

# WORK IN THE DIGITAL AGE

Max Neufeind  
Jacqueline O'Reilly  
Florian Ranft

**CHALLENGES  
OF THE FOURTH  
INDUSTRIAL  
REVOLUTION**

## **Praise for *Work in the Digital Age***

*Work in the Digital Age* is a superb collection of articles that together provide a wide-ranging, comprehensive analysis of the challenges and opportunities for labour in a period of rapid technological change. This volume is essential reading for academics and policymakers alike’.

—**Kathleen Thelen**, MIT

‘Everybody is in favour of technological innovation and modernisation, yet not enough research and discussion is devoted to the actual consequences for society. *Work in the Digital Age* brings together leading European academics and thinkers to help us find our course, as the future hurtles toward us at breakneck speed’.

—**László Andor**, European Commissioner for Employment, Social Affairs and Inclusion (2010–2014)

*Work in the Digital Age* should be required reading for the many groups around the world that are being formed to plan for the future of work in the age of digitisation. These European experts explore the broad terrain of private actions, public policies, and social dialogue needed to ensure that technological innovations can be shaped to benefit society while providing adequate compensation and adjustment opportunities for those who might

otherwise bear the costs. As such, they lead the way for the rest of us’.

—**Thomas A. Kochan**, MIT Sloan School of Management

‘*Work in the Digital Age* is a valuable contribution to understanding how technology is disrupting the way we work and threatening the safety net that has long undergirded successful economies. We need a clear vision for the path forward, and this book helps provide that’.

—**Steven Hill**, Berlin Social Science Center

‘This edited volume provides a very valuable overview over the general discussion about the potential impact of new technologies on the future of work. The book is unique in the way in which it brings together a series of case studies showing how the topic is discussed in different countries. It is essential reading for everybody interested in this crucial public policy debate’.

—**Henning Mayer**, Social Europe

‘The transformation of employment in the digital era raises fears of insecurity, technologically induced unemployment and more stress at work. The political and academic discourse of digital technology and its impact on work is often alarmist and resorts to drastic policy recommendations. The collection of essays in *Work in the Digital Age* is a highly welcomed contribution that offers a rich understanding of the complex interaction between the role of new technologies in the world of work and the welfare state. There will be no simple solutions to maintain good work and a good society in the digital age. Policymakers have to shape it themselves and need high quality intellectual input of this sort’.

—**Anke Hassel**, Hertie School of Governance  
and Institute of Economic and Social Research (WSI)

‘*Work in the Digital Age* is a cutting-edge collection of articles on the future of work, offering a comprehensive treatment of current debates regarding the effects of new technology on employment, labour relations and inequality. As the authors

make clear, the implications for public policy are profound. This book is an essential guide to the challenges of equity and policy that are emerging as digital technologies reshape the workplace’.

—**Michael J. Handel**, Northeastern University

‘The editors of *Work in the Digital Age* have done the rest of us a great service in bringing together this remarkable group of contributors. Carefully balancing broad themes and detailed country studies, the collection is a must-read for scholars and students from multiple disciplines interested in how current technological change is affecting work and employment’.

—**Christian Lyhne Ibsen**, Michigan State University

‘*Work in the Digital Age* is the major contemporary challenge. This book not only provides access to the outstanding trends, developments and challenges in the world of work and how to deal with them, it also provides country-specific access to the topic of digitalisation through country case studies’.

—**Wolfgang Schroeder**, University of Kassel

‘How does the process of digitalisation transform the nature of work? Do the new technologies lead to labour disruption including rising wealth inequality or increasing regional disparities? Do they offer the potential for new and exciting business opportunities and economic growth? What are the major challenges for policymakers? This excellent volume offers a range of compelling answers to these pertinent questions by some of the world’s leading labour market experts’.

—**Jette Steen Knudsen**, Fletcher School of  
Law and Diplomacy, Tufts University

‘We are living in a time of major change in the labour market. Automation is altering both the amount and the nature of work as well as the skills, protections, and opportunities of people in all corners of society. Coming alongside unprecedented advances in human health and the ageing of populations, these changes throw up many challenges for policymakers. The proposals outlined in

this impressive collection are an important contribution to the conversation about how to enable all citizens to have the opportunities they need to succeed in the new world of work’.

—**Seamus Nevin**, Institute of Directors, London

‘The thematic arc of *Work in the Digital Age* makes clear that many futures of work are possible – and these futures are the consequences of choices that will be made by governments, businesses, technologists, educators, unions and activists working at the grassroots. Prior periods of technological innovations ushered in great social changes as people explored the uses and functions of new tools and systems. What is singularly remarkable about the digital age is that innovations are driving unpredictable, black swan events that are occurring at increasing frequency, in many forms, on multiple fronts and at a global scale. The challenge for policy makers is to see past each new technological event and, instead, establish and articulate an enduring set of principles that will guide the uses of unimagined technologies to the benefit of people and societies. *Work in the Digital Age* provides a great foundation that will help policy makers meet this challenge’.

—**Peter A. Creticos**, Institute for Work & the Economy

‘This is a refreshingly broad and original exploration of the current upheaval in work and employment. The power of the contributions by remarkable team is greatly enhanced by their brevity. It will be important in shaping the gathering international debate on policy choices’.

—**William Brown**, Cambridge University

‘Going beyond the buzzwords *Work in the Digital Age* provides a comprehensive analysis of how emerging technologies reshape the workplace and the labour market. Particularly the comparative perspective is highly valuable for academics and policymakers. This book is a major reference point in ongoing discussions on the future of work’.

—**Professor Dr. Werner Eichhorst**,  
IZA – Institute of Labor Economics

# **WORK IN THE DIGITAL AGE**

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***Challenges of the Fourth  
Industrial Revolution***

**Edited by  
Max Neufeind, Jacqueline O'Reilly  
and Florian Ranft**



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## GERMANY

### ***Rebalancing the coordinated market economy in times of disruptive technologies***

Sven Rahner and Michael Schönstein

*The views and opinions expressed in this chapter are those of the authors and do not necessarily reflect the official policy or position of any agency of the German federal government.*

**G**ermany takes a prominent place in the global debate on the future of work. This debate has been triggered by the widely held belief in Anglo-Saxon countries and Germany that digitalisation could lead to a massive loss of jobs (Brynjolfsson and McAfee 2014; Ford 2015). Domestically, the discourse evolved from a technology-focused debate around Industry 4.0 or the fourth industrial revolution to a much wider societal debate on Work 4.0. This was to a significant extent driven by a large public consultation process run by the German Federal Ministry of Labour and Social Affairs (Bundesministerium für Arbeit und Soziales; BMAS) from 2014 to 2016, culminating in a white paper *Work 4.0* (BMAS 2016). A key element of this white paper is the suggestion of a more responsive labour and social policy system that fosters decentralised innovation, based on targeted labour market intelligence and wide stakeholder participation in iterative policymaking processes. Elements of this

debate also made their way into international processes, such as the G20 (2017), the ILO Future of Work Initiative (2017) and the revised version of the OECD Jobs Strategy (OECD 2018, forthcoming).

The German debate on the future of work points to a moderate overall impact of the digital transformation on employment in Germany (see Arnold et al. this volume). Nevertheless, many analysts wonder whether the significant structural shift in the German economy and the labour market could potentially erode the foundations of German social policy. Beyond questions about the magnitude of employment effects, evolving employment and labour relations as well as resulting inequalities are front and centre in this debate. The fear of a ‘social problem’ posed by an army of ‘digital day labourers’ is connected to the international discourse on the risks of reaching a level of social inequality that it is socially and economically dysfunctional (Atkinson 2015; Fratzscher 2016). Digitalisation could further aggravate the already existing divide within society and accelerate the momentum towards widening inequality. This involves a growing inequality in the distribution of wealth, a widening gap in incomes, a reduction in the number of jobs subject to social security contributions, and more precarious job conditions right up to the emergence of a new lower class at a greater risk of poverty and of certain groups that have inadequate access to social security. At the same time, in a ‘society of singularities’ a small elite is benefitting from the advantages of digitalisation, such as greater personal freedom in structuring work as well as cultural distinction (Reckwitz 2017).

This chapter summarises the challenges to the German model of differentiated quality production apparent in this debate, and subsequently outlines the three key conflicts that determine the ongoing debate. The final section sets out policy options for the future.

## **CHALLENGES TO THE GERMAN MODEL**

Germany’s coordinated market economy (Hall and Soskice 2001) is characterised by companies focusing on a fixed set of high-quality

products, a sufficient number of skilled labourers, a long-term relationship between companies and employees, and a strong relationship to a certain place of production. As Kirchner and Beyer (2016) point out, the very logic of digital platforms is losing these traditionally tight couplings. Germany's diversified quality production (Streeck 1997) and the disruptive, growth-obsessed world of digital platforms are far from a natural fit. Nonetheless, major players of the platform economy try to penetrate the German market and German costumers ask for the convenience they provide. Therefore, the progressing digitalisation of the economy and the world of work are putting the German economic and social model to the test. This has already been affected by an increasing degradation since the early 1990s. Besides the domestic (endogenous) factors, like the consequences of the German reunification and demographic change as well as trends towards knowledge intensive services, international (exogenous) change processes, like deeper European integration and globalisation, have a sustainable impact on successful productivity constellations. Shortages of skilled labour, the decrease in the number of companies and employees covered by collective agreements, and the increase of atypical forms of employment are symptoms of this development. The digital structural change is boosting the problem of the necessary skilled labour supplier and threatens to further erode the social market economy's promise of social balance.

A central structural component of Germany's coordinated market economy is a functionally networked state that operates incrementally and through negotiation (Czada 2000), and employs initiatives to steer the adjustment of the overall political and economic system so as to stay in step with political and social change. Its policy space is restricted by institutional factors, such as the close political coordination between individual states and between states and the federal government, as well as international factors such as European integration and economic globalisation. Schmidt (2006) speaks of "the policy of the middle way", which features an institutional order that tends towards the middle as a characteristic of German domestic government activity and as a reflection of the necessity for the

government and the opposition in the Bundestag and the Bundesrat to cooperate on major legislative proposals.

In this context, the question arises in particular to what extent the political forms of cooperation and coordination in the German model can pave the way towards achieving social balance in the process of transformation. A further question is what “institutional complementarities” (Hall and Gingerich 2004) can be identified between the traditional structures of the German model that have grown through time and the new parameters set by the evolution of a digital economy, and if “synergy effects between the different institutions” can be observed (Vitols 2006, 50).

The ongoing digitalisation in the German labour market changes sectors, jobs and tasks. Overall, the German labour market is in good shape. Labour market forecasts look mostly at a period until 2030 and agree that the number of workers is going to remain roughly stable until then, with a slight increase considered likely by some. However, there will be profound structural changes in supply and demand of labour behind this apparent stability.

On the demand side, we see the following:

- Employment will shift across sectors. There will be between 750,000 and 1 million jobs lost in some sectors and a similar number of new jobs created in others. We will see significant employment growth in sectors like business services, health and social care, while the number of jobs will decrease in sectors like public administration, retail or gastronomy. Automation plays a role in this – the OECD forecasts that about 12% of jobs in Germany are likely to be automated over the coming years (Arntz, Gregory and Zierahn 2016; see also Arnold et al. this volume).
- The same OECD study estimates that another 31% of jobs will see significant change because of digitalisation. In addition to employment shifts, job profiles across all sectors and qualification levels are evolving as a result of technological change. This will require skills adaptation across the whole spectrum of qualification

levels and sectors. Whereas technical skills will remain important, increasingly socio-emotional and creative skills will be in demand (Patscha et al. 2017).

Demographic change continues to be a crucial challenge to labour supply:

- A key difference is between rural and urban regions. At an aggregate level, we see that federal states (*Länder*) with more rural areas, like those in the east of Germany, are projected to lose 10–15% of their active population by 2030, while the urban centres will remain stable, and some city states (eg Berlin, Hamburg) will continue to grow.
- In addition, as a result of demographic change, workers are older than in the past, on average, almost everywhere. The average age of the population in Germany today is 43 years, and it will rise to 47 years by 2030 – in large parts of eastern Germany it will be 50 years by then. Crucially, the diversity of workforces will increase not just through the different ethnic backgrounds of workers – in 2016 the number of people with a migration background living in Germany peaked at 18.6 million overall or 22.5% of the population (Statistisches Bundesamt 2017) – but also through having older and younger workers collaborating in teams with the older ones in the majority. The dynamics are also interesting because our younger cohorts tend to enter the labour market at a higher level of formal qualification than earlier ones.

In essence, what we see is an increasingly dynamic labour demand meeting an increasingly diverse and older workforce. Therefore labour market policies need to aim much more at preventing mismatches arising from the disparate development in labour supply and demand than they did in the last decades and be based on a deeper understanding of the underlying mechanisms of work and society in the years to come.

## **DICHOTOMIES IN THE GERMAN DEBATE**

Against the backdrop of these challenges, three interrelated dichotomies, if not conflicts, characterise the current debate on the future of work and welfare in Germany. They comprise the relation of jobs and incomes, the relationship between humans and machines, and the relationship between work and leisure.

### **THE INCREASING DICHOTOMY BETWEEN JOBS AND INCOME**

There is an increasing dichotomy of jobs versus income, resulting in technology-driven inequalities. Most analyses of the German labour market find an ongoing polarisation of the labour market (OECD 2017; Spitz-Oehner 2006), though to a slightly smaller extent than that in the US or the UK (Autor, Katz and Kearney 2010; Goos and Manning 2007). Whatever the take on polarisation, all labour market forecasts expect a strong structural shift in employment towards more jobs in services, in particular human services, whose productivity is limited and/or difficult to measure, and a continued but much smaller growth of highly productive jobs in information and communications technologies, professional services and industry. In other words, there will be many jobs, with relatively little income, for example in healthcare, education or social work, and few jobs with relatively high incomes for IT engineers and consultants. Middle-skilled, above-average-income jobs that today are the financial basis of the German corporatist social security system through payroll-based contribution are projected to decrease markedly.

### **THE CONFLICT BETWEEN HUMANS AND MACHINES**

A second conflict that shapes the German debate is between humans and machines. Though related, the issues arising from this dichotomy

are distinct from the often-cited spectre of automation. This conflict plays out, crucially, in dimensions such as skills and health. Machines, such as assistance systems, may augment and complement human skills in many workplaces, ranging from production lines to call centres (Apt et al. 2016). At the same time, they bear risks. First, they may be conducive to de-qualification, as unused skills wither, second, they put pressure on workers to acquire and maintain skills that complement technology, such as communication, creative and social skills (Patscha et al. 2017). But not everyone is apt to do so, which in turn is a key driver behind the polarisation outlined above. A second dimension of the conflict between humans and machines is that machines, in particular robots, may alleviate physical stress and thus support the promotion of physical health (Apt et al. 2016). The automation of routine tasks also implies an increased share of complex non-routine tasks in any given working day, however. This may be stressful for workers, and it leads many workers to perceive an increase in the density of work. This perception goes together with a strong increase in mental-health-related issues. The share of new disability benefits recipients who are unable to work because of mental health problems has increased from 15.4% to 42.9% between 1993 and 2015 (DRV 2016).

## **THE CONFLICT BETWEEN WORK AND LEISURE**

Related to this (perceived) intensification of work is the conflict between work and leisure. Technology increasingly blurs the temporal and spatial boundaries of work. At the same time, the values that shape workers' attitudes, needs and preferences regarding work and working conditions are increasingly pluralised. Multiple different conceptions of what constitutes a quality job coexist across the population.

A recent study identified seven distinct groups, each with a discrete, distinct system of values about work, ranging from people embracing technology to optimise their productive potential to those

who mainly seek a steady income to find meaning in life outside work (BMAS 2016, 32 ff). These two trends, blurring boundaries and pluralisation of value systems, collide, as technological opportunities for some are threats for others. Flexible working times, for example, may bring a gain in autonomy for some, while being a stressor for others (BMAS 2016).

Demographic change and significant urban–rural divides in demand for and availability of infrastructure move this debate to the intersection of work opportunities and care duties. In (growing) German metropolitan areas, and semi-urban areas located close to cities, job opportunities abound, but because of time constraints and the lack of a care infrastructure, care duties are often difficult to handle. For example, there is a significant lack of educators in metropolitan areas (Klemm and Zorn 2017) and an inadequate number of nurses across the whole country (BA 2017). In many rural regions unemployment is higher than in cities, and job opportunities are likely to worsen in the future, especially as digital infrastructure is of a low standard.

## **POLICY OPTIONS**

To resolve these conflicts within the – challenged – German corporatist system will require policy innovations. Four options are currently discussed by policymakers in Germany (BMAS 2016, 96 ff). They are based on a set of three decisive criteria to shape the fundamental structural change: social partnership, social investment and social innovation:

First, labour market intelligence requires an update. This is not about developing the perfect forecast, nor about workforce planning. Instead, the dynamic of the digital transformation requires continuous monitoring of changes in labour demand and supply. Forecasts are only one part of such a new labour market monitoring – they can take into account demography, skills and regional

differences to generate useful insights into emerging mismatches. But, crucially, forecasts will have to be embedded in the German system of social partnership and corporatist labour market policy-making, so insights have to feed into the political debate between government and social partners at the federal level of coordination. It also requires the same approach at the regional level, making regionalised forecasts available to local labour market actors who are crucial in the design and implementation of professional education, such as chambers of commerce and industry and chamber of crafts, as well as labour unions and the regional offices of the Federal Employment Agency.

Second, labour market policy has to be more preventive. To help workers (and not just the unemployed) invest early on and over their whole career in adapting and improving their skills is crucial. This requires counselling, financing and, in the medium term, a legal entitlement to continuous professional development. People need a clear idea of where they stand with their formal and informal competences, and to get orientation about development opportunities to make lifelong learning work for all. This is especially the case for low-skilled workers, workers in small- and medium-sized enterprises (SMEs) and, to some extent, for older workers.

Third, we need new investment in social policies, such as individual activity accounts (see Weber this volume), to complement existing measures and thus accommodate individual needs and wishes. Such accounts would empower individuals to shape employment biographies in a more autonomous manner. It can be used for qualification and further training as well as setting up an enterprise. The individual activity account especially would provide young people with financial scope for personal development, thus opening up new opportunities for them, as it combines individual freedom with social security. It can thus be an instrument to target problems arising from the digital transformation better than a universal basic income could. At the same time, it could take up some of its objectives. This could

be a crucial element of a comprehensive transformation strategy for professional and educational transitions throughout the whole career span of workers, and an option to react to the increasingly uneven distribution of wealth and opportunities.

Fourth, we need to enable innovation at the firm level. If we want to shape the future of work we need to involve those who know best: workers and managers on the shop floor. This will require new governance tools. An interesting example are innovation spaces, a project that the German Federal Ministry of Labour and Social Affairs is currently setting up. It aims to implement and experiment with new types of work organisation to respond to the challenges in a new world of work. This comprises a platform for exchange for companies that invest in new learning environment, or new organisational models, for example concerning working time or work place. But it also includes financial support for SMEs to innovate in these areas.

## **CONCLUSION**

German labour market and social policy is still predominantly targeted at activation. This system is under pressure from endogenous and exogenous factors, leading to significant societal conflicts. The digital and demographic structural change requires a paradigm shift away from the predominant activation-oriented policy system towards an empowering labour and social policy system.

The core task will be providing framework conditions to promote social partnership and social innovation as well as new and additional social investment. Social partnership will require strengthening through legal, non-monetary incentives such as innovation spaces for social-partner-led firm-level reform in areas such as working time and workplace regulation that go above and beyond the current regulatory framework. Social innovation such as socially insuring against the risk of loss of employability rather than (only) insuring the risk of job loss can contribute to an empowering social

security system. Following Stiglitz, Sen and Fitoussi (2009), social investment should especially promote the capabilities of people. Given limited resources, there is a delicate balance to find between different infrastructure needs, especially care infrastructure and services in cities versus digital infrastructure and services in the countryside.

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