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# Sheffield City Region and Lancashire

*Science and Innovation Audit*

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# Science and Innovation Audits

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## Introduction

- This slide deck sets out a range of data for the Midlands Engine consortium area Science and Innovation Audit. The purpose of this document is to provide a ‘teaser’ of the types of analyses that will be possible using the data provided, and to demonstrate an initial view into the data you have received.
- Note that a full list of LEPs and Local Authorities in the consortium area can be found in the Word document, **section 1.1**. A full list of research organisations (including universities) included in the Word document, **section 2.2**.

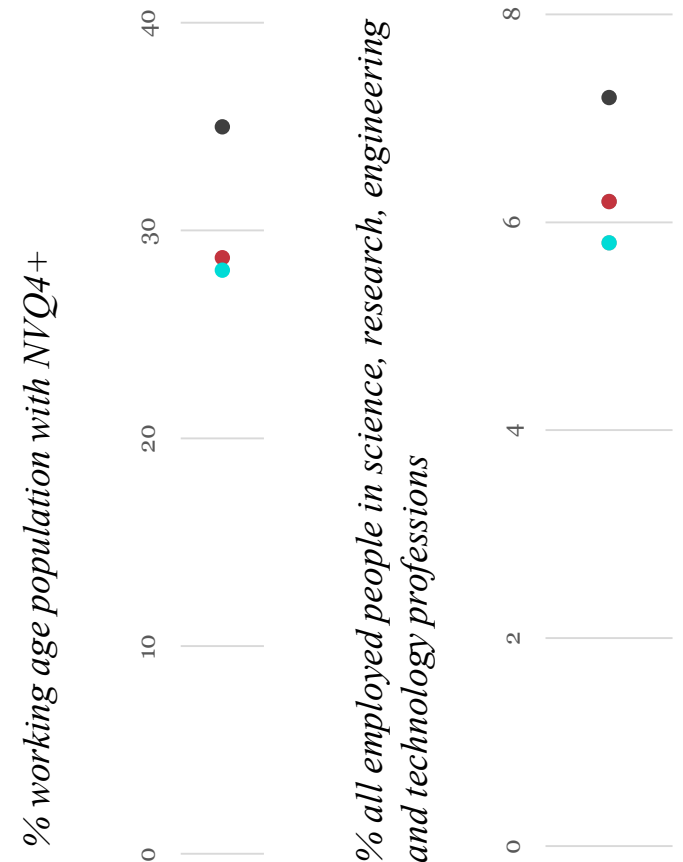
# Regional Science and Innovation Assets

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## Regional Science and Innovation Assets

### Human capital and talent

- The consortium area's workforce has a slightly lower proportion of **highly skilled workers** than the national average, with 29% of Lancashire's working age population, and 28% of Sheffield City Region's working age population having **NVQ4 or above**. This compares to the England average of 35%
- A lower proportion of the consortium area's workforce is **employed in science, research, engineering and technology professions** than the England average.



## Regional Science and Innovation Assets

### University researchers submitted to the REF

- The consortium area accounts for 4% of the UK's REF-submitted university researchers. Within the consortium, analysis of those areas that make up a higher percentage than the overall UK proportion would reveal higher performing areas. Those areas that fit this criteria, and are in an area of interest for the consortium, are set out in the table below.
- The University of Sheffield's submission of researchers in Civil and Construction Engineering in particular is a strong area. This submission constitutes 8.9% of the UK's REF-submitted staff in this unit of assessment. Given the nature of the exercise, universities put forward their best staff (for whom they will also submit their outputs) and consequently this indicates that the University hosts almost than 1/10 of the strongest researchers in this area across the UK.

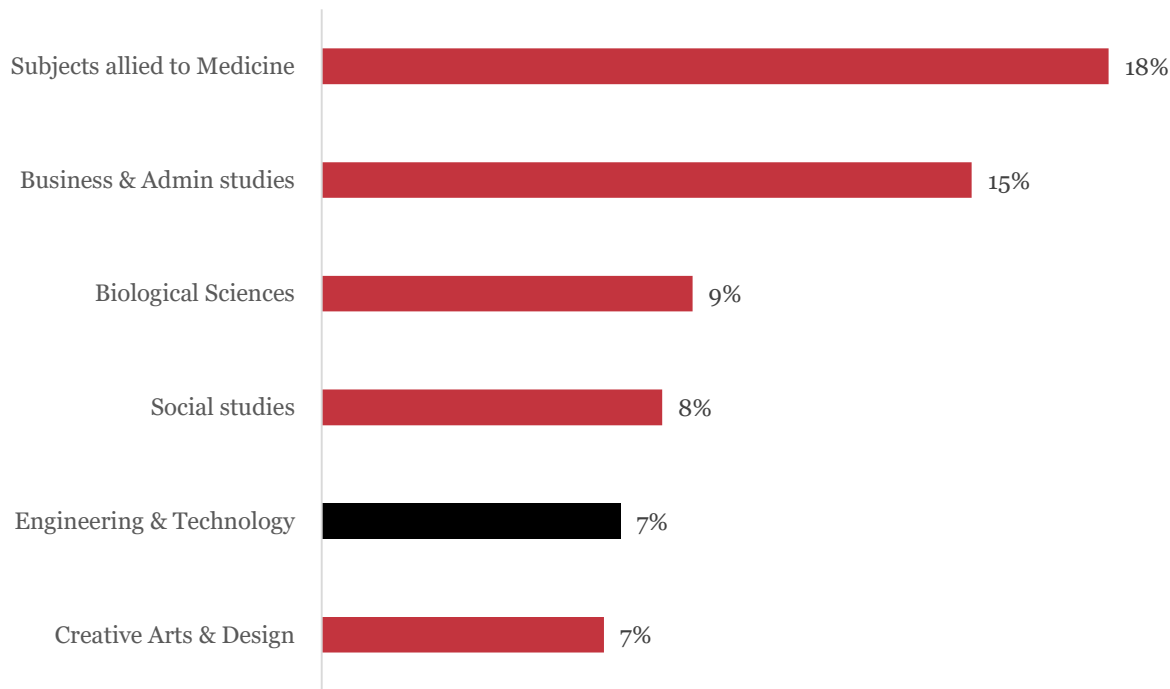
Areas of interest	Institution	Unit of Assessment	% of Institution Total	% of UK Total
Advanced manufacturing / Energy	University of Sheffield	Aeronautical, Mechanical, Chemical and Manufacturing Engineering	7.4%	6.5%
Transport	University of Sheffield	Architecture, Built Environment and Planning	3.4%	3.3%
Transport	University of Sheffield	Civil and Construction Engineering	3.5%	8.9%

*As a % of all UK REF-submitted researchers* 4%

## Regional Science and Innovation Assets

### Student population

Students studying specific subjects, as a proportion of all HE and FE students



81%

Percentage of the consortium area's **graduate talent retained** in the North West region (top) and Yorkshire and the Humber / East Midlands (bottom). Between 5% and 6% move to London.

70%

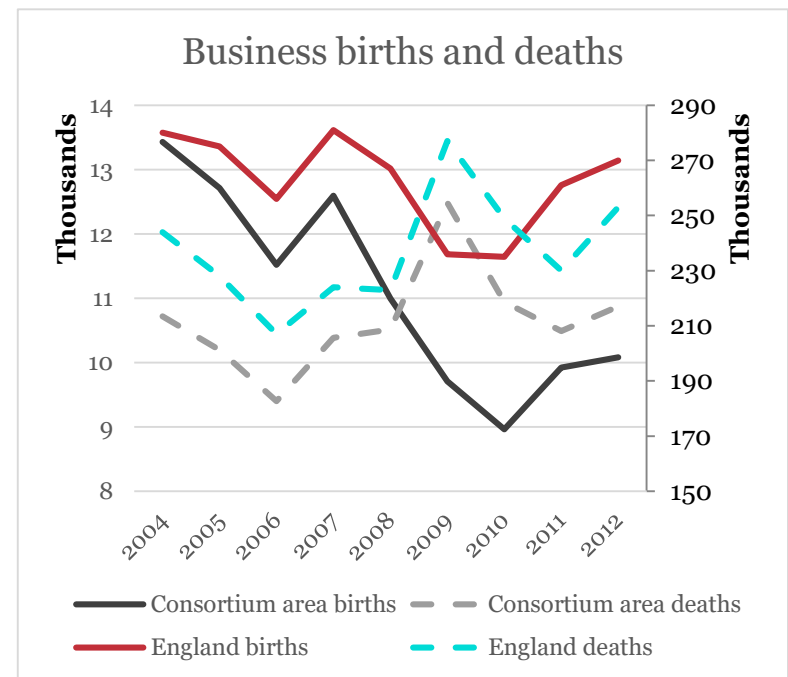
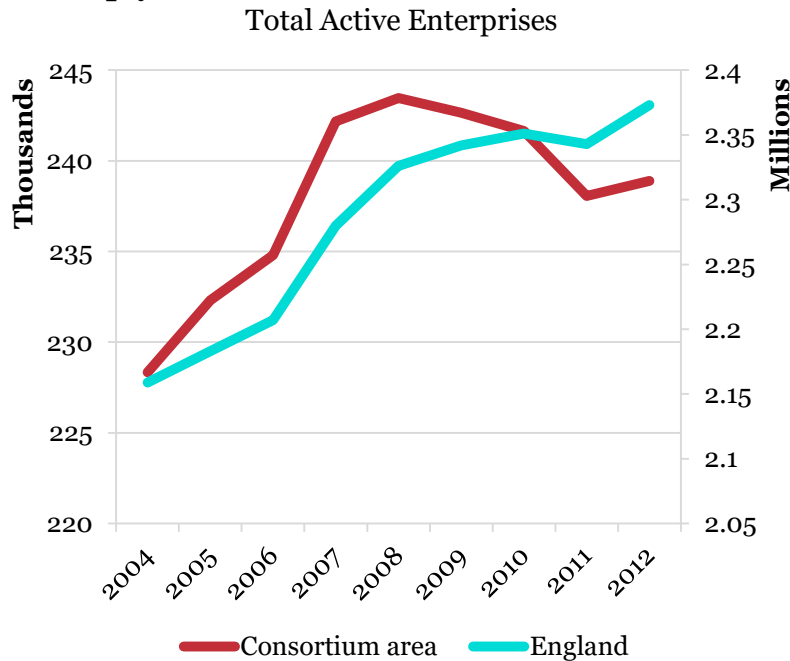
The largest proportion of students in the consortium area across both further and higher education study subjects allied to medicine (18%, 87,655). If this subject follows the overall retention average (above) an estimated almost 71,000 would remain in the North West. Engineering and Technology is the area of interest with the highest proportion (highlighted in black).

The consortium area also contributes **5%** of England's doctorates overall, and almost **6%** of England's STEM doctorates.

## Regional Science and Innovation Assets

### Business demography

- The number of active enterprises has begun to grow again after a decline during the recession. However, it has not yet recovered to pre-recession levels and appears to be slower than the national growth rate. Business births are outnumbered by business deaths, and this declined sharply from 2007.



## Regional Science and Innovation Assets

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### Productivity

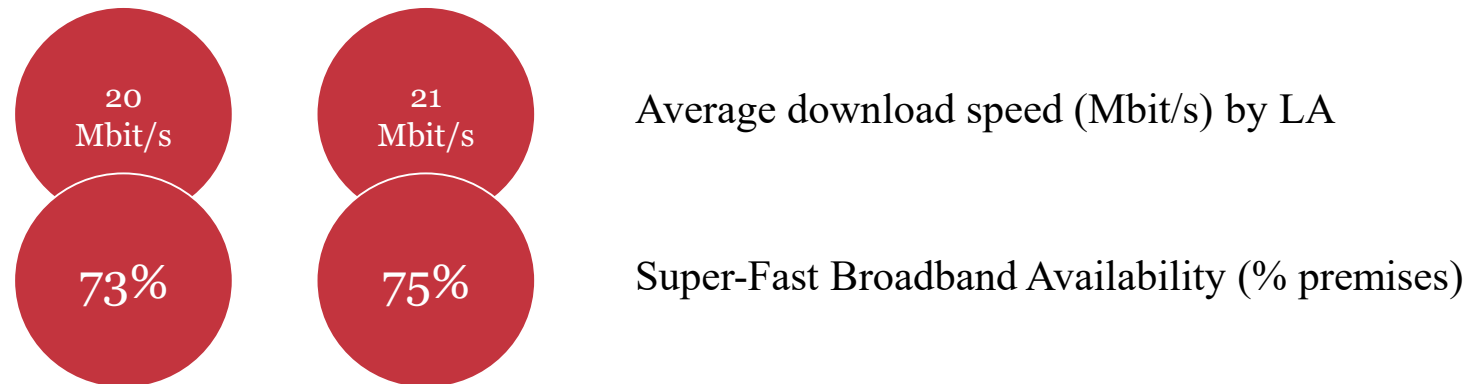
- Measures of labour market productivity show that in the consortium area, **GVA per capita** is significantly lower than the England average of £24,091, being between £16,786 and £17,377.
- Average **annual gross full-time pay** is also lower in the consortium area (between £27,990 and £28,293 ) than the national average (£34,197), though figures in London and the South East will drive up the national figure



## Regional Science and Innovation Assets

### Quality of place and life, digital infrastructure

- The consortium area's average travel to work time is **between 25 and 26 minutes**, which is favourable compared to the England average of 31 minutes (42 minutes in London and 26 minutes outside of London)\*
- The consortium has slower average download speeds (of between 20 and 21 Mbits per second) than the national average of 29.8 Mbits per second\*\*
- There is less availability of premises with super-fast broadband availability, compared to the national average of 83%\*\*



\* National Travel Survey: England 2014 (Dept. for Transport, 2015, p.27 and p.49)

\*\* Connected Nation 2015 (Ofcom, 2015, p.4)

# Excellence in Science and Research

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## Excellence in Science and Research

### Scientific quality

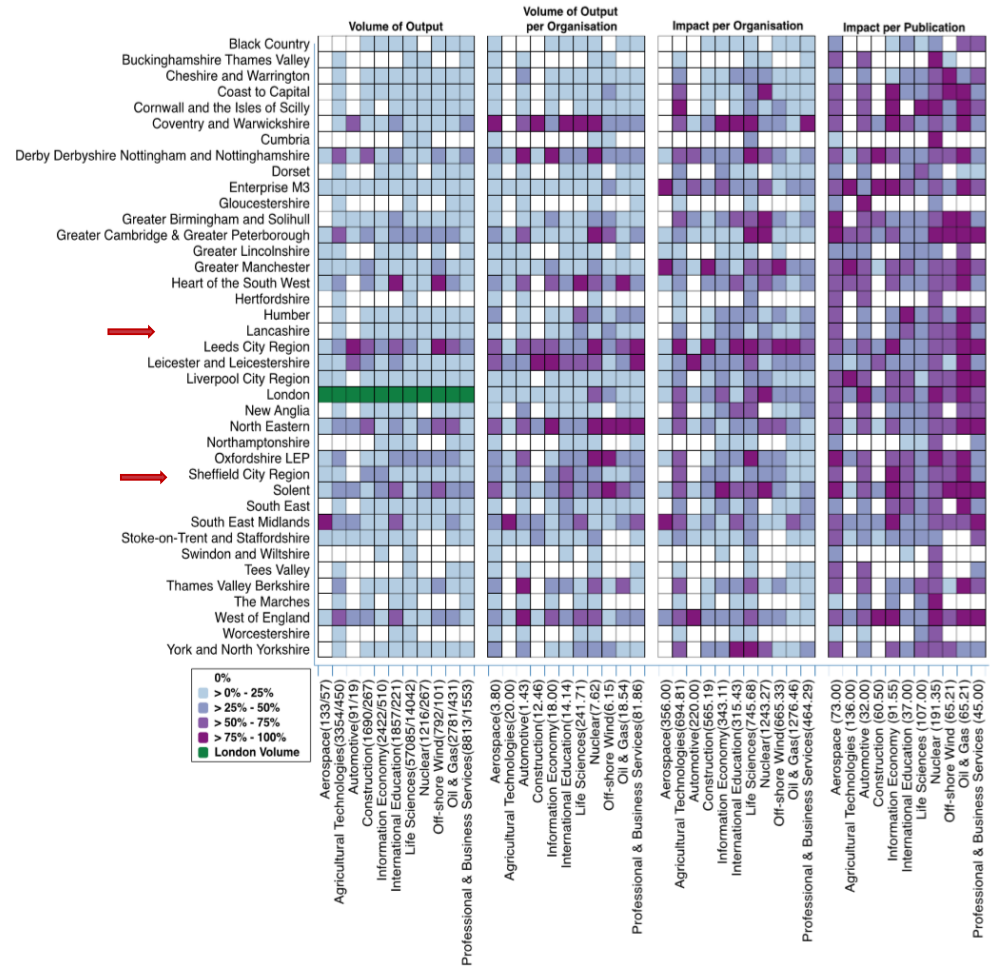
- An analysis of the proportion of research activity rated 4\* (world class in terms of originality, significance and rigour) in the REF quality profile compared to the national average reveals a range of high-scoring areas for the consortium area. This is indicated below for the main areas of interest for the consortium.
- The table shows the difference (in percentage points) between the national average and each university under analysis. Green means the difference is positive (i.e. that the university had more outputs classified as 4\* as compared to the national average), and red means the difference is negative.
- For example, in Physics, two institutions in the consortium area achieved a higher proportion of activity rated 4\* than the national average (Lancaster University and the University of Sheffield). This is the same for Architecture, Built Environment and Planning (Sheffield Hallam University and the University of Sheffield).

Areas of interest	Unit of assessment	Lancaster University	Sheffield Hallam University	University of Central Lancashire	University of Sheffield
Advanced manufacturing	Electrical and Electronic Engineering, Metallurgy and Materials		-0.17	-0.166	0.0015
Energy	Physics	0.063		0.118	0.023
Energy / Advanced manufacturing	General Engineering	-0.054		-0.131	0.237
Energy / Advanced manufacturing / Bio-economy	Aeronautical, Mechanical, Chemical and Manufacturing Engineering				0.0175
Transport	Architecture, Built Environment and Planning		0.064	-0.174	0.118
Transport / Bio-economy	Civil and Construction Engineering				-0.002

# Excellence in Science and Research

## Scientific specialisation

- The BIS mapping local comparative advantage report mapped LEPs' publication intensity in UK Industrial Strategy fields\*. The chart to the right highlights each LEP's performance in four main dimensions of publication intensity in terms of quartiles. Deep purple squares represent the top quartile (values of 75%-100%).
- Taking impact per publication (the fourth column) as an example, the chart shows that Sheffield City Region is in the highest quartile for publications in the fields of information economy and oil and gas.
- Impact per publication highlights specific areas of research focus and impact, even where publishing volumes may be low.



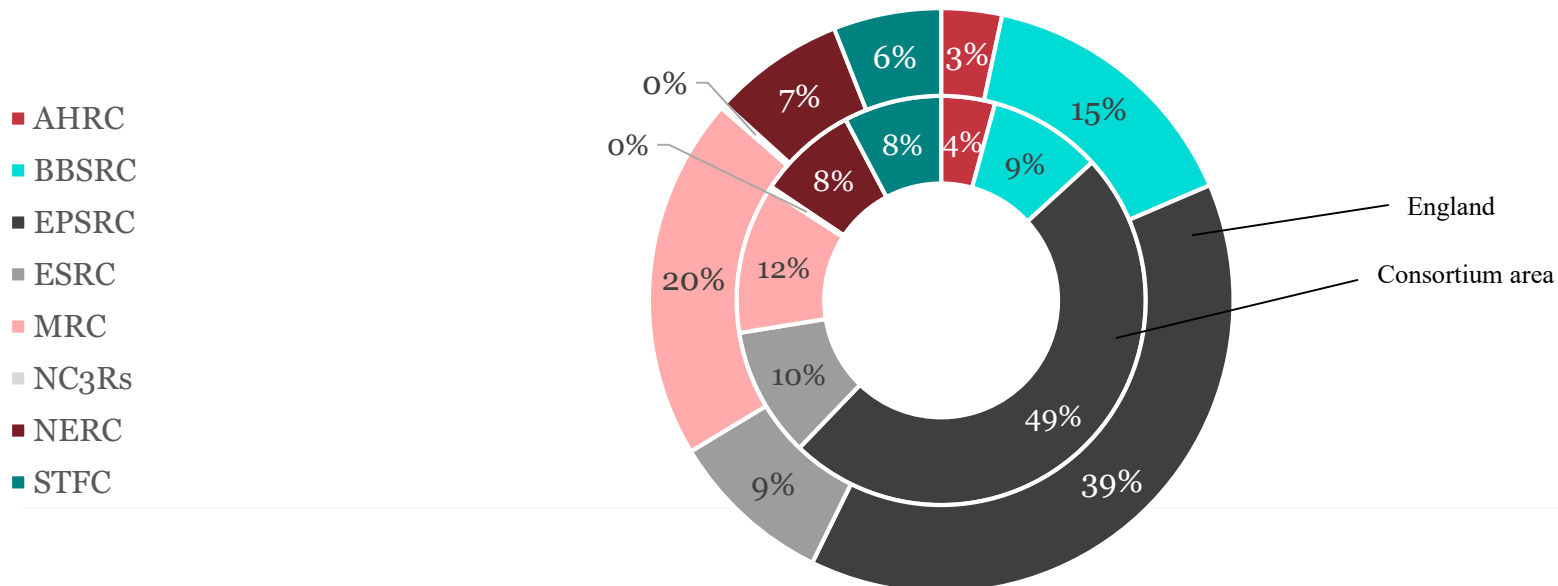
Source: Mapping local comparative advantages in innovation. Department for Business, Innovation & Skills (BIS) (2015, p.120)

\* The report profiled the same for publications in the Eight Great Technologies, Innovate UK Priority areas, and research domains. These are available in the report and tables. The report can be found here: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/468179/bis-15-344-mapping-local-comparative-advantages-in-innovation-framework-and-indicators.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/468179/bis-15-344-mapping-local-comparative-advantages-in-innovation-framework-and-indicators.pdf)

## Excellence in Science and Research

### Strength and competitiveness in national research funding

- Of the funding received over the period 2010 – 2015, the majority was from the EPSRC (49%, £227.3m). 12% (£54.1m) was from the Medical Research Council, and 10% (£47.7m) from the ESRC.
- By comparing the consortium area's drawdown to the national figures, we can see that the SIA is significantly more competitive in drawing down funding from the EPSRC, and slightly more competitive in drawing down funding from the STFC, NERC and the AHRC.



## Excellence in Science and Research

### Strength and competitiveness in international research funding

- The consortium area accounts for 3% of the UK's domestic REF income and 3% of the UK's total international REF income. Within the consortium, analysis of those areas that make up a higher percentage than the overall UK proportion reveals higher performing or more competitive areas.
- The institutions within the consortium area perform particularly well in areas related to advanced manufacturing and energy – set out below. Those areas that perform well in **both** domestic and international funding are highlighted.

Area of interest	Unit of Assessment	% of domestic income (REF)	% of international income (REF)
Advanced manufacturing / Energy	Aeronautical, Mechanical, Chemical and Manufacturing Engineering	11%	16%
Advanced manufacturing / Energy	Electrical and Electronic Engineering, Metallurgy and Materials	10%	12%
Advanced manufacturing / Energy	General Engineering	4%	3%
Advanced manufacturing / Energy	Physics	15%	5%
<i>% of all UK REF funding</i>		3%	3%

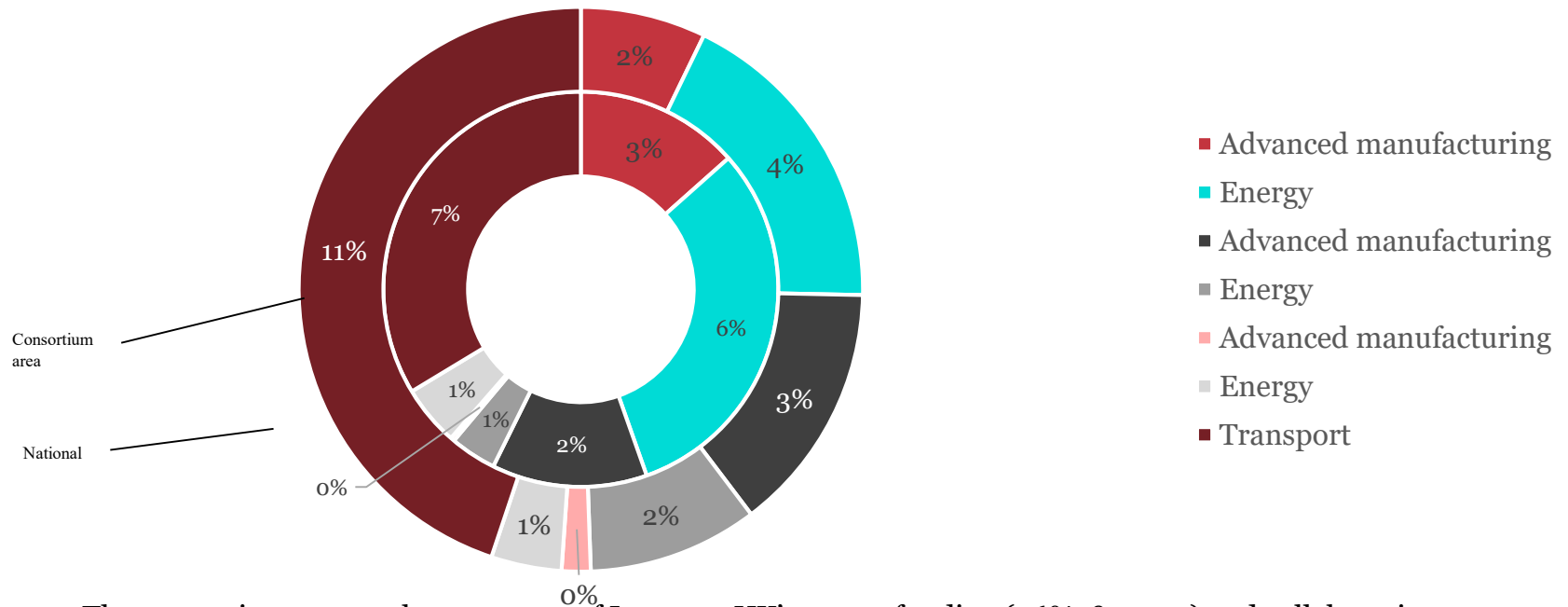
# Innovation Strengths

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## Innovation Strengths

### Strength and competitiveness in national research

- The majority of Innovate UK awards received in an area of interest for the consortium area were in the area of transport (7%, £6.7m). The second highest proportion in an area of interest was in energy (6%, £6.2m). The consortium area slightly outperformed the national average in energy and advanced manufacturing. Nor included in this chart is the funding received for Catapult activities, which was by far highest for the consortium area, at £47.8m (47% of InnovateUK funding received) in the period.

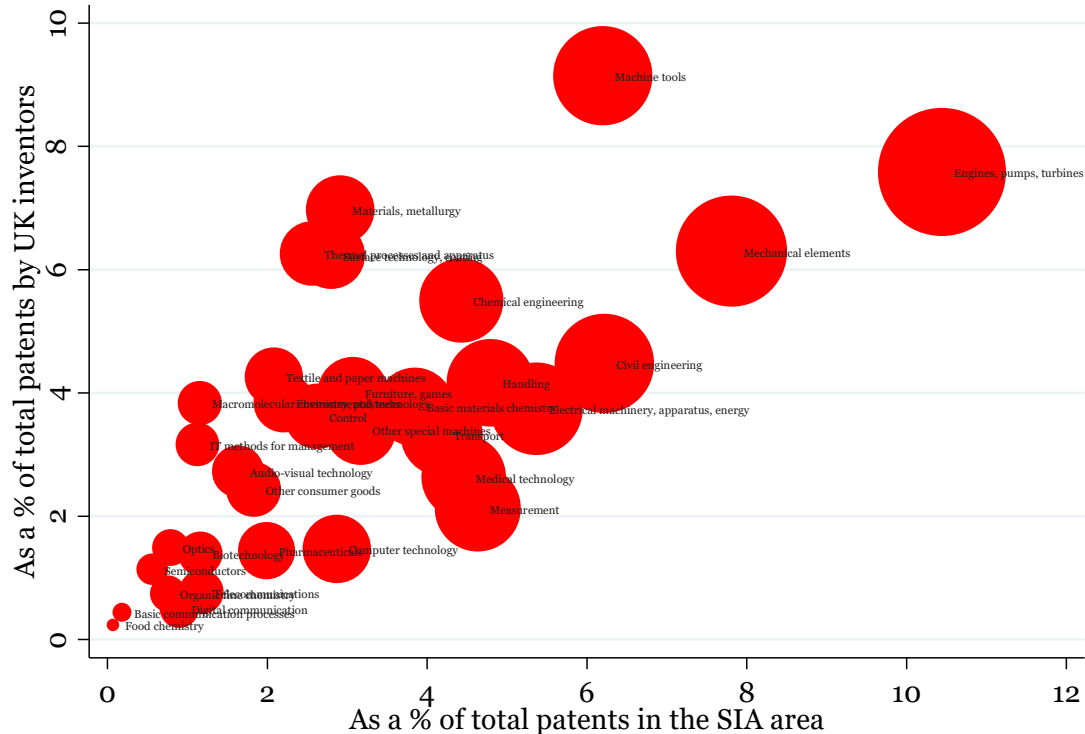


- The consortium area makes most use of Innovate UK's centre funding (36%, £49.5m) and collaborative research and development grants (28%, £39.0m).



## Innovation strengths

- Patent data reveal strengths in several technological areas which show a relative high share of the total patents submitted by UK inventors (overall share: 3%) and represent a relative high proportion within the patent portfolio of the consortium. These areas include: Engine, pumps and turbines, Mechanical elements, and Machine tools.



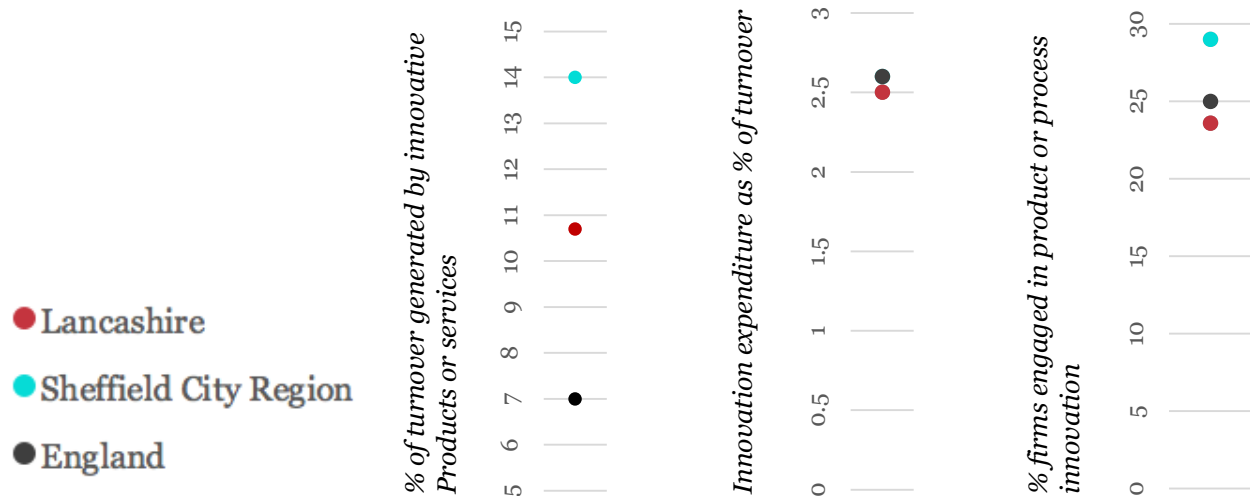
Source: EPO PATSTAT, 2004-2013

\*EPO PATSTAT includes information on patents submitted by UK inventors to application authorities around the globe. Because the analysis focuses on inventors (who tend to be the individuals that worked on the innovation) rather than on applicants (who tend to be the main organisation where the inventor worked), the analysis permits to identify where the invention took place and was developed.

# Innovation Strengths

## Innovation activities

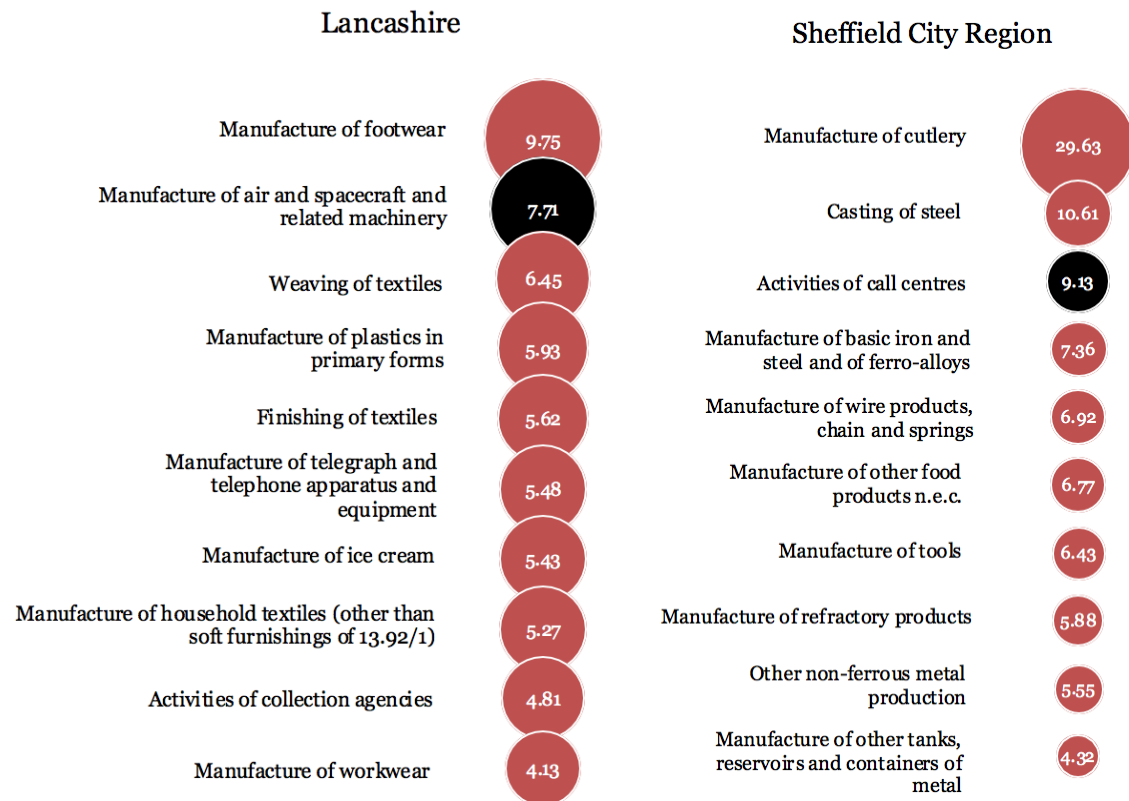
- The consortium area outperforms the England average in two out of three significant indicators of innovation activity. There are more firms in the Sheffield City Region (though fewer in Lancashire) engaged in product or process innovation, with a much higher average proportion of turnover from product or process innovation. Businesses in Lancashire also out-perform the national average in this second measure. Businesses in the Sheffield City Region are exactly level with the national average of the proportion of turnover spent on innovation, though Lancashire slightly behind in this measure.



# Innovation Strengths

## Established Industrial Capacity and Growth Points

- The bubble charts show industrial concentration within the two LEP areas in this consortium. The size of the bubbles indicates the concentration of that sector in that particular LEP.
- Black spheres indicate a high proportion of employee jobs within the specified sector (in the particular LEP) in comparison with the national average. This indicates where that industry may be considered a driver of employment, as well as an industrial specialism.
- Two areas of industrial specialisation in the consortium area are also drivers of employment, highlighted in black in the chart. These are shown to be manufacture of air and spacecraft and related machinery, and activities of call centres



# National and International Engagement

## National and international engagement

Analysis of the 8<sup>th</sup> European Commission Framework Programme (H2020) shows the consortium’s participation in European competitive funding. There are three areas where drawdown is high and participation is relative high in comparison with the overall participation of the consortium in H2020 (4%): Transport, Security and other societal challenges.

Within the Transport programme, the consortium collaborates mostly with organisations in Germany. They also collaborate nationally (with other UK organisations situated outside the consortium area) and with organisations in France, Spain and Italy and to a lesser extent with Austria, The Netherlands and Belgium.

	Relatively high participation (based on EC Contribution )	Top 5 (based on EC contribution)
Access to risk finance	0%	
Advanced manufacturing and processing	2%	0.84
Advanced materials	2%	0.36
Biotechnology	0%	
Climate action, environment, resource efficiency	2%	1.72
Europe in a changing world	12%	4.35
Food security, sustainable agriculture	5%	3.36
Health, demographic change and wellbeing	1%	2.76
Industrial Leadership - Cross-theme	2%	0.35
Information and Communication Technologies	3%	5.84
Innovation in SMEs	0%	
Nanotechnologies, Advanced Materials	2%	0.55
Secure societies - Protecting freedom	9%	5.77
Secure, clean and efficient energy	3%	5.72
Smart, green and integrated transport	11%	8.88
Societal Challenges - Cross-theme	51%	5.06
Space	2%	0.70

Total EC Contribution	46.26
Relative overall participation	4%

Area:  
Smart, green and integrated transport

