



# THE AUTOMATION IMPACT

Which, when and where?

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# About Localis

## Who we are

We are an independent, leading not-for-profit think tank that was established in 2001. Our work promotes neo-localist ideas through research, events and commentary, covering a range of local and national domestic policy issues.

## Neo-localism

Our research and policy programme is guided by the concept of neo-localism. Neo-localism is about giving places and people more control over the effects of globalisation. It is positive about promoting economic prosperity, but also enhancing other aspects of people's lives such as family and culture. It is not anti-globalisation, but wants to bend the mainstream of social and economic policy so that place is put at the centre of political thinking.

In particular our work is focused on four areas:

- **Reshaping our economy.** How places can take control of their economies and drive local growth.
- **Culture, tradition and beauty.** Crafting policy to help our heritage, physical environment and cultural life continue to enrich our lives.
- **Reforming public services.** Ideas to help save the public services and institutions upon which many in society depend.
- **Improving family life.** Fresh thinking to ensure the UK remains one of the most family-friendly places in the world.

## What we do

We publish research throughout the year, from extensive reports to shorter pamphlets, on a diverse range of policy areas. We run a broad events programme, including roundtable discussions, panel events and an extensive party conference programme. We also run a membership network of local authorities and corporate fellows.

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## Key points

- The places where automation should cause most concern to people and policymakers are predominantly in the Midlands. They are places, such as Corby and North Warwickshire, where there is a high proportion of people working in the industries at highest-risk of automation. If a 'big bang' moment occurs as expected, where a large proportion of jobs in these industries are automated in a short amount of time – what we have termed cliff-edge automation – these are the places whose local economies and workforce will be worst impacted by impending automation.
- The impact of automation will not be uniform across one industry. In manufacturing, for instance, lower-skilled jobs are far more likely to be automated. This means that a place like Leicester, where manufacturing makes up an eighth of employment and half of that is low-skilled, will be much worse impacted than Coventry, where manufacturing also makes up an eighth of employment however only a fifth is low-skilled.

# Introduction – when will automation happen?

Automation is a major point of debate in politics and policy. How it will happen, when it will happen and who will be affected are all contentious questions with multiple conflicting answers. Cutting through the various arguments around automation is the certainty that it is going to happen, and that it hasn't really started to happen yet:

## Cusps, waves and moments

- Contemporary research suggests that **we are on the cusp, not in the midst, of the automation moment.**<sup>1</sup>
- In February, **researchers at Price Waterhouse Coopers (PwC) predicted 'waves' of automation**, with up to 30 percent of all employment at risk by the mid-2030s:<sup>2</sup>
  - The first wave, which they term the *algorithm* wave, will occur up to the early 2020s. Its largest impact will be on “sectors like financial services where algorithms can lead to faster and more efficient analysis and assessments”, however, because it will impact only one or two tasks that make up a person's jobs, the impact on all employment will be relatively low (around 2 to 3 percent of UK jobs).
  - The second wave, *augmentation*, is expected to take effect by the late 2020s. It will impact similar technologies to the *algorithm* wave, however impacting far more tasks that a job entails. This means job displacement will be much greater. The wave is expected to affect up to 20 percent of all UK jobs.
  - The third and final wave, *autonomy*, is expected to take effect between now and the mid-2030s. It is forecast to impact up to 30 percent of UK jobs, “As autonomous vehicles and other machines replace many manual tasks”.
- This built on PwC's 2017 report which showed how **the impact of automation will vary by industry.**<sup>3</sup>

What we therefore know is that the pace and timing of automation's impact on an industry depends on both the tasks its workforce performs and the general skill level of its workforce. Jobs in the advanced manufacturing and engineering industry, for instance, are relatively 'safe' from automation because they require a higher level of skill and dexterity than a robot is likely to provide in the near future. This contrasts starkly with lorry driving and warehouse packing where jobs

1 Citi GPS/Oxford Martin School (2017) – Technology at work v3.0

2 PwC (2018) – How will automation impact jobs?

3 PwC (2017) – UK Economic Outlook, March 2017: Section 4

are likely to disappear very quickly as driverless cars are rolled out across the country. Their workers will struggle to find work in industries and occupations which necessitate skills that a robot cannot provide.

**For these industries, there is less of a slide into automation than there is a cliff-edge. And for places with high levels of employment in industries most at risk of this cliff-edge, there is an immediate imperative to devise policies for reskilling the local workforce and reorienting their economy towards more sustainable industries.**

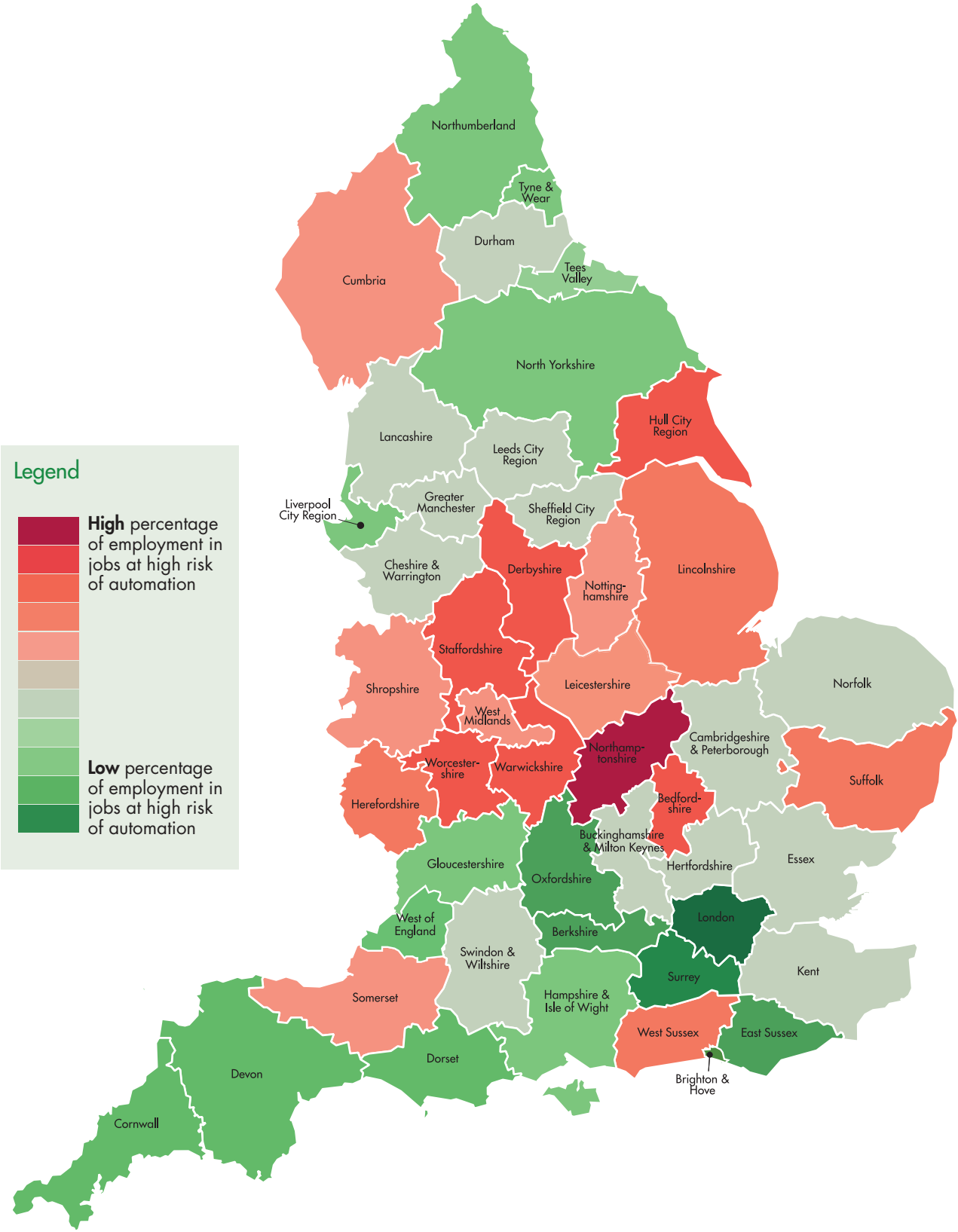
### **Risk by strategic authority**

Our report from November of last year, *In Place of Work*, considered how risk exposure to this *cliff-edge automation* varies across the country. The research looked at the industries where 33 percent of jobs or more are forecast to be at risk (as forecast by PwC in the aforementioned report) and mapped the impact by strategic authority – i.e. city-region and county – geography. Those industries at highest-risk are listed below.

- Manufacturing (46.4 percent of jobs at potential high risk)
- Wholesale and retail trade; repair of motor vehicles and motorcycles (44 percent of jobs at potential high risk)
- Transportation and storage (56.4 percent of jobs at potential high risk)
- Administrative and support service activities (37.4 percent of jobs at potential high risk)

The map showing impact by strategic authority is reproduced across the page. It shows the places where we can expect automation to have a significant impact on the local economy because, whenever it happens, they are heavily-reliant on high-risk industries with relatively few fall-back job opportunities in industries where the risk of automation is lower. As the map shows, at a strategic authority level, the Midlands is likely to be impacted most. We projected Northamptonshire to be the worst impacted of England's forty-seven strategic authority areas.

**Figure 1:** Map showing the exposure of England’s 47 strategic authority areas to the automation of manual jobs



Source: Author’s calculations from Business Register and Employment Survey

# The automation impact by local authority

In collaboration with Sky News we have put together new research that further draws out the automation aspect of *In Place of Work* but this time **forecasting by local authority area**. The aim is to provide more granular estimates of where different places in the UK stand in the face of this upcoming shift in the industrial landscape.

The new research, which we summarise in the rest of this short report, is three-pronged:

Firstly we show risk exposure by local authority area to 'cliff-edge' industries. This follows the same methodology as *In Place of Work* and illustrates specific places where automation should cause the most immediate concern because their economies are most-reliant on high-risk industries.

Secondly we show risk exposure by local authority area to all industries. This shows the total impact of automation across the country. It tells us less in immediate policy terms – because many of these jobs may be replaced by new roles opening up as the economy evolves with automation – however it illustrates the places where, over the long-term, we can expect the highest proportion of current jobs to be automated.

Finally, we look at jobs at risk of automation when considering *occupation* alongside *industry*. This allows us to delineate between whether a job in a high-risk industry is low-skilled or high-skilled. In other words, whether it is likely to be automated or not.

## Is the automation moment upon us?

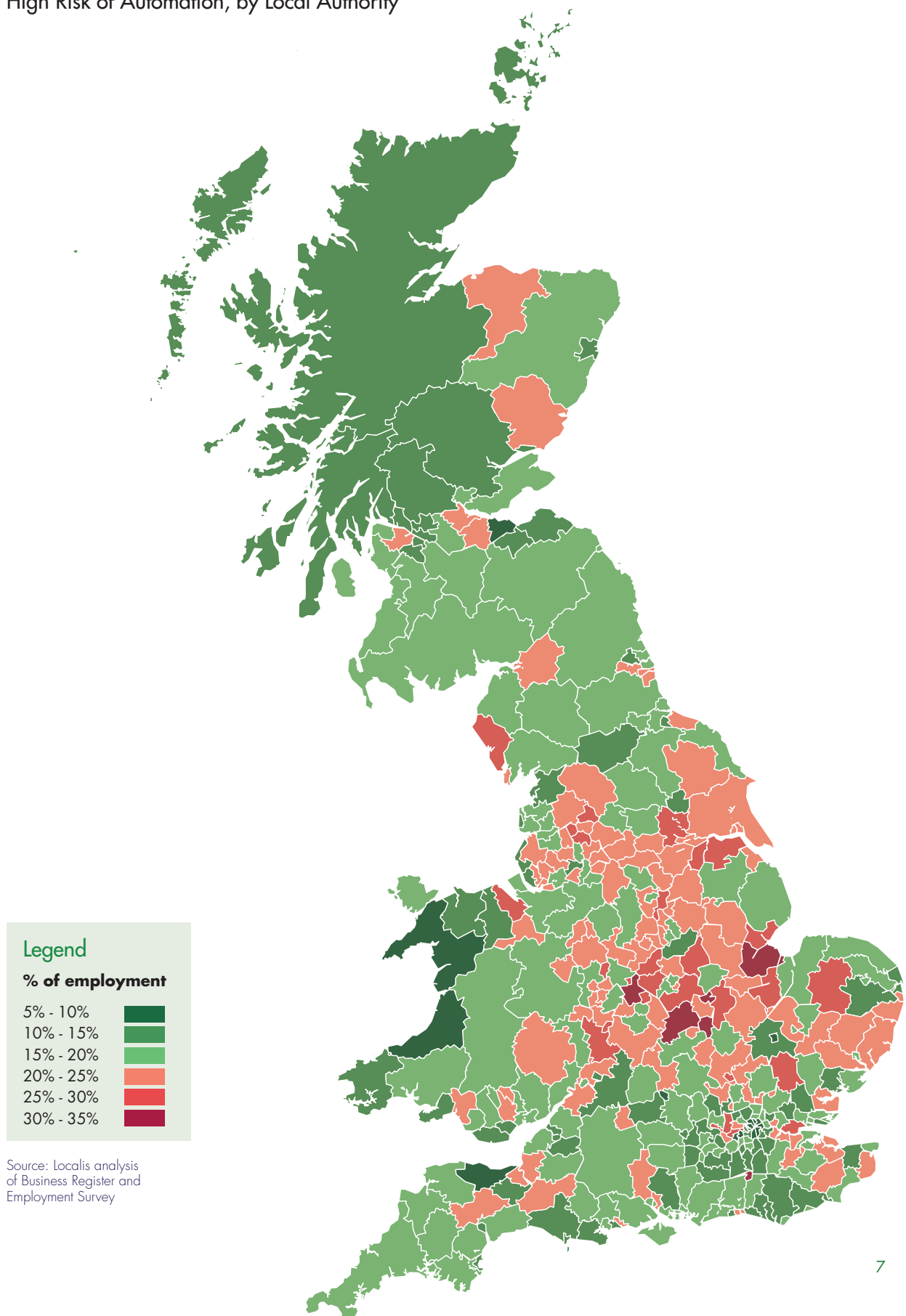
This research began with an attempt to look at the extent to which automation is already having an impact on the workforce. In quantitative terms, this is difficult. Data sets tend to provide snapshots of employment and the economy rather than detecting whether a job has disappeared and the reason why. A sign of jobs being replaced by machinery in an industry might be increasing or stable productivity twinned with a notable decrease in employment.

Research conducted by Localis supports this view. When comparing an industry, employee numbers and Gross Value Added (a measure of a sector's contribution to the national GDP) for industries at risk of automation, no significant trend is observable over the past five years.



## 1. Place-by-place exposure to cliff-edge automation

**Figure 2:** Employment in Industries at High Risk of Automation, by Local Authority



### The ten places at most risk of cliff-edge automation

	Local Authority	Jobs at-risk of cliff-edge automation (%)	Jobs at-risk of cliff-edge automation (#)
1	Corby	31.1%	10323
2	North Warwickshire	30.7%	13780
3	South Holland	30.3%	10794
4	Crawley	29.2%	27170
5	Wellingborough	28.9%	10430
6	Daventry	28.5%	11360
7	Thurrock	26.5%	16316
8	Fenland	25.6%	8517
9	Tamworth	25.4%	7231
10	Cannock Chase	25.4%	10098

### The ten places at least risk of cliff-edge automation

	Local Authority	Jobs at-risk of cliff-edge automation (%)	Jobs at-risk of cliff-edge automation (#)
1	City of London	6.8%	31586
2	Camden	8.3%	29858
3	Tower Hamlets	8.4%	23386
4	Westminster	8.6%	60558
5	Hackney	8.9%	10270
6	Oxford	9.0%	10798
7	Cambridge	9.2%	9257
8	Islington	9.8%	22728
9	Southwark	10.1%	23388
10	Ceredigion	10.2%	2787

### Analysis

The research shows:

**The places most vulnerable to cliff-edge automation are mostly in the Midlands.** The region includes seven out of the top ten places with the highest percentages of employment in vulnerable industries, with three in Northamptonshire alone. Corby is the most vulnerable.

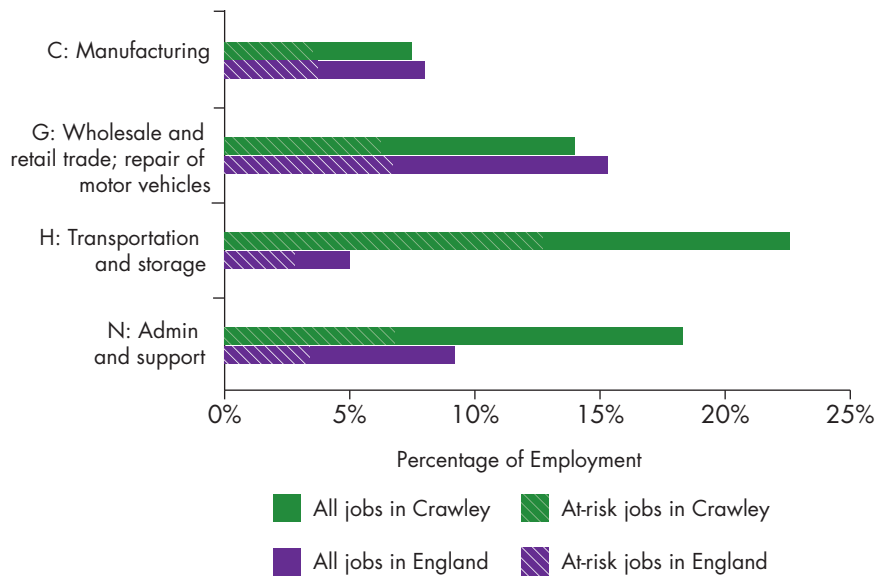
**The places least vulnerable to cliff-edge automation are almost all in London.** Nine of the ten places with the lowest percentage of employment in vulnerable industries are London boroughs.

**The impact of cliff-edge automation varies substantially across the UK.** Exposure to high-risk industries ranges from 31.1 percent in Corby to 8.3 percent in Camden. The average deviation from the mean for all local authorities is 3.1 percent. This is twice the deviation when considering all industries.

**Hotspots of vulnerability exist in wider areas of relatively low vulnerability and typically high prosperity.** Crawley (shown by the graph across the page), Hounslow and Hillingdon are three of the highest risk places in the UK. They are also homes to Gatwick and Heathrow airports, where jobs tend to be concentrated in, other than manufacturing, the highest-risk sectors.

This raises a question for policymakers – **what happens when people working in relatively low paid, low-skill work lose their jobs in relatively high paying, high-skill areas?**

**Figure 3:** Forecasting Automation in Crawley

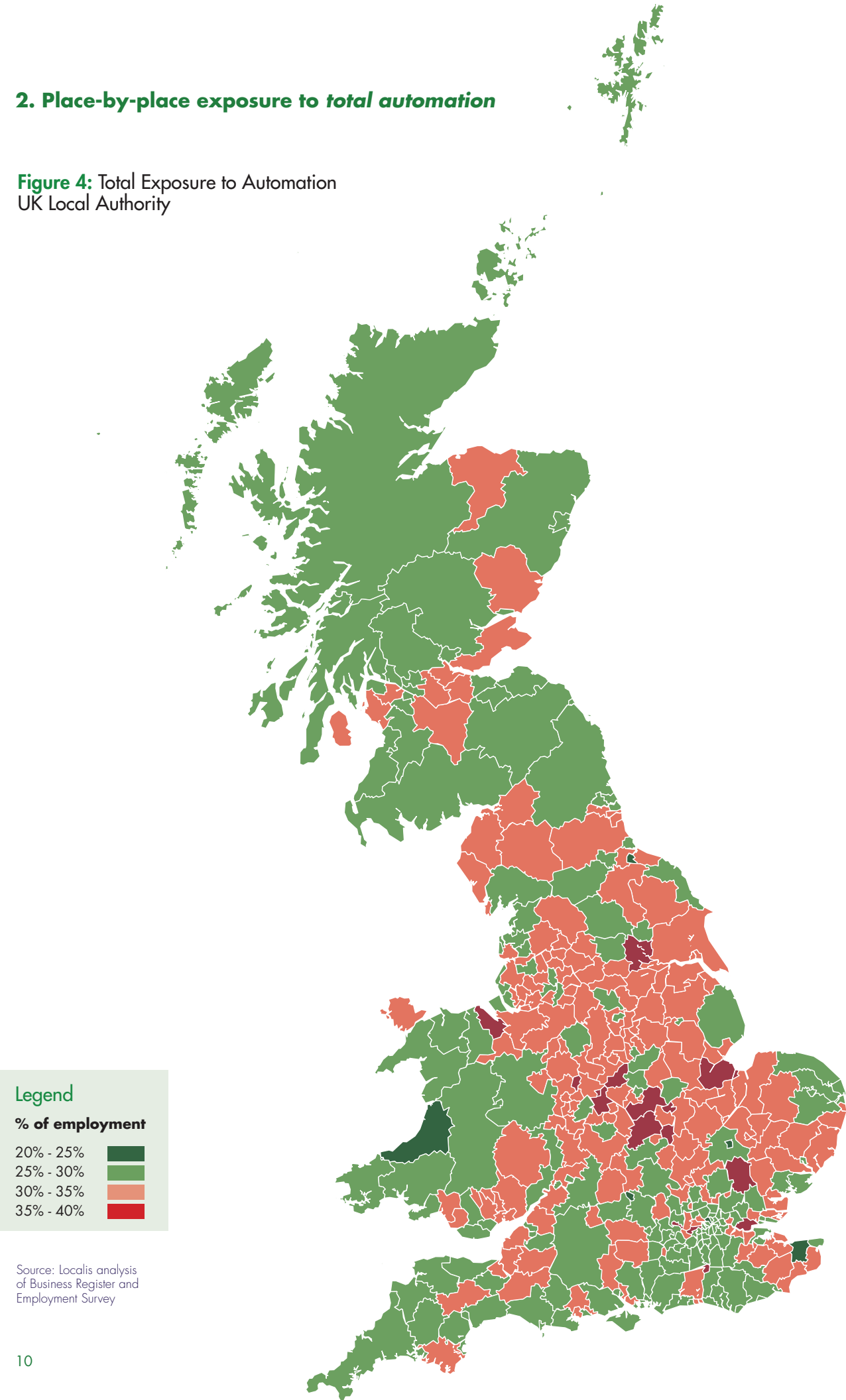


Note: 'At-risk' is a proportion of 'all'.

Source: Business Register and Employment Survey

## 2. Place-by-place exposure to total automation

**Figure 4:** Total Exposure to Automation  
UK Local Authority



### The ten places at most risk of total automation

	Local Authority	Jobs at-risk of total automation (%)	Jobs at-risk of total automation (#)
1	North Warwickshire	38.6%	17316
2	Crawley	38.2%	35493
3	Corby	38.0%	12617
4	South Holland	37.2%	13287
5	Daventry	36.9%	14726
6	Wellingborough	36.6%	13194
7	Thurrock	36.1%	22191
8	Hounslow	35.9%	61820
9	Uttlesford	35.5%	14043
10	North West Leicestershire	35.4%	19727

### The ten places at least risk of total automation

	Local Authority	Jobs at-risk of total automation (%)	Jobs at-risk of total automation (#)
1	Oxford	23.0%	27577
2	Cambridge	24.7%	24872
3	Ceredigion	25.4%	6967
4	Canterbury	26.5%	17072
5	Camden	26.8%	95837
6	Middlesbrough	26.9%	15961
7	Gwynedd	27.0%	14174
8	Conwy	27.1%	11703
9	Richmond upon Thames	27.2%	22564
10	Hackney	27.3%	31576

### Analysis

The research shows:

**The impact of automation is more uniform when considering all industries.** Exposure to high-risk industries ranges from 38.6 percent in North Warwickshire to 23 percent in Oxford. This is a significantly smaller range than when considering just the industries at *highest* risk.

**Automation is every place's problem.** The research suggests all places have an imperative to reskill and retrain their workforce.

### 3. Jobs at risk of automation when considering occupation alongside industry

While the pace of automation could lead to people finding alternative employment in current and emerging industries, our research shows the imperative to do so is far greater in certain places. We have explored this further by looking at, by UK region, the percentage of employment in manufacturing, transport and storage concentrated in low-skill occupations.

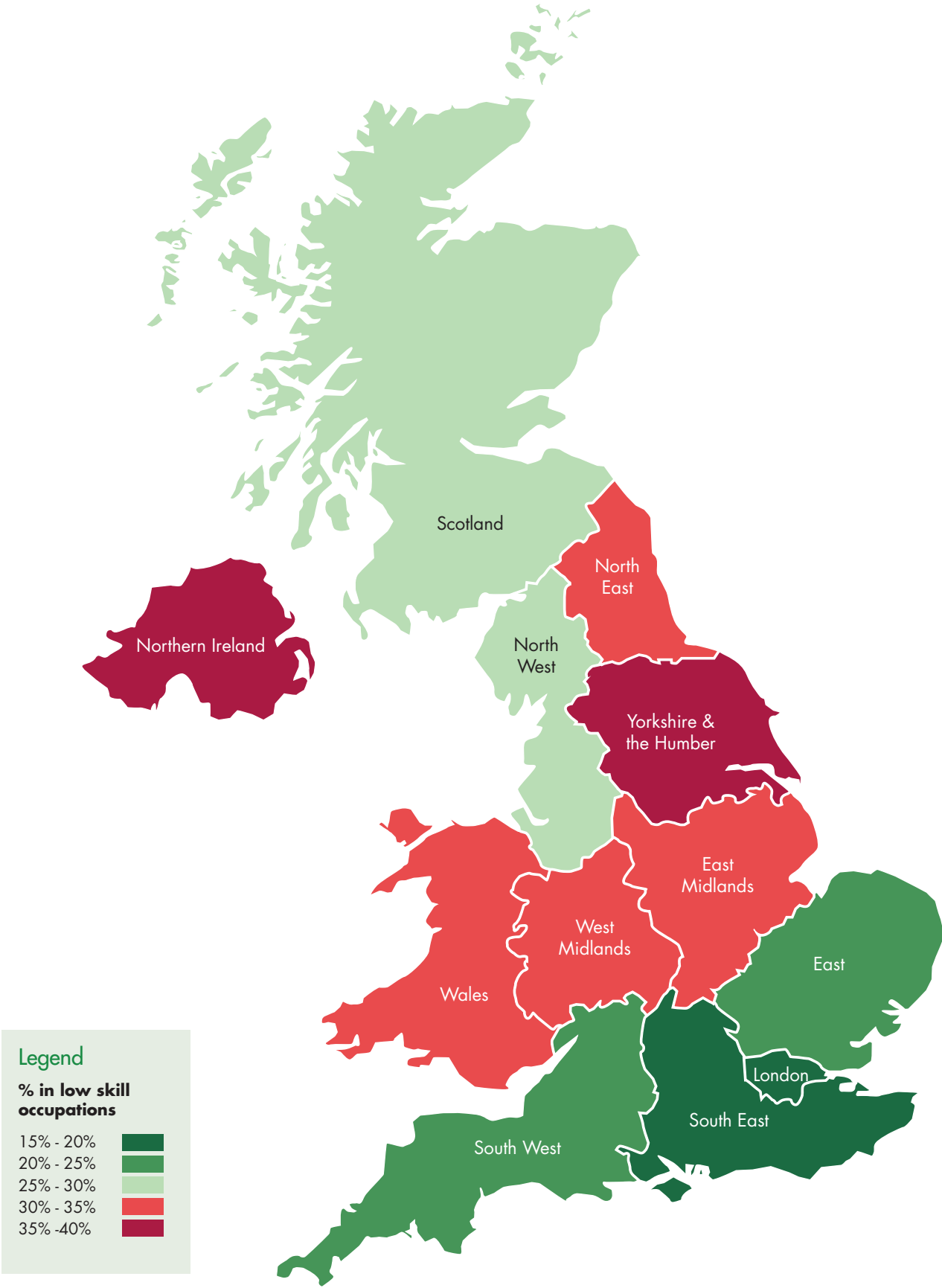
The autonomy wave is expected to severely impact low-skilled, manual jobs. The above analysis is focused on industries. In this section, this is supplemented by looking at occupation by industry: where in the country low-skilled occupations are concentrated in high-risk industries. As already written, this allows for a delineation between whether a job in a high-risk industry is low-skilled or high-skilled. (In other words, whether it is likely to be automated or not.) Because detailed occupation by industry data is unavailable at a local level, the analysis is presented at a UK region level.

Given the manual nature of many occupations predicted to be impacted by the autonomy wave of automation, the focus is narrowed here to the Manufacturing and Transport and Storage industrial groups. The occupations considered to be low-skill, and at highest risk - as categorised Standard Occupational Classification 2010 groups, are:

- Elementary occupations
- Plant, process and machine operatives

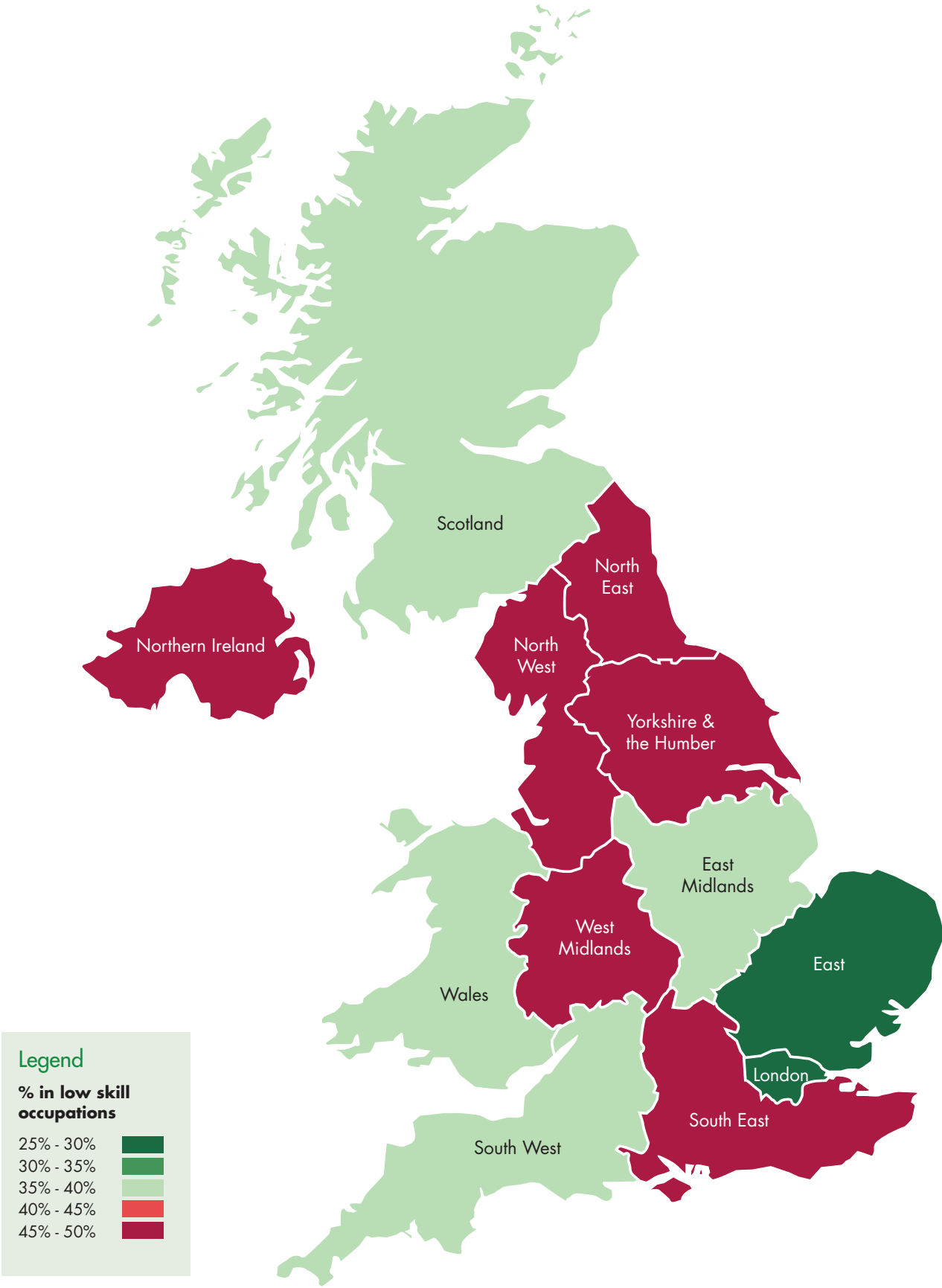
These occupations are considered as a percentage of the total employment within each sector. *NB: they exclude Personal Care and Service occupations, the estimates for which are very small and unreliable within the Manufacturing and Transport and Storage industrial groups.*

**Figure 5:** Manufacturing employees in low-skill occupations (%)



Source: Annual Population Survey/Nomis UK

**Figure 6:** Transport and Storage employees in low-skill occupations (%)



Source: Annual Population Survey/Nomis UK



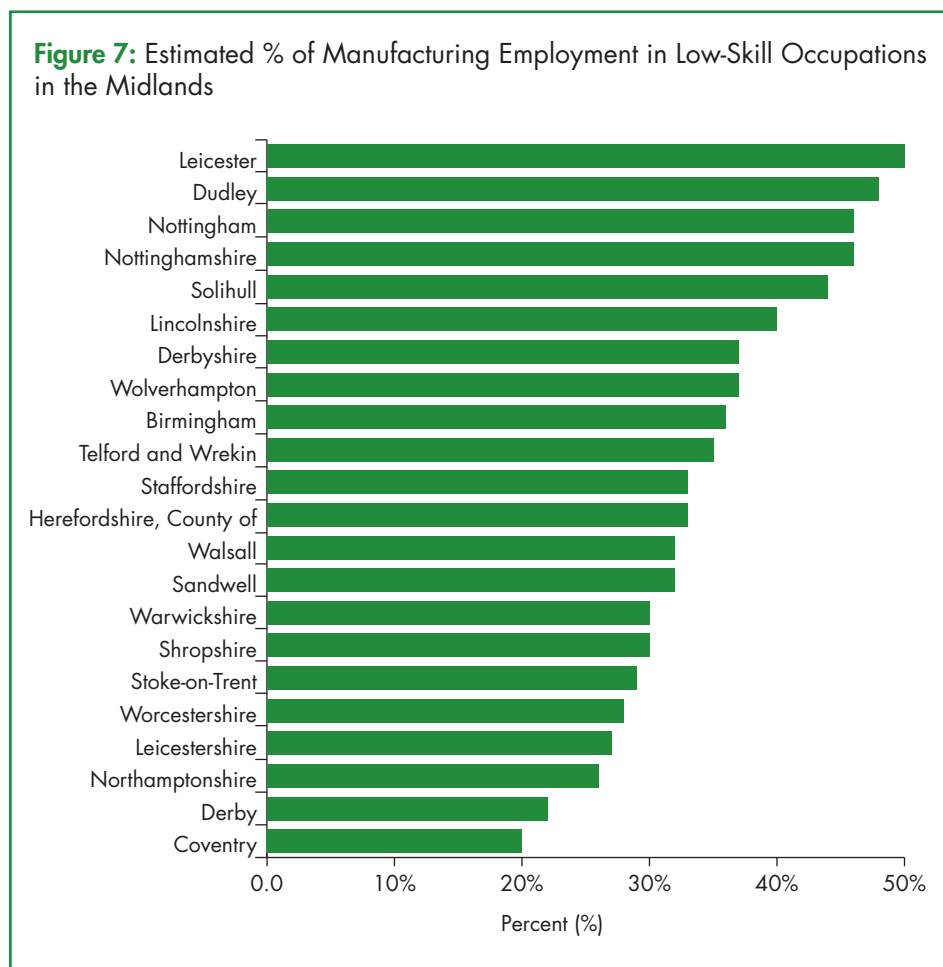
## Analysis

The research shows:

**The impact of cliff-edge automation on low-skilled jobs will hit the north of England and Northern Ireland hardest.** The regions with the highest proportion of low-skilled jobs in the manufacturing industry are in Northern Ireland and the East Midlands. The regions with the highest proportion of low-skilled jobs in the transport and storage industries are all in the north of England and Northern Ireland.

**London and the South East will be least impacted.** They have significantly lower exposure to automation-driven low-skill job losses in both sectors.

This analysis can be broken down further, to illustrate the importance of looking at the automation impact in a nuanced way. Below, the breakdown of low-skilled manufacturing jobs in the Midlands is detailed. Unfortunately, reliable estimates for transport and storage are not available at this geographic level.



Source: Annual Population Survey

**The chart shows the vast differences in the way the manufacturing sector can function across a regional economy:**

The proportion of people employed in the manufacturing industry in Coventry and Leicester is nearly the same – 12 percent and 13 percent respectively. However, the proportion of those jobs in low-skilled occupations is much different: In Coventry just over one-in-five manufacturing jobs is low-skilled. In Leicester one-in-two jobs are low-skilled. This means the impact of automation will be felt significantly more in Leicester than in Coventry.

This kind of nuance is often lacking from the national debate around automation

– both in political and policy terms. If the imperative is for policymakers, businesses and unions to reskill and reallocate labour which is vulnerable to automation, then the urgency to do so is clearly much more pressing in Leicester than in Coventry.

**Data sources:**

- For industry employment proportions by place, Business Register and Employment Survey data for 2016 was used
- For occupation by industry figures the Annual Population – Workplace Analysis dataset from Nomis UK was used

# Appendix

## Low-skilled manufacturing

<b>Region</b>	<b>Manufacturing Employees</b>	<b>Manufacturing employees in low-skill occupations (#)</b>	<b>Manufacturing employees in low-skill occupations (%)</b>
Northern Ireland	79200	30000	37.9%
East Midlands	299200	108000	36.1%
Wales	143300	48300	33.7%
North East	123300	40800	33.1%
West Midlands	318100	105100	33.0%
Yorkshire and the Humber	300300	94800	31.6%
Scotland	199500	56300	28.2%
North West	345500	95600	27.7%
East	269500	61700	22.9%
South West	256300	58000	22.6%
South East	344600	59300	17.2%
London	179400	29600	16.5%

## Low-skilled transportation and storage

<b>Region</b>	<b>Transport &amp; Storage employees</b>	<b>Transport &amp; Storage employees in low-skill occupations (#)</b>	<b>Transport &amp; Storage employees in low-skill occupations (%)</b>
East Midlands	196800	94100	47.8%
Yorkshire and the Humber	182600	86200	47.2%
West Midlands	230000	107800	46.9%
North West	275200	126300	45.9%
North East	80700	36900	45.7%
Northern Ireland	39200	17900	45.7%
Wales	83400	33000	39.6%
East	228200	88100	38.6%
Scotland	192200	71900	37.4%
South West	194500	69400	35.7%
South East	402700	114200	28.4%
London	649200	160200	24.7%



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