Automation, AI and Applied Science: The New Technological Triple Threat?

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Executive Summary

Rapid advances in technologies – in areas such as robotics, artificial intelligence (AI), big data analytics, synthetic biology and clean technologies – are fundamentally changing the nature of global labour markets, economies and societies. They represent disruptions as well as opportunities for governments around the world. As the main investors in such technologies and drivers of automation, the G7 community in particular must work together to harness the benefits, and mitigate the costs, of the changing labour market. This policy brief discusses how the theme of 'Preparing for Jobs of the Future' was addressed at the 44th annual G7 Summit in Charlevoix. First, it provides background on how technological advancements are affecting jobs, pertaining to the issues of increasing automation, the changing nature of work and the emergence of new types of jobs. Second, it explains how these issues affect the G7 countries in particular and how their leaders should prepare citizens for the future of work. And finally, it discusses how the G7 have dealt with the topic in previous summits, and what credible commitments and developments leaders have made during this year's summit.

Background

The conventional historical narrative of technological advancements has been that they will make human labour redundant. This narrative of 'technological unemployment' has resurfaced many times, from the 19th century Industrial Revolution with the rise of machines and steam engines through to the 1980s with the analogous emergence and rise of personal computers. Nonetheless, the effect of technological development

has generally been to replace labour with more intellectual work.

However, increasingly many now fear that rapid technological developments and the use of AI will fundamentally challenge labour markets across the globe. Undoubtedly, these developments are affecting jobs – by creating disruptions as well as opportunities – in a number of ways. First, sophisticated machine learning and other AI functions are increasing automation and resulting in job displacement across a wide range of sectors. Currently, [occupations with the highest risk of automation](#) are manual/low-level jobs mainly in activities like construction, manufacturing, sales, services, transport, logistics, office support and so on. Yet, what determines vulnerability to automation is not so much whether the work concerned is manual/low-level but whether or not it is *routine*. This means that mid-level and some high-level jobs will increasingly be at risk from automation. The [2018 OECD policy brief on the future of work](#) stated that, 'cutting-edge technologies now open

the possibility for tasks as diverse as medical diagnosis, insurance brokerage and driving to be automated,' concluding that 'around 14% of jobs in OECD countries are currently highly automatable'.

Second, as companies harness new technologies, the very nature of work itself is changing. Workers are required to learn new skills and knowledge to use them, and adapt to new tasks and job content. As the [OECD](#) noted, '32% of jobs in 2018 could face substantial change in how they are carried out'. For example, the use of AI is spreading beyond the technology sector and changing the ways non-tech companies operate. While AI involves computers using vast quantities of data to find patterns and make predictions, it is changing a multitude of tasks and transforming traditional functions within sectors such as [management, operations and marketing](#).

And, third, new technologies are creating the opportunity for new jobs to emerge. While technological disruption may destroy some jobs, it is also

spawning new industries. For example, some digital technologies have fuelled the rise of new firms that challenge incumbents – notably the car-sharing app Uber and the online rental platform Airbnb. In addition, new jobs will be created to constantly update and maintain new technologies, especially in areas involving computer programming and data mining.

How Should the G7 Prepare for Jobs of the Future?

Technological developments evidently present both opportunities and challenges for governments globally, but especially for the G7 countries, which are investing heavily in them and moving towards automation. This trend among G7 members (and especially in the US) is partly due to competition with China, which intends to become the world's AI leader in technological terms. The G7 members also have to deal with ageing populations and a declining workforce: this is especially the case in Japan where AI is playing an increasingly vital role in supporting the economy. In any case, the G7 are experiencing considerable changes to their labour

markets. Overall, studies suggest that around 47% of workers in the US currently have jobs with a high risk of potential automation, with the figure standing at 49% of the workforce in Japan and 35% of the workforce in Britain (where more people work in creative fields that are less susceptible to automation). Thus, there is a pressing need for the G7 to work together, and also with the major tech firms, to prepare for the future of work. There are, in all, three key areas which the G7 should focus on.

First, there is a need for members to provide the skills and training for people to adapt to new technologies and/or enter new jobs. This will invariably require substantial changes to education systems. G7 members should put more emphasis on vocational and technical education, particularly the Science, Technology, Engineering and Maths (STEM) subjects. The fast rate of technological change means that education and training must also be adaptable and responsive. This means members should set up incentives to encourage effective retraining and lifelong

learning so workers can stay current. Germany sets a good example for the G7 community in terms of its renowned [apprenticeship programmes](), and its ability to sustain high levels of manufacturing employment despite increased mechanisation. At the same time, and as one of the core themes of this year's summit, the G7 must ensure the inclusion of women in the development of education systems. Women are currently underrepresented in the STEM subjects. For example fewer than 13% of practicing licensed [engineers]() in Canada are women. As gender inequalities in work and society persist, the G7 must promote equality of rights and opportunities for men and women, and especially encourage more women to study and pursue careers in the STEM subjects.

Second, there is a need for the G7 to improve education and training in jobs which robots/AI cannot do. AI raises the value of tasks that can only be done by humans, most notably those involving creativity, empathy or social interaction, and so members should emphasize teaching these 'soft' skills in education. As more tasks become susceptible to automation, the tasks where human skills are most valuable will also constantly shift. There will be an increasing need for workers to improve '[character skills]()' – such as perseverance, sociability and curiosity – which are highly valued by employers and correlate closely with employees' ability to adapt to new situations and then acquire new skills. It is arguable that truly diverse teams obtain these 'soft' and 'character' skills, partly because women are often more oriented towards empathy and collaboration, and they complement essentially male forms of competitiveness. If there were more diversity in organisations, especially in tech firms, then tech-based products and services might have more 'humanity' as well as being more efficient. Therefore, it is imperative that the G7 focus on gender equality and boosting women's participation in the labour market, especially since it is a key component for creating strong economies and more progressive societies.

Third, the G7 will need to ensure that technological changes are adequately governed and regulated. The sheer speed and scope of technological developments often result in their activities operating outside of conventional laws. The G7 will need to ensure that laws remain up to date and relevant to new technologies. This will require a collaborative effort from all members, particularly in developing laws and measures that require international co-ordination, such as data protection and privacy. The EU has made steps towards greater data privacy measures with the General Data Protection Regulation (GDPR). However, with major tech firms continuing to collect data, and with the development of more sophisticated algorithms, the G7 must work together to develop international data governance standards to ensure issues around ethics, privacy and security are all addressed.

Tech and G7 Summitry

The theme of 'Preparing for Jobs of the Future' is a relatively new issue for the G7 community. While it was raised at the 2017 Taormina Summit, leaders did not establish any substantial commitments or measures for dealing with changes to the labour market brought by technological developments and automation. The theme was not really considered a pressing issue, especially since other issues such as terrorism and the Syrian refugee crisis were at the forefront of the discussions. Leaders mainly resorted to vague commitments about dealing with the social challenges raised by automation, and only really agreed that there was a need to 'rethink the future of work and education'.

At this year's summit in Charlevoix, however, there were a range of developments covering the theme of 'Preparing for Jobs of the Future'. If we look at the G7 Employment and Innovation Ministerial Meeting from earlier in the year, and also the final Communiqué, we can see three major commitments that offer promising potential. Embedded in them was also the critical focus on ensuring gender equality and women's empowerment.

The first major commitment addressed the need to ensure workers have access to the skills and education necessary to adapt to changing labour markets. G7 leaders committed to promoting innovation through lifelong learning, apprenticeships and vocational learning. For example, Canada announced the creation of up to 500 student work placements in AI over the space of three years. Leaders also committed to collaborate with each other on creating work-integrated learning strategies and programmes. Specifically, they pledged to expand training and education in the STEM subjects, with a particular focus on including girls and women. The Communiqué also addressed other barriers to women in the workplace. These included ensuring equal opportunity for women to participate in all aspects of the labour market, and in leadership positions, by eliminating violence, discrimination and harassment within and beyond the workplace. Employment ministers established an 'Employment Task Force' made up of international organisations, labour organisations

and businesses to work with a digital 'Future of Work Forum' to provide recommendations on best practices and policy approaches to these issues. At the same time, leaders began initial steps to improving education and training in soft skills. Employment ministers advocated the importance of investing in digital literacy, foundational and social skills; as well as adaptable social protection systems to support those in non-standard forms of work. Together these measures present strong potential for preparing for future jobs both within the technology sector and also those requiring more social skills.

Second, leaders committed to working closely with outside partners and businesses in preparing for changes to the labour market. Employment ministers agreed to foster a dialogue among governments, social partners, private sector, and educational institutions. They identified measures to support workers to adapt and transition to new jobs, in particular jobs operating on the digital economy (e.g. online platforms). Through collaborating closely with businesses,

leaders will be able to understand what skills, training and knowledge will be required for people to change jobs and adapt to new job content. In addition, leaders can ensure that businesses provide equal opportunities to women and underrepresented groups. This commitment is thus key in preparing people for the rapidly changing labour market, by ensuring effective training and equal participation.

The third major commitment addressed the challenges and opportunities posed by AI specifically. All members endorsed the [Charlevoix Common Vision for the Future of Artificial Intelligence](). This commitment is based upon the G7 Ministerial Statement on AI and the multi-stakeholder, human-centric vision outlined in the [2017 G7 ICT and Industry Ministers' Torino Declaration](). The G7 made substantial progress on the topic of AI, particularly due to their 'human-centric' approach to the issue. Leaders established measures to ensure AI is ethical and works in the best interests of all humans and protects their rights. These measures addressed issues surrounding the

privacy, security and safety of AI. Specifically the [Ministerial Meeting]() outlined the development of appropriate legal regimes; the enforcement of privacy legislation and communication of enforcement decisions; more investments in cyber-security; improving digital security in 'the internet of things' and cloud services; and developing codes of conduct, standards and guidelines for AI. Crucially, leaders also provided much needed clarity on the issues surrounding data protection and privacy. They all committed to informing individuals about how their data may be used by AI systems, and committed to [continued research and development by industry in safety, assurance, data quality, and data security.]()

Underlying AI measures was also a [much broader commitment]() to gender equality and women's empowerment. Leaders committed to support and involve women, underrepresented populations and marginalized individuals as [creators, stakeholders, leaders and decision-makers]() at all

stages of the development and implementation of AI applications.

Conclusion

Overall, a good degree of progress was made at the G7 Summit in Charlevoix with regards to preparing citizens for the future of work. There was a focused commitment from all members to understand how technological developments in general, and AI in particular can disrupt labour markets. The 'human-centric' approach to AI was a particularly progressive and effective development made by all members. This approach allows the G7 to produce measures to mitigate the potential negative effects from technologies, through regulating and protecting ethics, privacy and security, and also ensuring equal participation for men and women in the workplace. Whilst substantial commitments were made to improving education and training in the STEM subjects (including women's participation), there should have been more significant commitments made to developing soft skills in education and training. As already mentioned, as automation increases, skills inherent only to humans will become more vital and valuable, and thus G7 members should have placed the development of soft skills higher on the agenda. Finally, the G7's commitment to working closely with business was also a crucial development. As the most powerful firms today are the major tech companies – including Facebook, Amazon and Google and so on – it is imperative that the G7 continue to work closely with them. This will ensure not only that governments can adapt education systems, but also that they can ensure effective governance and regulation of these firms and their activities.

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