Technological Change and the Scottish Labour Market

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Introduction

At their Biannual meeting in March 2017, the Scottish Government and STUC noted growing public anxiety about technological change. Press coverage of the anticipated pace of automation and associated job losses had left some workers fearing for their security of employment.

Therefore it was agreed to produce this paper to consider in some more detail how technological change might affect the Scottish labour market.

Section 1 considers the global debate and sets out competing visions of the future; from those who believe we stand on the cusp of widespread technological unemployment to those who believe the labour market will prove, as it has in the past, much more resilient.

Section 2 considers current labour market trends and challenges the assumption that demand for labour is likely to reduce in response to technological change.

Sections 3 summarises research undertaken by the STUC, including a survey of trade union branches, which looks at how technology is changing the workplace, as well as setting out some STUC views.

Section 4 sets out the positive approach adopted by the Scottish Government as expressed in its current policy framework and Programme for Government
Section 5 identifies a number of areas for future consideration.

SECTION 1 Overview

There is nothing remarkable about new technologies replacing workers: from the seed drill and threshing machine to the silicon chip, innovations have allowed machines to undertake with the necessary quality and speed, tasks that could previously only have been performed by humans.

The consequences for the individuals, families, communities and regions directly affected have at times been severe. Yet, overall, the economies of the 19th and 20th centuries managed to create new jobs at least as quickly as old jobs disappeared. The higher productivity unleashed by new technologies freed up resources for investment elsewhere. Technological change ultimately enhanced the general welfare of the population through the provision of new goods and services and the welcome displacement of hard, physical and routine low wage labour.

This dynamic is apparent in recent Scottish history: despite shedding thousands of jobs in extractive and manufacturing industries and suffering extended periods of high unemployment, widespread and enduring technological unemployment is not currently a feature of Scotland's labour market nor indeed that of any advanced nation. However, significant sectoral shifts in employment are identifiable over relatively short periods of time. The last 20 years have seen a near halving of manufacturing jobs in Scotland but large increases in health and social work, professional services and accommodation and food services jobs.

Views differ on how technological change will affect employment in the 21st century. Some argue that a significant proportion of current jobs are at risk over a relatively short horizon whilst others stress that humans and technology are often complements not substitutes and that the labour market could prove as resilient as during previous waves of technological change. The following is a brief overview of the arguments and evidence underpinning these positions.

View 1: New technologies are already enabling new forms of management and work organisation and will soon be able replace a significant proportion of current workers

Some prominent researchers argue that the current wave of technological change will differ fundamentally from previous waves in that the net impact on employment could prove negative. In their influential book The Second Machine Age[1], MIT's McAfee and Brynjolfsson argue that the 'exponential, digital and combinatorial' technological progress of the 21st century will prove 'profoundly beneficial' but bring 'some thorny challenges…stemming from the fact that as computers get more powerful, companies have less need for some kinds of employment". They provide numerous examples of technologies that are redefining – or will redefine - the range of human capabilities machines can replicate.

[1] McAfee, A. and Brynjolfsson, E. (2014), The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies, Norton

A widely cited study[2] (Frey and Osborne 2013) estimated that 47% of current US jobs were vulnerable to new technologies within the next 10 to 20 years. IPPR[3] applied the same methodology to Scotland and found a very similar number of jobs at risk. A number of other books, papers and articles[4] argue that swathes of jobs including whole occupations will be lost and that these will include some previously regarded as immune to technological displacement.

Beyond the net impact on employment, there is also a growing awareness that new technologies are already transforming – for good and bad - the way the workplace is experienced. This debate is most prominent around the 'gig economy'[5]: somewhat loosely defined as temporary or freelance work facilitated by digital intermediaries.

Management by algorithm can change the nature of employment relationships. Platform based companies such as Uber and Deliveroo and their many advocates argue that technology 'creates new employment opportunities, better and cheaper consumer services, transparency and fairness in parts of the labour market that are characterised by inefficiency, opacity and capricious human bosses'[6]. Others worry about the precarious nature and quality of the work generated and the over-reliance on forms of self-employment[7].

Technology also facilitates new forms of performance management which may have adverse consequences for workers (a recent STUC report[8] discusses such practices and their impact). The prevalence of these practices extends well beyond the gig economy into traditional occupations in sectors previously regarded as a source of stable, quality employment.

At the same time, technology is helping create quality new jobs and occupations, opening up possibilities for forms of flexible working that benefits workers and creates new ways to improve health and safety. Rewarding working lives can now be led in locations that previously could only sustain a narrow range of employment. The ease with which technology can connect businesses and consumers allows many more people to pursue fulfilling careers in self-employment.

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[2] Frey, C. and Osborne, M. (2013), The Future of Employment, , Oxford University

[3] IPPR Scotland (2017), Scotland Skills 2030: The Future of Work and the Skills System in Scotland, ,

[4] Examples include Susskind and Susskind (2017) The Future of the Professions: How Technology will Transform the Work of Human Experts, Oxford University Press; Ford (2015) The Rise of the Robots: Technology and the Threat of Jobless Future, Basic Books; 'Robot automation will take 800m jobs by 2030' BBC News website 29 November 2017; 'Automation poses a high risk to 1.2m Scottish jobs' BBC Scotland News website 7 May 2017

[5] A discussion on the issues with defining and measuring platform based employment can be found in 'The feasibility of measuring the sharing economy', ONS, April 2016

[6] 'When your boss is an algorithm' Financial Times, 8 September 2016

[7] Ibid; Taylor Review of Modern Working Practices, UK Government (2017); Morgan and Nelligan (2018) The Creativity Hoax: Precarious Work in the Gig Economy, Anthem;
Taylor, P. (2012) Performance Management and the New Workplace Tyranny, STUC

View 2: The pace of technological change and its impact on jobs may be exaggerated; it is unlikely Scotland (and other advanced nations) will experience widespread technological unemployment in the foreseeable future

The extent to which technology will replace workers in the 21st century is fiercely contested. The OECD critique of the Frey and Osborne report cited above stresses that technology will also create jobs and that technological feasibility is not synonymous with economic viability[9]. It concludes that 9% of UK jobs are at risk by 2030.

Contrary to the predominant narrative, some commentators argue that the labour market is becoming 'less, not more, dynamic'[10]. MIT labour economist David Autor stresses that "tasks that cannot be substituted by automation are generally complemented by it" and predicts that "many of the tasks currently bundled into [middle skill] jobs cannot readily be unbundled—with machines performing the middle-skill tasks and workers performing only a low-skill residual—without a substantial drop in quality"[11].

If new technologies were substituting for workers at the rate assumed in much popular writing, productivity growth should be increasing rapidly. However, this is the opposite of what is actually observed across the global economy where productivity growth has slowed significantly since the crisis[12]. There is little sign of the investment boom necessary for a surge in deployment of new technology.

Gordon[13] argues that when compared to the great innovations of the 1st and 2nd industrial revolutions the productivity dividends of the 4th will ultimately disappoint (and that the 3rd has already disappointed); technological progress will not compensate – at least in the US - for the six 'headwinds' of 'demography, education, inequality, globalization, energy/environment, and the debt overhang". In a provocative paper Nordhaus[14] concludes that the point at which growth increases sharply as technological improvements rapidly cascade through the economy "is not near". Jones et al suggest that "growth is constrained not by what we are good at but rather by what is essential and yet hard to improve"[15].

[9] OECD (2016) The Risk of Automation for Jobs in OECD Countries
[10] 'The sticking power of false narratives', Gavin Kelly blog 10 May 2017
[11] Autor, D. (2015) Why are there still so many jobs? The history and future of workplace automation, Journal of Economic Perspectives, Summer 2015
[12] *Productivity Puzzles*, speech by Andy Haldane, Chief Economist, Bank of England March 2017
[13] Gordon, R. (2016) The Rise and Fall of American Growth, Princeton University Press; Gordon, R. (2012) Is US Economic Growth over? VoxEu
[14] Nordhaus, W. (2015) Are we approaching an economic singularity? Information Technology and the future of economic growth, NBER Working Papers
[15] Jones, Jones and Aghion (2017) Artificial Intelligence and Economic Growth, , NBER Conference paper

Not only are productivity growth and business investment weak, the innovation diffusion mechanism may be breaking down[16]: it is no longer safe to assume that new technologies will be quickly and widely adopted. Similarly, others warn that "almost all innovations in robotics and AI take far, far, longer to be really widely deployed than people in the field and outside the field imagine…In principle, it could be done differently, in practice it isn't"[17].

Weighing competing theories of the future

It's very difficult to tell which version of the future will prove more accurate: will technological unemployment be widespread or will, as has happened with previous waves of technological change, the labour market prove more resilient than many anticipate? There are compelling arguments on both sides. It is incontestable that productivity growth in the advanced world has been very weak over the last decade but slow productivity growth and high employment in the present does not necessarily preclude technology induced mass unemployment in the future.

One explanation for stagnant productivity and weak investment is that low labour costs – attributable to technology and globalisation – may discourage further investments in labour-saving technology[18]. It is difficult to justify expensive investment in technology if profits can be maintained by simply deploying more low wage labour. Another may simply be that AI is suffering from the implementation lags suffered by all general purpose technologies: the full productivity dividend may not be realised until waves of complementary innovations are developed and implemented[19]. If and when these are forthcoming, the more pessimistic forecasts about job losses may start to prove accurate.

The pace of technological development is undoubtedly rapid (though not necessarily more rapid than previous waves[20]). The dispute is around the deployment of this technology and the timing and extent of wider economic impacts. What matters for jobs isn't just the pace and nature of technological change but how this interacts with other factors – e.g. globalisation – to determine final labour demand. Technology can directly replace and create jobs but it also exerts an indirect effect as it opens up new possibilities for the development of global value chains[21].

[16] *Productivity Puzzles*, speech by Andy Haldane, Chief Economist, Bank of England March 2017
[17] *The Seven Deadly Sins of AI Predictions*, MIT Tech Review October 2017
[18] The Productivity Paradox, Ryan Avent blog 16 March 2017
[19] Brynjolfsson, Rock and Syverson (2017) Artificial Intelligence and the Modern Productivity Paradox, NBER Conference Paper
[20] Gordon
[21] Baldwin, R. (2016) The Great Convergence, Harvard University Press

Interestingly, researchers on both sides of the future of jobs debate share concerns over the potential distributional consequences of technological change[22]. The OECD finds that "low qualified workers are likely to bear the brunt of the adjustment costs... the likely challenge for the future lies in coping with rising inequality"[23]. Autor argues that "the primary societal challenge posed so far is not falling aggregate labour demand but, rather, an increasingly skewed distribution of employment and ultimately earnings favouring highly educated workers"[24]. The high capital intensity and concentrated ownership structures of digital/technology firms could also exacerbate income and wealth inequality[25].

Summary

There is no consensus on the impact new technologies will have on labour demand; some tasks and occupations will be replaced but new jobs will be created and it will not necessarily make economic sense to replace human labour even when technologically feasible to do so. This is especially true when there is weak wage growth and a global abundance of labour.

However there is a plausible case that the technological change in the 21st century could pose new and serious challenges in sustaining a labour market that supports broadly based prosperity. The following sections consider what is currently happening in the labour market and workplace in an attempt to draw specific conclusions about how Scotland might best prepare to meet these challenges.

[22] See for instance McAfee and Brynjolsson (2014); OECD (2016); Autor (2015); Atkinson, A. (2015) Inequality: What Can Be Done?, Harvard University Press; Korinek, A. and Stiglitz, J. (2017) AI, Worker Replacing Technological Change and Income Distribution, NBER Conference paper
[23] OECD (2016)
[24] Autor (2015)
[25] McAfee and Brynjolsson (2014)

SECTION 2 What does the evidence tell us about what is happening in Scotland?

Labour demand

Scotland's labour market is performing strongly. Over the year to November – January 2018, the employment rate has increased and the inactivity rate and unemployment rate have both fallen. More people are moving into full-time jobs, with full-time employment up 22,000 over the past year. Scotland continues to outperform the UK on female and youth employment, unemployment and inactivity rates.

The headline statistics therefore do not currently support the argument that technological change is already exerting a negative effect on final labour demand in Scotland.

Trends

The STUC and Scottish Government agree that placing undue emphasis on the headline figures can obscure deeper labour market trends. A number of trends, most obviously the historic weakness in real wage growth, but also the increasing prevalence of atypical forms of work (e.g. self-employment, zero hours contacts and agency work), suggest that labour demand may not be as strong as the headline figures indicate.

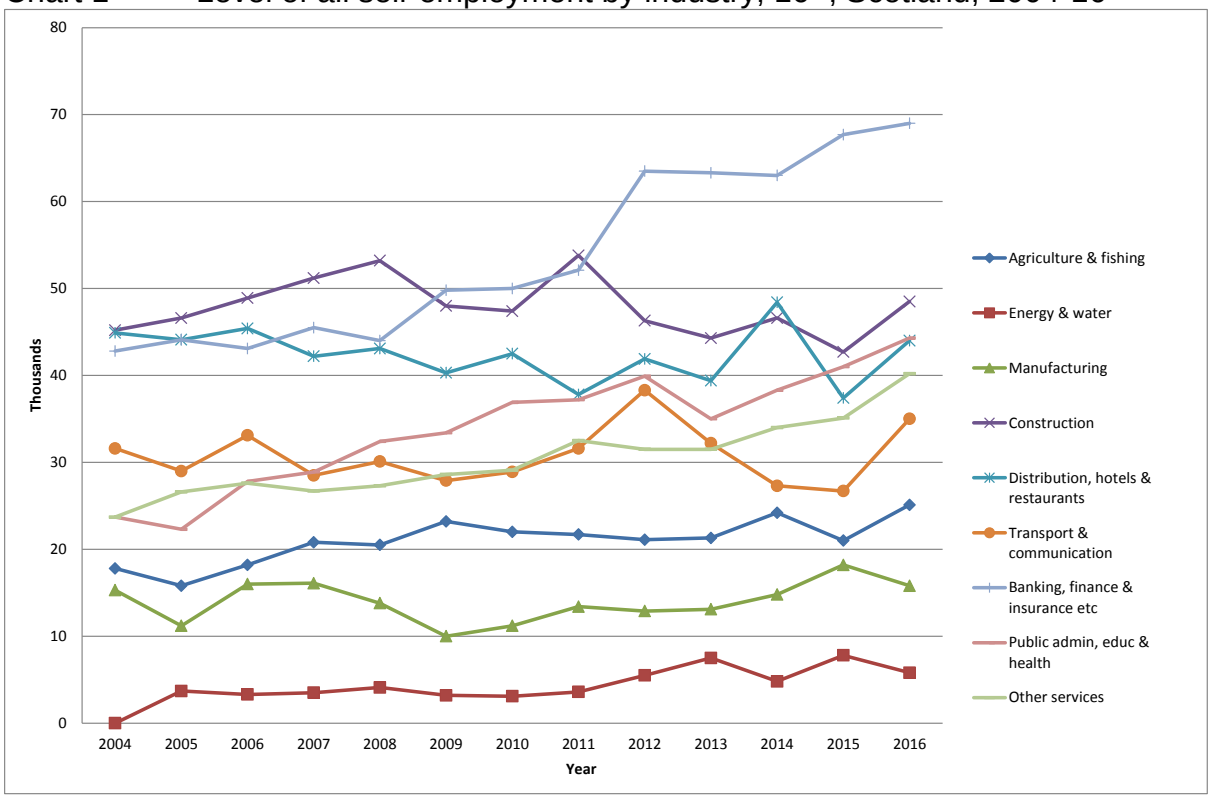
Before examining the extent to which technological change may be influencing the Scottish labour market it might be helpful to examine current trends:

i) Although total employment is now close to historically high levels and rates, full-time employment has only recently returned to the levels seen in 2008. Part-time employment now appears to be stabilizing at around 700,000, more than 10% above pre-crisis levels.

ii) Self-employment has driven the overall increase in employment since the recession with part-time self-employment increasing from 21% to 28% of all self-employed.

iii) In 2016 74% of those who are self-employed are in high/medium skilled occupations. However the largest percentage growth has been in the occupations classed as 'low skilled' for example 'Elementary Cleaning, Administration occupations'. Sectors registering significant growth, since 2004, include Energy, Public Administration, Education and Health (likely to be attributable to growth in the care sector) Banking and Finance and Other Services. Construction, Transport and Communications and Manufacturing registered much slower growth and Distribution, Hotels and Restaurants is the only sector to register contraction in the numbers of self-employed. There has been an increase across the majority of occupations with the largest growth within Caring, Leisure and Other Service occupations. Although subsector data is unavailable this is likely to have been driven by increases in the care sector. This sector includes care, services and Leisure and Travel Services.

Chart 1 Level of all self-employment by industry, 16+, Scotland, 2004-16



Source: Annual Population Survey

iv) 71,000 people in Scotland reported being on a zero-hour contract in Oct-Dec 2017 around 2.7% of all those in employment although this is slightly lower than the rate in the UK as a whole (2.8%). It should be noted that zero hours jobs more than tripled between 2012-16 although this is likely to be at least partly attributable to greater awareness and reporting of contract type.[26]

v) Temporary employment has remained remarkably stable over the last decade and is around 10% lower than when the series began in 2004.

vi) Although agency workers are less prevalent in Scotland (1.5% of all workers) compared to the UK as a whole (2.5% of all workers) there has been an increase in recent years. Agency workers are concentrated in lower skilled occupations, tend to earn less, are more likely to be from disadvantaged groups, and want to have more secure employment – 60% of temporary agency workers would prefer to be in a more permanent job.[27]

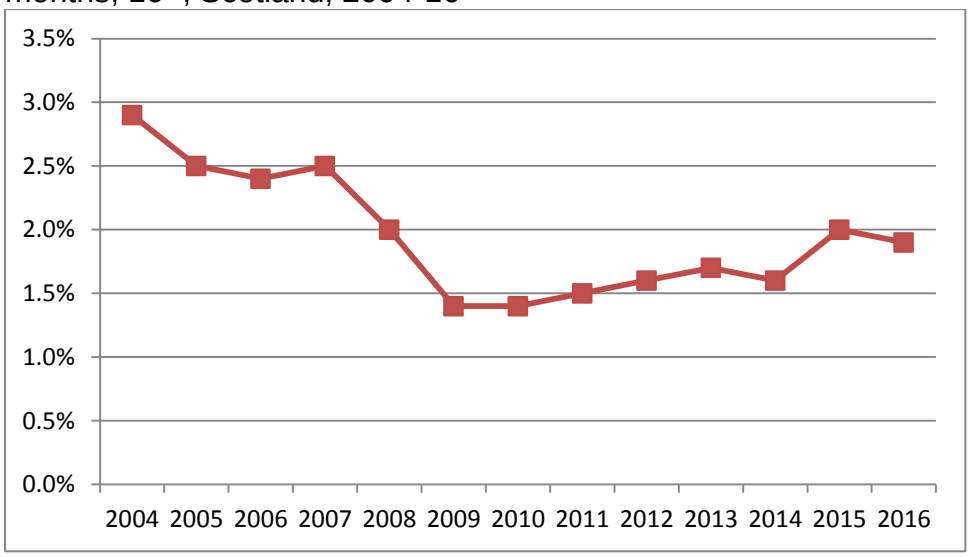
vii) There seems to be less dynamism in the labour market than might be expected with the high employment and low unemployment rates:

- Job to job changes have fallen: in 2004 2.9% of all employed people had moved job in the past three months, falling to 1.9% in 2016

[26] Labour Force Survey, ONS
[27] Secret Agents: Agency workers in the new world of work, Resolution Foundation, December 2016 http://www.resolutionfoundation.org/app/uploads/2016/12/Secret-Agents.pdf

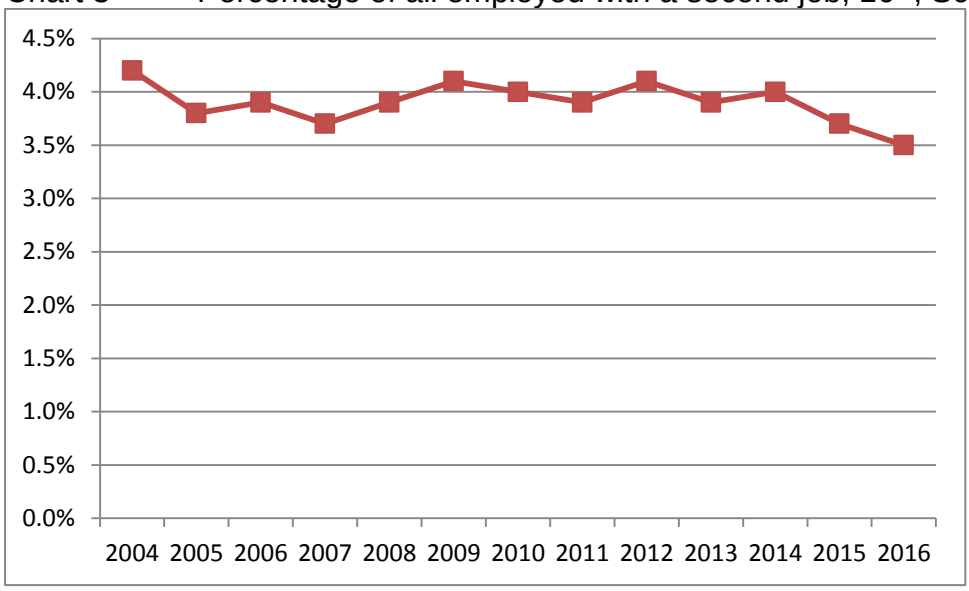
- The number of people working two jobs fell from 101,000 (4.5% of all employed people) to 89,000 (3.5%) between 2004-2016.
- Contrary to popular perception, job tenure is actually rising: median tenure has risen from 4.8 years to 5.8 years between 2004 and 2012, only the 25-34 age group has seen a small decrease. (It should be noted that median job tenure is affected by a number of factors including the increase in older workers and women remaining in the labour market for longer so a year for year comparison is not comparing like for like).

Chart 2 Percentage of all employed who left paid job for a new job in the last 3 months, 16+, Scotland, 2004-16



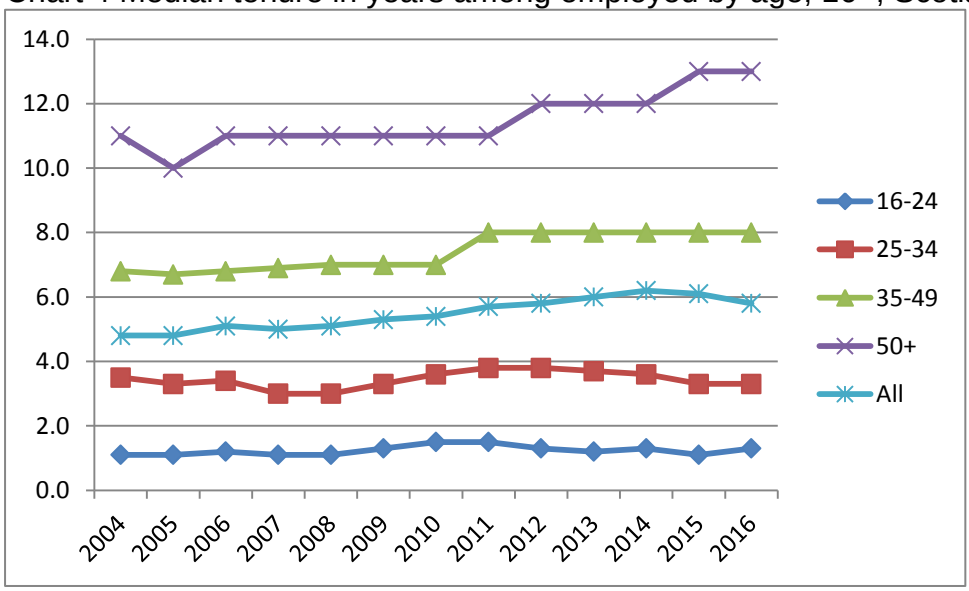
Source: Annual Population Survey January to December 2016

Chart 3 Percentage of all employed with a second job, 16+, Scotland, 2004-16



Source: Annual Population Survey January to December 2016

Chart 4 Median tenure in years among employed by age, 16+, Scotland, 2004-16



Source: Annual Population Survey January to December

Atypical work and technology

The significant increase in self-employment across most sectors and occupations is probably the most significant post crisis labour market trend and there are a number of reasons to believe that technological developments help explain the increase: ICT products have lowered the cost of starting a business and networking software facilitates easier matching of self-employed workers with customers. The unbundling of production processes discussed in the introduction may also open up more opportunities for self-employed workers.

However technology is only one of many factors influencing the increase in self-employment:

- The UK tax system incentivizes self-employment particularly for higher skill/pay groups. Self-employed workers pay less NICs and employer NICs don't apply. An employer who changes the status of employed staff to self-employed will make significant savings. The number of self-employed workers increased sharply in 2003 when a change if Corporation Tax eliminated tax on the first £10,000 of company profits and allowed directors of small firms to save income tax by taking salaries as profits.
- Changing individual preferences: despite lower wages and greater insecurity, people value the flexibility of self-employment.
- Demographics: over the past decade the number of people aged over 65 in employment in Scotland has increased by over 200%. Older workers are more likely to be self-employed.

If, as many current popular narratives suggest, technology was helping turn Scotland and the UK into nations of' multiple jobbers and portfolio jugglers', we might be expected to see this greater dynamism manifest in statistics for job tenure, job to job moves and second jobs. Yet the statistics reveal subdued labour market dynamism despite the high levels of employment.

In summary,

1. There is an understandable and increasingly widespread anxiety about the consequences of the current wave of technological change for the Scottish labour market.

2. Some current labour market trends - including growing prevalence of zero-hour contracts and, especially, rising self-employment - are a serious and legitimate concern for both the STUC and Scottish Government as they can lower job quality, increase economic insecurity, lower productivity and undermine inclusive growth.

3. However there is a risk of exaggerating the extent to which these trends are influenced by technology. The sharp increase in zero hours between 2012-2016 is at least partially attributable to a growing awareness and reporting of contract type and a variety of factors, not all negative, have conflated to drive the substantial increase in self-employment. Insecure, exploitative forms of employment have been a deeply embedded characteristic of the UK labour market since at least the widespread deregulation of the 1980s and 1990s. Technology also opens up opportunities for worker in terms of new jobs created and innovative, non-exploitative forms of flexible working.

4. The significant increase in self-employment across all skills groups is a distinguishing characteristic of the post crisis UK labour market and appears to have a number of contributory factors. The precise extent to which technology, in particular platform based employment, has contributed to the increase in Scotland is not yet wholly clear but does not appear to be the principal cause.

5. Statistics on tenure (rising), job to job moves (falling) and second jobs (falling) show that the labour market dynamism that might be anticipated given popular narratives around technological change actually remains subdued.

6. Overall, **there is little evidence to suggest that technology is currently significantly 'disrupting' the Scottish labour market or that it is likely to do so in the short-medium term.** The structure of the Scottish economy tends towards a slower rate of automation i.e. sectors where automation is most rapid do not have a large presence (e.g. automotive). The more pessimistic accounts of imminent job losses are based on flawed methodology and a lack of appreciation of the relationship between technological and economic feasibility.

7. If technology was a major factor driving change in the labour market then we might expect to see similar trends in other nations e.g. large increases in self-employment across OECD nations. That this doesn't seem to be happening to the same extent as in the UK suggests that the origins of current trends are more likely found in the distinctive characteristics of the UK economy/labour market e.g. a tax system which incentivises self-employment, low collective bargaining coverage, relatively deregulated product and labour markets and industrial structure.

8. However, none of the above is to argue that impact of technological change is having no effect on the labour market or that its impact might not be significant in the longer term:

    - new employment opportunities are already being created, and will continue to be, in the production and delivery of a wide range of new goods and services.
    - even if its impact on aggregate labour demand is limited, technological change may have significant distributional consequences: job displacement will be unevenly spread across tasks, occupations, sectors and regions; there may be on-going polarisation within the labour market and it is reasonable to expect capital income to become increasingly concentrated.
    - technology can facilitate both positive forms of flexible working and exploitative forms of management.
    - the impact on workers may often be hidden e.g. jobs will change rather than disappear and there may be a lack of support and training to ease the transition.

SECTION 3: STUC analysis - evidence from workplaces

This section has been compiled by the STUC and does not necessarily reflect the views of the Scottish Government.

The STUC is Scotland's trade union centre. Its purpose is to co-ordinate, develop and articulate the views and policies of the trade union movement in Scotland; reflecting the aspirations of trade unionists as workers and citizens.

The STUC represents over 560,000 working people and their families throughout Scotland. It speaks for trade union members in and out of work, in the community and in the workplace. Our affiliated organisations have interests in all sectors of the economy and our representative structures are constructed to take account of the specific views of women members, young members, black members, LGBT+ members, and members with a disability, as well as retired and unemployed workers.

The STUC has worked with its affiliates in order to gain an understanding of how automation and digitisation has impacted the Scottish economy. The purpose of this is to understand how automation and new technologies are already being implemented in workplaces and to identify the direction of travel is in this area. This work, therefore, is not an effort to forecast the future in the longer term but rather to understand what is currently happening or is about to happen in workplaces in Scotland. The purpose of this is to develop a clearer picture of how automation and digitisation is progressing in a real world setting and therefore put into perspective how automation may develop in the future. The following section, therefore outlines the results of research that the STUC has conducted on how automation and digitisation is developing in Scotland, and sets out some of the positive and negatives of these changes as experienced by workers across Scotland.

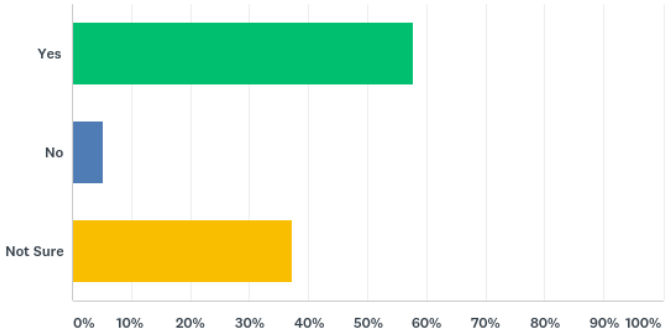
The STUC conducted desk based research, considered intelligence from senior trade unionists and conducted a survey of union branches. The survey received 99 responses from branches across Scotland based in both the public and private sectors. The branches varied in size, with some representing small employers and small numbers of workers while others covered hundreds and on some occasions thousands of workers. The survey was supplemented by written submissions from unions and discussions with senior officials in order to build as complete a picture as possible of how automation and digitisation is developing in Scotland.

It should be noted that while many branches could identify automation within their workplace, and there are clear examples of workplaces with high levels of automation, there were also branches which struggled to highlight examples of where automation or digitisation had taken place. Around 24% of those responding to the survey stated that no automation or digitisation had taken place in their workplace. While this could genuinely reflect the position of the workplace, it is also possible that it reflects the survey responder's understanding of the terms 'automation' and 'digitisation'. Interestingly there was some evidence to suggest that at times this could reflect a certain perspective within a workplace, rather than definitively describe the experiences of the workplace as a whole, with unions representing different groups of workers reporting different experiences from the

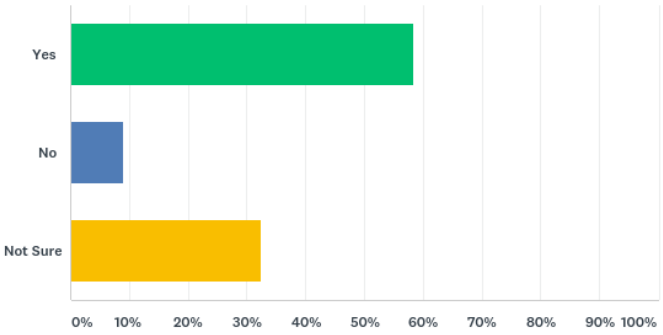
same workplace. One example of this was in the school sector, with teaching unions clear that automation was not an issue, while support staff unions also working in schools identified changes in working practices as a result of automation and digitalisation.

The majority of responders (76%) identified examples of automation and digitisation in their workplace. In general, union branches saw automation and digitisation as potentially problematic, often being introduced poorly and without proper training and support for workers. It was also true, however, that unions could see the potential benefits of automation and digitisation. The level of responses which identified future automation as potentially problematic and the level which identified potential benefits were therefore strikingly similar.

Q21 Do you believe that further automation or digitisation could cause problems in your workplace?



Q23 Do you believe that there are forms of automation or digitisation that your workplace could benefit from?



From the work undertaken with affiliated trade unions through the survey or through discussions with union officials it is possible to identify some issues to be considered around automation and digitisation of the economy. These align with much of the academic literature on why automation might be pursued, the limitations of it and reasons why it may not be implemented. These factors are: technological feasibility and adoption; the cost of developing and deploying the technology; the capacity of the workforce; issues around efficiency, health, safety and wellbeing; and the regulatory framework and legal questions around deploying new technologies.

By considering these issues in turn it is possible to gain a better understanding of how automation and digitisation are impacting the labour market in Scotland.

Technological Feasibility and Adoption

The Frey and Osborne report and many of the other reports that use high estimates of automation are driven primarily by analysing the availability of technology. This approach in many ways assumes that if technology is available then it will be adopted and it will, in the short to medium term, replace jobs. It should not be assumed, however, that because it becomes possible to automate a particular job or even a particular task within a job, that the technology will be adopted within an individual workplace or wholesale across a sector.

Take for example the automation of supermarkets. In many ways this is a sector that has already been exposed to a high level of automation. Self-service checkouts are a feature of most big supermarket stores and customers are now accustomed to operating them. The introduction of such technology has had an impact on jobs and ways of working but it is also evident that a much higher degree of automation and digitisation is available to this sector than has been adopted. A comparison between British and French supermarkets, for example, shows that a higher level of digitisation around pricing and maintaining stock levels has been adopted in France, allowing French supermarkets to operate with much lower staffing levels than in the UK, with a higher degree of price sensitivity and with a greater level of automation behind these processes.

It is clear that UK supermarkets have not adopted the use of new technologies at the same pace or in the same way as their French counterparts. One explanation for this difference might be that the relative cost of labour in the UK can be lower than in France. Trade Unions in Scotland have been faced with employers pursuing cheaper labour costs through more insecure working practices, rather than automating their workplace to the maximum degree that is available. Despite this, forms of automation have been adopted. For example, the Union of Shop, Distribution and Allied Workers (USDAW) reports a high degree of automation behind the scheduling of shifts which allows employers to fit workers' hours around peaks and troughs in customer demand. This can often have negative consequences on shop workers and result in their hours changing from week to week. It can also result in workers being scheduled for very short shifts to fill gaps in the schedules, sometimes meaning that they spend almost as much time travelling to and from work as they do completing their shift.

There is some evidence, however, that these practices are beginning to change. We note that a number of employers are now moving away from these extreme forms of electronic scheduling, instead putting it back into the hands of managers at store level. Equally the introduction of automated tills within supermarket stores in Scotland is becoming more prevalent. These tills allow stock levels to be automatically monitored and communicate directly with the warehouse, providing details of when stock requires topping up, reducing the need for workers to manually perform stock checks.

This example both illustrates how the decision to pursue technological change is shaped by external factors, and how technological change can be approached to differing degrees in different places. In this way a transition to a more automated workplace is likely to be incremental and it may not be linear. While a greater degree of automation might creep into workplaces over time, it might also mean that some workplaces begin to automate and then stop due to other factors affecting the cost or the development of the change. It also suggests that different companies can and will make different decisions around the degree of automation within their business and the level of technological change. Like with the off-shoring of call centres, trends can also be reversed depending on the preferences of consumers and the effect that it has on the wider business model.

As USDAW highlight in their submission:

"We believe that, human contact in retail transactions is so important that simply because a task **can** be replaced by a machine, does not mean that it **will."**

The cost of developing and deploying the technology

In addition to the costs associated with labour, a clear driver of technological change is the cost of developing and deploying the technology. It is clear from previous waves of automation and from the wide scale digitisation that has already taken place, that technology can create job losses but it can also create new jobs in a different part of the business or across the economy as a whole. In this respect the net loss of jobs from the economy can be difficult to identify, and net gains are equally possible. At the level of the individual worker, however, there is likely to be change, with jobs altered or being lost. Much of the academic literature anticipates a loss of low and medium skilled jobs and suggests that many of the jobs that will be left in the economy after automation will be high skilled, focusing on research skills, analytical skills, IT skills and engineering[28].

Evidence from trade unions suggests that automation and digitisation can cause job losses but findings from the survey were relatively mixed in relation to the scale of the loss at this point. There are, however, some workplaces that are reporting job losses in the 1000s or the 100s through automation, notably in the finance sector and parts of local government. Often these workplaces have already seen a large roll out of new ways of working, which are now fairly well embedded.

More regularly, union branches responding to the survey reported that job losses were in the 10s (even when reporting from large workplaces) and many respondents struggled to be certain what overall effect automation and digitisation was having on the number of jobs in their workplace to this point. Often this was because the change was still underway and therefore ways of working had not been firmly enough established to create job losses. Equally these changes are coinciding with, and perhaps being driven by, a wider cost cutting agenda due to austerity and the

[28] https://www.etui.org/Publications2/Working-Papers/Digitalisation-of-the-economy-and-its-impact-on-labour-markets
https://www.edfenergy.com/sites/default/files/jobs-of-the-future.pdf
http://unions21.org.uk/files1/Unions-21-Changing-World-of-Work.pdf

difficult economic climate, therefore at times the falling headcount was discernible but not necessarily solely attributable to automation. In the civil service, and some other public sector workplaces, workers have been covered by 'no compulsory redundancy' agreements and therefore changes due to automation had been dealt with through attrition or redeployment.

There was a sense, however, from across many of the unions surveyed in both the public and private sectors that it was only the beginning of this issue, with many branches highlighting an expectation that job losses would be greater in the future, and highlighting a general anxiety around the issue of automation amongst their members.

"At present this technology is just being introduced so job losses not evidenced as yet but in longer term automation poses a very real danger to our members' jobs"

"8 senior posts have gone in the last 18 months. Sustainability of admin support services to be reviewed early 2018"

"Potentially, the Council has an objective to lose 2500 staff in five years. Unison is actively working to protect staff"

"Inevitably workloads have been lightened by the railway finally catching up but ultimately jobs will be lost as positions are found to be surplus to requirements. Drivers are also fearful of what technological breakthroughs and advancement will bring with regards to their own positions."

"We are actively encouraging our customers to contact us through digital channels. If enough people do this it will lessen the need for staff to answer calls from customers. So we will likely need less staff"

It is clear that a driver of automation is the reduction of costs through the loss of staff. It is also clear, however, that significant investment is required to make a transition to a more digitised or automated workplace and that the reduction in costs are not necessarily immediate. How much investment is made, the degree to which it is well managed and the account that is taken of wider systems in the organisation, along with the timing of the change all play a role in how successful this process of automation will be.

There were a variety of issues raised on this topic by unions, with many examples of automation being pursued primarily as a cost cutting measure. This driver of automation created a variety of issues at a workplace level, as it often led to technology which was underinvested in, systems which were not fit for purpose, increased workplace stress and services which were lower quality as a result.

Across the public sector many examples were raised which suggested that workloads had risen as a result of automation with background support around HR or finance cut back and individual workers now responsible for updating systems and inputting data in addition to their normal workloads. In these workplaces, views around automation tended to be negative and the quality of work had been reduced as a result of higher workloads and systems that were not fit for purpose.

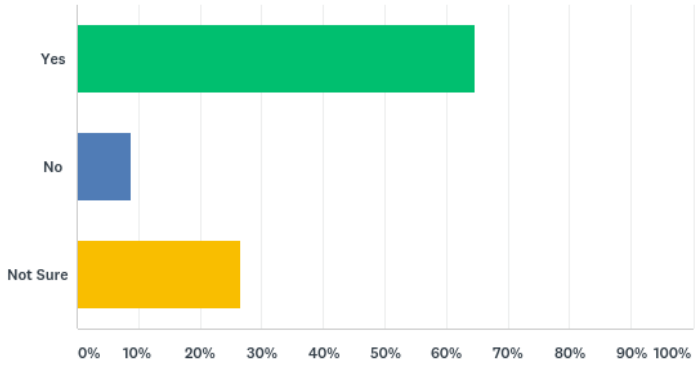
There were, however, also examples highlighted where automation and digitisation had been pursued for cost cutting reasons and where these savings had not been realised. UNISON highlighted an example of the digitisation of hospital records, which was significantly more expensive than expected, due to the complexity of the systems that needed to be integrated and the need for robust systems that allowed a universal service to be maintained. Despite this the union recognised that the new automated system offers improvements to efficiency, health and safety and the quality of care for patients. The driver therefore may have been at least partly around cost but the benefits were much wider than this and it was the wider benefits around efficiency and safety that were easier to realise.

These examples highlight that while automation and digitisation can offer savings in the long term, a purely cost cutting motive for pursuing the change is unlikely to offer the best results. It is also clear that when automation and digitisation are pursued in a workplace that must offer a universal service, challenges are different than in the private sector where services can simply be withdrawn and not replaced. For example, a local council, the DWP or other parts of the public sector might encourage people to use online services to access benefits but frontline staff must also be available to offer support, which can cause stress and workload problems if inappropriately managed. In the finance sector, however, bank branches could simply be shut and replaced with online banking services. While this disenfranchises many users, particularly older people, and can cause significant problems for rural communities and small businesses, the change can simply be delivered as envisaged by the company regardless of the consequences for service users.

The capacity of the workforce

A clear finding from the survey was that workers were often required to change their working practices as a result of new technologies or new ways of working. It was also clear that training needs existed as a result as shown in the figure below.

Q12 Are there currently training needs as a result of automation or digitisation in your workplace?



Despite this, only 23% of survey responders felt that training needs were being met in full, while 48% felt that they were only partially met, and 29% of responders felt

that training needs were simply not met by the employer. Union members in the retail and distribution sectors have also repeatedly raised concerns that new technology is simply delivered to their site with little more than an instruction manual and members often receive no support from the company with its use.

The evidence from the development and deployment of new technologies in the past also suggests that employers are lax about properly training their workforce to use new technologies. Scottish Union Learning (SUL), the STUC's learning project funded by the Scottish Government, regularly responds to training requests on digital skills and the use of new technology. It is interesting to note that SUL has provided training for more than 100 teachers in 2013-2017 on the use of smartboard technology. It is illustrative of the issues around the deployment of technology and training that the union must still support this type of training despite smartboards being a feature of Scottish schools for over a decade.

Given that one of the features identified in the academic literature around the current wave of automation is the speed of the change, failure to provide training and support for workers who are expected to use new technologies is likely to increase the problems of deploying new technologies at a workplace level. Particular concerns were also raised by trade unions around older workers in this respect. Without a focus on training and support for workers, there is a danger that the productivity gains expected from the use of new technologies will not be realised.

Efficiency, Safety, Health and Wellbeing

The Scottish and UK labour markets have been increasingly affected by the rise of insecure work, with a marked growth in zero hours contracts, umbrella contracts and self-employment over the last ten years. Automation and digitisation are therefore being pursued at a time when the cost of labour is low, real wages are falling and insecurity is high. Between 2014/5 and 2016/17, 100,000 people in Scotland reported an illness caused or made worse by work, an increase on the previous reporting period.[29] In workplaces across the private and public sectors unions are reporting that workloads are increasing and stress, burnout and mental ill-health are becoming more prevalent.

In this context, while automation may be a tool to enhance wellbeing and job quality, there is also a risk that it will further pressurise those already under-pressure in the workforce. Findings from unions suggest that strain in the workplace could be increased as a result of automation in a number of ways.

The first issue is the extent to which automation allows a higher level of performance management or a greater ability for the employer to track the whereabouts of staff and their work rate. This can create a sense of powerlessness or a loss of control for workers and can drive an unhelpful and inappropriate targets culture.

"staff are being micro-managed and monitored in real time. Targets are artificially inflated and staff pressurised to meet them with vastly reduced resource."

[29] http://www.hse.gov.uk/statistics/regions/tables.htm

“Management can check everything you do on a daily basis, from the moment you log onto your computer each day. This is used as part of the performance management system.”

“Big Brother Approach. It was supposed to help us improve health and safety however just spy in cab”

“In the distribution sector, close monitoring of productivity through electronic picking systems puts some workers under pressure to reach unrealistic targets. Those who do not achieve their targets can face the loss of their bonus or even disciplinary action. In these cases it is not the technology itself that is the cause for concern, but the way in which it is being used to support unfair management practices.”

Secondly, there are impacts around the quality of work. In some instances improvements in the quality of work were identifiable:

“Information is easier to share and find. Home working is more viable. Communication is faster and easier.”

“It has removed some of the more routine queries and has automatic responses freeing staff to deal with more urgent or pressing needs”

“Less errors from double keying as the machine makes no mistakes”

Much of the research that has been carried out into automation expects it to be job enhancing in the ways highlighted above. For call centre workers for example, chat bots and other automating tools are expected to reduce the number of simple or routine enquiries coming to call handlers, providing more scope for interesting or varied work[30]. The specific evidence from the CWU seems to suggest that this is not the reality experienced by many workers on the ground:

“Manual handling is reduced with automation, restricting specialised skills and input. Automated scripts reduce any personal input or decision making. Lack of flexibility and personal judgement reducing variety of roles.”

It seems that this kind of diminution of job quality is often the experience with a large number of branches citing issues around the deskilling and a loss of variety and flexibility:

“Less time to do core functions, elimination of parts of jobs leading to more generic jobs, less time to deal with customers, increased use of statistics to measure performance, less motivation or feeling of recognition of skills, less support from HR/admin/etc”

“Job roles have become repetitive and singular task based rather than working a whole case on an end to end basis”

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[30] https://www.cable.co.uk/news/vodafone-chatbot-will-give-customers-instant-answers-but-wont-replace-humans-just-yet-700001789/

“Job roles are more generalised and deskilled”

A further problem of staff morale throughout the automation process is also identifiable. Workers often felt that their jobs had changed in a way that simply lessened the rewarding elements of it. Equally workers struggled to accept and enjoy new roles when they could clearly identify that if they were successful in their work, their own job would no longer be necessary.

“It can make it easier and quicker to serve customers but the personal touch and ‘making a difference’ are lost”

“Customer facing staff become demoralised having to encourage customers not to speak to them but to go online instead”

At times, unions at a national level also identified that restructuring due to automation and digitisation also meant that teams were now centralised or that data was now handled in such a way as to make parts of the business easier to off-shore. This added to a general sense of the increasing precariousness of roles and concern that unions held for the future of their members jobs. It should be noted however, that reducing costs in manufacturing, encouraging use of new technologies and 3-D printing were also identified as potential contributions to the re-shoring of industry, and manufacturing in particular, which could be pursued as part of a wider industrial strategy.

One of the more positive features of automation and digitisation is routinely identified in the academic literature, but which was also highlighted by unions, is the support that it gives to flexible working, working from home and working in a range of locations. On the whole these were highlighted as positive changes with workers appreciating the added flexibility it provided and the greater ability to balance home and work commitments. Elements of these changes, however, are also having a negative effect on the wellbeing of workers. An issue that is of growing significance across the labour market is how technology increases working hours and blurs the lines between work and home life. One union identified this as a particular issue for younger workers who often feel a greater pressure to be available to their employer at all times.

It was also identified that automation and digitisation could enhance feelings of isolation in the workplace, as workers were less required to report in person, could receive instruction remotely and had less of a fixed work location. The impact of this on working cultures was already being felt in a number of workplaces and could grow as automation develops. This issue of isolation often went hand in hand with benefits in efficiency or remote working and was a feature of new automated processes. For example the ability to receive jobs on handheld units allows workers in the social care sector to go straight to their first appointment benefiting the worker by reducing time spent going to and from a central location to receive appointments or pick-up notes. Often workers appreciate this change as it allows them to manage their workload more effectively but it also reduces their contact with co-workers and their feeling of being part of a workplace. There were many examples raised of how

automation and digitisation change the nature of work, and there are both positive and negative elements to this change.

Interestingly the issues around health and safety more generally provoked a varied response. Union officers at a national level often cited benefits in health and safety or a desire to improve health and safety as one of the drivers behind the automation process, and certainly one of the elements that the union sought to enhance. On a branch level, however, benefits to health and safety were not widely recognised or highlighted with the majority of responders citing that health and safety had not been impacted (35.96%) or that they were unsure of the impact of automation and digitisation on health and safety (40.22%). Only slightly over a fifth of respondents could identify a health and safety impact and of those 19% felt that health and safety had been negatively affected and only 3% felt that there had been an improvement in health and safety as a result of automation and digitisation. The difference between the drivers behind automation and its contribution to health and safety and the impacts at a workplace level were not well explored within this survey, however, and therefore could benefit from greater focus in future studies.

Ultimately there was a sense that automation and digitisation is best pursued with effective consultation and collaboration with unions and the workforce. A well designed automation and digitisation process could create better ways of working and better quality jobs, along with more efficient practices but the workforce would need to be supported, engaged and empowered in line with fair work practices for this to be achieved. It was also noted that this is seldom the way change is approached by employers, often leading to poor outcomes for workers and for the employer.

The regulatory framework and legal questions around deploying new technologies and ways of working

Much of the debate around digitisation and automation in the media has focused on the use of new technologies like driverless vehicles and drones. While some anxiety around these issues certainly exists in workplaces and while there were examples of automated vehicles and highly automated processes being used in warehouse settings[31], it is clear that these technologies are not yet routinely in place across the economy on the scale that some of the literature suggests they will be in the near future.

[31] https://www.logisticsmanager.com/amazon-robotics-for-new-warrington-site/?utm_source=Subs_LM_Weekly&utm_campaign=f90800ada1-EMAIL_CAMPAIGN_2016_12_19&utm_medium=email&utm_term=0_95229da346-f90800ada1-129213369
http://www.mailonsunday.co.uk/news/article-4401108/Meet-Little-Orange-robot-warehouse-worker-China.html
http://en.prnasia.com/releases/apac/Digital_ingenuity_triumphs_over_logistics_challenges_at_DHL_Asia_Pacific_Innovation_Day-172348.shtml
https://www.logisticsmanager.com/dhl-buys-packing-robots/?utm_source=Subs_LM_Weekly&utm_campaign=a6423a1524-EMAIL_CAMPAIGN_2016_12_19&utm_medium=email&utm_term=0_95229da346-a6423a1524-129213369

It should be noted that wide scale deployment of these technologies could be limited by legislative constraints with analysis from DPD, an international parcel delivery company, noting that even a limited automation of delivery driver jobs, would need some change in regulation[32]. These constraints therefore might slow the deployment of these technologies and ways of working, and it may also slow the level of investment that companies are prepared to put into them. It is clear, however, that drivers are often already subject to higher levels of scrutiny from their employer as a result of automation, with routesmart technology, monitoring of locations, monitoring of braking patterns, digital tachographs and in-cab surveillance now routinely present in a variety of driving jobs across the public and private sectors.

The rise of the often ill-defined 'gig economy' is also having an impact on ways of working. Here apps and new technologies are in theory facilitating a new way of working that has been championed for its flexibility due primarily to the perceived benefits for employers and consumers. From a worker's rights perspective, however, many of the features of the gig economy and the questionable employment practices used are not new and have been the subject of trade union campaigns and legal challenges for a number of years.

The issue here is not around the use of new technologies per se, but rather how exploitation is masked by innovation, through the framing of 'collaborative economy' services. As noted by the Employment Tribunal Judgement against the taxi hire firm Uber, the company had resorted to 'fictions, twisted language and brand new terminology[33]' in order to justify a situation of self-employment for Uber drivers. The employment tribunal found that Uber drivers were workers and therefore were covered by a range of employment protections that had previously not been available to them, including:

- Information about pay, notice and holiday entitlement
- National Minimum Wage (except statutory exceptions)
- Protection against unlawful pay deductions
- Equal Pay
- Working hours and breaks
- Holidays
- Rights not to be refused work because of union membership
- Rights to be accompanied to a disciplinary or grievance hearing
- Protection against discrimination on all unlawful grounds
- Protection against detriment for whistleblowing
- Protection against detriment due to a blacklist
- Pension auto-enrolment

This case has now been upheld by the Employment Appeals Tribunal and is a landmark ruling for the gig economy.

The STUC remains concerned that some companies in the 'gig economy' are seeking a trading advantage by ignoring employment regulations and their

[32] https://www.dpd.com/de_en/media/press_releases/2016/autonomous_driving_thesis_and_scenarios
[33] https://www.judiciary.gov.uk/wp-content/uploads/2016/10/aslam-and-farrar-v-uber-reasons-20161028.pdf

responsibilities as employers by framing their business in terms of ‘sharing labour’ or ‘facilitating trade’ rather than offering goods and services in the traditional manner. Flexibility can be a useful feature of the labour market for both employers and workers and when used properly can support a greater degree of work-life balance but exploitation disguised as flexibility is incompatible with fair work principles and should be addressed.

As the Expert Panel on the Collaborative economy noted in their report ‘fundamentally, if a business model by necessity must not offer basic rights in order to be commercially viable, then this does not constitute access to good or fair work.’[34]

[34] http://www.gov.scot/Resource/0053/00530703.pdf

SECTION 4 Scottish Government approach

The Scottish Government's policy framework - including Scotland's Economic Strategy, and it's defining commitment to Inclusive Growth, and the Labour Market Strategy - provides a strong basis from which to optimise the labour market changes posed by technological change, ensuring that all Scotland's people have the opportunity to benefit from new goods and services and employment opportunities in emerging sectors. The new type of dialogue between employers, unions and Government promoted through the Fair Work Convention will help meet the labour market challenges outlined in this paper. The Scottish Government also remains committed, as far as devolved powers allow, to the maintenance of a robust social safety net which meets the needs of all Scotland's citizens as well as providing the security necessary to support innovation and entrepreneurialism.

It is important to note that quality jobs have already been created in the recent past in sectors where Scotland is at the forefront of technological change. These include life sciences – where almost 40,000 people are now employed, the games industry (particularly in Dundee – where post-industrial unemployment has traditionally been high) and the emerging technology cluster (including FinTech) in Edinburgh. The world leading research pursued by Scotland's higher education – for example, Edinburgh University's work on robotics and data analytics - and research institutions is translating into successful commercial ventures.

As noted in this year's Programme for Government, the Scottish Government believes that emerging technologies provide significant opportunities for Scotland:

"Businesses and governments across the world are investing in artificial intelligence, machine learning, data analytics and low carbon energy technologies that will revolutionise the global economy. The opportunities for those that adapt and lead these changes are substantial. The prize is an innovative, growing economy which creates more and better jobs for everyone in Scotland. But we know that to grasp these opportunities we must act quickly and with purpose or be left behind. We intend to seize the moment, and this Programme for Government sets out actions to make Scotland a country that will lead change and reap the economic rewards it will bring".

Specific measures included in PFG that will help maximise the employment benefits of technological change include:

- a bold new ambition on ultra-low emission vehicles, including electric cars and vans, with a target to phase out the need for petrol and diesel vehicles by 2032, underpinned by a range of actions to expand the charging network, support innovative approaches and encourage the public sector to lead the way

- providing direct support for additional business research and development.

- establishing a National Investment Bank to support infrastructure investment, help companies grow and support our economic vision.

- establishing a Just Transition Commission to advise Scottish Ministers.

- directly supporting the Lightweight Manufacturing Centre in Renfrew to give Scottish companies a competitive edge in new manufacturing processes for lightweight materials.

- a commitment to confirm the location and academic and business partners for the National Manufacturing Institute for Scotland (NMIS) this year and to begin construction work onsite during 2018.

- launching a service to engage 200 manufacturing businesses each year to develop their own 'Manufacturing 4.0 Improvement Plan'.

- provide £18 million support - from the Scottish Government and the European Regional Development Fund - through Zero Waste Scotland to help manufacturing businesses unlock the economic potential of the circular economy by maximising the value of the manufacturing process from beginning to end.

- Investment in digital skills.

Also, Ministers established the Enterprise and Skills Strategic Board in November 2017 in line with the Enterprise and Skills Phase 2 report. Its objective is to improve Scotland’s productivity through the alignment and co-ordination of the activities of Scotland's enterprise and skills agencies: Scottish Enterprise, Highlands and Islands Enterprise, Skills Development Scotland and the Scottish Funding Council.

The Strategic Board will seek to maximise the impact of the collective investment that Scotland makes in enterprise and skills development, and to create the conditions that are conducive to delivering inclusive and sustainable growth. It is anticipated that the Board will play a crucial role in shaping our response the skills challenges around technological change.

Section 5: Areas for further consideration

Scotland, like all advanced nations, may be standing on the cusp of an unprecedented transition: from a high emission to a low carbon economy; towards a society where fewer workers support an ageing population and, as discussed here, a phase of technological change which, unlike previous waves, may over time tend to reduce demand for labour.

The trajectory of this technological change is not yet clear and its likely impact on the range and quality of jobs is currently subject of fierce debate. It is therefore sensible to prepare to manage this change, in a way that is consistent with shared Scottish Government and STUC priorities of inclusive growth, Fair Work and reducing inequality.

On the basis of both the STUC's analysis of change at workplace level and a wider consideration of the academic literature, it is possible to identify a number of areas for further consideration and potential action, recognising the critical importance of the role of unions in giving workers an effective voice in determining the action required.

Ongoing knowledge exchange and examining how other countries cope with technological change: The Scottish Government is committed to working with social partners to assess how economic development is being affected by technology. It is important that the latest assessment of sectoral and geographical opportunities and challenges is informed by and shared with trade unions and other civic organisations and that future analysis and dialogue on how technology is shaping the labour market is maintained.

Recent evidence suggests that Germany is handling the shift to higher robot intensity with little impact on aggregate employment[35]. The system of collective bargaining and codetermination provides the basis for an approach based on retraining and redeployment. Detailed analysis will be undertaken of how other countries are coping with these changes to inform future strategies in Scotland.

The Scottish Government and the STUC will work together to assess how the process of technological change is being approached in other countries, with a particular focus on the role that fair work principles, workplace democracy and unions play in supporting positive change.

Fair Work and maximising high quality employment opportunities: Whether or not the net impact on overall employment is ultimately positive or negative, there is no doubt that jobs will be created in the researching, developing, producing and deploying of new goods and services. Scotland is already creating high quality jobs in advanced technology sectors where it possesses a genuine competitive edge such as sensors and data analytics.

[35] Dauth, W, S Findeisen, J Suedekum and N Woessner (2017), "German robots – The impact of industrial robots on workers", CEPR Discussion Paper 12306.

Building on these advantages to create and sustain significant numbers of jobs in emerging sectors will require, an excellent education and skills systems including in-work training, high levels of digital and other infrastructure, and a supportive business environment including access to patient capital. It also requires an immigration system suited to Scotland's needs post Brexit, which allows talent and specialist skills around research and development to be accessed. As discussed earlier, much of this policy framework is already in place and is being supplemented by the range of measures announced in the Programme for Government.

The Scottish Government and the STUC agree that automation and digitisation have the potential to improve quality of work if deployed well. It is essential to encourage high levels of health and safety, greater wellbeing and greater prosperity for those in work, while maintaining access to everyday and essential services.

The STUC and Scottish Government agree that automation and digitisation cannot become an opportunity to repackage poor employment practice as innovation. Unions will continue to challenge poor employment practice across the economy and develop new organising strategies that take account of the changing nature of work. The Scottish Government and the STUC will continue to vigorously promote fair work and aim to ensure that all employers place fair work at the heart of their business model. Promoting high quality employment opportunities continues to be a priority for Government, its agencies and the new Strategic Board.

In line with recommendations from the Expert Panel on the Collaborative Economy, the Scottish Government and the STUC will seek to both promote fair work in the collaborative economy and ensure participants are aware of the Fair Work Framework. The Scottish Government will also as far as possible within its powers also seek to ensure that participants in the collaborative economy comply with all relevant regulation when operating in Scotland.

Focus on skills: While the evidence does not support the view that automation and digitisation will lead to the catastrophic net loss of jobs predicted by some researchers, it is likely that some occupations and sectors will experience significant change. It is also possible that these losses could exacerbate regional imbalances.

Workers may see their job change, or disappear, and it is likely that some level of re-skilling may be required throughout their lifetime. It is imperative that workers are treated fairly if faced with these changes and must be supported to change roles with their current employer or supported to find new work with another employer, or in another sector of the economy. Career development is important and routes through the labour market from low skilled, to medium skilled to high skilled roles are necessary to provide a level of social mobility. If these routes are diminished, serious focus will be required to offer lifelong learning and support for workers to allow them to participate in the labour market and to make the most of their skills and potential.

Lessons may be learned from previous and on-going initiatives aimed at managing change in the interests of workers and communities e.g. The Transitional Training Fund established to help oil and gas workers retrain.

It is inevitable that technological and demographic change will combine to place **renewed emphasis on in-work training**; workers are likely to have to adapt and develop new skills throughout their careers. Workers must be supported to use new technologies, without this support outcomes for individuals will be poor and the positive impacts these changes can have on national productivity will be reduced. Employers will have to play a greater role in delivering this agenda. Scottish Union Learning, which provides demand led training for workers across Scotland, will continue to play an important role. Automation and digitisation should not lock people out of the job market, reduce career progression or limit the ability for workers to raise their living standards throughout their working life.

The Scottish Government's Programme for Government recognises that investment in digital skills is a priority. The Scottish Government and the STUC will work together to expand the support available to workers in improving their digital skills in addition to the wider support for learning delivered by Scottish Union Learning.

Inequality: There is a broad consensus that the distributional consequences of technological change could be significant. Much of the research literature indicates that there is likely to be a reduction in the number of low and medium skilled roles[36]. This trend, if realised, is likely to exacerbate the hollowing out of the labour market that has already occurred. It will be important to consider how employability services prepare for these changes, ensuring that people further from the labour market (and often living in more deprived areas) can secure sustainable work.

The Scottish Government and the STUC are committed to inclusive growth. Technology has the potential to improve access to work and to level the playing field, but it must be deployed in such a way as to tackle inequality. Some of the roles most vulnerable to automation are held predominantly by women or workers from minority ethnic groups, it is therefore important that workers are supported to ensure that automation and digitisation does not exacerbate the inequalities that already exist in society.

Positive wider social benefits could and should be unlocked by the use of new technologies and new ways of working. This will require an ongoing assessment of how regulation and taxation might enable effective redistribution from the use of technology. New mechanisms such as incentives and support for worker ownership will help spread the wealth created through the deployment of new technologies.

Collective bargaining: Through the Fair Work agenda, the Scottish Government and the STUC will support unions and encourage employers to include technological change within collective bargaining agreements, so that workers can shape how technology is used and introduced in their own workplace. The Government and the STUC will also encourage new entrants into the market to engage with fair work principles, encouraging access for unions and effective voice for workers. Automation should be demand not supply driven; should be fully informed by the views of workers; should be job enhancing, and should support high quality and safe workplaces in line with Fair Work objectives.

[36] OECD (2016), Autor (2015), Nesta (2017), Centre for Cities (2018)

Influencing development of the UK labour market: The Scottish Government and STUC share serious concerns over the UK Government's approach to labour market issues. We note again that the origins of current labour market trends originated at least as much in the UK's distinctive approach to labour market policy and institutions as they do to technological change. This approach undermines shared objectives around inclusive growth, Fair Work and reducing inequality. Therefore, the Scottish Government and STUC will continue to campaign for the case for the devolution of employment law.

Creative Solutions: In the longer term both the STUC and the Scottish Government will consider the need to pursue creative responses to the challenges posed by automation, including investing more in workplace innovation to build capacity around job design and work organisation; and investigating the potential need to reduce working hours but maintain or increase pay levels.

The Scottish Government and the STUC share a common objective – to ensure automation and digitisation are life enhancing for all of Scotland's people.

Scottish Government and STUC
April 2018

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