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Benchmarking Local Innovation

The Innovation Geography
of England 2016 -18





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Executive Summary

Firms' ability to innovate successfully plays an important role in their ability to sustain growth and competitiveness. This report – which is the fourth in the series - provides innovation benchmarks for local areas in England, updating our previous analysis published in 2019 and providing some brief historical comparisons.

The benchmarks are based on a new analysis of data from the 14,000 firms which responded to the UK Innovation Survey 2019. Data in the survey covers firms' innovation activity during 2016-18 so pre-dates the COVID-19 pandemic and its impacts on firms' innovation activity. The analysis is designed to provide representative results for each local area for the 2016-18 period. Information is provided on nine benchmarks including indicators for organisational innovation.

Three benchmarks focus on forms of organisational and marketing innovation. Three further metrics relate to the inputs and structure of firms' innovation activity with a focus on R&D, design investment and collaboration. Arguably the most important, the remaining three metrics relate to the outcomes from firms' innovation reflecting the extent of innovation across the population of firms.

Our analysis suggests three key results:

- Reflecting the results of our earlier analyses, we find a concentration of relatively high levels of R&D activity and product and service innovation in an arc of local economic areas in the South and East Midlands and along the M4 corridor. This arc of innovation stands out particularly strongly – and consistently through time – in terms of new-to-the-market innovation. Albeit with some variation, these areas are characterised by high proportions of innovating firms and a particularly high incidence of new-to-the-market innovation.
- We observe a rather different geography in terms of process innovation with higher levels of process innovation activity in some Northern and peripheral areas where product/service innovation is less common.
- Our benchmarks for organisational innovation suggest a less clear geographical pattern with a range of different local areas performing relatively strongly. Areas in the 'arc of innovation' also tend to perform relatively strongly on these metrics too, however.

Our analysis highlights the diversity of innovation activity across local areas in England. Some local areas are marked by strengths in organisational innovation but weaker elsewhere; others exhibit higher levels of collaborative behaviour and R&D. Both suggest the value of differentiated local innovation strategies which can build on existing strengths and remedy weaknesses.

Two important caveats need to be borne in mind when considering these results. First, as mentioned previously, the level of innovative activity in a locality will depend both on the type of business activity in the area as well as the innovativeness of individual firms.

Second, it is also important to remember that our benchmarks are based on survey data. This inevitably means that our results are subject to some measurement error, although the general picture we observe in 2016 to 2018 is reassuringly similar to that for earlier periods. In future, if more precise local benchmarks are desired, larger surveys or different analytical approaches will be needed. Here, it is also important to recognise that the UK Innovation Survey only covers firms with 10 or more employees so we can deduce nothing from this source about the geography of innovation among micro-businesses.

1. Introduction

Firms' ability to innovate successfully plays an important role in their ability to sustain growth and competitiveness. For local areas this means that the more innovative local companies are, the stronger the potential for local growth. In this report we provide a series of benchmarks which profile the level of innovative activity for local economic areas across England over the period 2016-18. We also provide some local comparisons with previous periods.

The benchmarks we report cover Local Economic Areas, defined by the 38 individual Local Enterprise Partnerships (LEPs) in England.

Tables and maps in Section 2 of this report are based on a new analysis of the UK Innovation Survey 2019 which relates to firms' innovation activity during the three-year period from 2016 to 2018. Constructing these benchmarks has involved re-weighting survey responses to provide results which are representative of each local economic area. We report a range of benchmarks representing different aspects of firms' innovation activity. The first three benchmarks focus on forms of organisational and marketing innovation:

- ***Firms engaged in the introduction of new business practices*** - the proportion of firms reporting the adoption of new business practices during the 2016 to 2018 period.
- ***Firms engaged in the introduction of new methods of organising work responsibilities*** - the proportion of firms reporting the adoption of new work organisation methods during the 2016 to 2018 period.
- ***Firms engaged in marketing innovation*** - the proportion of firms reporting changes to marketing concepts or strategies.

The next three metrics relate to the inputs and structure of firms' innovation activity with a focus on R&D, design investment and collaboration:

- ***Firms engaged in R&D*** - the proportion of firms reporting undertaking R&D over the 2016 to 2018 period (either internal or external).
- ***Firms engaged in design*** - the proportion of firms reporting investing in design as part of their innovation activity over the 2016 to 2018 period.
- ***Firms that were collaborating as part of their innovation activity*** - the proportion of firms partnering with other organisations as part of their innovation activity.

Arguably the most important benchmarks, the remaining three metrics relate to the outcomes from firms' innovation reflecting both the extent of innovation across the population of firms as well as the success of innovation:

- ***Firms engaged in product or service innovation*** - measured as the proportion of firms reporting the introduction of a new or significantly improved product or service during the 2016 to 2018 period.
- ***Firms engaged in new to the market innovation*** - measured as the proportion of firms reporting that their new products or services were new to the market.
- ***Firms engaged in process innovation*** - the proportion of firms reporting the introduction of a new or significantly improved process during the 2016 to 2018 period.

Details of the approach used to derive the individual benchmarks are provided in Annex 1.

Historical comparisons between the results for 2016-18 and earlier waves of the UK Innovation Survey are included in Section 3. These compare the geographical profile of innovation activity in England in four overlapping three-year periods covered by successive waves of the UK innovation survey (2010-12, 2012-14, 2014-16 and 2016-18).

In reading this report it is important to acknowledge that the benchmarks are based on firms' survey responses and, importantly, that in some smaller areas the number of respondents is relatively low. This inevitably means that the benchmarks are subject to potential measurement errors due to non-response or disproportionate response by particular groups of firms. Care is therefore necessary in interpreting the results which should only be seen as providing a general indication of the engagement of firms with innovation in each local area and the period-to-period changes.

2. Innovation Geography 2016-18

2.1 Introduction of new business practices

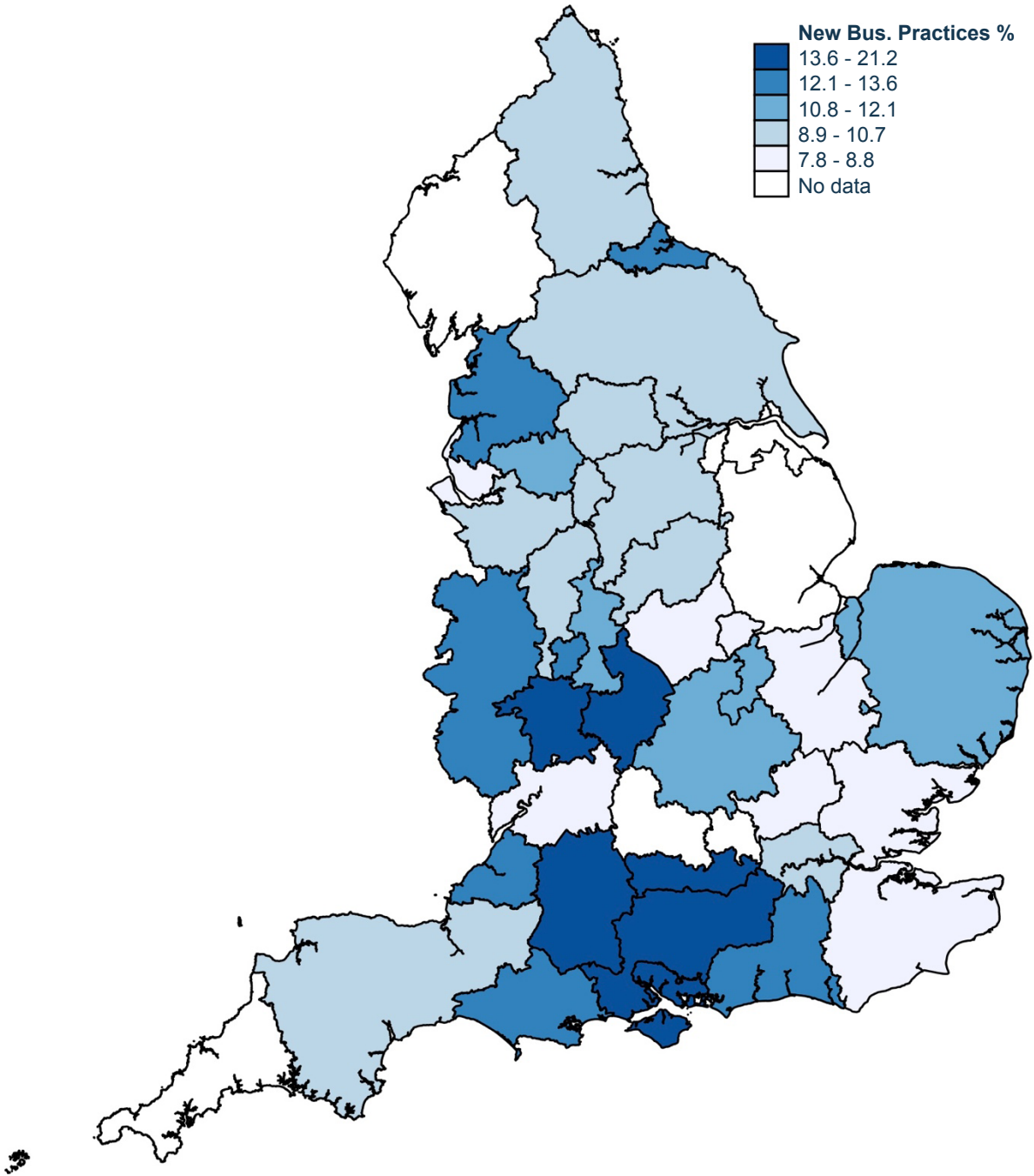
Business model innovation has attracted significant attention in recent years as firms seek new profit opportunities and new ways of creating value for customers and other stakeholders. This benchmark relates to firms' adoption of new organisational processes over the 2016 to 2018 period. Examples of this type of innovation would be the new introduction of the following: supply chain management, business re-engineering, knowledge management, lean production, or quality management.

The spread of this benchmark across local economic areas is relatively wide: 21.2 per cent of firms in Worcestershire reported introducing new business practices over the 2016 to 2018 period compared to only 7.8 per cent in Liverpool. There is little clear geographical pattern to this measure, although higher levels of business practice innovation are clustered in the Southern part of the West Midlands and central areas of the South Coast. Data is unavailable for a number of areas due to disclosure.

Table 1: Introduction of new business practices by local economic area (% of firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Worcestershire	21.2	1	Sheffield City Region	10.2	20
Swindon and Wiltshire	17.7	2	York, N. Yorkshire and E. Riding	9.7	21
Solent	15.9	3	Derby, Derbyshire, Notts	9.3	22
Enterprise M3	15.4	4	North-East	9.3	23
Thames Valley Berkshire	14.3	5	Cheshire and Warrington	9	24
Coventry and Warwickshire	13.7	6	London	8.9	25
Tees Valley	13.6	7	Stoke-on-Trent and Staffordshire	8.9	26
West of England	13.5	8	Leicester and Leicestershire	8.8	27
The Marches	13.1	9	South-East	8.7	28
Black Country	13.0	10	Gloucestershire	8.4	29
Dorset	12.8	11	Gtr. Cambridge and Peterborough	8.1	30
Coast to Capital	12.6	12	Hertfordshire	8	31
Lancashire	12.4	13	Liverpool City Region	7.8	32
South-East Midlands	12.1	14	Buckinghamshire Thames	*	
Greater Manchester	11.7	15	Cornwall and Isles of Scilly	*	
New Anglia	11.7	16	Cumbria	*	
Greater Birmingham and Solihull	11.1	17	Greater Lincolnshire	*	
Heart of the South West	10.8	18	Humber	*	
Leeds City Region	10.8	19	Oxfordshire	*	

Figure 1: The geography of new business practices by local economic area (% of firms)



2.2 New methods of work organisation

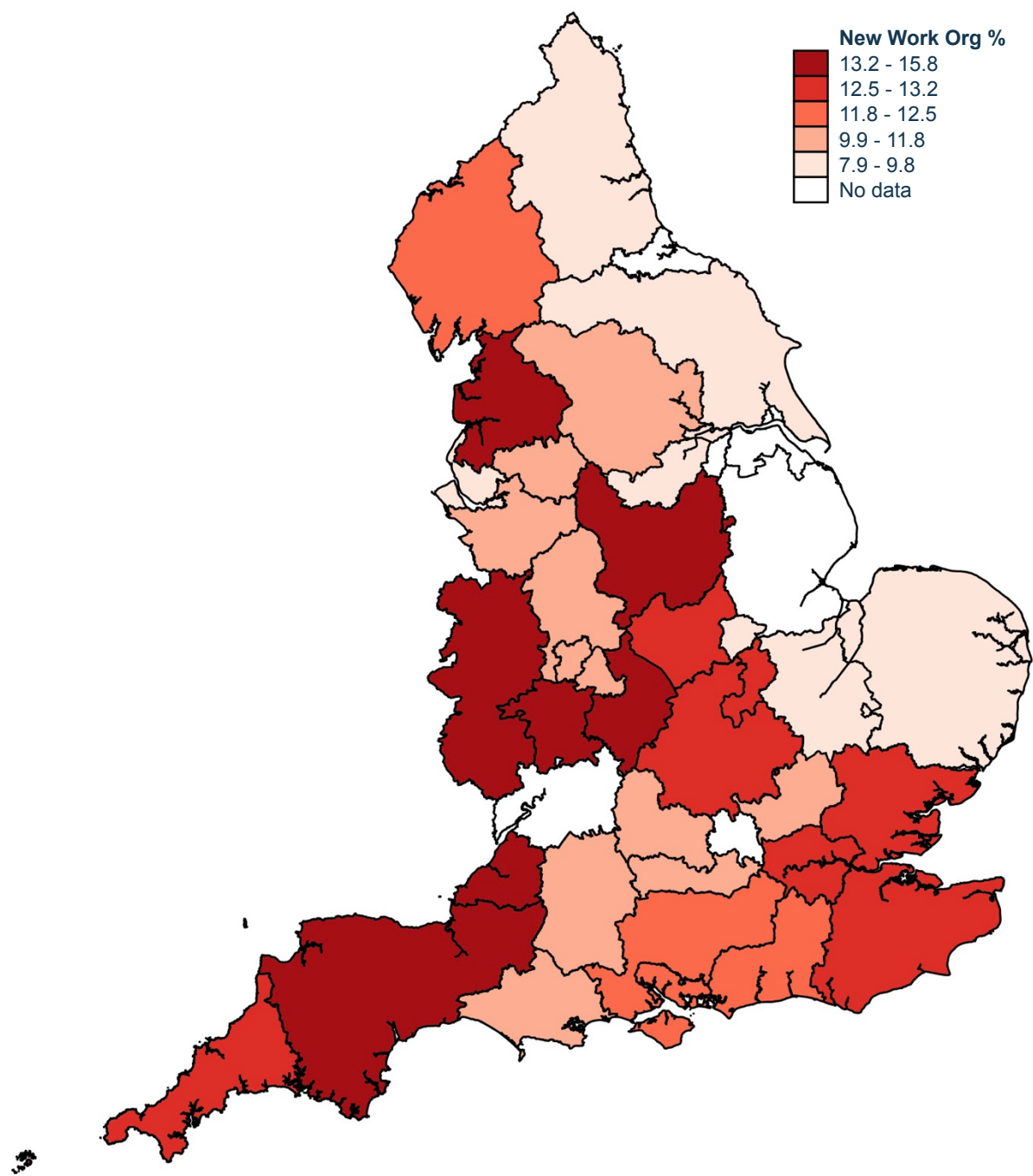
The way work is organised and structured can play an important role in shaping levels of innovative activity and productivity. Rigid, hierarchic forms of work organisation can hinder innovation, while more fluid, risk-tolerant regimes can facilitate creative thinking. This metric relates to a survey question which focuses on firms' adoption of 'new methods of organising work responsibilities and decision making'. Examples are firms' first use of a new system of employee responsibilities, teamwork, de-centralisation, integration or de-integration of departments, education / training systems.

As with the introduction of new business practices, we see wide variation between the proportion of firms in each area reporting the implementation of new forms of work organisation (Figure 2). There is a relatively strong correlation between this benchmark and that relating to new business practices with a correlation across local areas of 0.44 (see Section 2.1).

Table 2: Introduction of new methods of work organisation by local economic area (% of firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Coventry and Warwickshire	15.8	1	Oxfordshire	11.8	20
The Marches	15.1	2	Cheshire and Warrington	11.6	21
West of England	14.7	3	Swindon and Wiltshire	11.3	22
Worcestershire	14.6	4	Leeds City Region	10.6	23
Lancashire	13.8	5	Thames Valley Berkshire	10.5	24
Heart of the South West	13.3	6	Hertfordshire	10.4	25
Derby, Derbyshire, Notts	13.2	7	Stoke-on-Trent and Staffordshire	10.2	26
London	13.0	8	Greater Birmingham and Solihull	9.9	27
South-East	13.0	9	Liverpool City Region	9.6	28
Leicester and Leicestershire	12.8	10	North-East	9.3	29
South-East Midlands	12.7	11	New Anglia	8.8	30
Cornwall and Isles of Scilly	12.6	12	Gtr. Cambridge and Peterborough	8.8	31
Solent	12.5	13	Sheffield City Region	8.4	32
Cumbria	12.4	14	York, N. Yorkshire and E. Riding	7.9	33
Coast to Capital	11.9	15	Buckinghamshire Thames	*	
Enterprise M3	11.9	16	Gloucestershire	*	
Black Country	11.8	17	Greater Lincolnshire	*	
Dorset	11.8	18	Humber	*	
Greater Manchester	11.8	19	Tees Valley	*	

Figure 2: The geography of new methods of work organisation by local economic area (% of firms)



2.3 Marketing innovation

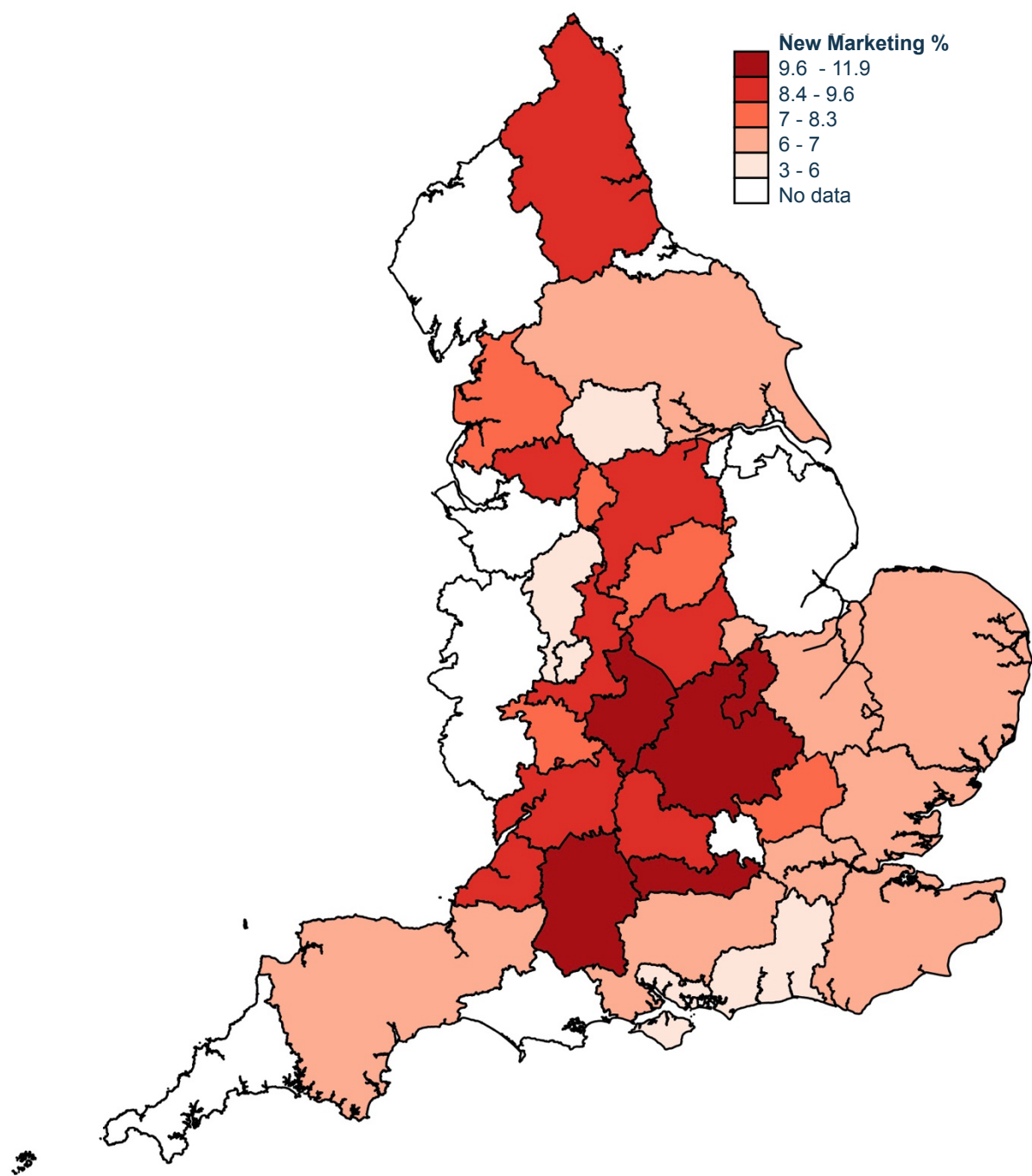
Alongside product, service and process innovation it is increasingly recognised that significant commercial advantage may also stem from marketing innovations. This metric is derived from a survey question which asks firms whether over the 2016 to 2018 period they implemented 'changes to marketing concepts or strategies'. As previously the metric is expressed as the percentage of firms in each local economic area undertaking this type of marketing innovation over the three-year period covered by the survey. In a number of areas figures for this metric were not available due to confidentiality requirements.

Again, we see significant variations in this metric between local economic areas with 11.9 per cent of firms in Coventry and Warwickshire reporting the implementation of new marketing concepts and strategies compared to only 3.0 per cent in Coast to Capital. There is a tendency for areas which perform well on the other organisational metrics also to perform well in terms of marketing innovation, with a marked regional geography (Figure 3). Again, however, there are positive correlations between this benchmark and those for new business practices (0.12) and work practices (0.26). The implication is that marketing innovations may often accompany other organisational changes.

Table 3: Marketing innovation by local economic area (% of firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Coventry and Warwickshire	11.9	1	Enterprise M3	6.5	20
Swindon and Wiltshire	10.9	2	Heart of the South West	6.3	21
Thames Valley Berkshire	10.3	3	York, N. Yorkshire and E. Riding	6.1	22
South-East Midlands	10.0	4	Gtr. Cambridge and Peterborough	6.1	23
Oxfordshire	9.6	5	Black Country	5.9	24
Greater Birmingham and Solihull	9.4	6	Solent	5.8	25
Gloucestershire	9.2	7	Leeds City Region	5.4	26
Greater Manchester	8.8	8	Stoke-on-Trent and Staffordshire	5.2	27
Leicester and Leicestershire	8.8	9	Coast to Capital	3	28
North-East	8.8	10	Buckinghamshire Thames	*	
West of England	8.4	11	Cheshire and Warrington	*	
Sheffield City Region	8.4	12	Cornwall and Isles of Scilly	*	
Hertfordshire	8.3	13	Cumbria	*	
Worcestershire	8.3	14	Dorset	*	
Derby, Derbyshire, Notts	7.7	15	Greater Lincolnshire	*	
Lancashire	7.2	16	Humber	*	
London	7.0	17	Liverpool City Region	*	
South-East	6.9	18	Tees Valley	*	
New Anglia	6.8	19	The Marches	*	

Figure 3: The geography of marketing innovation by local economic area (% of firms)



2.4 Research and development (R&D)

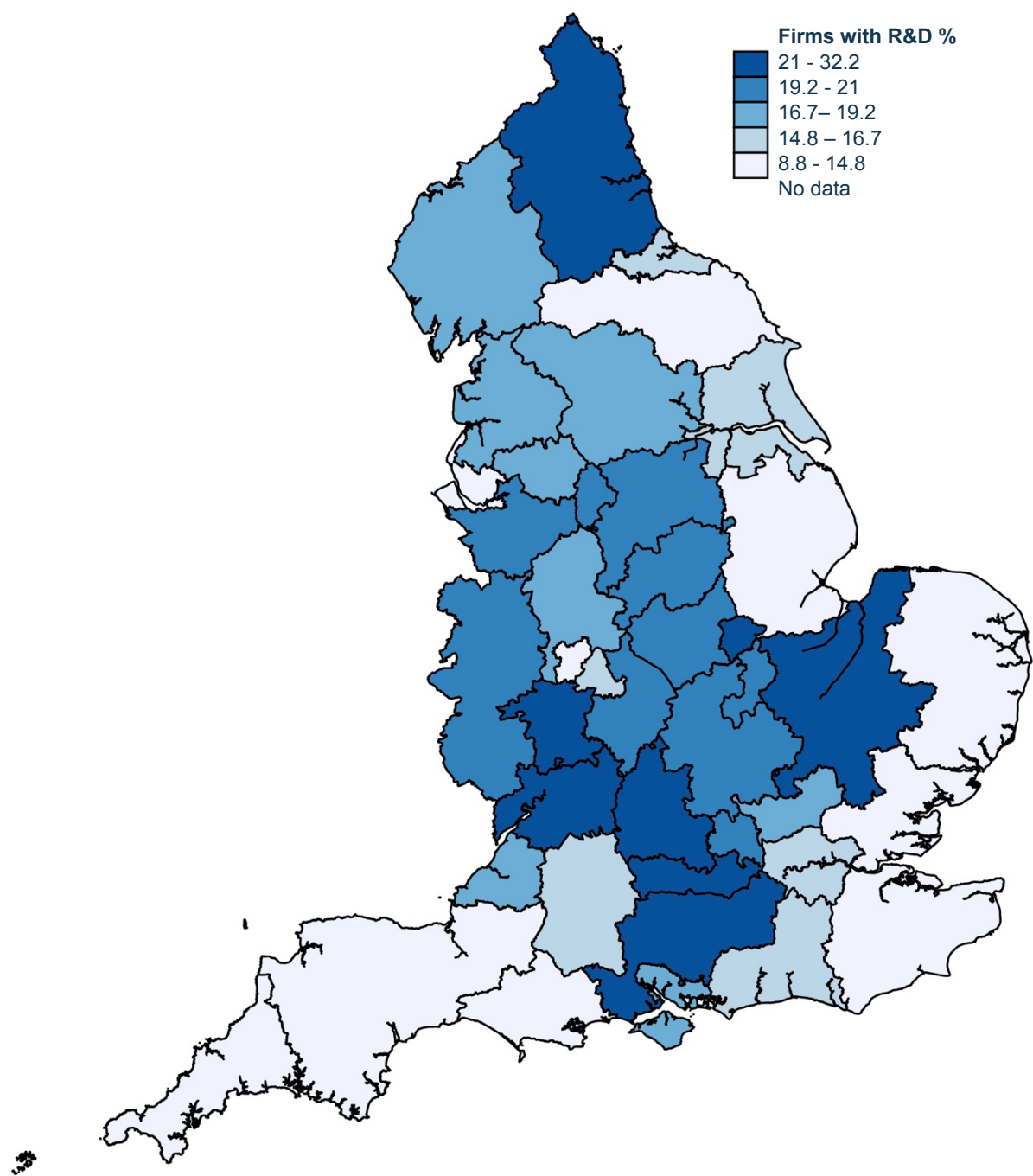
R&D provides one of the key inputs into firms' innovation activity. Not only can R&D provide the new knowledge or technological discovery which might drive innovation. There is also substantial evidence that R&D personnel are important in enabling firms to identify external knowledge or technologies which may help to develop the firm's own innovation. In part this may reflect the expertise of R&D personnel but may also be related to their personal links and networks to other researchers. As a result the R&D benchmark is correlated strongly with that for design investment (0.55) and new-to-the-market innovation (0.67).

Again, there is significant variation between local areas in terms of the proportion of firms reporting either in-house or externally sourced R&D activity. In this indicator we see a strong regional pattern with some of the highest reported figures consistent with the 'arc of innovation' identified in earlier Innovation Benchmarks report covering Oxfordshire, Northamptonshire, SE Midlands and Thames Valley, Berkshire Greater (Figure 4). Outside this area the North-East also does well on this particular benchmark in 2019.

Table 4: Percentage of firms undertaking R&D by local economic area (% firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Gtr. Cambridge and Peterborough	32.2	1	Hertfordshire	17.6	20
Oxfordshire	32.1	2	Cumbria	17.5	21
Worcestershire	25.5	3	Stoke-on-Trent and Staffordshire	17	22
Thames Valley Berkshire	23.3	4	Solent	16.8	23
Enterprise M3	22.6	5	London	16.5	24
Gloucestershire	22.6	6	Greater Birmingham and Solihull	16.1	25
North-East	22.3	7	Tees Valley	15.9	26
Cheshire and Warrington	21.0	8	Humber	15.4	27
Sheffield City Region	21.0	9	Swindon and Wiltshire	15.3	28
Derby, Derbyshire, Notts	20.6	10	Coast to Capital	14.9	29
South-East Midlands	19.9	11	South-East	14.8	30
Coventry and Warwickshire	19.7	12	York, N. Yorkshire and E. Riding	14.8	31
The Marches	19.7	13	Liverpool City Region	14.1	32
Leicester and Leicestershire	19.6	14	Cornwall and Isles of Scilly	14	33
Buckinghamshire Thames	19.3	15	New Anglia	13.7	34
Lancashire	19.1	16	Dorset	12.3	35
West of England	18.4	17	Heart of the South West	12.2	36
Greater Manchester	18.3	18	Black Country	9.6	37
Leeds City Region	17.8	19	Greater Lincolnshire	8.8	38

Figure 4: Percentage of firms undertaking R&D by local economic area (% of firms)



2.5 Design investment for innovation

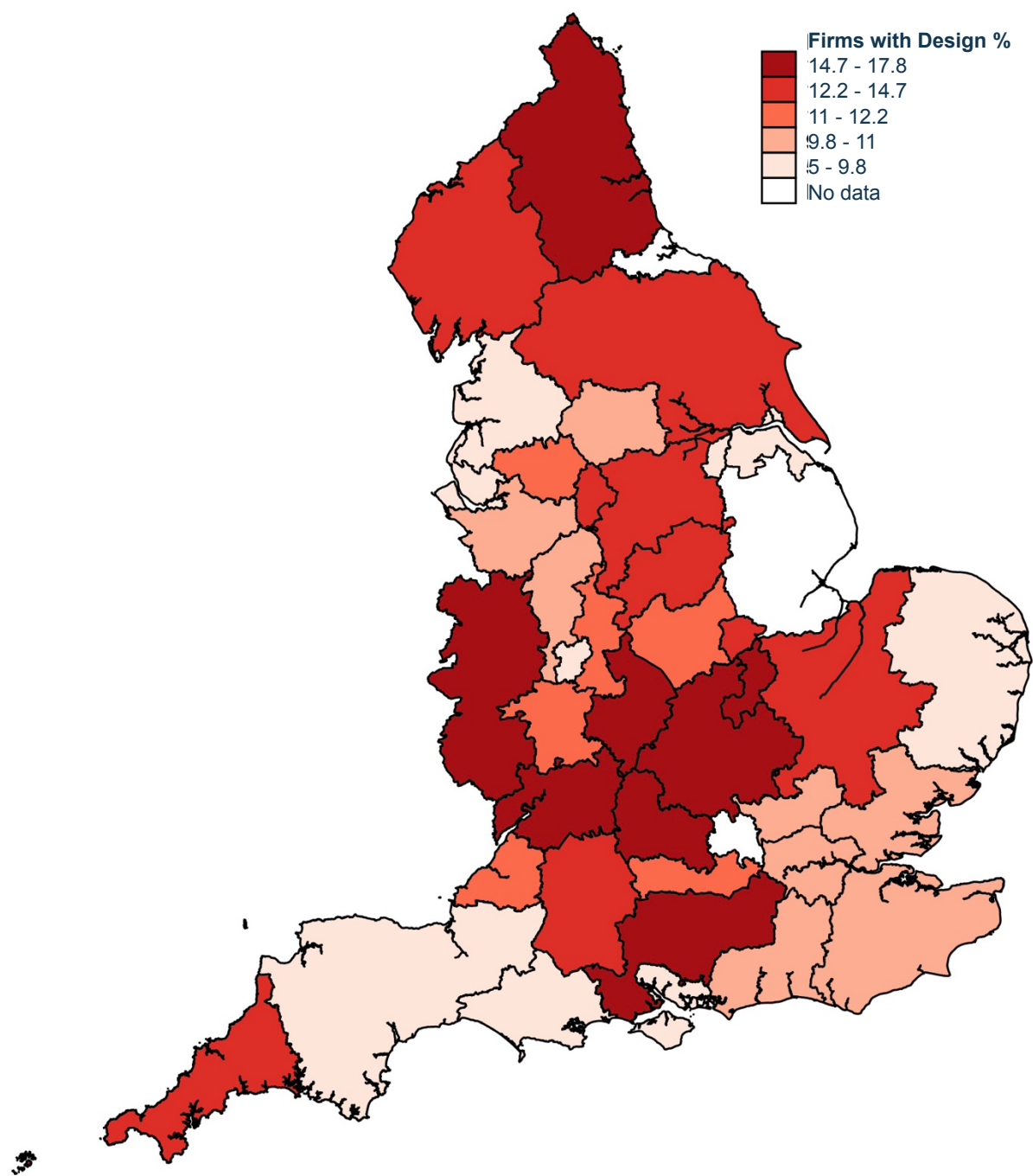
Studies have repeatedly linked design investment to enhanced innovation outcomes in both manufacturing and services. This benchmark relates to firms' investment in all forms of design related to the development or implementation of new or improved goods, services and processes. For this benchmark, figures are not available for three local areas due to confidentiality constraints.

The proportion of firms making design investments for innovation again varies relatively widely between local areas. There is a relatively strong relationship, however, between areas which perform strongly in terms of R&D (Table 4) and design investment (Table 5), reflecting the strong correlation between the two metrics. This is also evident in the geography of areas which perform well on this metric (Figure 5).

Table 5: Percentage of firms undertaking design investment for innovation by local economic area (% firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Oxfordshire	17.8	1	West of England	11.1	20
Enterprise M3	16.7	2	Cheshire and Warrington	11	21
The Marches	15.4	3	London	11	22
Coventry and Warwickshire	15.2	4	Leeds City Region	10.4	23
North-East	15.0	5	Coast to Capital	10.2	24
Gloucestershire	14.7	6	Stoke-on-Trent and Staffordshire	10.2	25
South-East Midlands	14.7	7	Hertfordshire	10.1	26
Cumbria	14.5	8	South-East	9.9	27
Swindon and Wiltshire	14.3	9	Dorset	9.8	28
York, N. Yorkshire and E. Riding	14.2	10	Humber	9.5	29
Sheffield City Region	13.5	11	Heart of the South West	9.4	30
Derby, Derbyshire, Notts	12.5	12	Solent	9.3	31
Gtr. Cambridge and Peterborough	12.5	13	Liverpool City Region	7.5	32
Cornwall and Isles of Scilly	12.2	14	Lancashire	7.4	33
Thames Valley Berkshire	11.9	15	New Anglia	5.4	34
Greater Birmingham and Solihull	11.5	16	Black Country	5.0	35
Worcestershire	11.4	17	Buckinghamshire Thames	*	
Greater Manchester	11.1	18	Greater Lincolnshire	*	
Leicester and Leicestershire	11.1	19	Tees Valley	*	

Figure 5: Percentage of firms undertaking design investment for innovation by local economic area (% firms)



2.6 Collaboration for innovation

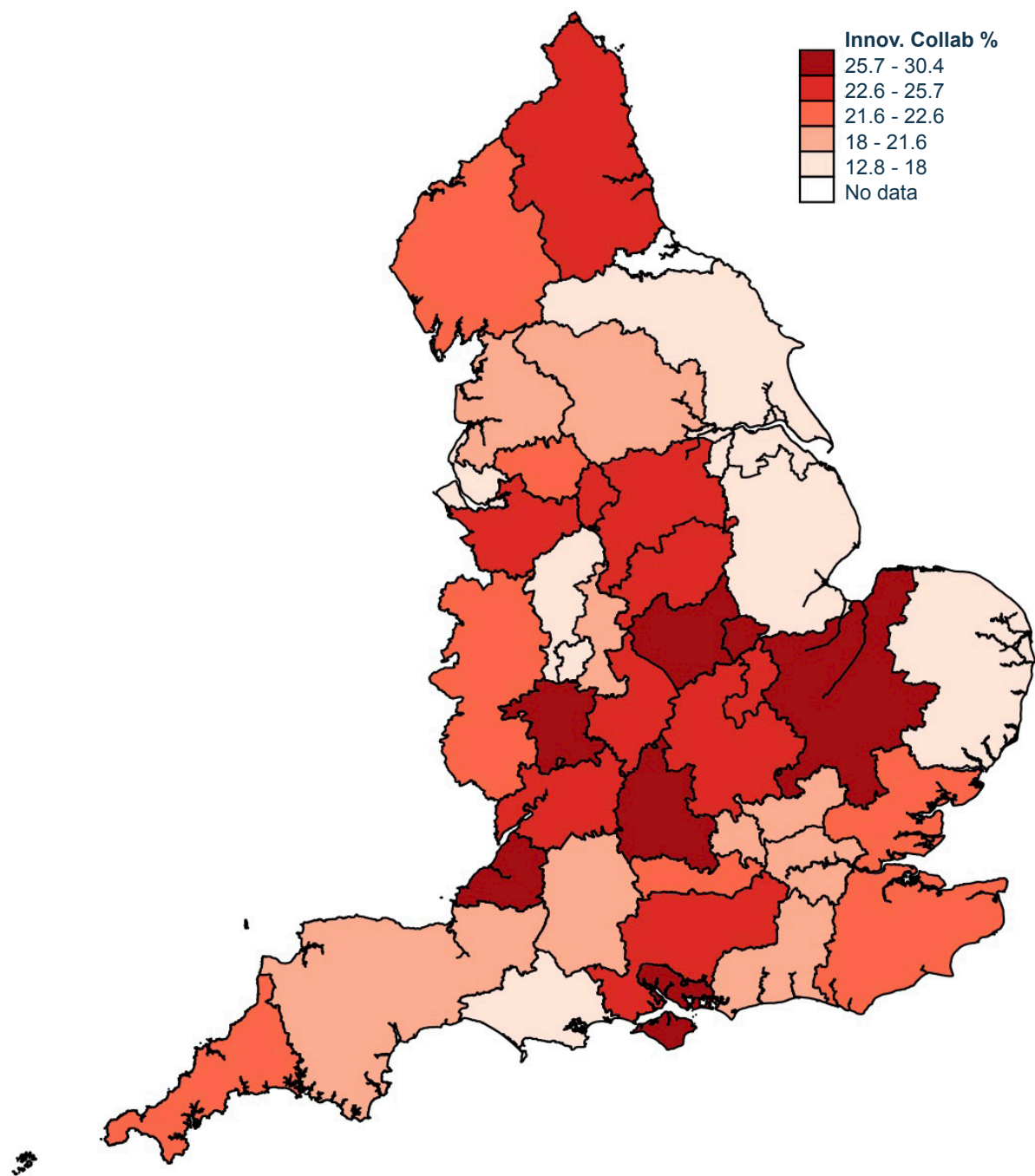
Notions of open, partnering or networked innovation have received considerable recent attention with the research literature suggesting that collaboration can deliver significant benefits for innovating firms. High levels of collaboration by firms in a locality can also help improve knowledge diffusion and ensure that firms maximise the potential of any innovative opportunities. Here, we report a metric based on the percentage of firms in any local economic area which were collaborating for innovation during the period 2016 to 2018. Collaboration need not have been continuous over this period, and partners were not necessarily local. The metric simply records whether innovating firms worked with other partners on their innovation activity over this period.

Before considering this benchmark, it is worth noting that here issues around sample size in some local areas become more important. Information is only available on collaboration for those firms which undertook some form of innovative activity during the 2016 to 2018 period. This said, several local areas which perform strongly on other organisational and innovation metrics also perform well here. There is also a strong correlation (0.72) between the R&D and collaboration benchmarks and the geographic pattern of collaboration is strongest around the 'arc of innovation' (Figure 6).

Table 6: Collaboration for innovation by local economic area (% of innovating firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Gtr. Cambridge and Peterborough	30.4	1	Greater Manchester	22	20
Solent	29.8	2	Coast to Capital	21.6	21
Worcestershire	29.8	3	London	21.6	22
Oxfordshire	28.9	4	Buckinghamshire Thames	21.4	23
West of England	27.1	5	Lancashire	20.1	24
Leicester and Leicestershire	26.4	6	Leeds City Region	19.3	25
South-East Midlands	25.7	7	Heart of the South West	19.1	26
Cheshire and Warrington	25.0	8	Hertfordshire	19.1	27
Sheffield City Region	25.0	9	Swindon and Wiltshire	18.3	28
Enterprise M3	24.4	10	Greater Birmingham and Solihull	18.2	29
Derby, Derbyshire, Notts	23.5	11	New Anglia	18	30
North-East	23.5	12	Stoke-on-Trent and Staffordshire	17.7	31
Gloucestershire	23.4	13	Dorset	15.9	32
Coventry and Warwickshire	23.1	14	Humber	15.8	33
Cumbria	22.6	15	York, N. Yorkshire and E. Riding	15.6	34
Thames Valley Berkshire	22.6	16	Black Country	14.8	35
The Marches	22.6	17	Greater Lincolnshire	12.9	36
South-East	22.3	18	Liverpool City Region	12.8	37
Cornwall and Isles of Scilly	22.2	19	Tees Valley	*	

Figure 6: Collaboration for innovation by local economic area (% of firms)



2.7 Product and service innovation

The ability to successfully introduce new or improved products and services is a key aspect of firms' innovation capability. Previous research studies have strongly linked new product innovation to both growth and productivity improvements. This metric measures the percentage of enterprises in each locality introducing either a new or significantly improved product or service during the three-year period from 2016 to 2018. The higher the percentage the more firms in any locality are engaging with innovation with its potential growth and productivity benefits.

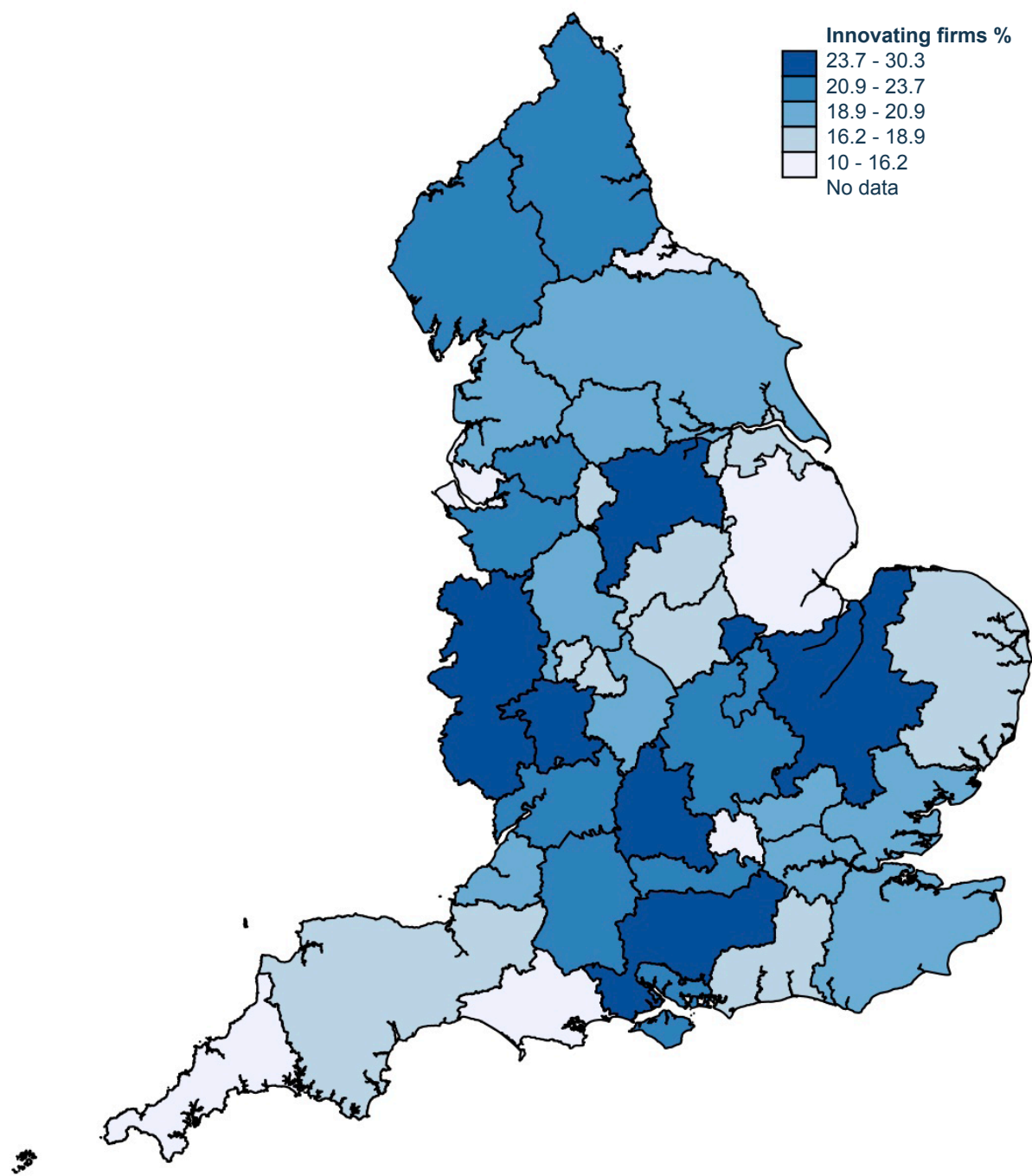
Differences in the levels of this metric between local areas will reflect both the innovativeness of local firms and to some extent the structure of local industries. For example, high-tech industries, or those where there is a high degree of competition, may have higher levels of innovative activity. Similarly, as larger firms are typically more likely to introduce new or improved products or services in any given period, those local areas where there is a preponderance of larger firms are likely to perform well on this benchmark.

Sheffield and Worcester have the highest proportion of innovating firms, both areas which perform well across a range of metrics relating to investment and collaboration. As in our 2019 benchmarks, some of the other highest levels of product and service innovation activity are recorded in areas North of the M25 and along the M4 Corridor. Lower levels of product and service innovation are generally associated with more peripheral and coastal areas (Figure 7).

Table 7: The proportion of firms undertaking product or service innovation (% of firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Sheffield City Region	30.3	1	London	19.5	20
Worcestershire	26.3	2	Stoke-on-Trent and Staffordshire	19.4	21
Oxfordshire	25.4	3	South-East	19.1	22
Enterprise M3	24.4	4	Lancashire	18.9	23
The Marches	24.4	5	West of England	18.9	24
Gtr. Cambridge and Peterborough	23.9	6	Leicester and Leicestershire	18.3	25
South-East Midlands	23.7	7	Coast to Capital	18.1	26
Cheshire and Warrington	22.4	8	New Anglia	18	27
Solent	22.4	9	Derby, Derbyshire, Notts	17.8	28
Cumbria	22.3	10	Humber	17.6	29
Thames Valley Berkshire	22.0	11	Greater Birmingham and Solihull	17.2	30
Gloucestershire	21.9	12	Black Country	16.3	31
Swindon and Wiltshire	21.8	13	Heart of the South West	16.3	32
Greater Manchester	21.2	14	Buckinghamshire Thames	15	33
North-East	20.9	15	Dorset	14.6	34
Leeds City Region	20.7	16	Cornwall and Isles of Scilly	12.6	35
Hertfordshire	20.5	17	Tees Valley	11.7	36
Coventry and Warwickshire	19.9	18	Greater Lincolnshire	10.8	37
York, N. Yorkshire and E. Riding	19.6	19	Liverpool City Region	10	38

Figure 7: Product and service innovation by local area (% firms)



2.8 New to the market innovation

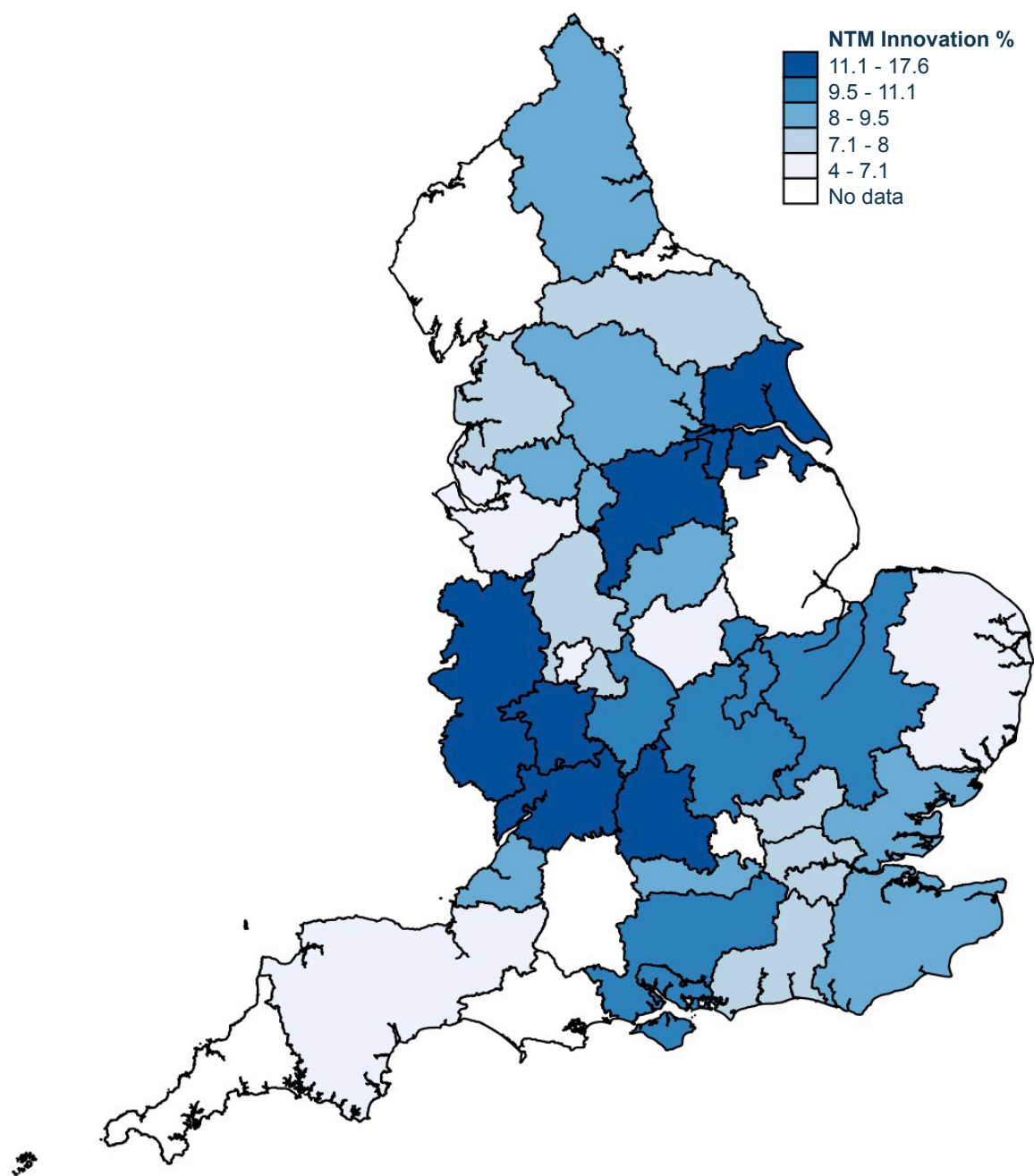
The previous metric provided an indication of the overall extent of innovation in products and services across the whole population of firms within each locality. Innovations vary in nature, however, with a usual distinction being 'new to the market' or 'new to the firm'. It is generally thought that more radical 'new to the market' innovations might generate higher returns although these are offset by the potential for higher risks. This metric provides an indication of the percentage of firms which reported introducing new to the market innovations (either products or services) during the 2014 to 2016 period. As this proportion is relatively small, the benchmark is unavailable for some more rural areas due to confidentiality constraints.

To understand this benchmark, it is useful first to consider the situation on one specific area. Take Oxfordshire, for example, where 25.4 per cent of firms reported undertaking some product or service innovation between 2016 and 2018 (Table 7). Over the same period 17.6 per cent of firms in Oxfordshire (around two-thirds of all innovating firms) reported undertaking new-to-the-market innovation (Table 8), the highest proportion of any local area. Areas such as Greater Manchester had both lower levels of overall innovation (21.2 per cent of firms, Table 7) and new-to-the-market innovation (9.2 per cent, Table 8). More generally, eight of the ten best performing local areas in terms of overall innovation (Table 7), were also in the ten best performing areas in terms of new to the market innovation.

Table 8: New to the market product and service innovation by Local Area (% firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
Oxfordshire	17.6	1	York, N. Yorkshire and E. Riding	8.0	20
Worcestershire	14.6	2	Stoke-on-Trent and Staffordshire	7.8	21
Humber	12.4	3	Greater Birmingham and Solihull	7.7	22
Gloucestershire	12.1	4	London	7.6	23
Sheffield City Region	12.1	5	Lancashire	7.4	24
The Marches	11.5	6	Coast to Capital	7.2	25
South-East Midlands	11.1	7	Cheshire and Warrington	6.5	26
Solent	10.7	8	Liverpool City Region	6.4	27
Gtr. Cambridge and Peterborough	10.6	9	Heart of the South West	6.2	28
Enterprise M3	9.8	10	Leicester and Leicestershire	6.2	29
Coventry and Warwickshire	9.7	11	Black Country	5.8	30
Thames Valley Berkshire	9.5	12	New Anglia	4	31
Greater Manchester	9.2	13	Buckinghamshire Thames	*	
Derby, Derbyshire, Notts	8.6	14	Cornwall and Isles of Scilly	*	
North-East	8.6	15	Cumbria	*	
Leeds City Region	8.4	16	Dorset	*	
West of England	8.3	17	Greater Lincolnshire	*	
South-East	8.2	18	Swindon and Wiltshire	*	
Hertfordshire	8.0	19	Tees Valley	*	

Figure 8: New to the market innovation by innovating firms (% of firms)



2.9 Process innovation

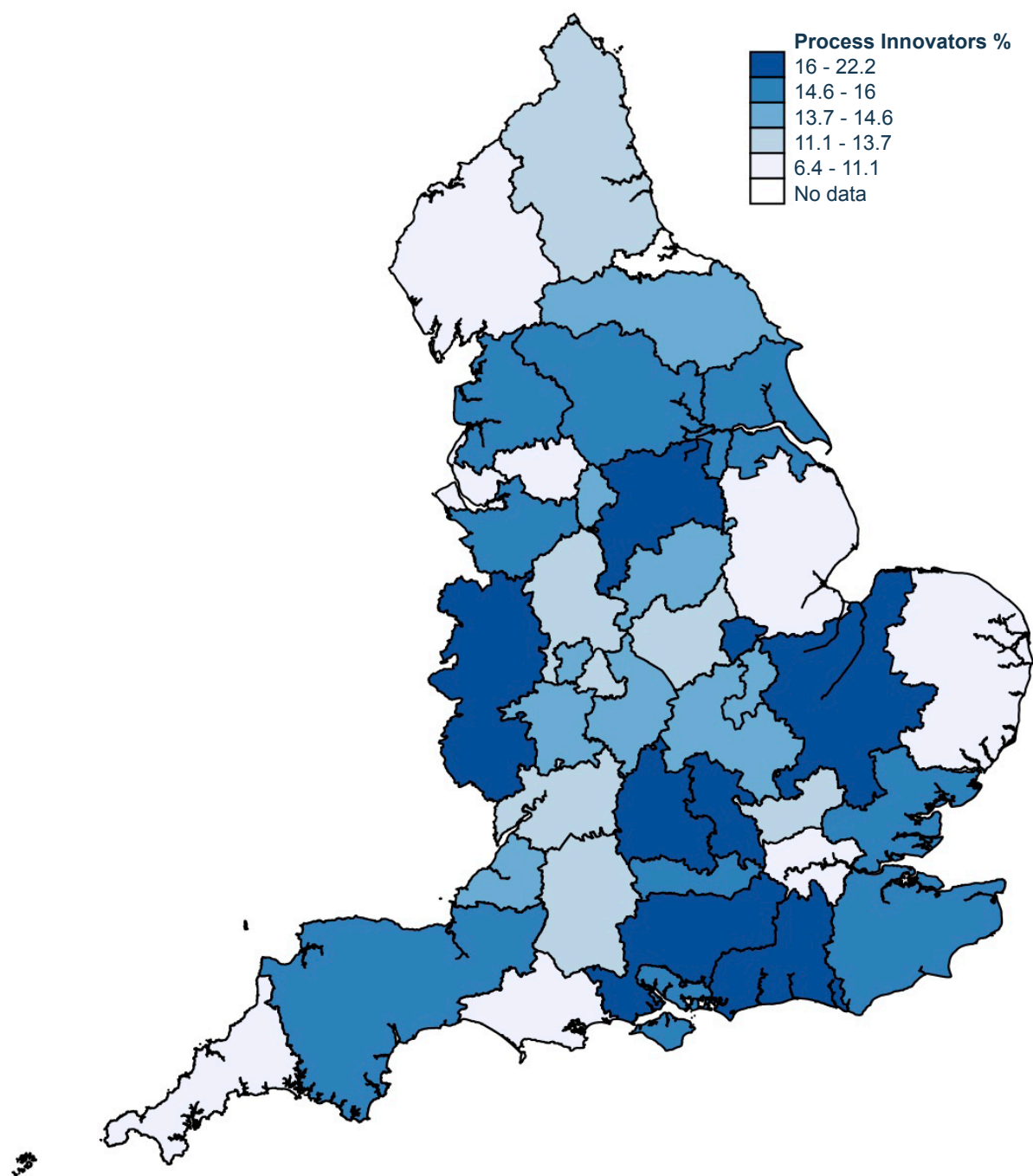
Alongside product and service innovation it is usual to measure firms' innovation in manufacturing or service delivery processes. Either type of innovation may provide advantages in terms of flexibility, productivity or cost saving. Process changes have also been linked by previous research to quality improvements and firms' improved ability to develop new product and service innovations. The metric we report here is similar in nature to that for product or service change and relates to the percentage of firms in each local area introducing new or significantly improved processes during the 2016 to 2018 period.

Process innovation may or may not be accompanied by product or service innovation although there is a strong correlation (0.35) between the two benchmarks. Overall, the proportion of firms reporting that they undertook process change is a little lower than that for product or service innovation (Figure 9). The geography of process innovation also differs somewhat from that for product and service innovation.

Table 9: Process innovation by local economic area (% of firms)

LEP	% Firms	Rank	LEP	% Firms	Rank
The Marches	22.2	1	York, N. Yorkshire and E. Riding	14	20
Coast to Capital	18.9	2	Derby, Derbyshire, Notts	13.8	21
Buckinghamshire Thames	18.4	3	Coventry and Warwickshire	13.7	22
Oxfordshire	18.0	4	Stoke-on-Trent and Staffordshire	13.6	23
Gtr. Cambridge and Peterborough	17.3	5	North-East	13.5	24
Sheffield City Region	17.0	6	Gloucestershire	12.6	25
Enterprise M3	16.8	7	Greater Birmingham and Solihull	12.5	26
Humber	16.0	8	Leicester and Leicestershire	12.5	27
Cheshire and Warrington	15.8	9	Swindon and Wiltshire	12	28
Thames Valley Berkshire	15.3	10	Hertfordshire	11.6	29
South-East	15.2	11	London	11.1	30
Lancashire	15.1	12	New Anglia	11.1	31
Solent	15.0	13	Dorset	10.6	32
Leeds City Region	14.8	14	Greater Manchester	10.3	33
Heart of the South West	14.7	15	Greater Lincolnshire	10	34
West of England	14.6	16	Cumbria	9.7	35
South-East Midlands	14.6	17	Cornwall and Isles of Scilly	9.1	36
Black Country	14.5	18	Liverpool City Region	6.4	37
Worcestershire	14.5	19	Tees Valley	*	

Figure 9: Process innovation by local economic area (% of innovating firms)



3. Innovation Comparisons Through Time

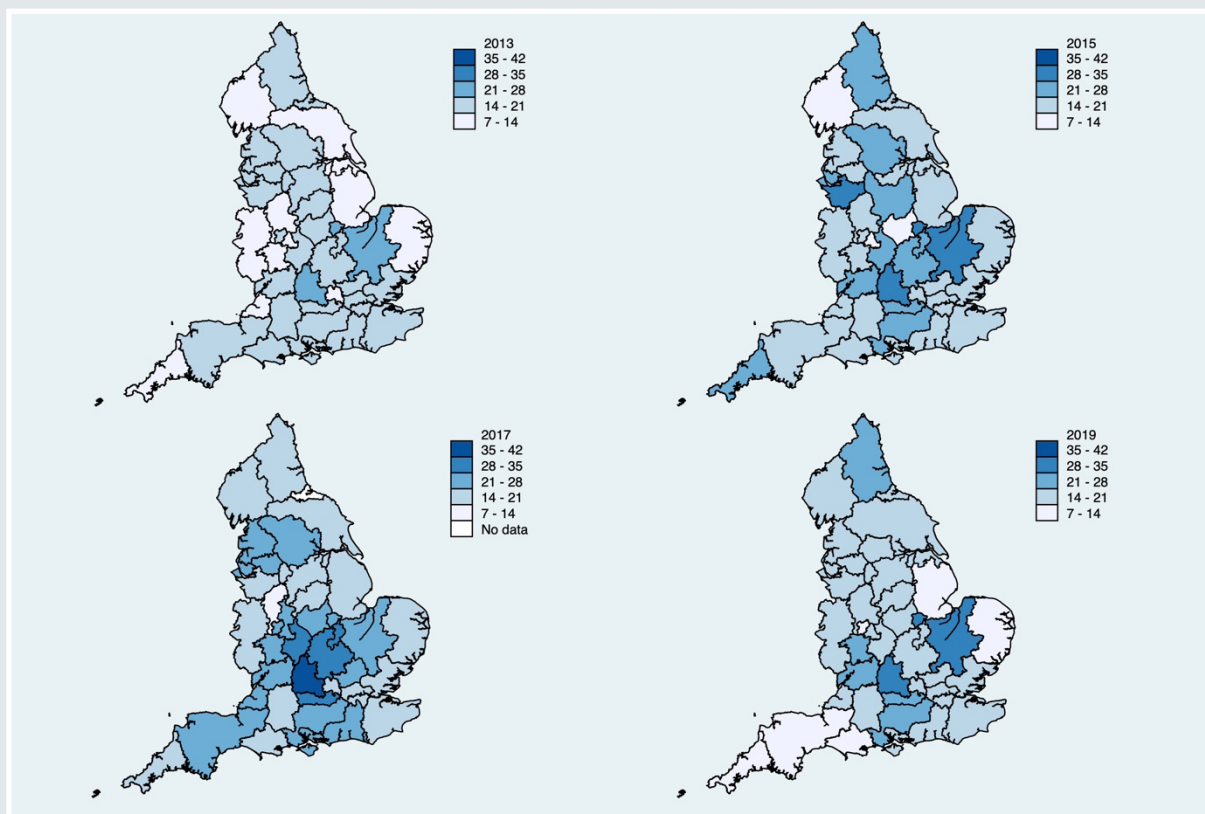
In this section we briefly examine some of the main spatial trends in innovation activity across England in the period since 2010-12. Our analysis focuses on the last four waves of the UK Innovation Survey covering the periods 2010-12, 2012-14, 2014-16 and 2016-18, and on R&D and the two main innovation indicators used in the previous section. That is, product or service innovation and new to the market innovation. In each case our focus is on the percentage of firms undertaking each type of innovation in the three years covered by each wave of the UK Innovation Survey. Note that in the remainder of this section the categories used in each of the maps are slightly different to those in Section 2 to ensure comparability across the different waves of the UK Innovation Survey.

3.1 Research and development

In 2010-12 significant disparities were evident in the proportion of firms investing in R&D in central and Southern parts of England and more Northerly coastal areas and the Welsh Marches (Figure 10). As the proportion of firms investing in R&D rose in these lagging areas in 2012-14 disparities reduced somewhat, a pattern which continued through 2014-16.

The most recent data for 2016-18 suggests that firms in most Northern coastal regions of England were sustaining levels of R&D activity while R&D activity fell in the South-West (Cornwall, Devon), East Anglia and Lincoln. Throughout the period from 2010 the highest levels of R&D activity have been in the South Midlands/Thames Valley area (Figure 10).

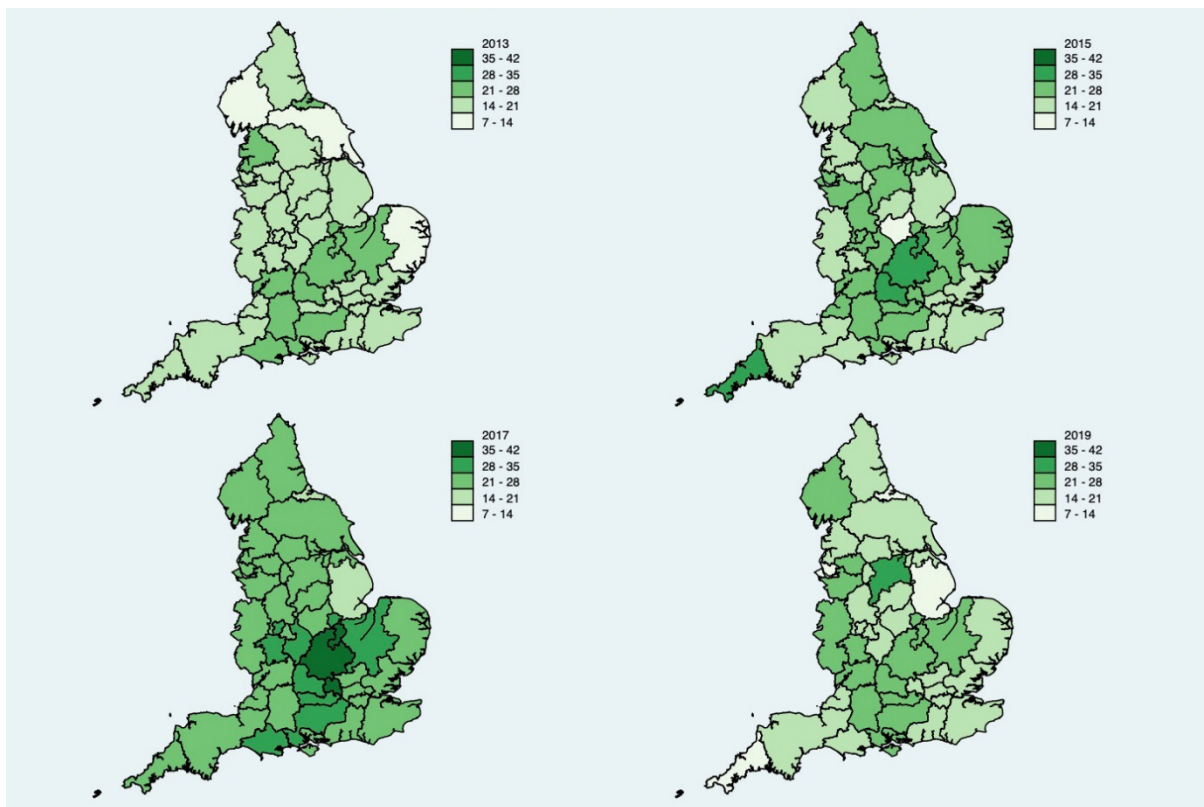
Figure 10: Percentage of firms undertaking R&D



3.2 Product or service innovation

Product and service innovation exhibited something of a North-South divide in 2010-12 before recovering somewhat in more Northerly regions towards 2012-14 and 2014-16 (Figure 11). This reflects the national trend in this metric which peaked in 2014-16. The fall in the national level of product and service innovation activity between 2014-16 and 2016-18 saw reduced levels of innovation activity across the country and a re-establishment of the North-South divide observed earlier. Some notable exceptions to this are higher levels of innovation activity maintained in Western areas of England and Cumbria.

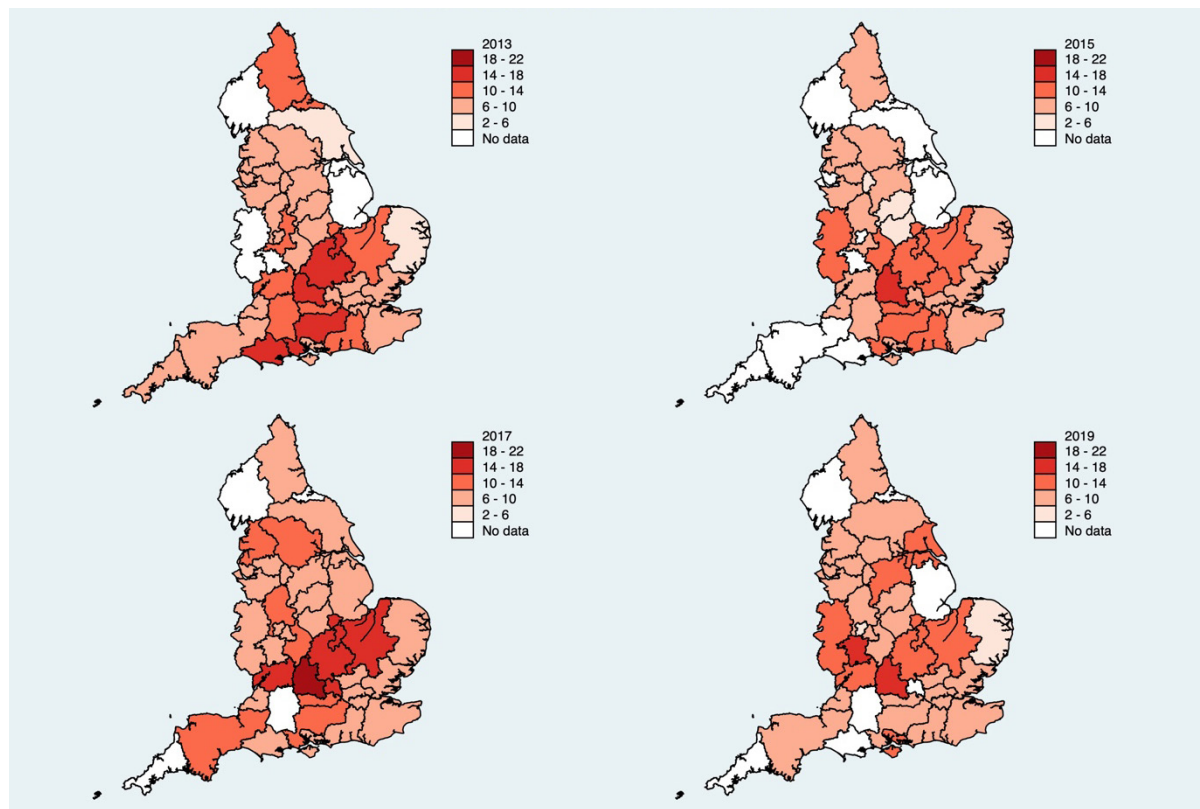
Figure 11: Percentage of firms undertaking product or service innovation



3.3 New to the market innovation

New to the market innovation is particularly demanding for firms to achieve and activity is strongly concentrated in the arc of innovation identified in earlier sectors running from Cambridge through Oxford and the South Midlands and Thames Valley (Figure 12). This pattern remains largely stable across the four waves of the UK Innovation Survey. For some more rural areas there is little data for this metric due to the disclosure rule that where less than 10 firms are engaging in new to the market innovation this cannot be reported.

Figure 12: Percentage of firms undertaking new to the market innovation



4. Conclusions

Innovation is important as it both contributes to productivity and provides the basis for business growth through the development of new export market opportunities. Research has also linked innovation positively to resilience: innovating firms are more likely to be able to adjust when market conditions become more challenging. The benchmarks we report here, based on a new analysis of the UK Innovation Survey 2019, provide an indication of the distribution of innovation activity across local areas in England.

Our analysis suggests three key results:

- Reflecting the results of our earlier analysis of the earlier 2017 UK Innovation Survey, we find a concentration of relatively high levels of R&D activity and product and service innovation in an arc of local economic areas in the South and East Midlands and along the M4 corridor. This arc of innovation stands out particularly strongly – and consistently through time – in terms of new-to-the market innovation. Albeit with some variation, these areas are characterised by high proportions of innovating firms and a high incidence of new-to-the-market innovation.
- We observe a rather different geography in terms of process innovation with higher levels of process innovation activity in some Northern and peripheral areas where product/service innovation is less common.
- Our benchmarks for organisational innovation suggest a rather less clear geographical pattern with a range of different local areas performing relatively strongly. Areas in the ‘arc of innovation’ also tend to perform relatively strongly on these metrics too, however.

Our analysis highlights the diversity of innovation activity across the UK. Some local areas are marked by strengths in organisational innovation but weaker elsewhere; others exhibit higher levels of collaborative behaviour and R&D. Both suggests the value of differentiated local innovation strategies which can build on existing strengths and remedy weaknesses.

Two important caveats need to be borne in mind when considering these results. First, as mentioned previously, the level of innovative activity in a locality will depend both on the type of business activity in the area as well as the innovativeness of individual firms.

Second, it is also important to remember that our benchmarks are based on survey data. This inevitably means that our results are subject to some measurement error although the general picture we observe in 2016 to 2018 is reassuringly similar to that for earlier periods. In future, if more precise local benchmarks are desired, larger surveys or different analytical approaches will be needed. Here, it is also important to recognise that the UK Innovation Survey only covers firms with 10 or more employees so we can deduce nothing from this source about the geography of innovation among micro-businesses.

Finally, while our benchmarks provide an overview of the geography of innovation across England, they also raise questions about ‘why’ this pattern arises. Addressing this question is likely to require more detailed statistical and institutional analyses of the drivers of innovation at the local level. Only in this way will we be clear about the impact and effectiveness of different elements of the business eco-system on local innovation outcomes.

Annex 1: Methodological notes

The metrics reported here are derived primarily from the UK Innovation Survey (UKIS) wave 10 – UKIS 2019 - covering the period 2016 to 2018. The survey covered enterprises with 10 or more employees in sections C-K of the Standard Industrial Classification (SIC) 2007 and therefore omits primary sectors and micro-businesses with less than 10 employees.

Two main steps have been necessary to develop local innovation benchmarks from the original survey data file, with analysis being undertaken within the Secure Data Service. First, postcodes on the UKIS are matched to the UK postcode directory in order to link individual observations to local areas. Benchmarks are reported for 38 local economic areas and earlier analyses have been adjusted to provide comparability.

Second, as the UKIS is a structured survey with higher sampling rates among larger firms it is also necessary to weight observations to ensure that the results are representative of each local area. To do this we profiled the population of firms in each local area using the 2017 Business Structures Database and then developed new weights to gross observations in each local area to the local firm population. Weights for each local economic area were developed to reflect three broad sectors and four enterprise size bands. Where firms were located in an area covered by more than one LEP they are included in the benchmark for each overlapping LEP.

Two further points are worth making in relation to the local innovation benchmarks presented here. This is secondary analysis – using the UKIS survey for a purpose for which it was not originally intended – and the results must therefore be considered in this light. In particular, the UKIS was originally structured to be representative of Government Office regions in England (rather than Local Economic Areas). We are therefore extending the use of the data beyond its original design in undertaking this analysis. Having said this, it turns out that (un-weighted) observation numbers for most LEAs (except some of the smaller rural LEAs) are reasonable and that the resulting weights are very similar across LEAs (see Table A1). Nonetheless the use of survey data suggests that all of our estimates are subject to sampling error and we report 95 per cent margins of error in Table A2 for each Local Economic Area and metric. Table A3 reports the correlations between metrics. Second, before release for publication, data have also been checked for ‘disclosure’, i.e. the ability of an interested party to identify any individual business from published data. This results in a small number of results which are unavailable particularly for rural LEAs where the number of firms undertaking innovation is relatively small.

Data acknowledgement

The statistical data used here is from the Office of National Statistics (ONS) and is Crown copyright and reproduced with the permission of the controller of HMSO and Queens Printer for Scotland. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. The analysis upon which this paper is based uses research datasets which may not exactly reproduce National Statistics aggregates.

Table A1: Weighted sample numbers by local economic area (number of firms)

Black Country	208	Leeds City Region	539
Buckinghamshire Thames	89	Leicester and Leicestershire	215
Cheshire and Warrington	203	Liverpool City Region	225
Coast to Capital	349	London	4742
Cornwall and Isles of Scilly	124	New Anglia	302
Coventry and Warwickshire	172	North East	295
Cumbria	110	Oxfordshire	121
Derby, Derbyshire, Notts	333	Sheffield City Region	279
Dorset	152	Solent	242
Enterprise M3	318	South East	1324
Gloucestershire	140	South East Midlands	382
Greater Birmingham and Solihull	283	Stoke-on-Trent and Staffordshire	213
Greater Lincolnshire	160	Swindon and Wiltshire	130
Greater Manchester	544	Tees Valley	93
Gtr. Cambridge and Peterborough	378	Thames Valley Berkshire	207
Heart of the South West	336	The Marches	134
Hertfordshire	212	West of England	246
Humber	110	Worcestershire	128
Lancashire	285	York, N. Yorkshire and E. Riding	292

Source: UKIS 2019, ERC Analysis

Table A2: Margins of error by LEA and metric: 2016-18

	Business Practices	Work Organisation	Marketing	R&D	Design	Co-operation	Product/Service Innov	Radical Innov	Process Innov
Black Country	4.6	4.4	3.2	4.0	3.0	4.9	5.1	na	4.8
Buckinghamshire Thames	0.0	na	na	8.3	na	8.6	7.5	na	8.1
Cheshire and Warrington	4.0	4.5	na	5.7	4.3	6.0	5.8	3.4	5.1
Coast to Capital	3.5	3.4	1.8	3.8	3.2	4.4	4.1	2.7	4.1
Cornwall and Isles of Scilly	na	5.9	na	6.2	5.8	7.4	5.9	na	5.1
Coventry and Warwickshire	5.2	5.5	4.9	6.0	5.4	6.4	6.0	4.5	5.2
Cumbria	na	6.2	na	7.2	na	7.9	7.9	na	5.6
Derby, Derbyshire, Notts	3.2	3.7	2.9	4.4	3.6	4.6	4.2	3.0	3.7
Dorset	5.4	5.2	na	5.3	4.8	5.9	5.7	na	4.9
Enterprise M3	4.0	3.6	2.7	4.6	4.1	4.8	4.8	3.3	4.2
Gloucestershire	4.6	na	4.8	7.0	na	7.1	6.9	5.5	5.6
Greater Birmingham and Solihull	3.7	3.5	3.4	4.3	3.8	4.5	4.4	3.1	3.9
Greater Lincolnshire	na	na	na	4.4	na	5.2	4.9	na	4.7
Greater Manchester	2.7	2.7	2.4	3.3	2.7	3.5	3.5	na	2.6
Gtr. Cambridge and Peterborough	2.8	2.9	2.4	4.8	3.4	4.7	4.3	3.1	3.9
Heart of the South West	3.4	3.7	2.6	3.5	3.2	4.2	4.0	na	3.8
Hertfordshire	3.7	4.2	3.8	5.2	4.1	5.3	5.5	3.7	4.4
Humber	na	na	na	6.8	5.5	6.9	7.2	na	6.9
Lancashire	3.9	4.0	3.0	4.6	3.1	4.7	4.6	3.1	4.2
Leeds City Region	2.6	2.6	1.9	3.3	2.6	3.4	3.5	2.4	3.0
Leicester and Leicestershire	3.8	4.5	3.8	5.4	4.2	6.0	5.2	3.3	4.5
Liverpool City Region	3.5	3.9	na	4.6	3.5	4.4	4.0	na	3.2
London	0.8	1.0	0.7	1.1	0.9	1.2	1.1	0.8	0.9
New Anglia	3.7	3.2	2.9	3.9	2.6	4.4	4.4	2.2	3.6
North East	3.3	3.3	3.3	4.8	4.1	4.9	4.7	3.2	3.9
Oxfordshire	na	5.8	5.3	8.4	6.9	8.2	7.8	6.9	6.9
Sheffield City Region	3.6	3.3	3.3	4.8	4.1	5.1	5.4	3.9	4.5
Solent	4.7	4.2	3.0	4.8	3.7	5.8	5.3	3.9	4.5
South East	1.5	1.8	1.4	1.9	1.6	2.3	2.1	1.5	2.0
South East Midlands	3.3	3.4	3.0	4.0	3.6	4.4	4.3	3.2	3.6
Stoke-on-Trent and Staffordshire	3.9	4.1	3.0	5.1	4.1	5.2	5.4	3.6	4.7
Swindon and Wiltshire	6.6	5.5	5.4	6.3	6.1	6.7	7.2	na	5.6
Tees Valley	7.0	na	na	7.5	na	na	6.6	na	na
Thames Valley Berkshire	4.8	4.2	4.2	5.8	4.5	5.8	5.7	4.0	5.0
The Marches	5.8	6.1	na	6.8	6.2	7.2	7.3	5.5	7.1
West of England	4.3	4.5	3.5	4.9	4.0	5.6	4.9	3.5	4.5
Worcestershire	7.2	6.2	4.8	7.6	5.6	8.0	7.7	6.2	6.2
York, N. Yorkshire and E. Riding	3.4	3.1	2.8	4.1	4.0	4.2	4.6	3.1	4.0

Table A3: Correlations between metrics

	Business Practices	Work Org.	Marketing	R&D	Design	Cooperation	Product Innov	Radical Innov	Process
Business practices	1.00								
Work Organisation	0.45	1.00							
Marketing	0.13	0.26	1.00						
R&D	0.14	-0.05	0.31	1.00					
Design	0.01	-0.01	0.45	0.55	1.00				
Cooperation	0.31	-0.17	0.25	0.65	0.52	1.00			
Product/service innov	0.48	0.15	0.34	0.67	0.59	0.85	1.00		
Radical innovation	0.23	-0.01	-0.36	0.29	0.21	0.35	0.34	1.00	
Process innovation	0.35	0.32	0.26	0.72	0.41	0.60	0.70	0.32	1.00



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