The many worlds of work in the 4.0 era in Europe

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Introduction

In the 2010s, the long-lasting academic and political debate about the future of work once more became more intense as it started to be dominated by a discussion of ongoing technological change and the imminent and potentially profound effects of digitalisation, in particular regarding the closer interaction between quickly-advancing digital technology and employment, focussing on the question of how much paid work and of which kind would remain to be done by humans as technology progresses.

Over the years, many of us have got used to widely-shared expectations of an accelerating change in the structure of both the economy and the types and number of jobs available, with some fear of a disruptive element that would put major segments of employment at risk of extinction. While the frontier of applicable technological solutions is clearly dynamic, it is not clear how fast it is moving and which tasks can actually be substituted in terms of technical feasibility and practical application. The development of artificial intelligence in particular can potentially and partially overcome the so-called Polanyi's paradox of tacit human knowledge (see Autor 2015). This is needed to perform tasks at different levels of complexity, which often appear quite easy for humans, but are difficult to programme systematically in a step-by-step manner. While this frontier is moving fairly quickly for different tasks, human capabilities remain essential in the fields of non-routine abstract, interactive, creative and manual tasks still seem quite hard to replicate and replace fully. For the time being, and potentially also in the medium and long-term, we can still reasonably assume that digital technology is not likely to bring human work close to extinction. Instead, it leads to job risks in some sectors and occupations, while creating new potential for job growth and better job quality in occupations that are complementary to technology rather than substituted by it (Frey and Osborne 2013; Autor 2015; Acemoglu und Restrepo 2019). New occupational profiles and more options for participation and autonomy will emerge, challenging the way work is being performed and organised in a fundamental sense.

Over time, work done by human beings will most likely continue to migrate to areas where non-automatable tasks are dominant and will take an ever larger share of total activities performed in individual jobs. This is, in fact, not a new phenomenon at all, as job profiles have been undergoing change for a long time, as have broader economic sectors and firms.

Consequently, the digital transition brings about highly-diverse implications for certain job profiles and occupations on an international level. The risks and potential for work in the digital era are distributed unequally in this respect, pointing to the crucial role of institutions that facilitate or inhibit certain pathways to adaptation. Empirical research shows that countries, which are more advanced regarding the digital edge, have a lower risk of further substitution, as they have a higher share of workers with high and adaptable general and digital skills that are needed for maintaining high employment levels. Work is then organised in a way that distinguishes less strictly between supervisory and operational tasks (Nedelkoska and Quintini 2018). Therefore, from a policy point of view, but also from a business and an individual perspective, the main challenge is to identify perspectives for human work that make it more resilient and potentially more attractive, in terms

of quality. Humans need to become more compatible to technological solutions so that their capabilities can continue to contribute crucially to productivity.

While this is valid for all kinds of work, there are large differences between broad categories of the workforce. To put simply, and in line with research on labour market polarisation, it makes sense to distinguish between three segments of work that react differently to technological advances, implying some degree of employment polarisation, where the severity depends on the institutional environment (Goos, Manning and Salomons 2014; Salvatori and Manfredi 2019).

The mid-level segment: vulnerable, but adaptable

The main issue is the structural pressure on the mid-level segment, consisting of many administrative and manufacturing jobs, often carried out with a vocational degree. This segment is particularly large and well protected institutionally in many European countries, relative to other segments. It is largely dominated by permanent, regular employment that forms the backbone of contribution-based social protection systems, with above-average rates of collective bargaining coverage. Yet, at the same time, it tends to be characterised by an above-average share of routine work and therefore potentially automatable tasks. To avoid long-term decline and job downgrading, which is a real threat to many of these jobs, the protection of this segment requires an upgrading strategy of job profiles and the actual use of skills. Given the strong institutional framework regarding collective bargaining, firm-level worker representation and typically standard employment, the general institutional environment facilitates skill adaptation and new models of negotiated flexibility, while still requiring some innovative business ideas from firms in these sectors. In fact, excess capacities that medium-skilled workers possess, given their vocational training and subsequent work experience, can pave the way towards an enlargement of skills that allows for the execution of more complex tasks. This is a main feature of formal apprenticeships, but, of course, it can be developed further through continued education alongside work and better links with tertiary education. Much is being done through the initiative of firms that want to keep their core workforce up to date on technological progress and see it as a crucial factor for business development. However, larger firms tend to have better capacities to manage such adaptational processes than small and medium-sized firms, and non-standard workers tend not to be equally integrated into continued training. Complementary support may come from sectoral agreements between social partners that still tend to be strong in this area as well as public labour market policies.

The mid-level segment was also protected in a peculiar way by the recent pandemic shock. Short-time work was again deployed heavily to stabilize jobs and income for those unable to work from home, trying to avoid dismissals, or at least postpone them (for the time being), for the core workforce. This is particularly relevant where skills are specific, and where a return to existing jobs is still perceived as a valid option. This might not hold in all cases, especially if the temporary decline becomes associated with a long-term change in demand, increased competition in markets and new technologies. In such cases, short-time work will not be sufficient, as is already the case with those workers that are less attached to individual

employers due to more replaceable skills and non-standard work arrangements. It seems fair to say that a large part of the mid-level segment is most affected by the risk of substitution but is typically well embedded in collective protection systems that can, in principle, also provide support for adaptation if properly used.

The whole mid-level segment does not fit easily into this box, as some occupations are characterised by a larger proportion of non-automatable tasks. The craft sector has shown a broadly stable development in terms of jobs and pay. Many non-routine manual tasks in construction-related and repair jobs are notoriously hard to automate and rely on the ability to improvise and work flexibly. This makes skill formation and work experience important and provides an insurance against downgrading, but, despite decent pay in these occupations, craft apprenticeships are losing some of their traditional appeal. The same is true for medium-skilled care occupations, where there is growing demand but also a notorious labour shortage due to adverse working conditions. Hence, working conditions and professional perspectives matter most for crafts and care in order for them to become more attractive.

The upper segment: autonomy as a productive factor

At the other end of the spectrum, more highly-skilled workers are in an advantageous position due to the dominance of non-automatable tasks, even though the technological frontier is moving forward. Individual capacities to cope and adapt to change over time still seem to be sufficient. These analytical, interactive and creative jobs have been growing continuously, creating more job alternatives for workers with the relevant skills, but have also gained in average income - not always high income - and job quality in exchange for demanding requirements and growing work intensity. The frontier of human work in this segment is to stimulate creativity and engagement that plays a crucial role in developing and adapting business models to new products and services, but also rethinking the organisation of work itself in order to extract the most out of the skills workers possess. It is no coincidence that demands for more autonomy and new modes of work have gained a lot of attention and have become more attractive for many working in this segment. Firms have eagerly taken up this trend in order to promote commitment and motivation through modern work environments and attempts to formulate a wider purpose for their business. Because of this, experiments with 'new work' arrangements that try to reconcile flexibility, autonomy, creativity and innovation have become a prominent leitmotiv for the highly-skilled workforce.

While a considerable share of workers in the upper part of the labour market still rely on standard employment relationships that provide them with stability and security, often combined with additional benefits, they also typically enjoy a higher level of autonomy at work. Collective regulation is less prominent here, as many new and smaller firms are not fully integrated into traditional industrial relations and since many experts and professionals are not really inclined to unionise. Trade union membership tends to be lower than with the mid-level segment. Ultimately, this means that working conditions depend more on the individual power to negotiate. However, the situation is more standardized in public sector jobs in this segment, i.e. health, research or education, and is also much more diverse with

respect to the self-employed, who experience a higher demand to be adaptable to market changes and value individual autonomy higher, on average, than stable earnings, despite the greater risk of economic vulnerability. The competitive self-optimization of skilled workers, demanding career ambitions and intensified 'job crafting' are not constrained to the formally self-employed. Currently, 'agile' ways of working are broadly perceived as a way to stimulate creativity and increase the speed of business innovation and imply a large degree of self-organisation and individual adaptability for workers in traditional, long-standing employment relationships. Earlier observations of a trend towards an 'entrepreneurial' worker have become even more relevant recently with the general trend towards project-based work and frequent organisational changes. Hence, larger degrees of freedom also imply more responsibility, and intense and stressful work.

COVID-19 has brought old and new inequalities and vulnerabilities to the forefront. The current shock interacts with long-standing patterns of technological development, questioning or confirming some trends but also stressing the need to address long-standing vulnerabilities. This holds true in particular for sectors with a high share of self-employed workers, e.g. those in creative and cultural activities, where we had seen a robust expansion, due to largely automation-proof tasks. These workers, however, suffered diverse incomes and patchy social protection in the past due to marginal integration into the welfare state. These highly visible and articulate sectors have now had to rely on ad hoc governmental measures providing more or less well-designed support for small businesses and freelancers. Most other professionals and expert-level workers in regular dependent employment could move towards remote work and continue to work from home, but their jobs are otherwise quite resilient in terms of employment and income stability (Fana et al. 2020). Here, both for firms and for workers, digital technologies were the main tool to ensure business continuity.

The lower segment: Elementary, but persistent

The situation is different in areas that have grown steadily as a response to demand shifting to private services that are interactive, manual and local. These areas are hard to automate when labour is not scarce. This concerns many jobs in the logistics and delivery sector that continued to grow during the pandemic, while employment in the leisure industry and in tourism, while on a long-term growth trend, was severely affected by mandatory closures. Despite some advances in self-driving vehicles or robotic delivery, many jobs in these sectors can still be perceived as being relatively resilient to automation. While full automation is still a more long-term perspective, technological innovations play a role in the current situation. Elementary jobs tend to be a major area for the stricter digital surveillance of workers in a tightly-controlled setting. While human work is still indispensable for the time being, it tends to be integrated into a technologically-driven optimization process. This is also true for consumer services that are administered and coordinated via online platforms.

These sectors, while less at risk of substitution, tend to be much less integrated into collective bargaining and regular employment, while economically-dependent self-employment, marginal part-time work or on-call work play a major role. At the same time, there tends to be very limited room for individual negotiation due to low and rather general skills, which means individual workers are more

likely to become replaceable. Both the quality and quantity of jobs in this segment is more or less directly influenced by state intervention. This holds true for statutory minimum standards regarding working conditions, e.g. via a minimum wage, restrictions on temporary agency work or the regulation of legal grey zones regarding vulnerable self-employment. It equally requires rather publicly-supported training policies administered mostly through active labour market policies and incentives given to employers in order to counter the general tendency of underinvestment in skills in this segment. Therefore, governmental policies can set an outer frame under which these types of jobs operate.

Overview table

Segment	Upper	Mid-level	Lower
Broad category	Experts and professionals	Skilled workers	Unskilled/ semi-skilled workers
General trend	Growth	Stagnation/decline	Growth
Substitutability	Low	High	Low / medium
Autonomy	Rather high	Limited	Very limited
Pay	Rather high	Medium	Low
Typical jobs	Researchers, engineers, consultants	Clerks, machine operators, craft workers	Logistics workers, cleaners, waiters
Tasks	Non-routine creative, analytic, interactive	Manual or cognitive routines + some non-routine add-ons	Non-routine manual or interactive
Skills	High, general	Medium, specific	Low, general
Training	Academic	Vocational	Elementary
Main regulatory level	Individual	Collective	Statutory
Main challenges	Purpose, performance	Stability and upgrading	Basic quality

What next? Policies matter

As comparative research shows, the broader public policy environment is crucial to ensure a transition to productive jobs that are hard to automate (Thelen 2021; Wren 2021). The overall institutional setting is an important factor facilitating certain paths of adaptation towards productive and more automation-resistant work. Even in cases where individual bargaining power matters most in negotiating on work processes and working conditions, the institutional environment is essential to the extent that it provides the fundamental capacities for individual negotiation and sets some orientation marks even when they are not legally binding. Even though firms have a strong self-interest in raising productivity through skill formation and effective skill use (at least for their core workforce), the overall institutional settings can either facilitate a high road or a low road of adaptation and help stabilize and broaden access to decent jobs and skill formation. If institutions

insist on cheap and precarious labour strategies, more sustainable, productive and satisfactory jobs will hardly emerge and survive. Hence, discouraging firms to take the low road can help create better jobs at lower levels of inequality. This implies a strong emphasis on guaranteeing a general and decent standard of working conditions, including wages and working time, for all workers.

Both digitalisation and the pandemic have already exhibited unequal consequences for certain sectors and occupations, pointing towards a priority for policies that should, on the one hand, reduce unequal access to social protection and, at the same time, erase barriers to adaptation so that transitions to better and more resilient work are facilitated. Many of the potential solutions have been long-standing policy priorities, which have been heavily debated but not fully adopted and implemented. Social protection is important for those at risk of losing their job or undergoing longer phases of short-time work. This holds true not only for dependent employees but also for many of the self-employed. It does not suffice to refer them to minimum income support or voluntary types of unemployment insurance. Rather, a forward-looking policy would be to design unemployment insurance that also works for the specific situation of the self-employed and those with hybrid employment records. More status-neutral social policies, that do not exclude certain categories of workers and allow for a combination of different types of contracts, will also help create a less segmented labour market.

While employment protection and short-time working schemes stabilize jobs, we need to find better solutions to strengthen the adaptability of firms and workers when obsolete job profiles and business models no longer work – as appears to be the case, e.g. in the automotive, event or tourism industry at the moment or, more substantially, in retail trade, banking or insurance, either by updating skills for the job or preparing positive transitions to new jobs in a different occupation or sector that have a positive outlook in terms of job quantity and job quality. Hence, skill formation and the creation of individual capacities to make the most of non-automatable abilities are the main areas for public social investment in a very broad sense, but even more so in medium and low-skilled jobs when individual and firm investment are lacking. In particular, public support is needed to ensure a basic level of skills for everyone that is sufficient to enter the labour market. In addition, regulation and funding of further education needs to ensure feasible individual trajectories that keep pace with a changing labour market.

For the foreseeable future, what we need is timely mobility from declining industries and firms to areas with stronger and more robust labour demand. To achieve that, we need a regular assessment of the skills available and the skills in demand and an early identification of feasible transition pathways that work for individuals, broadening access to adult learning way beyond those with strong individual capacities to cope with change or training provided by their employers. This needs to be as universal as the social protection side.

These topics are not new, but have not yet been realized, despite many years of debate. However, the digital transition and the pandemic have created a sense of urgency to reduce barriers in terms of qualification and in terms of differences by employment type, calling for more status-neutral regulation, training and social policies.

References

- Acemoglu D and Restrepo P (2019)
  Artificial Intelligence, Automation, and Work
  The Economics of Artificial Intelligence: An Agenda, edited by Ajay Agrawal, Joshua Gans and Avi Goldfarb
  Chicago: University of Chicago Press, 2019, pp. 197–236.

- Autor D.H. (2015)
  Why Are There Still So Many Jobs? The History and Future of Workplace Automation
  Journal of Economic Perspectives, vol. 29, no. 3, Summer 2015, pp. 3–30.

- Fana M, Milasi S, Napierala J, Fernandez-Macias E and Gonzalez Vazquez I (2020)
  Telework, work organisation and job quality during the COVID-19 crisis: a qualitative study
  JRC Working Papers on Labour, Education and Technology 2020-11, Joint Research Centre (Seville site).

- Frey C and Osborne M (2013)
  The Future of Employment: How Susceptible Are Jobs to Computerisation?
  Oxford Martin. 114. 10.1016/j.techfore.2016.08.019.

- Goos M, Manning A, and Salomons A (2014)
  Explaining Job Polarization:
  Routine-Biased Technological Change and Offshoring
  American Economic Review, 104 (8): 2509–26.

- Nedelkoska L and Quintini G (2018)
  Automation, skills use and training
  OECD Social, Employment and Migration Working Papers 202, OECD Publishing.

- Salvatori A and Manfredi T (2019)
  Job polarisation and the middle class: New evidence on the changing relationship between skill levels and household income levels from 18 OECD countries
  OECD Social, Employment and Migration Working Papers, No. 232, OECD Publishing, Paris.

- Thelen K (2021)
  Transitions to the Knowledge Economy in Germany, Sweden, and the Netherlands, in: Hassel A, Palier B (eds.), Growth and Welfare in Advanced Capitalist Economies
  Oxford: Oxford University Press

- Wren A (2021)
  Skill formation, equality and the welfare state, in Hassel A., Palier, B. (eds.), Growth and Welfare in Advanced Capitalist Economies
  Oxford: Oxford University Press

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