# Discussion Paper

**Innovation, technological advances and the changing world of work: Do we understand Scotland's future skills needs?**

Centre for Work-based Learning in Scotland

## Focus

Scotland has a highly skilled workforce, which is recognised internationally as one of our key economic strengths and an established driver of business growth and inward investment. Our labour market is performing strongly, but collectively we face short and long term challenges arising out of permanent changes in the way the economy and business will operate, as well as events such as BREXIT. This workshop will explore actions to support the development of the skills we will need in the future, and to safeguard and develop future jobs and fair work.

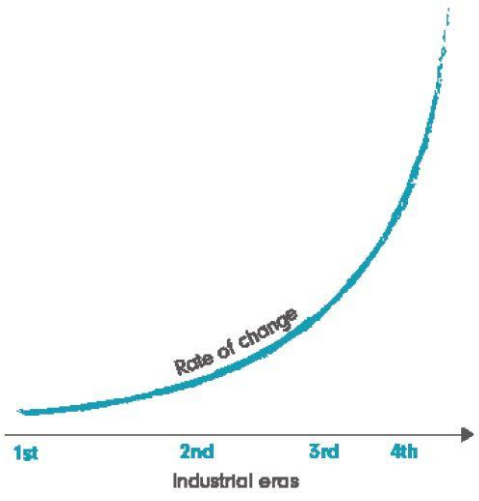
## Objective

The aim of the session is to share the current thinking on the skills which will be required in the future, and to discuss the impacts they will have on Business. The session will be informed by inputs from two entrepreneurs who are shaping new and growing businesses in this dynamic environment.

## Background

The Centre for Work-based Learning, in partnership with Skills Development Scotland, has been investigating what has been described as Industrie 4.0 or the fourth industrial revolution and its impact on skill requirements for the future (Skills 4.0).

It is widely anticipated that we are moving into a fourth industrial revolution, driven, as we have seen in previous industrial revolutions, by technological disrupters. "[We are] in the midst of a technological revolution that is once again changing the nature of work" (Carney, 2016). These disruptions are already changing the way we work and live, and will continue to have an undeniable impact on the skills required to drive a productive and competitive economy. These technological drivers are met by other large scale societal and demographic shifts such as further globalisation, an ageing population and increasing diversity within the workforce. They will have implications for individuals, learning institutions and the skills system as a whole.




We are exploring the impacts that the fourth industrial revolution will have on future skills requirements to better understand how Scotland's skills system might respond. To enable us to do this we need to look at how technological change and other trends impact on the economy, society and work.

# The future of industry, work and skills

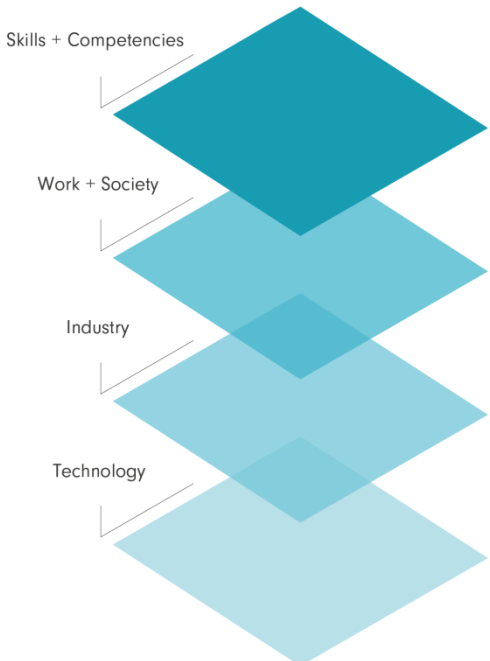
A number of key papers have been written on this subject. The 'Industrie 4.0' concept originates from a high-tech strategy by the German government, which promotes smart factories and robotisation of manufacturing. Although Industrie 4.0 refers primarily to manufacturing, its significant and far-reaching implications for the wider economy and the labour market have become an increasing focus area for Germany and for many advanced economies.

The World Economic Forum has also carried out analysis and futures thinking, which broadens this out into other industries and explores how the changes could impact on work and skills. A number of papers - notably by the UK Commission for Employment and Skills (UKCES) and McKinsey – also make some future trend predictions and apply these to skill requirements and economic scenarios.

The combined literature paints a good picture of the changes we can expect in the coming years. The major point is that this revolution is not like those that happened in the past; it is not one big change that the workforce will adjust to and then become the new 'normal'. The time span between industrial revolutions has reduced significantly as developments in technology have accelerated exponentially. The evidence from our current experience of rapidly changing technology tells us that we are moving into a period of constant change. This is why getting the skills right is so important this time round. "In this era of "becoming", everyone becomes a newbie. Worse we will be newbies forever" (Kelly, 2016). Scotland's workforce needs new skills to enable them to thrive in this environment of constant change.

# Trends

There are a number of other trends. The first is the convergence of manufacturing, communications and other originally distinct technologies. This in turn leads us towards the concept of a convergence of industries and the idea that changes are not confined to one industry or sector, nor easy to differentiate across these.




Within industry, changes in manufacturing processes will not only change the make-up of factories and the workforces that run them, but technologies such as 3D printing have the potential to drive a cyclical trend that leads to an increase in local, small scale production. Related to this is an increase in consumer choice leading to higher customer awareness and expectations, and a desire for quality over quantity. This in turn drives two

further trends: a desire for more customised, personal products and services and the convergence of products and services themselves.

Although manufacturing makes up a relatively small part of the Scottish economy, these shifts will also impact on a wide range of other sectors including the service industry, financial sector, life sciences and health care and even the public sector. Barriers between traditional industries and job roles are likely to be broken down with skills requirements transcending both of these.

In society and work, one view is that new technology will enable more remote working, leading to a truly global labour market. The removal of industrial boundaries is likely to lead to a need for the right person to do a job, irrespective of where they live or what subject their last piece of work was focused on. This could reduce travel to work times and has the potential to boost local economies. Linked to this is a trend for more project-based, contractual work with the potential to improve work/life balance.

These technology driven changes collide with vast demographic shifts and an increasingly diverse workforce. In addition, the changes brought about by Britain leaving the EU will change the dynamics of the labour market in as yet, uncertain ways.

One of the most significant changes for the workforce will be the use of robots and artificial intelligence to do an increasing number of the jobs currently done by humans. "Almost 1 in every 2 jobs have a high risk of being automated by machines" (Goldbloom, 2016). There is therefore a view that this could lead to increased unemployment and polarisation of the workforce, with a widening gap between a satisfied, mobile workforce and lower paid workers in roles that are more precarious. We have to understand all of the potential scenarios for our workforce to enable us to grasp the opportunities that automation presents and make these changes work for Scotland.

These trends and reports lead us to an understanding that the skills we need for the future are not technical skills, but the ability to learn new technical skills, to work with others, spot new opportunities and embrace ongoing change. While new technology forges ahead, Scottish citizens need support to develop the skills to create new technology, the skills to exploit new technology and the skills to thrive in the future of work - key considerations this work strives to address.

## The Centre for Work Based Learning in Scotland

Defining these skills for the future will form an important aspect of the work of the Centre for Work Based Learning in Scotland (a new research and development effort made up of Skills Development Scotland, the University of Strathclyde, Heriot Watt University and Robert Gordon University) by "championing and further developing existing approaches to enhancing work-based learning" as well as "developing a body of internationally recognised research and evaluation around current and emerging themes in work-based learning".

In November 2017 the Centre for Work-based Learning held an international symposium. The symposium brought together over 100 national and international thought leaders, directors and senior managers together with influencers from the education and policy landscape to:

- consider the future of work and what that means for employees and businesses
- explore the role of high performing work practices in enabling skills use in the workplace
- discuss and debate how Scotland's skills system needs to respond
- network and share on a national and international scale

A key theme arising during the course of the symposium was around the rapid speed in which the world of work is changing and the lack clarity around the technical skills required. Peter Cheese highlighted the need to become more human in a world of uncertainty, the reality being that 'people will no longer have a job for life, but a life of jobs'. Given the context of the discussion, one of the main challenges for Scotland will be to create the education, learning and work environments which enable people to be agile and adaptable in a precarious world.

Find out more about the Symposium and view Peter's keynote speech here

## Discussion questions

- How can Scotland exploit technological disruptors to build an inclusive and resilient economy?
- What are the distinctive human skills and capabilities required
- How can Scotland's workforce drive future change and thrive within this environment?
- How should the Scottish skills system respond to deliver this?

# References

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