

Student: Huw Chance
Student ID: 2031077
Module: Introduction to Industry 4.0

Assessment 2 – introduction to Industry 4.0

How industry 4.0 derived technologies
can improve the recruitment,
retention and training of staff within a
Government setting.

Table of Contents

INTRODUCTION	3
WHAT TECHNOLOGIES FROM INDUSTRY 4.0 COULD BE CONSIDERED?	4
WHAT BARRIERS WILL BE ENCOUNTERED IN IMPLEMENTING NEW TECHNOLOGY?	6
HOW WILL MANAGEMENT PLAY A ROLE IN IMPLEMENTING NEW TECHNOLOGIES?	7
WHAT POSITIVE OUTCOMES ARE LIKELY TO BE PROVIDED BY THE USE OF NEW TECHNOLOGY?	8
HOW WILL NEW TECHNOLOGIES BE IMPLEMENTED?	9
HOW WILL INDUSTRY 4.0 TECHNOLOGIES FIT INTO A FUTURE STRATEGY?	11
CONCLUSION	12
REFERENCES	13

Introduction

Currently the Welsh Government uses a recruitment policy that is somewhat unique in the public sector.

Rather than an individual applying for a specific role, the applicant applies for a certain grade, related to competence and skill. This is a feature of civil service recruitment, mirrored by UK Government as a whole.

While this does have benefits in the scope for individuals to move within government departments – sometimes at very short notice, it also has its limitations.

Applicants for civil service roles are applying for an unspecified role, often the job will only give geographical limits, ie the town or city you will be based at. As we shall see in the paper, geographical factors are now less important since the outbreak of covid and virtual working from our own homes. (ONS study May 2022)

Culture and historic practices will be explored and analysed to see to what extent industry 4.0 technologies could be implemented, within the existing structure.

What technologies from industry 4.0 could be considered?

Industry 4.0 offers the potential to streamline processes, connect various digital technologies, leading to increased efficiencies and time saving methods.

In this section technology that can be used across the recruitment process will be analysed, together with technology that enables existing employees to have the following:

- Long term sustainable employment
- Access to training
- Jobs directly related to their skills and personal circumstances, to achieve new goals related to well being and health while also trying to alleviate issues of discrimination.

What industry 4.0 technologies would help in the recruitment process?

While much weight is given to the technologies of industry 4.0 in manufacturing and industry, there is also a growing need to make use of employee's time as roles change and automation takes over certain jobs once done by humans. Employees are now being recognised as the foundation of any organisation, hence the change from human resources, to human capital. This is also true of data, and how we find data and make sense of it.

Data capture and how we use data is one of the changes that organisations now face. Most organisations will hold a large amount of data, often in various places and with little regard to how it can be best used.

Online platforms to enable people to work remotely

One of the simplest technologies used by organisations in the last 2 years since the worldwide covid pandemic is the use of computers to communicate. Platforms such as Skype, teams and the zoom were often used for one off events by tech savvy businesses. Since the pandemic the Welsh Government policy has been one of home working where at all possible, and even after restrictions are now easing, the directive is to work from home, unless there is a strong business case for meeting face to face.

Covid may have served to force this change in a shorter period of time than may have been expected. However, as Schwab (2018) writes about the speed of the change in new technology and the impact that will have on the traditional landscape of jobs, working patterns and the labour market.

The increase in the power of computers

We have seen automation being used in industrial processes for many years, repetitive tasks within a host of industries are now the norm. The power of computers is now evolving to a level that other tasks can now be taken care of by digital processes. Simple examples in government can be seen in the increase in

payments made digitally, data collection like the census being online and huge resources that would normally have been in printed form, going online.

This will no doubt have an effect on the labour market. Schwab (2018) talks about the two opposing camps that argue their cases. One camp believes that new tech will lead to increased opportunities and increased prosperity, while the other camp thinks that increases in digital resources will lead to wide spread unemployment in some sectors. Schwab (2018) believes the reality lies somewhere in the middle.

A BBC news article (Sept 2015) estimates only a 38% likelihood of a civil service role being taken by a robot. It would be interesting to see this article revised in light of the global pandemic and the increasing speed of new technology.

Increased use of web based solutions to provide training for staff.

Even before the emergence of the global pandemic, the use of online training has been gaining traction. This is for a number of reasons:

Cost effectiveness of training people from their original locations – no travel – less costs. The knock on effect is reduced travel, which is more sustainable and better for the environment. One of the reasons that face to face meetings now have to have a solid business case for their approval.

Is the data from staff training being used effectively?

Data mining as talked about in a research paper by Ling Yuan et al (Nov 2020) suggests two different ways in which you can use mine key words to analyse data in different ways. When used in the area of training it would be key to not only understand from employees answers:

- 1: the level of understanding they have after training - by virtue of a test.
- 2: the gaps in their knowledge after analysing the incorrect answers

Can big data be used to find skills within the organisation in a targeted approach?

The simple answer is yes. The data held by the government on their employees could be used for selection for certain positions, in the first instance by AI. Using data mined from the roles they already undertake. If the data is used in such a way that it removes certain criteria, for example, age, race and gender, then the likelihood of creating more diverse teams could be explored more fully. However, this may raise ethical questions of the use of such data. Would this constitute a type of big brother scenario if data is harvested from the content of reports or emails produced by staff members. The ethical side of this would need to be explored and staff would need to agree to this data being used. There is also the ethical dilemma if the use of such data may lead to job losses if roles can be not only automated, but combined to use less human resource. On the flip side to this is the notion that if data collection is required, then jobs may be created in digital aspects of the organisation to manage the process.

What barriers will be encountered in implementing new technology?

Large organisations, such as Government are historically hard to change quickly. There are not only the constraints of cost, but the efficiency and resilience of a proposed system.

As Schwab (2018) tells us, there is a need for us to still feel connected as human beings in this process. With a large workforce the need to consult, and to take into account the human aspects will always be an issue. As a public body laws, charters, bind the Welsh government and dare it be said out dated red tape which is at odds with the nature of fast moving technological change.

There are key factors to consider:

Cost – how will the costs be met when we live in a time of austerity and cost savings being introduced?

Political will – civil servants help the government deliver on their manifestos in effect they are the machine that support governments. The time lags in decision-making can mean that sometimes, while the authority or legal requirements for change are being met, the technology has moved on in the meantime at such a fast rate, its now out of date technology that is being implemented.

How will management play a role in implementing new technologies?

Management in government is multi layered, so in the first instance there may be several layers to overcome to make a decision.

Also, like many large organisations that are well resourced, they are also very departmentalised.

Industry 4.0 technologies enable a work environment to change quickly if change is embraced, this may be difficult in an organisation with defined structures of hierarchy and management. The will of management will be tested if the perceived outcome of new technology is job cuts or automation that is seen as unnecessary.

While managers in organisations may embrace the idea of technology in their personal lives, mobile phones, apps, different secure digital payment methods etc, they may be less keen to embrace this new technology in work. This could be due to lack of knowledge, or the reluctance to understand another department of the organisation. IT is often seen as an addition, rather than a resource for improvement or change. Change is also difficult in a structure geared towards stability and repeating historic practices that are well trusted and tested.

However, the reverse may also be true. Management may well see the reduced costs of home working for example as a way of managing budgets and solving issues of reduced finance from central government.

Management that seeks to embrace some key factors facing the workforce will be more likely to take on new technologies afforded by industry 4.0. There are a number of key drivers that could help make the transition and management buy in, more straightforward:

- Environmental impacts that could be reduced by increased use of technology
- Efficiency that can be achieved by the use of new technology
- Staff well being
- Using technology for training, recruitment and retention while diversifying the workforce – for example the increased amount of home working available, leading to positions being available to more employees who would not normally enter the job market, for example: disabled people.
- Greater accuracy in work practices

What positive outcomes are likely to be provided by the use of new technology?

Reduced costs after the initial outlay on equipment and training has been met

Ability to work towards more collaborative working throughout the organisation (Virtual workspaces, white boards, etc)

The ability to recruit and promote within the organisation by assessing skills via AI and data that is collected through new methods – less reliance on people making choices that are prone to bias, even when policies have tried to alleviate this problem. Using computers to harvest data that provides details on competence and skills without the judgements on personality, gender, race, ability etc.

Diversity in the workforce will lead to better outcomes for the organisation as a whole. New technologies will enable the organisation to collaborate with stakeholders on a bigger scale with enhanced results. As we know from history, many innovations come from Government funded ventures; the adoption of new technology will enable Government to work in tandem with its partners in real time.

How will new technologies be implemented?

There will need to be change within the organisation as a whole.

There will need to be an increased focus on how the organisation can not only embrace the idea of industry 4.0 available technology, but how the long term strategy of recruitment, retention and training can fully utilise its resources.

Implementation is difficult with an organisation of this scale. The organisation will need to fully educate its biggest resource as to the benefits, ie getting staff to contribute to the implementation and be part of the process. Many of the staff will already be making use of industry 4.0 tech in their personal lives, how will this translate into the work arena?

In an organisation as big as the Welsh government, the challenge faced to implement change is vast and will no doubt be countered with not only resistance, but also the logistics associated with scale. It will face a chicken and egg type scenario. Before changes can be made the results will need to be clearly defined. For that reason the change will need to come incrementally and should be focused on the areas that can make it happen.

IT will form the basis of its change, but in the meantime the need to recruit from a wider pool of talent may also need to be needed. Joint partnerships with the private sector have suffered in the past due to the entrenched thinking of Government officials, ie civil servants. With a new dawn of people focused approaches, we could see change happen via more discussion internally and the ability for employees to contribute to the process.

Much of the government focus in helping business is centred on the need to be ahead of the game when it comes to technology. Investment in fibre optic cable as a prime example. An emphasis away from the traditional road building programs and more focus on how technology can pave the way to a more sustainable and environmentally friendly future. More investment in tech industry start ups with grants and funding available. It may be true that the approach the government wishes the private sector to take is the very approach it should also adopt.

While lots of government departments contract the delivery of services out to third party providers, they will need to make use of the knowledge these partners possess.

In order for the implementation of industry 4.0 technologies to be successful, the whole culture of how government currently works will need to shift to a more collaborative and open approach. Successful private sector organisations thrive on being able to change and adapt to the market they serve. (Brown 2020)

On many levels the government now considers the public to be clients in its approach and this can be seen in the amount of information offered online and virtually. Some of these changes are a direct result of the pandemic and these

changes should be embraced, enhanced with a strategy that invites change and innovation at every opportunity.

One of the downsides to the current recruitment policy of government could actually turn out to be one of the factors that make change more palatable and even possible. Civil servants, the engine room of government and providers of the resources that implement government strategy are employed, but not in specific roles. As the roles evolve, some are lost and new ones created, this flexibility of the workforce and the transferable skills means that job losses may not be the key issue and that will serve to alleviate the pressures felt on job security etc, which may be more evident in the private sector.

In order for new technologies to be successful there will need to be a number of factors in the process:

1. Updating of job roles and descriptions to enable the data we do harvest to be accurate at the point of collection.
2. Cross party co-operation and buy in at an early stage
3. Eliminate fear of change through good communication with staff at the concept stage.
4. Increased focus on a diverse workforce to implement change
5. Funding in place before the strategy is formulated – the delay in agreeing funding may render any new tech out of date if there are delays.
6. Learning lessons from the past when technology implementation has been unsuccessful – legacy knowledge (something currently being worked on)

How will industry 4.0 technologies fit into a future strategy?

It is difficult to see how there can be a sustainable long-term strategy that is consistent without agreement across the whole political spectrum. If there was cross party agreement that funding could be ring fenced for the continued pursuit of technology advancement then a strategy could be formulated.

Long term strategy and government policy can be somewhat problematic unless all parties agree this approach is the right approach.

What is clear in the changing face of technology is that people and their roles and employment experiences are changing. Some jobs will become obsolete and other new roles will become necessary.

Short term, medium term and long term planning and strategy that has ring fenced funding so it can be done.

Conclusion

Change in organisations of this size is hard to implement quickly.

The success of such changes hinges on the ability to keep moving forward, adapting and being able to change direction quickly if the need arises.

Making use of the existing technology to its full extent would be the most cost effective use of funding. The government over the last two years has had to make sweeping changes to its policies regarding home working, due to the pandemic. The changes already made need to now encompass changes in technology to make the most of the potential that has been seen in the last two years. Office buildings in prime locations with less than a quarter of staff using them could be repurposed, sold, or rented on long leases. The cost saving could then fund the investment into new technology. Many employees will want to continue to work from home for a variety of reasons and given added IT resources they could become more productive not only in output, but thinking.

While the private sector will be able to embrace industry 4.0 technologies quickly as they emerge, the public sector will have to take a more measured approach if the transition is to be a success.

The ability for the whole organisation to function, as a whole, is possible via enhanced IT infrastructure that is now cheaper than ever to purchase or lease. The cost savings on physical assets, i.e., buildings, lease cars etc. that could be obsolete with different styles of working could free up capital resources. Government could become more customer focused, with the use of increased data capture, knowing what the public (who it serves) requires. The costs associated with data capture its clients is the key to cutting costs and refining services, leading to innovations on service delivery. Data is now much cheaper to store electronically and cost savings on a simple process of going paperless for example, would lead to more resources being available to help those most in need. While the cost of living presents the population with the greatest challenge in the last 3 decades, technology can open up pathways to gain knowledge that is up to date, rather than old systems that have been crying out for change. In particular the benefit system and the way we collect taxes and the need to collect data from sources that were not available in the past.

The mind set change needed to implement new technologies is the heart of the problem and will not be solved overnight, but if new technology is embraced as a whole organisation with common goals, through stronger communications, IT systems that are easy to use, robust and future proof is the first step.

References

(1)

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/homeandhybridworkinggreatbritain>

(2) <https://www.bbc.co.uk/news/technology-34066941>

Will a robot take my job? BBC report

"According to the [2018 Global Trends report](#) released by LinkedIn, 76% of recruiters and hiring managers think that the 4th Industrial Revolution, or more specifically automation and AI, will have a significant impact on the recruitment industry. Specialist recruiters, especially within sectors that are highly vulnerable to automation, may need to up-skill or shift their focus to a new discipline to stay in the game"

LinkedIn Global Talent Trends 2022 | The Great Reshuffle

How do we mine data of people's jobs when their job descriptions and specifications may be years out of date?

(1) *ESCO: European multilingual classification of Skills, Competences and Occupations*

Towards ESCO 4.0 – Is the European classification of skills in line with Industry 4.0? A text mining approach

Author links open overlay

panel [Filippo Chiarello^a](#) [Gualtiero Fantoni^a](#) [Terence Hogarth^{bc}](#) [Vito Giordano^a](#) [Ligab altina^b](#) [Irene Spada^a](#)

a

University of Pisa, School of Engineering, Italy

b

Fondazione Giacomo Brodolini, Italy

c

University of Warwick, Institute for Employment Research, UK

Received 26 February 2021, Revised 24 August 2021, Accepted 25 August 2021, Available online 9 September 2021, Version of Record 9 September 2021.

V. Giordano, F. Chiarello, N. Melluso, G. Fantoni and A. Bonaccorsi, "Text and Dynamic Network Analysis for Measuring Technological Convergence: A Case Study on Defense Patent Data," in *IEEE Transactions on Engineering Management*, doi: 10.1109/TEM.2021.3078231.

Brown, S. (2020) *The Innovation Ultimatum: How six strategic technologies will reshape every business in the 2020s*. New Jersey: John Wiley & Sons, Inc

AI meets labor market: Exploring the link between automation and skills

Author links open overlay

panel [EmilioColombo^a](#) [FabioMercorio^b](#) [MarioMezzanzanica^b](#)

a

Università Cattolica del Sacro Cuore and CRISP, Italy

b

University Milano-Bicocca and CRISP, Italy

Available online 29 May 2019, Version of Record 9 July 2019.

A paradigm for assessing the scope and performance of predictive analytics

Author links open overlay panel [Jeffrey T.Prince¹](#)

Indiana University, Department of Business Economics and Public Policy, Kelley School of Business, Bloomington, IN, USA

Available online 29 May 2019, Version of Record 9 July 2019.

Impact of COVID-19 outbreak on employee performance – Moderating role of industry 4.0 base technologies

Author links open overlay

panel [GopalakrishnanNarayanamurthy^a](#) [GuilhermeTortorella^{bc}](#)

a

University of Liverpool Management School, Liverpool, UK

b

The University of Melbourne, Melbourne, Australia

c

Universidade Federal de Santa Catarina, Florianopolis, Brazil

Received 25 October 2020, Revised 16 February 2021, Accepted 17 February 2021, Available online 23 February 2021, Version of Record 25 February 2021.

Schwab, K. (2017) *The Forth Industrial Revolution*. Great Britain: Portfolio Penguin.