
	Employers with Skills Gaps		1%	1%	1%	UKCES/2015
	Employers with Hard-to-Fill Vacancies		4%	5%	5%	UKCES/2015

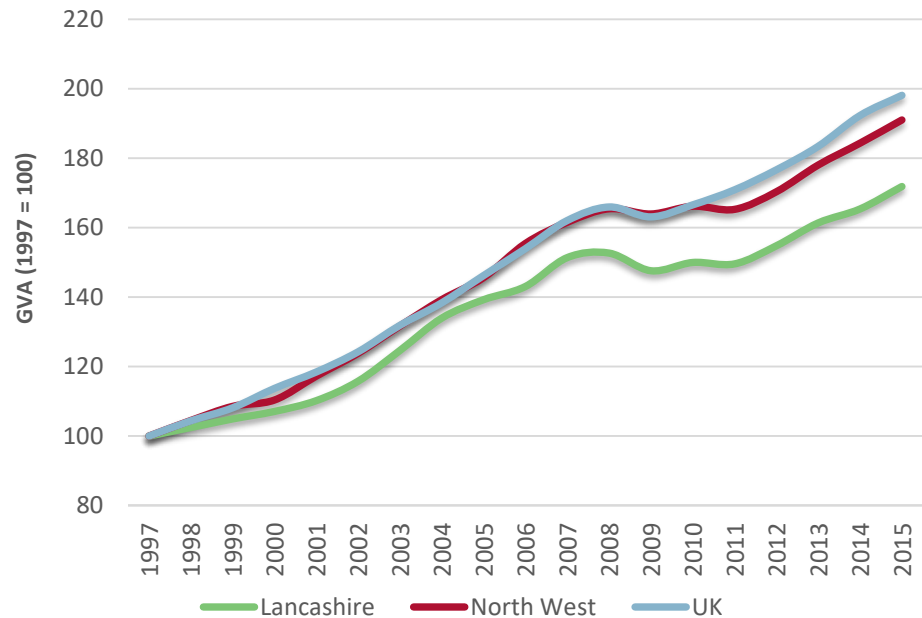
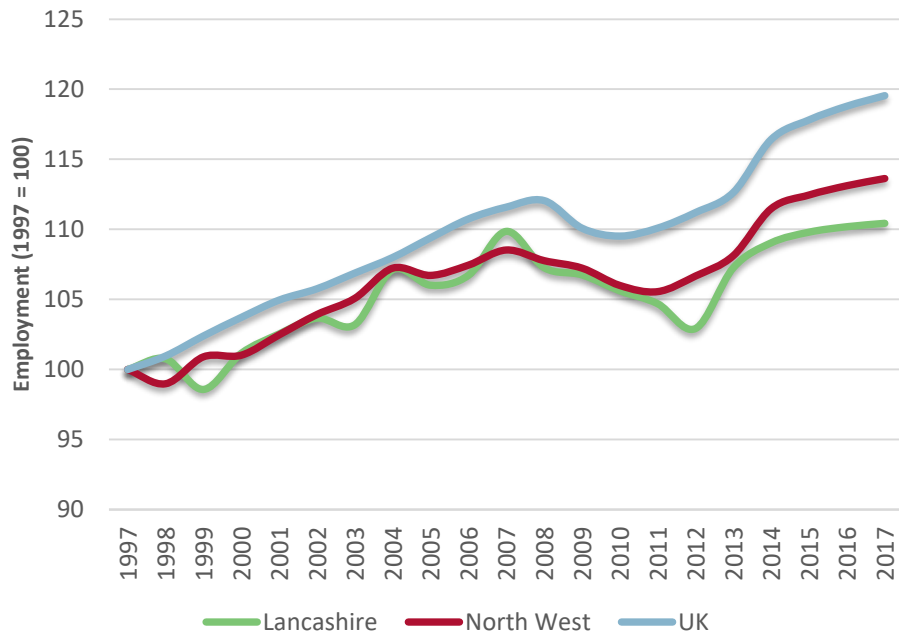
The Lancs economy – the long view: GVA per employee



The Lancs economy – the long view: jobs & GVA

- **Employment** in Lancs grew by 49k between 2012-17
- Recovery from 2013-17, following fall from 2007-12
- But, slower growth than NW & UK

- **Aggregate GVA** in Lancs was £29bn in 2015 = 18.5% of NW
- Consistent, but in relative terms, slow growth compared to NW & UK
- Gap with UK widened since 2011

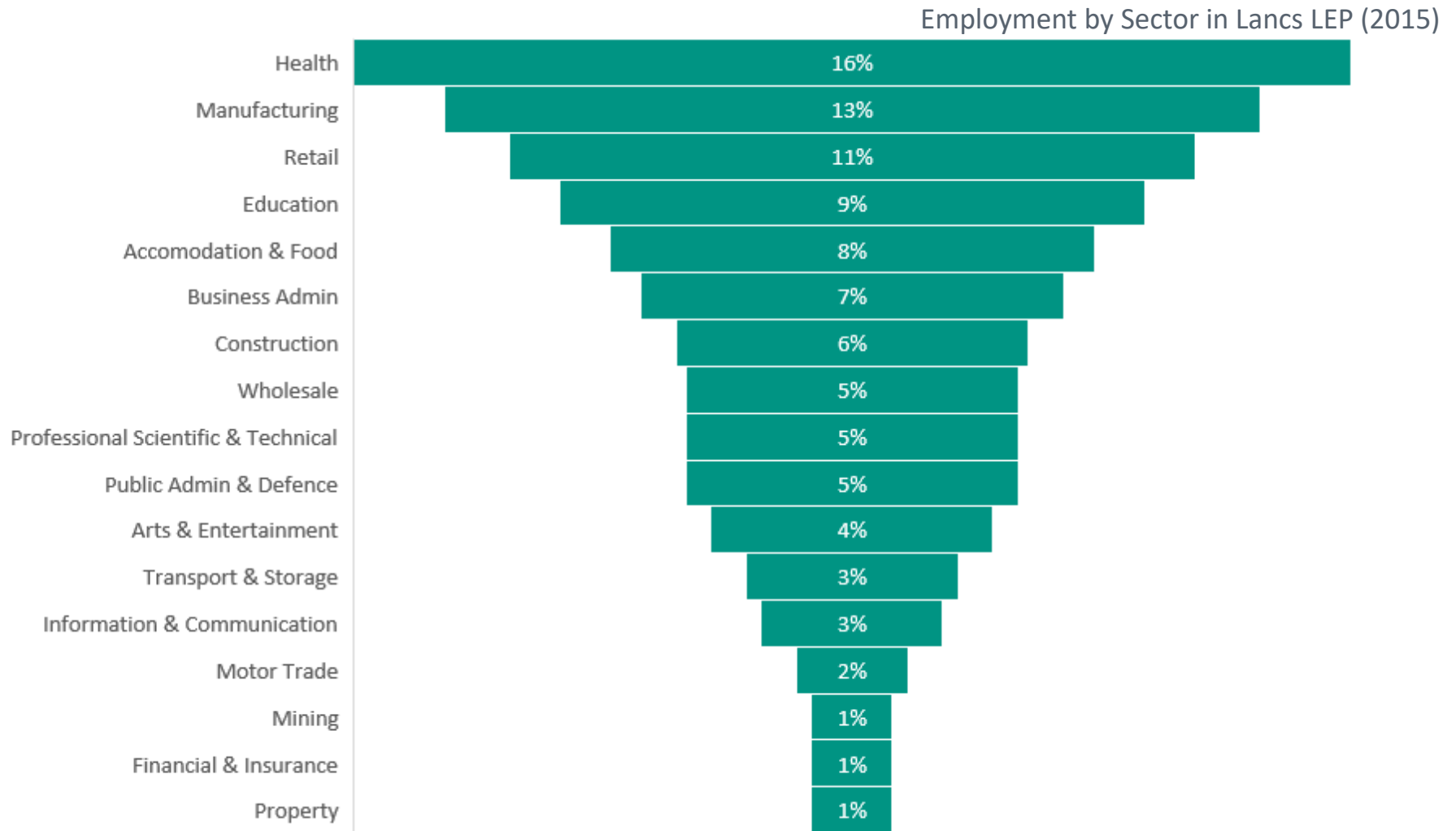


Business/sectors – overview

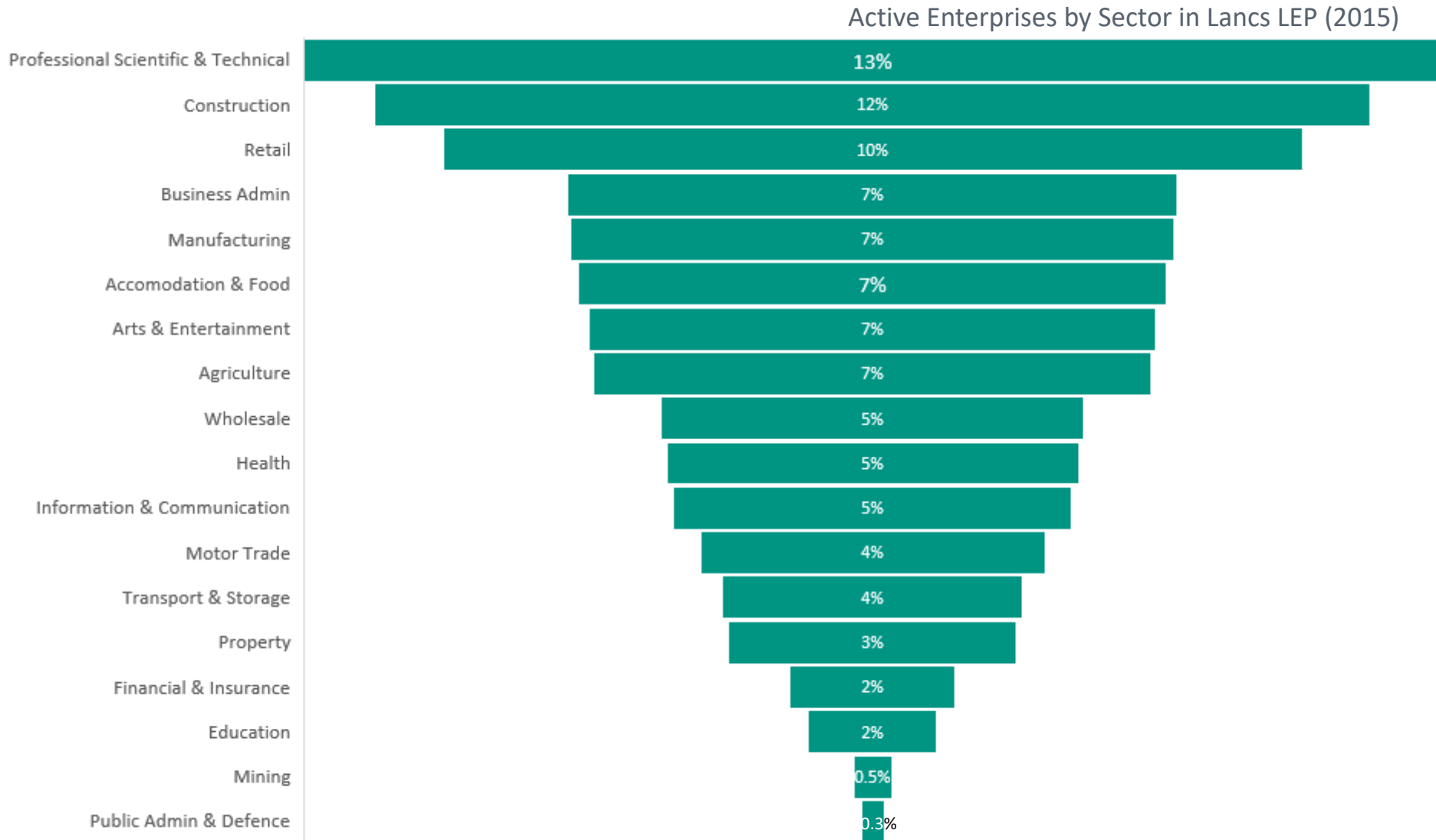
	Indicator		Lancs LEP	North West	UK	Source/Date
Enterprise	Total Active Enterprises	N/A	43.3k	259.7k	2.6m	BD/2015
	Business Birth Rate		7%	7%	9%	BD/2015
	Business Death Rate		11%	10%	11%	BD/2015
	Employment in Manufacturing (% of all jobs)		12%	9%	8%	BRES/2015

- 630k jobs in Lancs LEP in 2015 (~20% of NW total)
- 43k active enterprises in 2015 (20% of NW total)
- High concentration of manufacturing jobs as share of all jobs (industrial legacy)
- High density of jobs in Industrial Strategy & NPIER sectors...
- . . . but a low birth rate of new enterprises

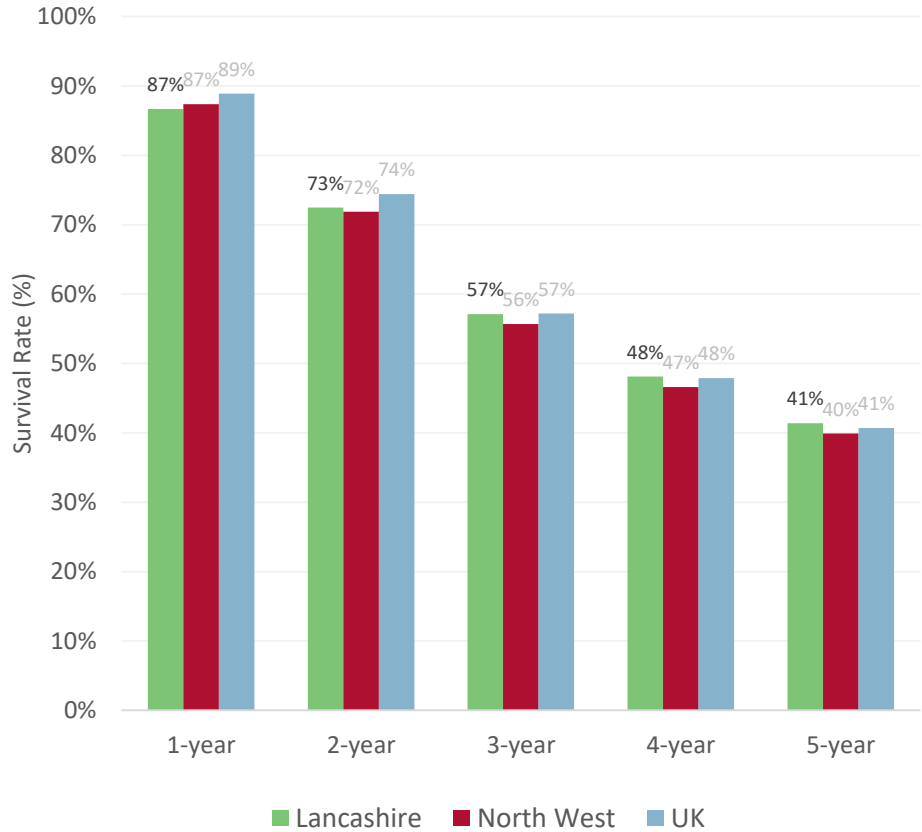
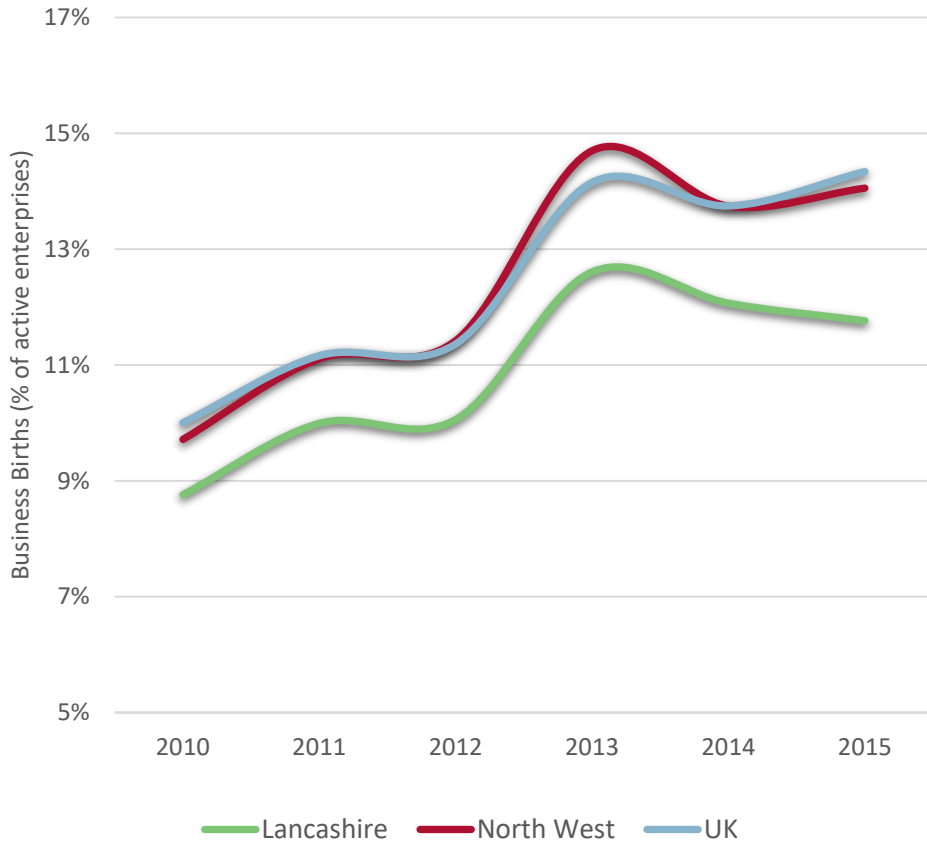
Business/sectors – employment distribution



Business/sectors – numbers of businesses by sector



Business/sectors – business births & deaths

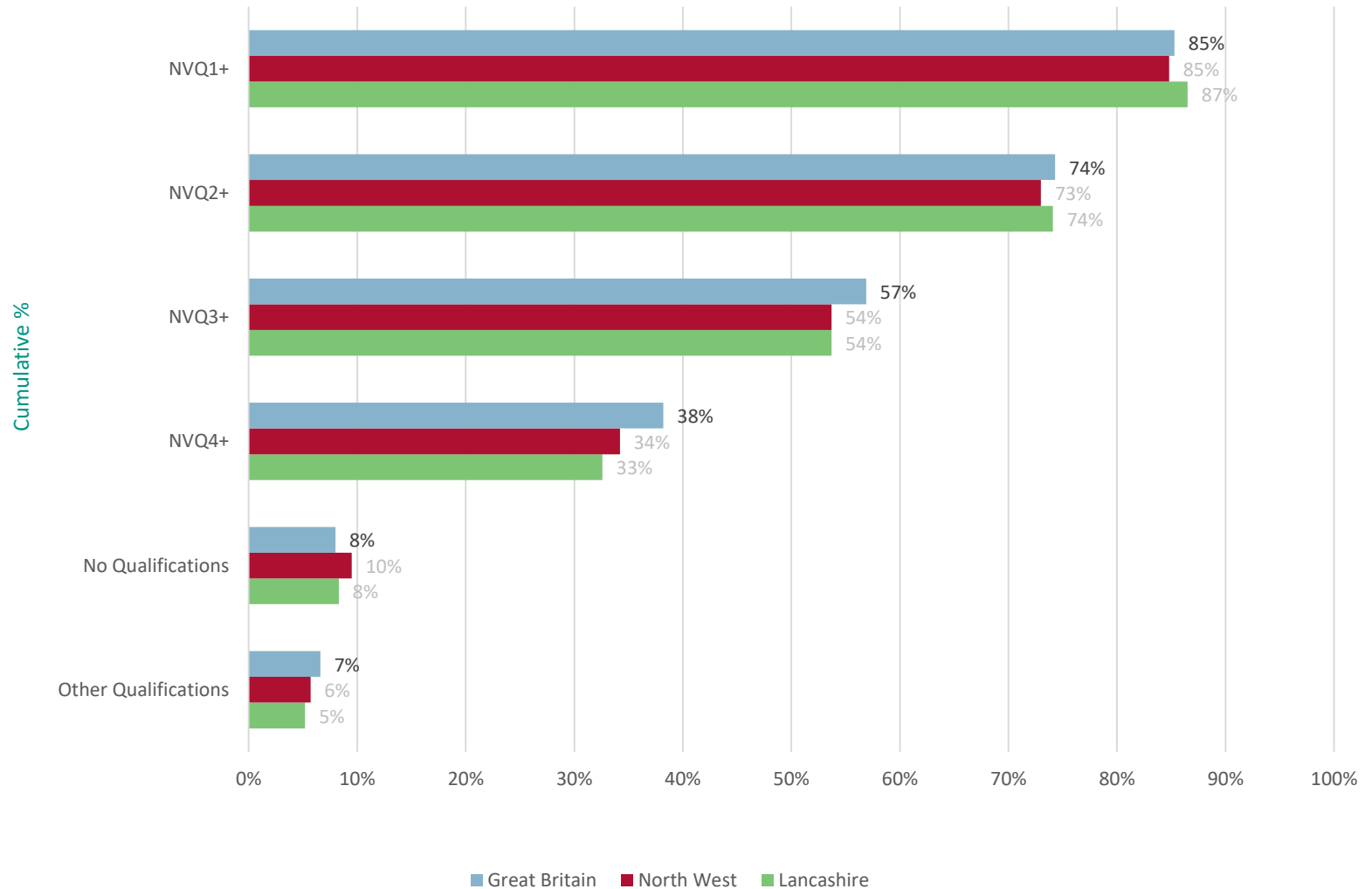


People/Human Capital – overview

	Indicator		Lancs LEP	North West	UK	Source/Date
Skills	NVQ levels (% with L4+)		33%	34%	38% (GB)	APS/2016
	NVQ levels (% with no qualifications)		8%	10%	8% (GB)	APS/2016
	Employers with Skills Gaps		1%	1%	1%	UKCES/2015
	Employers with Hard-to-Fill Vacancies		4%	5%	5%	UKCES/2015

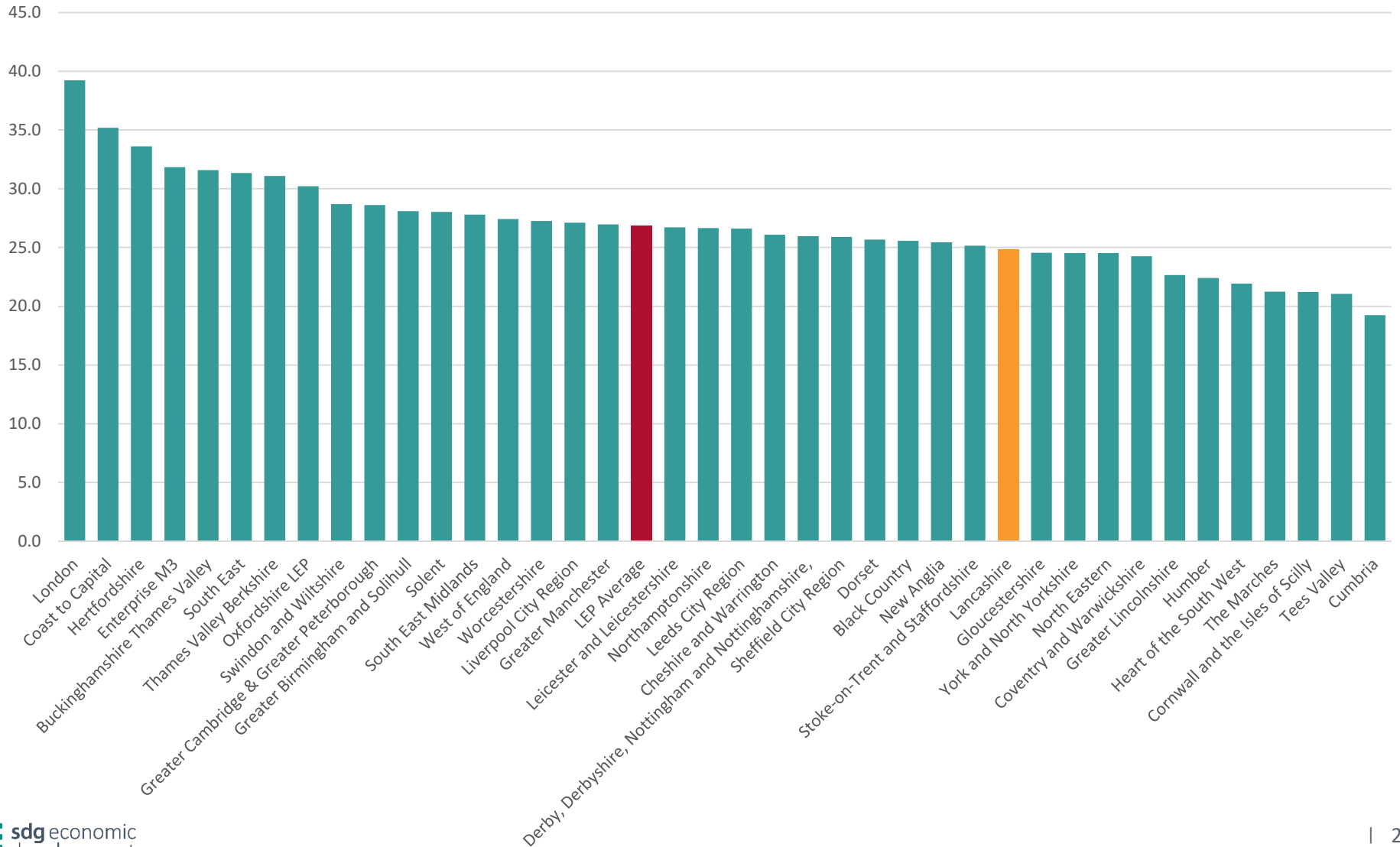
- Share of Lancs workforce skilled to NVQ L4+ is 5p.p. lower than GB average
- Still too few people with no qualifications compared to the North West as a whole

People/Human Capital – skills in workforce

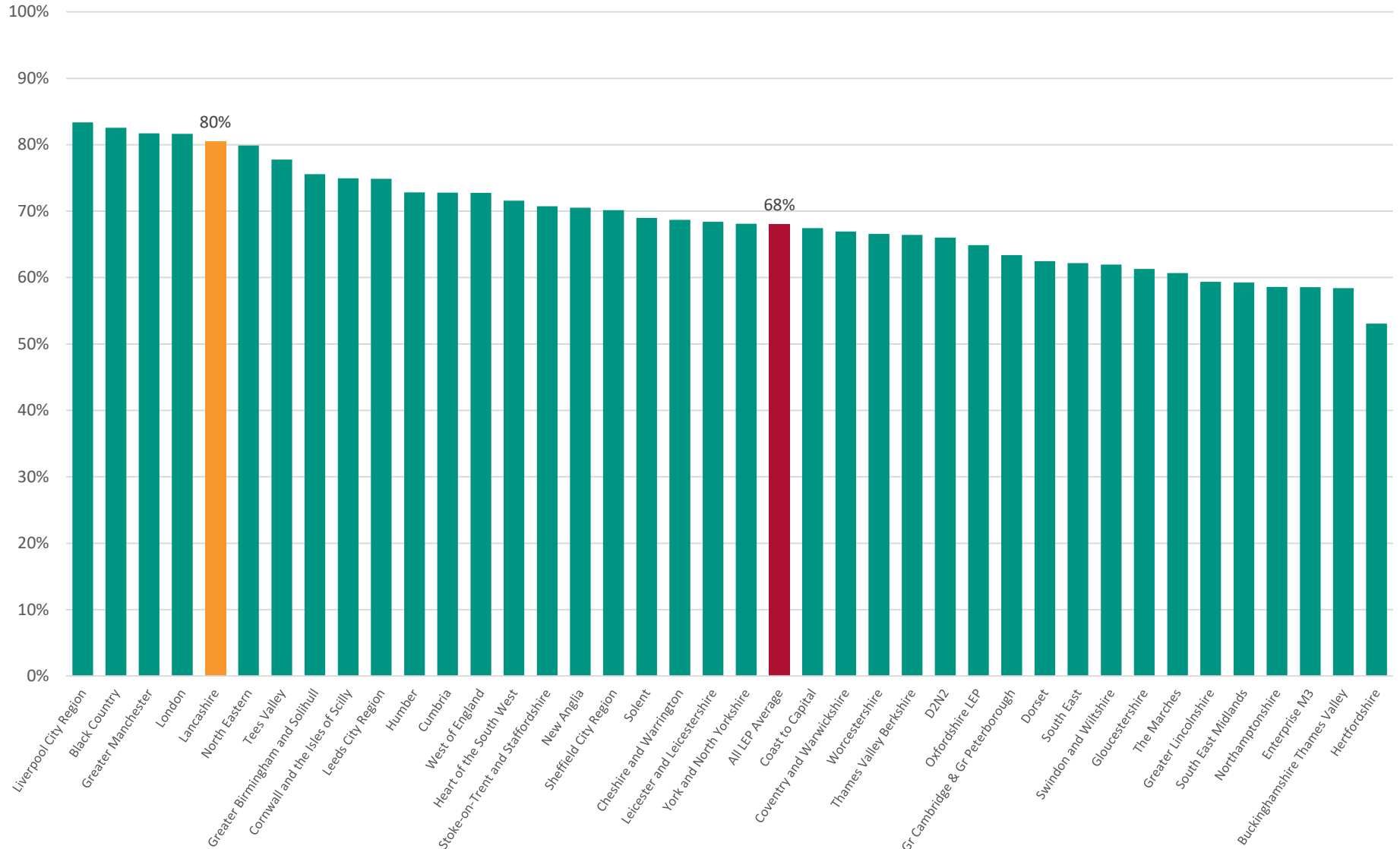


People/Human Capital – Travel to Work (LEP)

Average Travel to Work Time (Minutes), 2013



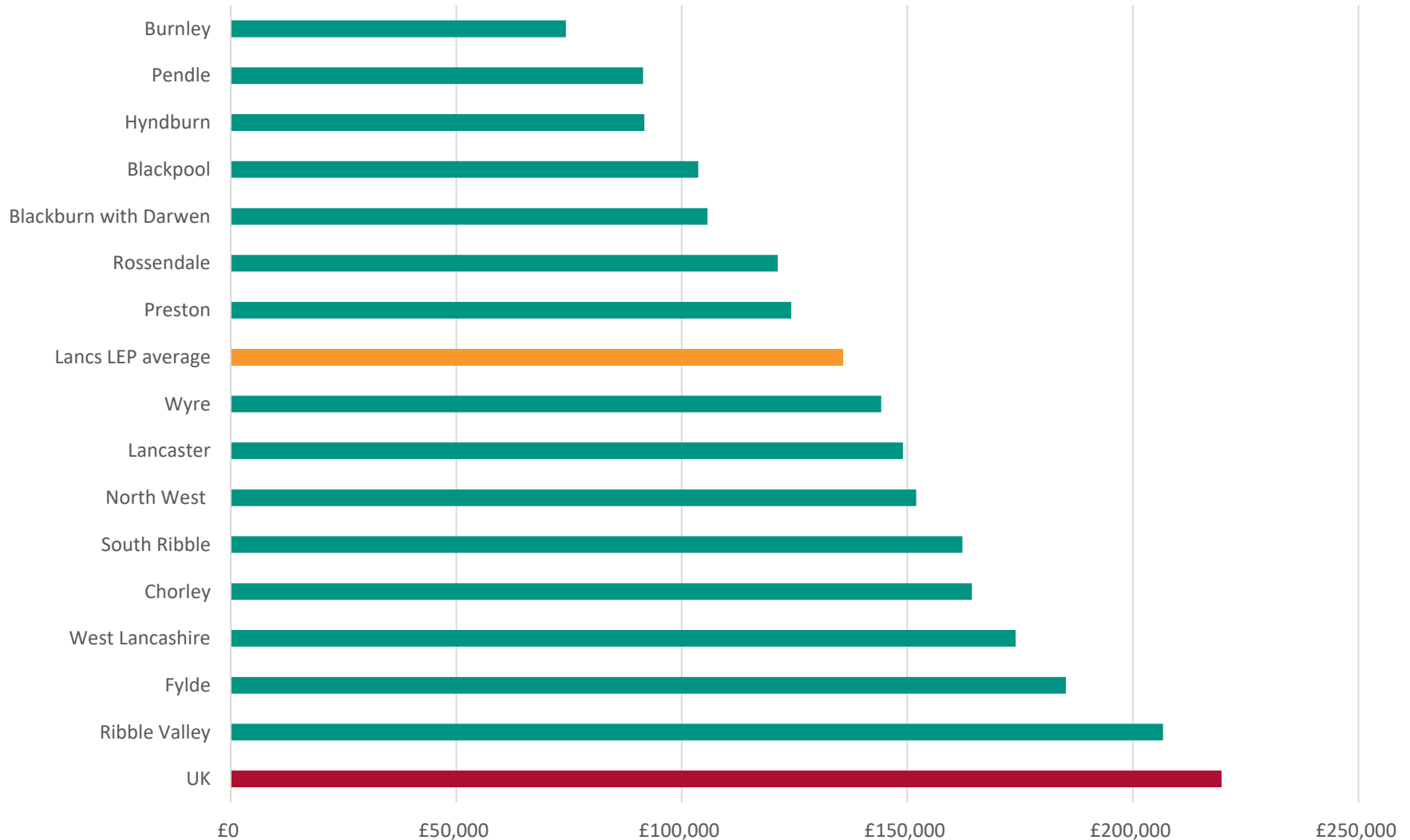
People/Human Capital – graduate retention at 6 months (2012/13)



Infrastructure/Assets – Strategic Sites

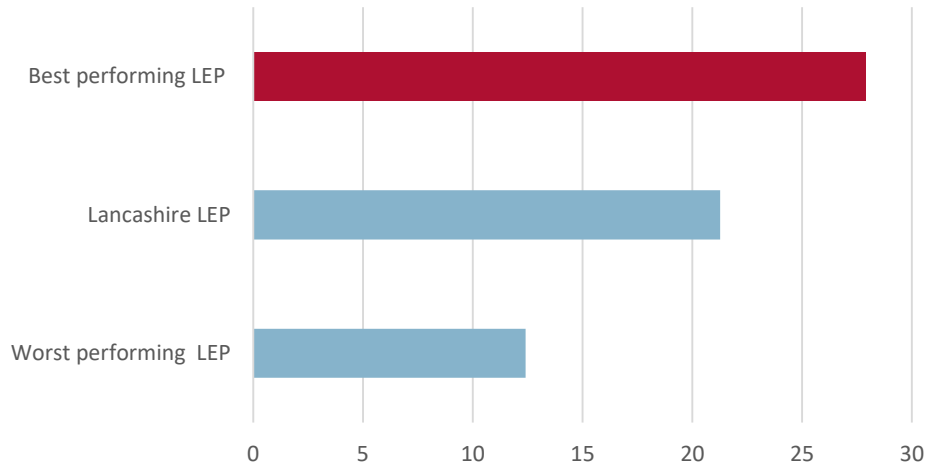
- Cutting edge R&D facilities in key sectors including Aerospace, Nuclear, & AdvMan
- EZs with specific sector foci :
 - Samlesbury Aerospace EZ (AdvMan & Engineering)
 - Hillhouse Technology EZ (Energy, Chemicals & Polymers)
 - Blackpool Airport EZ (Energy, Wind, Nuclear & Waste-to-Energy)
 - Wharton Aviation EZ (AdvMan & Engineering).
- 4 HEIs located/part-located in the area
 - Health Innovation Campus – Lancaster
 - Engineering Innovation Centre – UCLan
- Translational research centres & connectivity between HEIs/industry
- Strategic assets (e.g. Port of Heysham)
- However, a lack of quality employment space an ongoing problem...

Infrastructure/Assets – Average House Prices

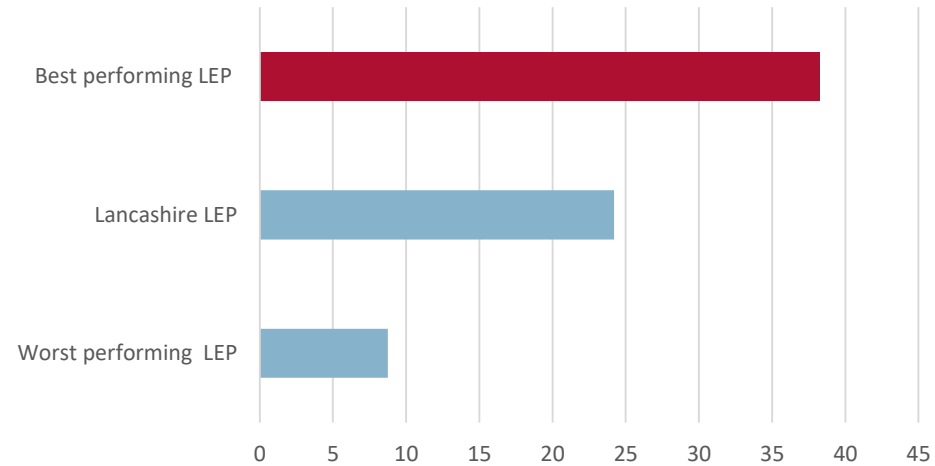


Infrastructure/Assets – Broadband

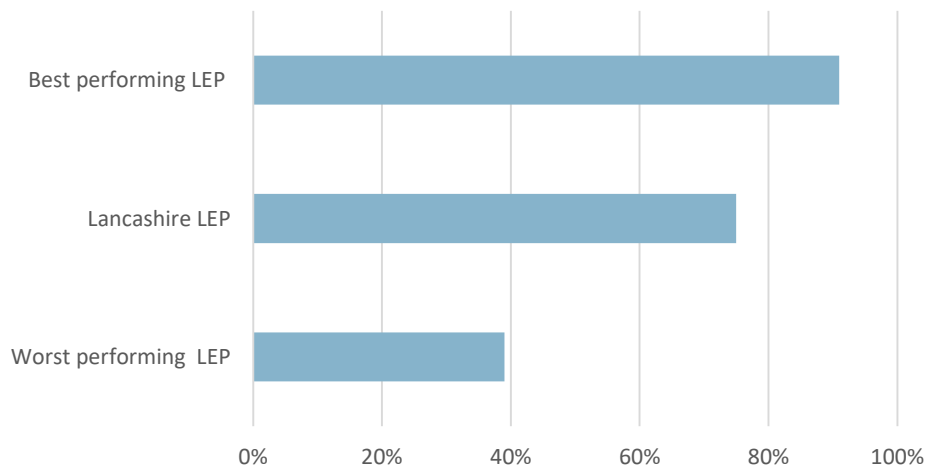
Average download speed (Mbit/s)



Take-up of lines > 30 Mbit/s (number of lines)



Super-Fast Broadband Availability (% premises)

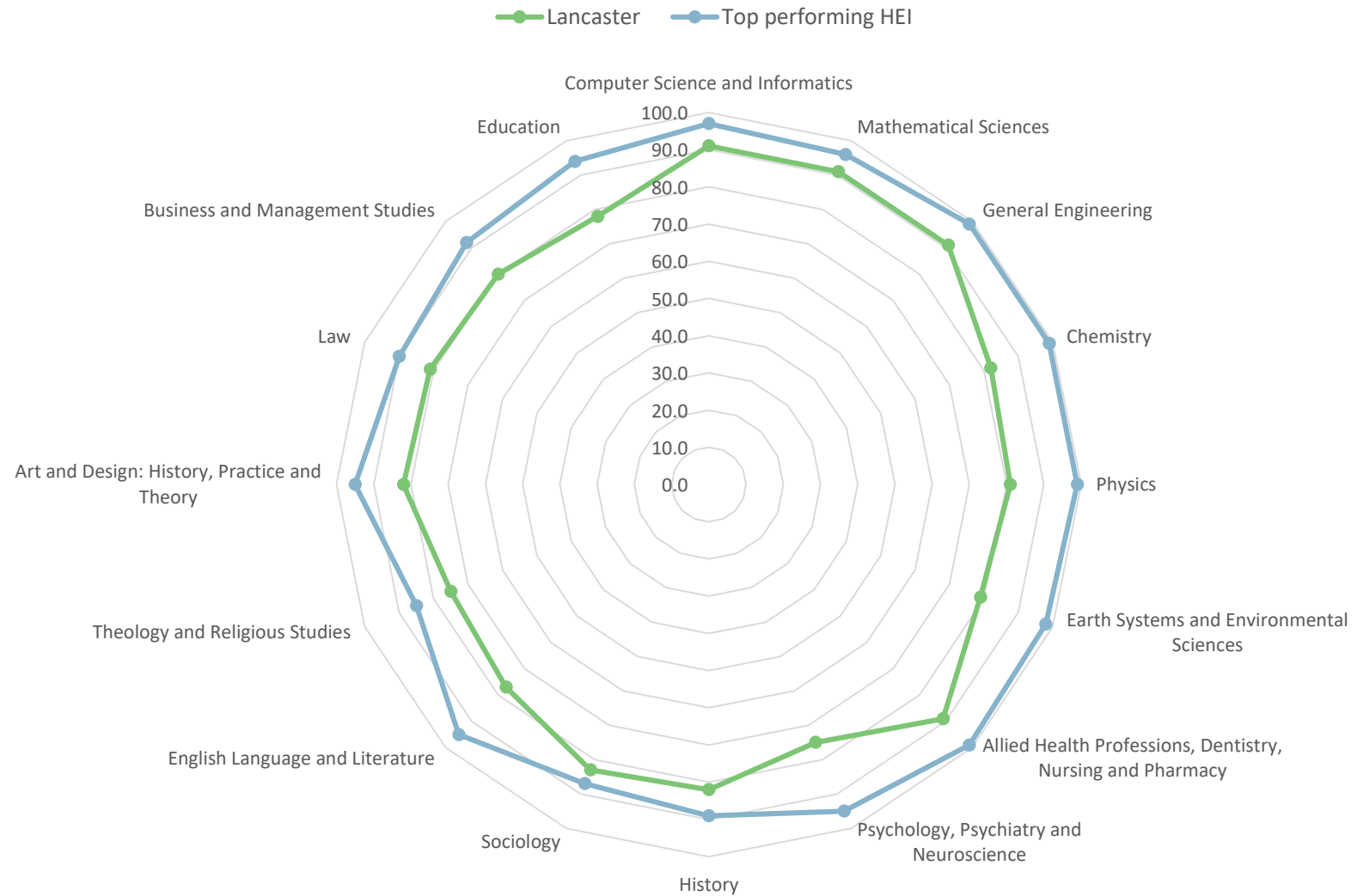


Note - Black Country LEP is the highest performing LEP against each indicator.

Knowledge – overview

	Indicator		Lancs LEP	North West	UK	Source/ Date
Educational Excellence	Graduate retention rates		80%	77% (NW average)	68% (All-LEP average)	HESA 2012/13
	Undergrads in STEM/non-STEM		34%/66%	35%/65%	35%/65% (England)	HESA 2013/14
	FT Post-grads in STEM/non-STEM		49%/51%	68%/32%	65%/35% (England)	HESA 2013/14
	University spin-outs/start ups since 2000		27 (1% of UK total)	156 (7% of UK total)	2,293	Spinouts UK/2017
Enterprise & Infrastructure	Total R&D Expenditure (£ per person employed)		£525	£1,093	£1,070	Eurostat + BRES/2011
	of which Business R&D expenditure (BERD)		£388 (74%)	£851 (78%)	£765 (71%)	Eurostat + BRES/2011
	Employment in Professional, Scientific & Technical (% of all jobs)		5%	7%	8% (GB)	BRES/2015
	Residents employed in STEM subjects (Prof & Associate Prof)		6.2%	6.9%	7.2%	APS/2014

Knowledge – REF 2014 Overall 3* & 4*, Lancaster



Knowledge – HE Business & Community Interaction Survey

Research related activities - <u>contract research 2015-16</u>	Lancaster	UCLAN	Edge Hill	University of Cumbria	Combined Total
Number with SMEs	47	19	0	0	66
Total value with SMEs (£000's)	1,235	86	0	0	1,321
Number with other (non-SME) commercial businesses	100	15	2	1	118
Total value with other (non-SME) commercial businesses (£000's)	1,254	244	3	3	1,504
Number with non-commercial organisations	243	82	17	26	368
Total value with non-commercial organisations (£000's)	5,818	1,566	129	140	7,653
Total number of contracts	390	116	19	27	552
Total value of contracts (£000's)	8,307	1,896	132	143	10,478

Knowledge – HE Business & Community Interaction Survey

Research related activities – <u>Cons Services</u> 2015-16	Lancaster	UCLAN	Edge Hill	University of Cumbria	Combined Total
Number with SMEs	212	62	6	9	289
Total value with SMEs (£000's)	4,206	492	29	0	4,727
Number with other (non- SME) commercial businesses	104	7	1	2	114
Total value with other (non- SME) commercial businesses (£000's)	483	55	2	8	548
Number with non- commercial organisations	40	34	24	10	108
Total value with non- commercial organisations (£000's)	854	8,103	1,699	69	10,725
Total number of contracts	356	103	31	21	511
Total value of contracts (£000's)	5,543	8,650	1,730	77	16,000

Knowledge – Research commercialisation

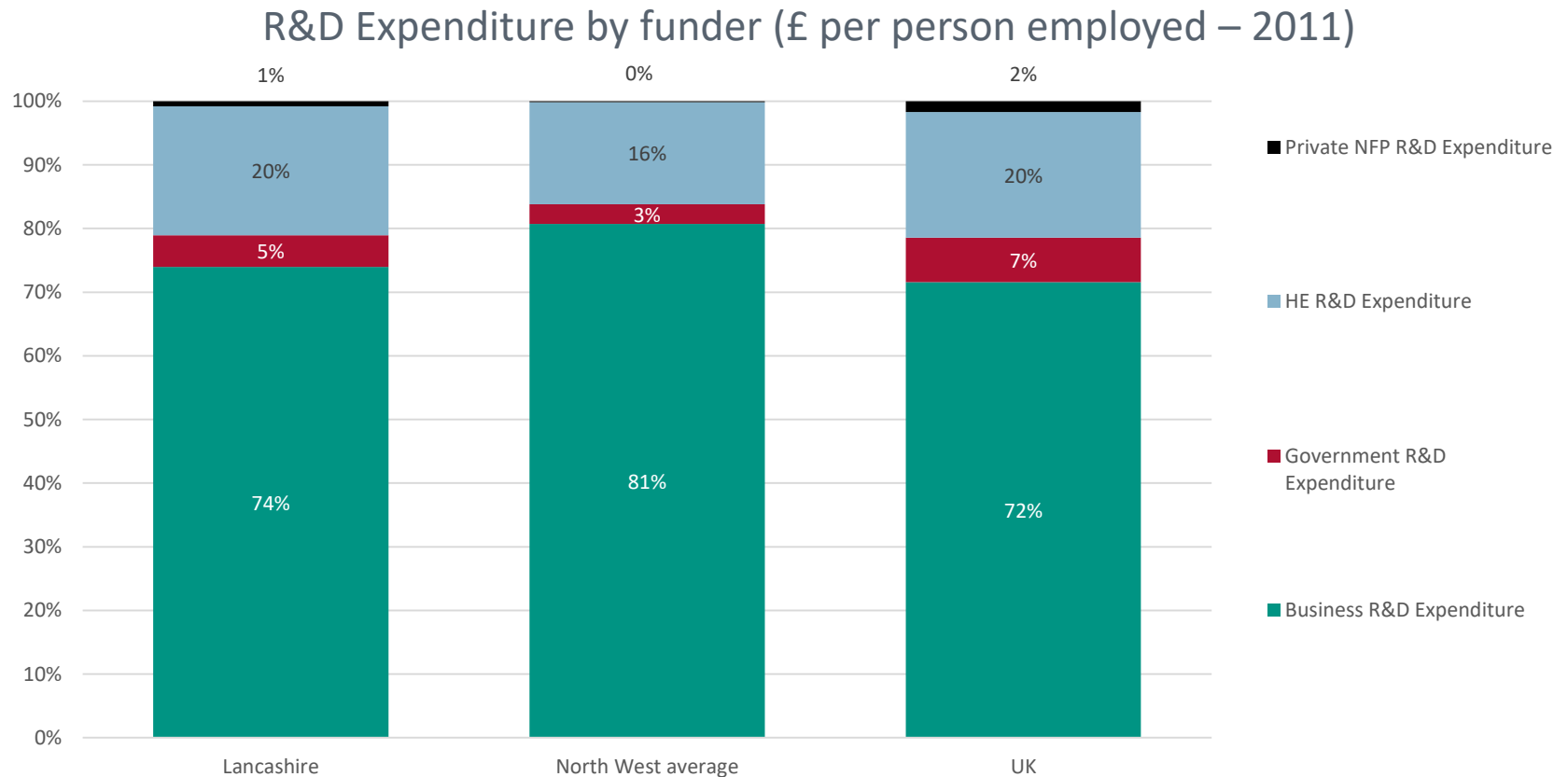
Region	Total Spin-outs/ Start-ups since 2000	Share of UK (%)
Scotland	631	28%
London	301	13%
South East	259	11%
East	252	11%
North West	156	7%
<i>of which Lancs HEIs</i>	27	1%
Yorkshire & Humber	151	7%
South West	132	6%
West Midlands	117	5%
Northern Ireland	91	4%
East Midlands	76	3%
North East	67	3%
Wales	44	2%
UK	2293	-

Lancs' HEI have historically produced few start-ups & spin-outs compared to other parts of the country

Spin-outs/start-ups since 2000:

- University of Lancaster – 26 spin-outs & 1 start-up
- UCLAN – 1 spin-out

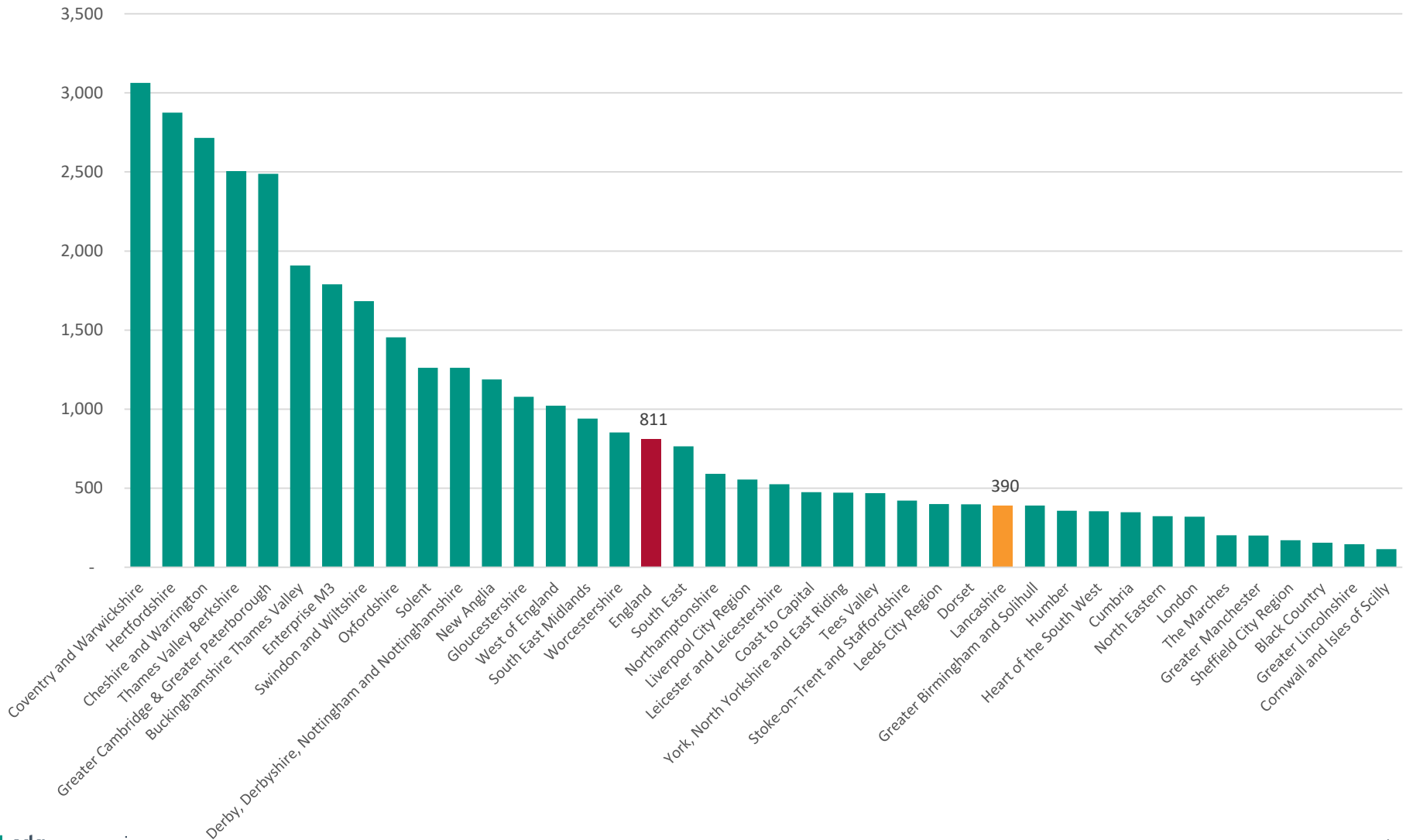
Knowledge – who's funding R&D in Lancs?



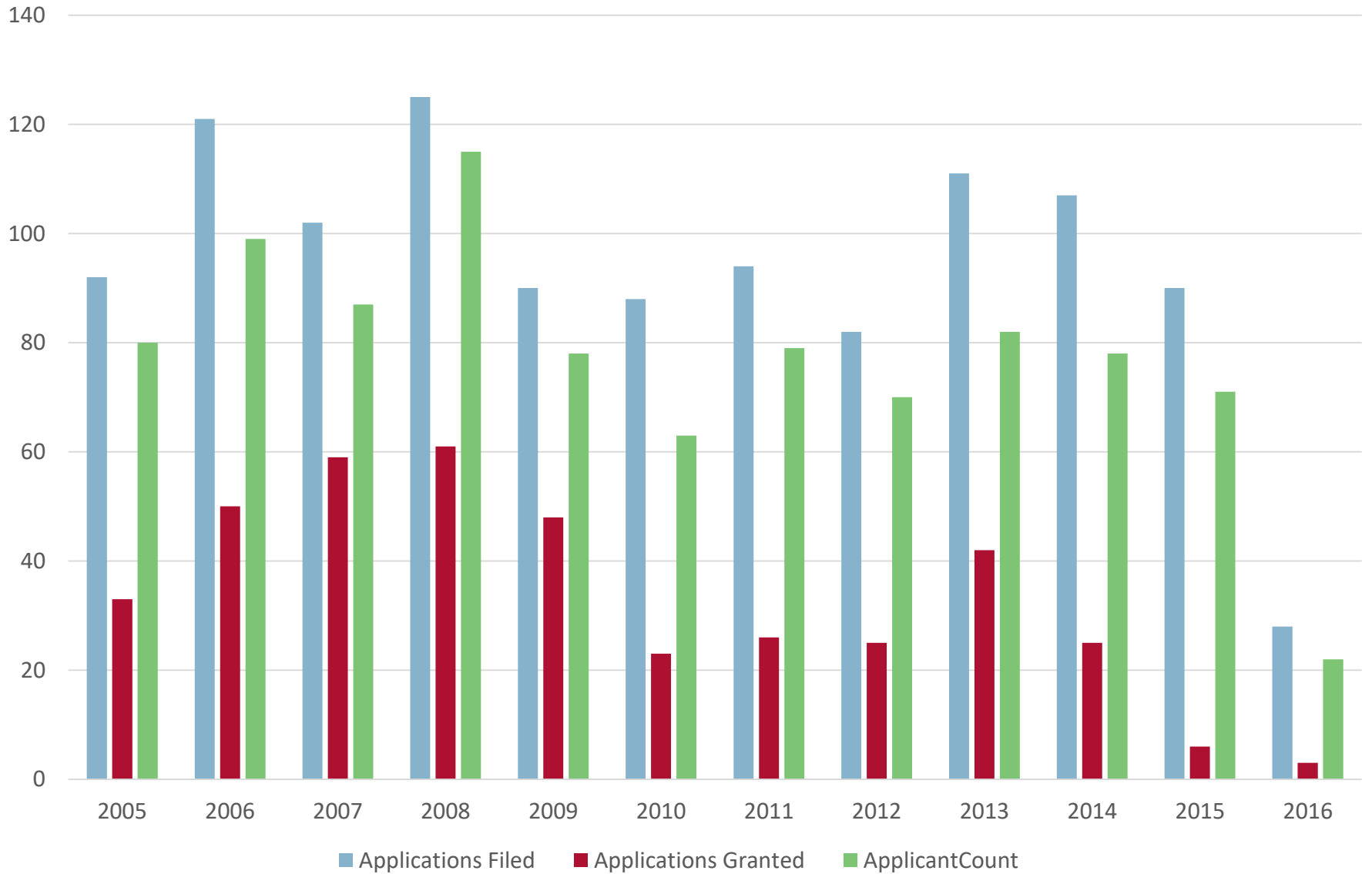
- Total R&D Expenditure (£ per person employed) in Lancs is £525 compared to UK average of £1,070 – nearly double that of Lancs
- Lancs has a greater share of BERD expenditure than UK average, but smaller slice of GovERD compared to UK

Knowledge - BERD in more detail

BERD £s per person employed (FTE), 2013



Knowledge – Patenting





3. Where are we heading?
...the GMFM forecasts

Forecast Summary

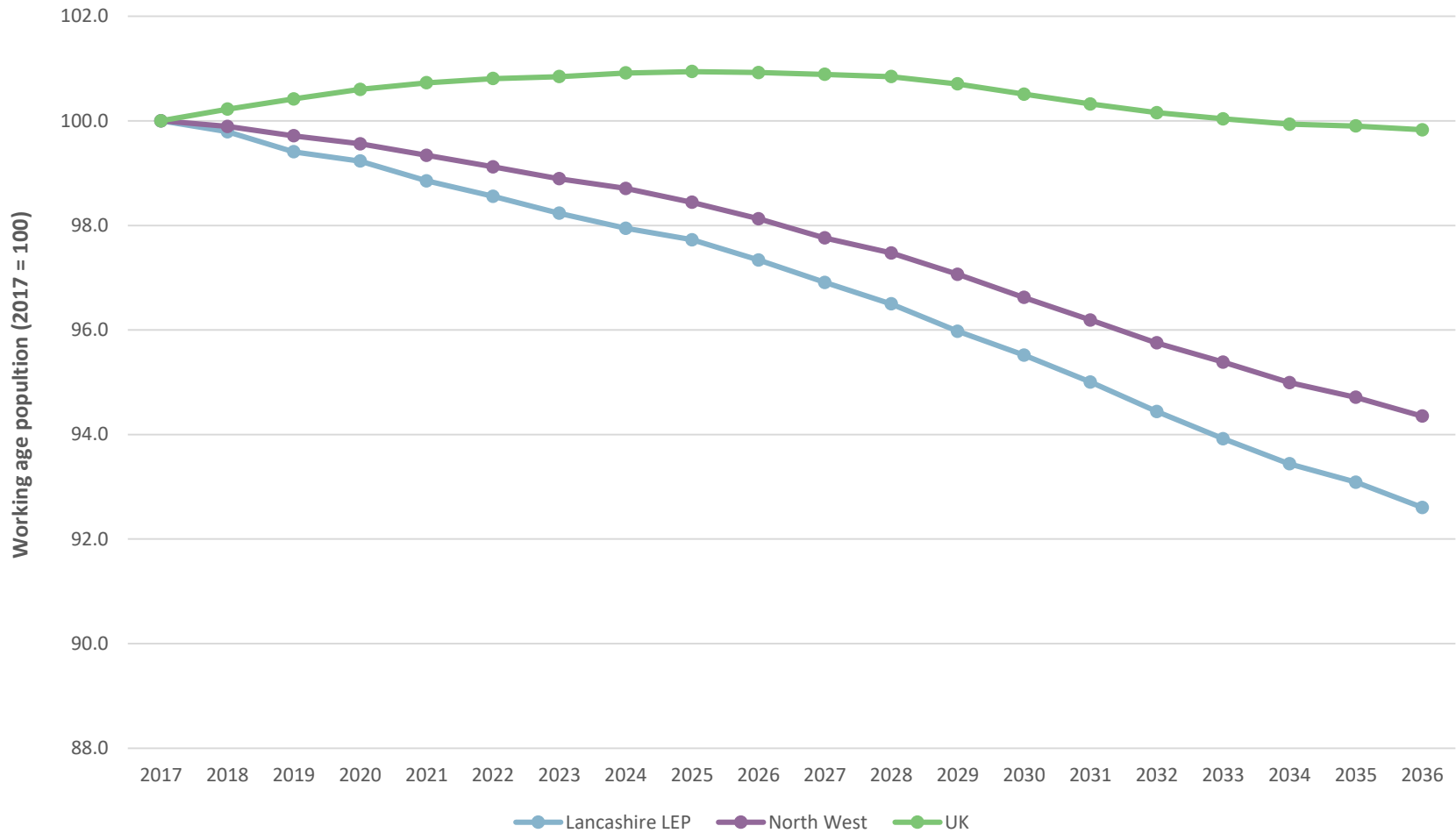
	Indicator	Lancs LEP	North West	UK
Now	Working-age Population	914k	4.5m	41.6m
	Employment (workplace-based jobs)	727k	3.6m	34.8m
	GVA (£2013 prices)	29.3bn	157.4bn	1,674bn



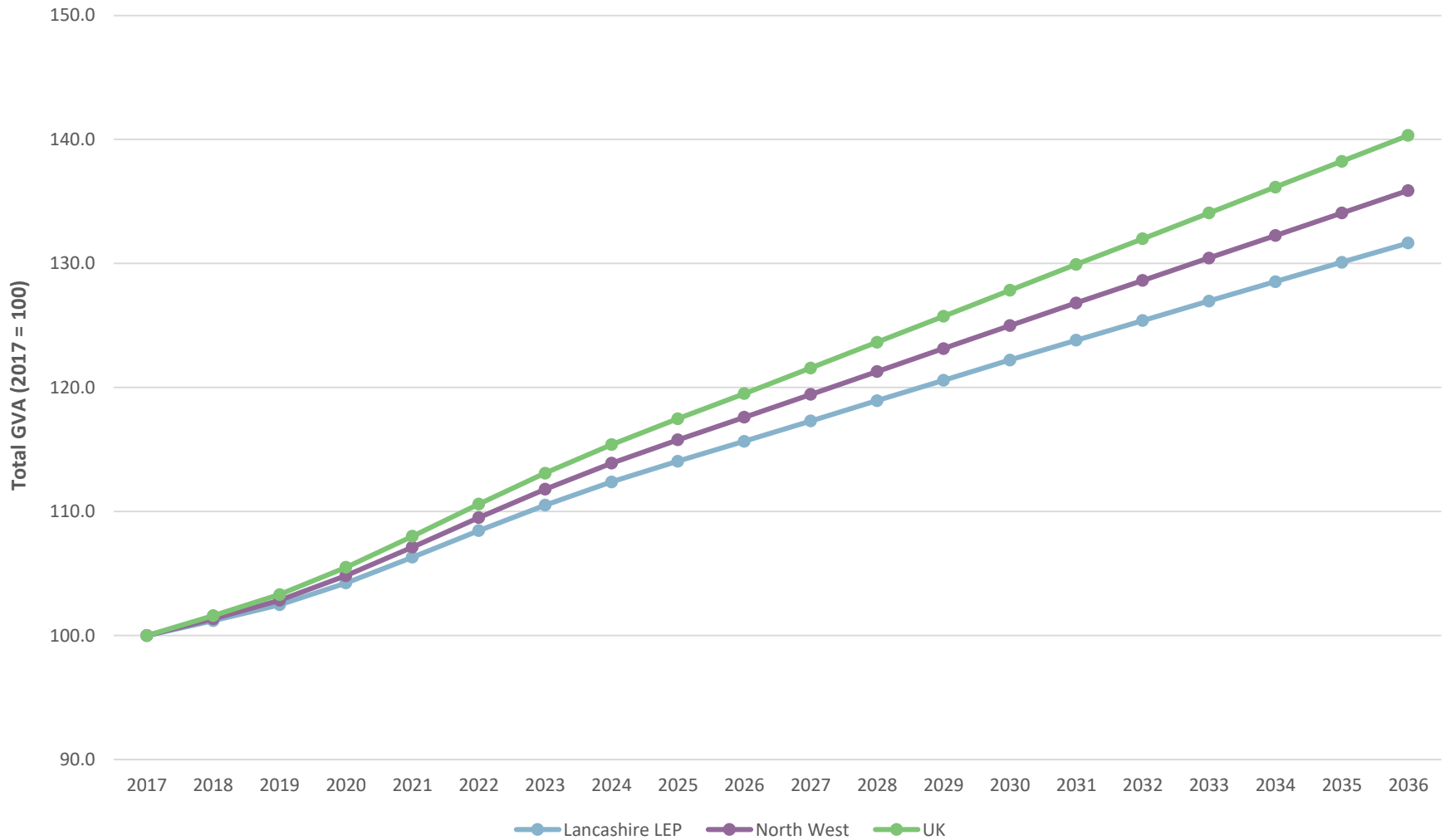
	Indicator	Lancs LEP	North West	UK
2036	Working-age Population	858k (-6.0%)	4.4m (-3.7%)	42.3m (+1.6%)
	Employment (workplace-based jobs)	746k (+2.7%)	3.8m (+5.6%)	37.3m (+7.3%)
	GVA	38.5bn (+31.7%)	213.9bn (+35.9%)	2,349bn (+40.3%)

Source: Oxford Economics forecasting models

Forecast Working Age Population



Forecast Productivity



Forecast Employment by Sector

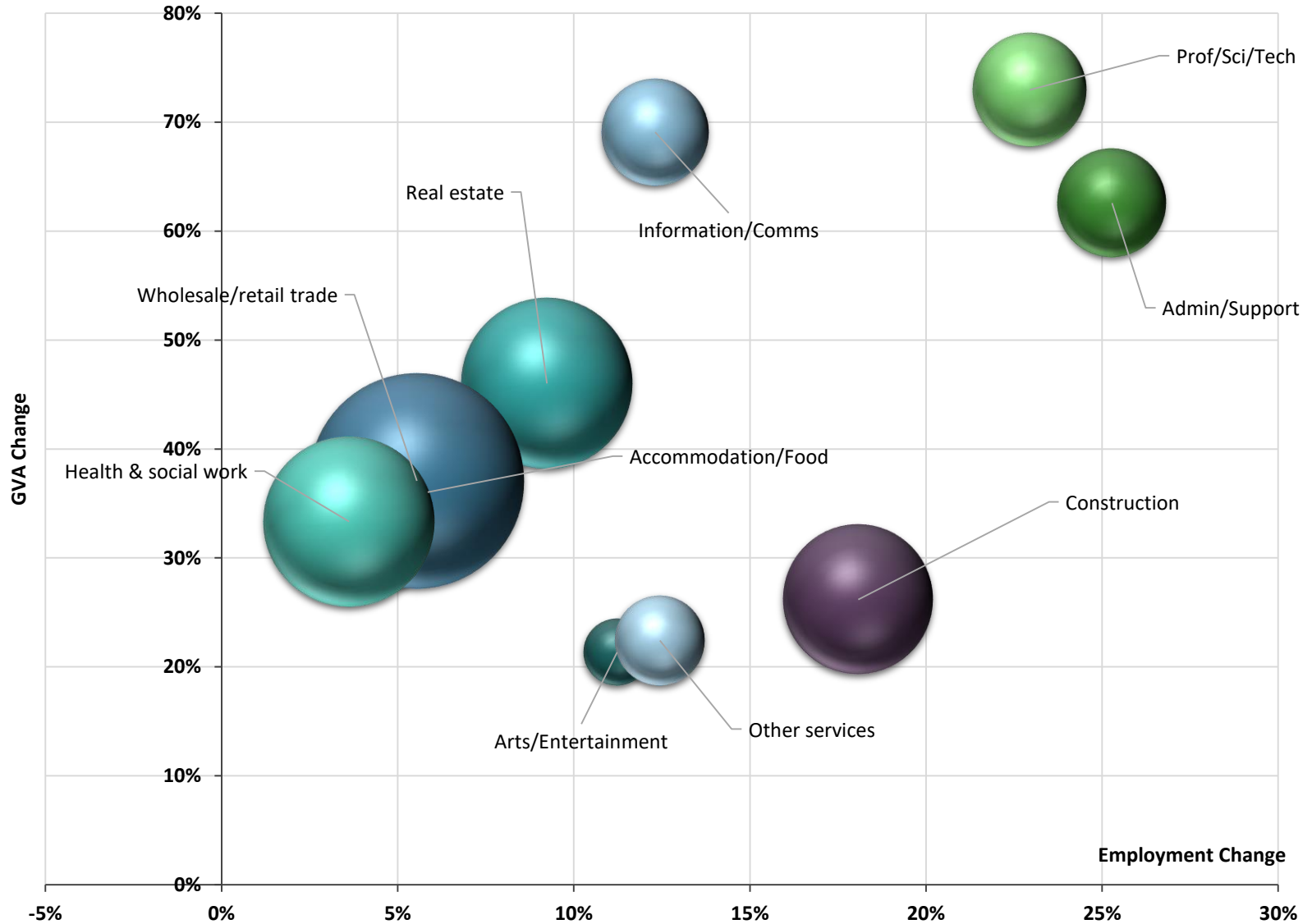
Sector	2017 (Employment 000s)	2036 (Employment 000s)	Change
Administrative and support service activities	50.8	63.7	25%
Professional, scientific and technical activities	39.0	48.0	23%
Construction	51.4	60.7	18%
Other service activities	23.3	26.2	12%
Information and communication	22.2	24.9	12%
Arts, entertainment and recreation	20.5	22.9	11%
Real estate activities	8.9	9.8	9%
Accommodation and food service activities	51.2	54.2	6%
Wholesale and retail trade; repair of motor vehicles and motorcycles	123.3	130.2	6%
Human health and social work activities	105.1	108.9	4%
Transportation and storage	25.8	25.0	-3%
Education	61.9	59.2	-4%
Financial and insurance activities	9.0	8.2	-9%
Public administration and defence; compulsory social security	32.6	27.2	-17%
Water supply; sewerage, waste management and remediation activities	5.9	4.8	-19%
Agriculture, forestry and fishing	9.7	7.7	-20%
Manufacturing	82.6	62.7	-24%
Electricity, gas, steam and air conditioning supply	2.6	1.9	-29%
Mining and quarrying	0.6	0.3	-52%

Forecast GVA by Sector

Sector	2017 (GVA £m)	2036 (GVA £m)	Change
Professional, scientific and technical activities	1,261	2,181	73%
Information and communication	1,123	1,899	69%
Administrative and support service activities	1,155	1,878	63%
Real estate activities	2,860	4,176	46%
Financial and insurance activities	712	989.1	39%
Wholesale and retail trade; repair of motor vehicles and motorcycles	4,527	6,205	37%
Accommodation and food service activities	1,133	1,541	36%
Electricity, gas, steam and air conditioning supply	273	368	35%
Human health and social work activities	2,853	3,804	33%
Water supply; sewerage, waste management and remediation activities	460	609.6	32%
Construction	2,196	2,771	26%
Transportation and storage	1,023	1,255	23%
Other service activities	791	968	22%
Arts, entertainment and recreation	438	532	21%
Manufacturing	4,965	5,950	20%
Education	2,001	2,045	2%
Agriculture, forestry and fishing	230	234	2%
Mining and quarrying	63	58	-8%
Public administration and defence; compulsory social security	1,217	1,088	-11%

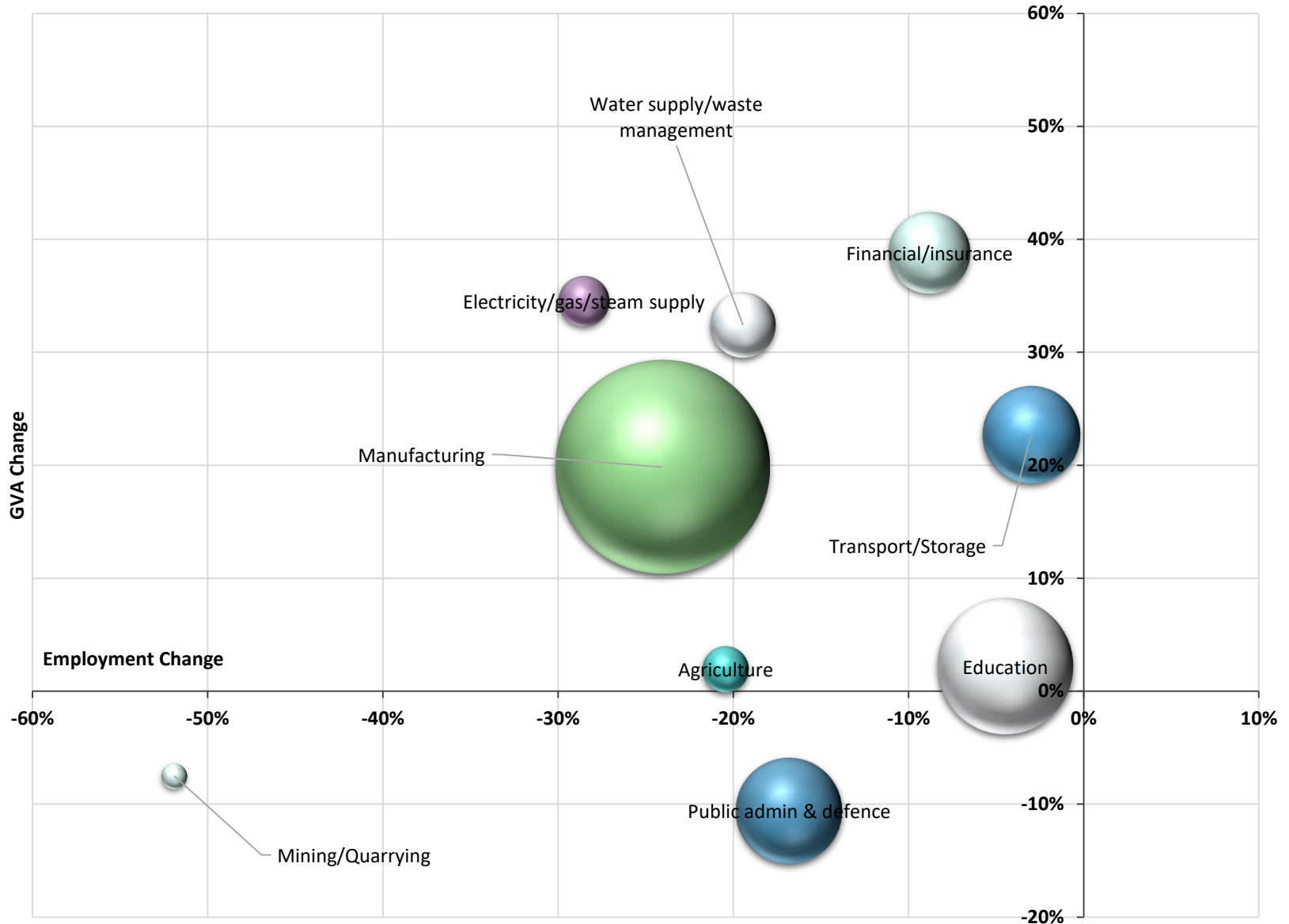
Projected Sector Shapes – Expanders

- Sectors projected to grow in both employment & GVA.



Projected Sector Shapes – Adjusters

- Adjusters are sectors projected to decrease in employment but grow in GVA.



Drawing in Call for Evidence & Scoping Call Evidence to create
the SWOT Assessment

Scoping Calls

- 12 semi-structured interviews with key stakeholders from a cross-section of industry, public sector, & academia
- Topics covered included:
 - Opportunities
 - Realistic ambitions
 - Risks & Mitigations
 - Strengths
 - Weaknesses
 - Collaboration

Scoping Calls – High-Level Headlines

- Opportunities:
 - Synergies both within and between sectors (e.g. civil/military aviation, advanced manufacturing/digital)
 - Create new clusters particularly in digital/health tech
- Ambitions:
 - Supporting “disruptive” innovation/technologies across different sectors
 - Combining technologies amongst sectors (e.g. ultra-reliable nuclear tech to automation/aerospace)
- Risks:
 - Lack of ownership and unity to deliver on the strategy
 - Apathy/lack of ambition

Scoping Calls – High-Level Headlines

- Strengths:
 - Significant and established technical strengths across a number of sectors
 - Strong supply chain capabilities
- Weaknesses:
 - Lancashire not currently ambitious enough with it's innovation agenda
 - Strengths not currently well publicised
- Collaboration:
 - Some strong examples of collaboration however tends to be within sectors rather than between
 - Opportunities for a more co-ordinated, pro-active, and responsive innovation collaboration

Call for Evidence

- Review of c.40 documents received from cross section of public/private and academia
- Reviewed through via SWOT analysis across 4 themes:
 - Businesses, sectors & agglomeration
 - People/Human Capital
 - Infrastructures/assets
 - Knowledge
- The SWOT findings from the call for evidence literature review is presented on the following slides

Call for Evidence – Businesses/Sectors - Strengths

- The county has the single largest concentration of aerospace production in the UK, employing over 20,000 people.
- The automotive sector has an important base in Lancashire with a workforce of over 3,500 and, along with nuclear and aerospace, is a key part of the advanced manufacturing sector.
- Energy supply chains, particularly nuclear, offshore, and wind are significant in the area.
- It is a strength that these sectors above are well-established and well-regarded.
- Lancashire businesses are generally good at exploiting export opportunities. Around 20% of all businesses in Lancashire export, and this equates to £5bn worth of goods and services.
- Larger businesses in the area are well linked to HEIs and research centres, and SMEs have many, not necessarily well-publicised, technical strengths in high value sectors.
- Lancaster University Management School (LUMS) is triple accredited and world ranked. It is one of only 4 UK management schools to have gained the Small Business Charter Gold Award in recognition of the role it has played supporting British enterprises.

Call for Evidence – Businesses/Sectors - Weaknesses

- Over recent years Lancashire has failed to capitalise on its key competitive strengths and assets to establish a successful track record in securing new inward investment opportunities.
- The county is currently ranked by UKTI as one of the poorest performing areas in the UK in terms of attracting new foreign-owned companies.
- Lancashire's poor performance relative to its economic size, industrial strengths and neighbouring competitor areas is in part due to the absence of a strategic marketing and investor development capacity.
- There could be a broader sector focus outside of high value manufacturing and the other obvious strengths. There is less of a focus on potentially important sectors such as food and drink, digital, tourism, professional services, and chemicals.
- Although large companies are well connected both regionally and internationally, more could be done to engage and connect SMEs. In particular, connecting SMEs more closely to the graduate talent pipeline and to international markets and export opportunities.
- While large companies are nationally and internationally connected, again more could be done to encourage SMEs to operate internationally.

Call for Evidence – Businesses/Sectors - Opportunities

- Opportunities to take advantage of Industry 4.0, not just in the advanced manufacturing sector but in enablers such as digital and specialised logistics.
- In nuclear, the development of Small Model Reactors (SMRs) presents an opportunity for the area to develop a nuclear advanced manufacturing hub.
- Developing and improving access to strategic employment sites.
- Improving the internationalisation of SMEs via existing networks HEIs and larger companies have, ensuring the supply chain can benefit from global markets.
- Lancaster is home to a burgeoning group of digital businesses and there is an opportunity for it to become the perfect place to operate as a test bed location.

Call for Evidence – Businesses/Sectors - Threats

- Overseas competitors are fast learners, particularly in aerospace.
- Pressure to reduce production costs has resulted in upper tier companies seeking to rationalise and simplify their supply chains.
- A sector profile report for Lancashire shows that unless additional land becomes available/ developed there will be a "shortage of employment land in Lancashire to 2019 and to 2024.
- A focus on existing strengths means the area could be too focussed on sustaining a presence rather than being more innovative in other growing sectors.
- One concrete consequence of the UK leaving the European Union will be the loss of EU structural funds. These have been of great importance in providing both capital and revenue funding for business and innovation support in the region, particularly to SMEs.

Call for Evidence – People/Human Capital - Strengths

- Higher level skills (Level 4+) have increased in recent years. There has been a 5-percentage point increase in the proportion qualified to this level between 2004 and 2014 (from 24 to 29%). This is equivalent to an increase of 56,500 of the workforce with higher level skills.
- Universities are good at attracting graduate talent in high value STEM subjects and are increasingly focussing on retention and connecting graduates to local employers.

Call for Evidence – People/Human Capital - Weaknesses

- Widespread consensus that skills remain a problem. This includes intermediate technical skills and graduate attraction and retention.
- Mismatch between the chosen career and skills development pathways of local people and the sectors of the economy which have the greatest growth potential.
- Raising awareness of career prospects in regional SMEs through internships and placements to highly-skilled graduates could be improved.
- Concern about gaps in leadership and management, to enable businesses to compete in international marketplaces.
- Other skills issues include difficulties in finding individuals with language and engineering skills, and engineers with marketing skills.

Call for Evidence – People/Human Capital - Opportunities

- The Energy HQ at Blackpool & Fylde College – the development of a National Energy HQ to meet the training needs of the energy and oil and gas sectors.
- Lancaster Campus Teaching Hub (Health and Social Care) – to provide staff and students with fully flexible space to support growth in qualified professionals and deliver CPD to upskill the existing workforce.
- The Advanced Manufacturing Centre for Skills Development and Employer Engagement - a £1.3m partnership between Lancaster University and BAE Systems to facilitate skills development.
- Opportunity to use higher level and degree-level apprenticeships to help meet the demand for high level skills although there may be a need for incentives to increase employer participation.

Call for Evidence – People/Human Capital - Threats

- Employers are likely to find it difficult to recruit higher skilled and experienced personnel.
- Increasing demand for construction is likely to lead to more severe skills shortages in skilled trades.
- Growth in business and professional services and ICT related business may be affected by a limited pool of labour of well qualified younger people.
- Economic forecasts suggest that manufacturing employment will decline by some 10,000 jobs over the next ten years.
- At every level, a better educated and qualified workforce is required, with both soft and professional & technical skills, to improve the overall competitiveness and sustainability of the Lancashire economy.
- There is a need to ensure that the engineers of the future are fully equipped with the right skills to work in an Industry 4.0 setting.
- Replacement of an ageing workforce will become increasingly pressing.
- The potential decline in EU nationals working in the private sector and academia will need to be managed.

Call for Evidence – Infrastructure/Assets - Strengths

- The National Nuclear Laboratory (based at Sellafield) is the most relevant publicly-funded non-university R&D facility.
- Enterprise Zones with sector focuses including:
 - Samlesbury Aerospace EZ (Advanced Manufacturing & Engineering)
 - Hillhouse Technology EZ (Energy, Chemicals & Polymers)
 - Blackpool Airport EZ (Energy, Wind, Nuclear & Waste to Energy)
 - Wharton Aviation EZ (Advanced Manufacturing & Engineering)
- Four HEIs located or part-located in the LEP area
- Port of Heysham, provides logistics support to one of the largest offshore gas fields in UK waters. Well placed to exploit market opportunities presented by existing and new offshore wind operations and maintenance facilities.

Call for Evidence – Infrastructure/Assets - Weaknesses

- Area has failed to attract significant new occupiers and investors in recent years.
- There has been relatively little additional, new, city centre office supply developed over the last decade in key centres such as Preston.
- There is a strong perception locally that East Lancashire is poorly connected.
- Congestion on the M65 is already evident during peak periods and exacerbated by the limited capacity, traffic flow composition and proximity of some junctions. This is negatively impacting on access and connectivity to key employment sites along the M65 corridor.
- For businesses in the digital sector, a current lack of the fundamentals of office space, networking, finance, support and telecoms infrastructure are making it difficult for businesses and start-ups to thrive.

Call for Evidence – Infrastructure/Assets - Opportunities

- A new Preston Western Distributor will improve access to the Warton site of the Lancashire EZ, the Springfields nuclear fuel facility at Salwick.
- Electrified rail services between Preston, Manchester and Liverpool.
- UCLAN Engineering Innovation Centre (EIC) - UCLAN Engineering Innovation Centre (ERDF) – due to be completed in 2019, the centre will host specialist engineering R&D facilities, and continued opportunities for local SME support.
- Burnley Vision Park - High quality 5-acre business park to accommodate advanced manufacturing and engineering sectors and to include 46,000 sq. ft. first phase incubator, workspace and grow-on space.
- Edge Hill University Innovation Technology Hub - The Edge Hill Technology Hub will create new and refurbished, high quality space for teaching, learning, student employability, enterprise and knowledge exchange activities.

Call for Evidence – Infrastructure/Assets - Threats

- Three motorways intersect with the M6 at Preston; anticipating pressures on this important part of the Strategic Road Network is of critical importance to Preston, Lancashire and the broader north of England economy.
- 90% of East Lancashire's manufacturing plants (1800) employ less than 50 people, and many of these businesses still operate from outdated mill premises, potentially constraining their ambitious growth opportunities.
- Any future changes in government policy around rail or road infrastructure investment could impact on potential network improvements and prevent these problems from being tackled.

Call for Evidence – Knowledge - Strengths

- The North West AMRC at Salmesbury, which links to the University of Central Lancashire's (UCLan) Engineering Innovation Centre, is the first substantial project which will begin to achieve an Advanced Manufacturing Innovation District.
- Research impact outperforming national averages in key underpinning areas for Industry 4.0, including Human-Computer Interaction, Computer Graphics/Computer-Aided Design, Artificial Intelligence, Ceramics and Composites, Transportation, Business and International Management.
- Large teaching hospitals, with many leading clinicians and academics active in collaborative research with local universities and the private sector.
- In 2014, BAE Systems managed overall research and development (R&D) investment of £902m, including £63m of its own funds.
- A weighted average of companies undertaking product and process innovation shows values of 25.4% in Lancashire compared to 23.6% in England as a whole., suggesting a strong foundation and culture of innovation in the area.
- There are a number of successful knowledge transfer partnerships in the region, and an increasing focus of connecting research and innovation between HEIs and the private sector.

Call for Evidence – Knowledge - Weaknesses

- Although there are some highly innovative companies, the overall level of private sector R&D is too low.
- On 2013 data, Lancashire ranked 27 out of 39 LEPs on R&D investment, with expenditure of £204 million (£390 per FTE).
- The excellence of the region's translational research institutions is acknowledged, but they should operate at a larger scale across the whole region to meet fully the demands and needs of the regional industrial base.
- There is a high degree of connectivity between the region's innovative manufacturing firms, though there is evidence of a long tail of less innovative companies.
- The research base is well connected to national and international networks, though more could be done, for example in some aspects of digital.

Call for Evidence – Knowledge – Opportunities

- The projected increase in the development and use of autonomous systems in both defence and civil applications provides a real opportunity for Lancashire to position itself as a centre of excellence in this area.
- The global security technology and services market is predicted to grow to more than £52 billion by 2016. Lancashire has unique strengths in this sector and there is an opportunity for Lancashire to position itself as a centre of expertise in this growing sub-sector.
- The growing use of big data will open up new commercial opportunities, such as the provision of data aggregation and analytics services to a wide range of businesses from climate change to manufacturing and defence.
- Lancaster University, together with partners Lancaster City Council and Lancashire County Council, is developing a Health Innovation Campus.
- Eco-innovation Cumbria is an existing ERDF funded programme led by the University of Cumbria with partners from Lancaster University and UCLan. Eco-Innovation Cumbria aims to increase innovation in, and adoption of, low carbon technologies.

Call for Evidence – Knowledge – Threats

- The region has a well-developed business network relating to innovation, representing the focus sectors, as well as those relating to SMEs. However, given the need for enhanced diffusion (in terms of speed of diffusion, and breadth across sectors) of technology relating to the developments of Industry 4.0, there is a need to review how these networks are responding and if they can continue to operate effectively.
- In Nuclear, a study by NAMRC indicated that supplier capacity could be the limiting factor if several small modular reactors were to be ordered simultaneously, which, given the opportunities for Lancashire in this area, is a risk to manage.
- There is some skepticism as to whether investment in technology alone will stimulate a suitable return on investment. Rather investment in skills will provide the appropriate support for the comprehensive innovation needs of the breadth of Lancashire's businesses.
- Should Britain leave Euratom when it exits the EU, there is potential that this may have a negative impact on technology transfer and innovation.

Aggregated SWOT Assessment

- The scoping calls, call for evidence, and secondary data analysis were combined to create an aggregated SWOT analysis of Lancashire's innovation potential.
- The following slides present the aggregated SWOT for the four themes.

Business/Sectors

Strengths

- Established sectoral strengths, particularly in AdvMan (Aerospace, Automotive), Energy (inc. nuclear), & Health/Social Care
- Track record of exporting/trading
- Good links between large businesses & HEIs/Research Centres
- SME/supply chain technical strengths in high value sectors
- Above average employment growth rate
- BOOST

Weaknesses

- Failure to secure inward investment
- Newco formation rate below UK average
- Slow GVA growth compared to NW & UK & widening relative productivity gap
- Business birth rate lags behind comparators
- Absence of strategic marketing capacity
- Overly insular mindset amongst SMEs

Opportunities

- Industry 4.0
- Small modular reactors (SMRs) . . . & nuclear AdvMan hub
- Fracking
- Well aligned with NPh IER
- Using existing networks to improve internationalisation of SMEs
- Test-bed opportunities – Health & Engineering
- Connecting SMEs to graduate talent & export opportunities

Threats

- Focus on traditionally strong sectors potentially at expense of others
- Competition, particularly from overseas
- Pressure for Tier 1s to reduce costs/rationalise supply chain
- Shortage of employment land
- Loss of EU Structural Funds
- Autonomy & digitization of rote activities

People/Human Capital

Strengths

- Higher level skills increased in recent years (+5% between 2004-14)
- Graduate retention rates generally high
- Pipeline of new skills initiatives & facilities in key sectors
- Good network of providers – Skills Hub coordination
- Lancaster University Mngt School
- HEIs/FEs which get 'inclusion'

Weaknesses

- Higher level skills lag behind UK average
- Widespread 'consensus' on skills needs remains a problem
- Mismatch between career/skills pathways of residents & key sectors
- Need to raise awareness of career prospects with SMEs
- Concern about gaps in leadership & management

Opportunities

- New initiatives inc Energy HQ, Lancaster Campus Teaching Hub for Health & Social Care, AdvMan Centre etc.
- Use of higher/degree-level apprenticeships to meet demand
- Northern Powerhouse Productivity Academy
- General scope for realigning to Industry 4.0

Threats

- Loss of highly-trained graduates to other parts of the country
- Replacement of ageing workforce
- Manu employment forecast to decline
- Major improvements in soft/professional/technical skills required
- Below average WAP, with WAP base expected to shrink in coming years
- Potential decline in attractiveness for EU Nationals
- Skills policy fuzziness nationally – Apps vs degrees, levy etc.

Infrastructure/Assets

Strengths

- High class R&D facilities across key sectors
- Enterprise Zones with key sector focus
- Four HEIs located/part-located in the area
- Translational research centres
- Strategic assets (eg as Port of Heysham)
- Relatively low Travel to Work times of employees

Weaknesses

- Failure to attract significant new occupiers & investment
- Relatively little new office space added to key centres in recent years
- Parts of LEP area poorly connected (e.g. East Lancs)
- Lack of infrastructure for digital start-ups
- Civic capacity & capability

Opportunities

- Capacity to grow – land & utilities
- Number of initiatives including:
 - Preston Western Distributor
 - Electrified rail investment
 - Burnley Vision Park
 - UCLAN Engineering Innovation Centre
 - Edge Hill Innovation Tech Hub

Threats

- Pressures on strategic road network
- Lack of employment space for growth
- Negative impacts of changes to Government policy on road or rail infrastructure will have a negative impact
- No upside from HS2/HS3 investment
- Attractiveness of QoL offer – housing & public services

Knowledge

Strengths

- NW AMRC at Samlesbury, EIC at UCLAN
- HEIs outperforming national averages in some underpinning areas for Industry 4.0
- Large teaching hospitals collaborating with HEIs/private sector
- Product & process innovation slightly higher than UK average
- Successful knowledge transfer partnerships

Weaknesses

- Overall private sector R&D is too low
- Translational research centres need to operate at larger scale
- Long tail of less innovative companies
- Smaller proportion of UGs & FT Post-Grads studying STEM subjects than nationally
- Academic links to Big Data agenda
- Innovation 'reputation' – historic

Opportunities

- Autonomous systems in Aerospace & AdvMan
- Next gen nuclear health & eco-innovation
- Global security technology/cyber market
- Big Data & Analytics
- Low-carbon sector more generally
- Greater role in Global Innovation Networks & Global Value Chains, post Brexit

Threats

- Need for enhanced diffusion
- Ability of key sectors to capitalize & deliver on growth opportunities
- Ensuring investment in skills as well as technology
- Brexit impacts on research collaboration
- Much lower £ per employee R&D expenditure compared to UK average – specifically in BERD & GovERD
- Innovation not yet a 'pervasive' behavior
- Lancs falls behind

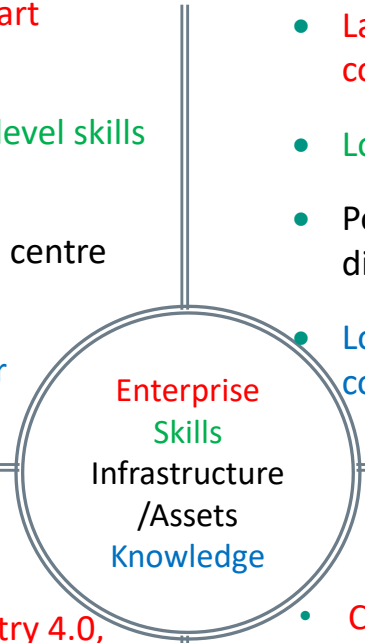
Overarching SWOT Analysis for Lancs

Strengths

- Sectoral strengths, tier 1 & supply chain - Smart Specialisation
- Graduate retention rates are good, & higher level skills are gradually improving
- Significant HEI, R&D, & translational research centre assets
- Track record of successful knowledge transfer partnerships & collaboration

Weaknesses

- Lack of inward investment & need to improve SME connectivity to talent & export opportunities
- Low skills/aspirations – longstanding
- Poor connectivity in parts of county, physically & digitally
- Low levels of private sector R&D, need to scale up & connect SMEs to opportunities



Opportunities

- Productivity improvements as result of Industry 4.0, delivery of strategic sites & SME clusters
- Wholesale shift to value-added economy gradually improving
- Number of initiatives in key sectors covering technical & leadership & management skills
- Frictionless interface between business & knowledge base

Threats

- Competition from overseas, cost challenges, focus on key sectors potentially at expense of others
- Replacing ageing workforce, forecast employment decline in some key sectors
- Ongoing connectivity problems, county 'passed by' by key infrastructures
- Parochial & insular approach to knowledge

Simon P's 3 Innovation Channels

- 'Staying Ahead' innovation
- 'Routeways to new excellence' innovation
- Process & behaviour innovation

Next Steps

- Notes from today's session & slide-pack
- Development of Plan Framework themes & vision statement, drawing on . . .
 - Baseline
 - Econometrics (& related market/technology futures work)
 - Policy review work
 - Today's feedback
 - Further round of consultation & reflection
- . . . & starting to think about impactful actions
- Presentation of strategy framework
 - Second Workshop event October 2017
- Action planning work
- Third workshop event October/November 2017