

**How Artificial Intelligence impacts labour and
management**

CEC Seminar

Management in the age of Artificial Intelligence

Employment, economics and ethics

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A. Introduction

Modern information technologies and the daily use of the Internet have strongly influenced the world of work in the 21st century. Computers and software simplify everyday tasks, and it is impossible to imagine how most of the steps of a procedure could be managed without them. But the use of artificial intelligence and robotics is accelerating. The same applies for online platforms who are acting as intermediary between service providers and clients. Thus, the question arises as to what the future world of work will look like and how long it will take for this to happen. Will the future world of work be a world where humans do not have to spend so much time working to subsist? Alternatively, mass unemployment, mass poverty and social distortions are also a possible scenario for the new world of work,¹ a world where robots, intelligent systems and algorithms play an increasingly central role.

The following paper reproduces some of the contents of the report on ‘**Artificial Intelligence and Robotics and Their Impact on the Workplace**’ which was published by the **IBA Global Employment Institute** on April 2017. The **key messages** of the report are:

- The introduction of AI and robots affects both the production and service sectors to the same extent.
- It is unclear how fast, but speed is accelerating and the future is unforeseeable.
- Statutory models, especially labor and employment law models, fit in this digital world only with difficulty.

The **full report** can be downloaded at:

<https://www.ibanet.org/Article/NewDetail.aspx?ArticleUid=012a3473-007f-4519-827c-7da56d7e3509>

I. Definitions

Strong Artificial Intelligence: The processes in the computer are intellectual, self-learning processes. Computers can "understand" by means of the right software/programming and are able to optimize their own behavior on the basis of their former behavior and their experience.² This includes automatic networking with other machines.

Industry 1.0 is known as the beginning of the industrial age around 1800. For the first time, goods and services were produced by machines. Besides the first railways, coal

¹ <http://www.spiegel.de/wirtschaft/soziales/arbeitsmarkt-der-zukunft-die-jobfresser-kommen-a-1105032.html> (last accessed on October 16, 2017, 01:47 p.m.).

² <http://www2.cs.uni-paderborn.de/cs/ag-klbue/de/courses/ss05/gwbs/ai-intro-ss05-slides.ps.nup.pdf> (last accessed on October 16, 2017, 06:44 p.m.).

mining and heavy industry, the steam engine was the essential invention of the first industrial revolution; steam engines replaced many employees, which led to social unrest. The second industrial revolution began at the beginning of electrification at the end of the 19th century. The equivalent of the steam engine in the first industrial revolution was then the assembly line, which was first used in the automotive industry. It helped accelerate and automate production processes.

The term **Industry 2.0** is characterized by separate steps being executed by workers specialized in the respective areas. Serial production was born.

The **Industry 3.0** began in the 1970s and was distinguished by IT and further automation through electronics. When personal computers took hold in working life, a new sector of industry was established.

The term **Industry 4.0** means in essence the technical integration of CPS (cyber physical systems) into production and logistics and the use of the Internet of things (connection between everyday objects)³ and services in industrial processes—including the resulting consequences for the creation of value, business models and downstream services and work organization.⁴ Furthermore, this "fourth industrial revolution" is characterized by the fact that AI will advance the digital shift in the service sector and change this labor market even more significantly than the use of intelligent production robots changed production.

II. Advantages of Robotics

Particularly in the industrial sectors in the Western high-wage countries, automation and use of production robots lead to considerable savings with regard to the cost of labor. While one working hour in the production of the European automotive industry costs more than €40, the use of a robot costs from €5 to €8 per hour.⁵ A production robot is already cheaper than a worker in China.⁶ Big data analyses and intelligent algorithms are replacing humans also in the service sector, because they can work on several processes at the same time.

A robot and an intelligent algorithm cannot become ill, have children or go on strike and is not entitled to annual leave, so it is worthwhile for many companies to invest in robots and intelligent software. An autonomous system does not depend on external

³ Stiernerling, "'Künstliche Intelligenz" – Automatisierung geistiger Arbeit, Big Data und das Internet der Dinge", *Computer und Recht* 2015, pp. 762.

⁴ *Forschungsjournal & acatech*, 2013, "Deutschlands Zukunft als Produktionsstandort sichern: Umsetzungsempfehlung für das Zukunftsprojekt Industrie 4.0."

⁵ <https://www.bcgperspectives.com/content/articles/lean-manufacturing-innovation-robots-redefine-competitiveness/> (last accessed on October 16, 2017, 09:17 a.m.).

⁶ "Kollege Roboter," *Fokus No. 38/2015* of October 19, 2015, p. 69.

factors and works reliably and constantly also in danger zones and during the night.⁷ As a rule, its accuracy is greater than that of a human, and it cannot be distracted either by fatigue or by other external circumstances.⁸

III. Key Features

Deep Learning: machine learning based on a set of algorithms that attempt to model high-level abstractions in data.

Gig Economy: The Gig Economy is a part of the labor market where small contracts are awarded at short notice to independent freelancers or part-time employees.⁹

Independent contractors looking for these individual tasks that companies advertise on online platforms (e.g. "Amazon Mechanical Turk" for crowdworking or Uber, Airbnb for sharing services). Work-on-demand via app in different sectors (car sharing, music, travelling, finance) is also a part of the gig economy. The use of platforms differs from country to country. In Germany, for example, there are 32 crowdworking platforms with 1 million platform users (mostly private users who want to earn some extra money), whereas in the UK there are about 5 million users, and a quarter of the interviewed crowdworkers earn at least the half of their income through these platforms.¹⁰ All of these industries are projected to increase global revenues from \$15 billion in 2015 to \$335 billion in 2025. Today, 34 percent of the total U.S. workforce are freelancers. In 2025 this will be about 50 percent.

Platform economics can be divided into four areas:

- social communication platforms (Facebook, XING),
- digital marketplaces (eBay, Spotify, Netflix),
- brokerage portals (Uber, Airbnb Lyft, BlaBlaCar) and
- crowdworking platforms (Amazon Mechanical Turk, Clickworker, Twago, 99designs or Upwork).

Robotization: production robots replacing employees because of advanced technology (they working more precisely than humans, e.g. 3D printers)

Autonomous Driving: vehicles have the power for self-governance using sensors and navigating without human input. Taxi and truck drivers become no longer necessary. The same applies to stock managers and postal carriers (e.g. delivery drones).

Dematerialization: Thanks to automatic data recording and data processing, traditional office activities are no longer necessary (e.g. accounting or lawyer assistants).

⁷ <http://www.faz.net/aktuell/wirtschaft/fuehrung-und-digitalisierung-mein-chef-der-roboter-14165244.html> (last accessed on October 16, 2017, 11:02 a.m.).

⁸ Haag, "Kollaboratives Arbeiten mit Robotern – Visionen und realistische Perspektive" in Botthof/Hartmann (editors), *Zukunft der Arbeit in Industrie 4.0*, p. 63.

⁹ https://de.wikipedia.org/wiki/Gig_Economy (last accessed on March 30, 2018, 8:42 a.m.).

¹⁰ https://www.herts.ac.uk/_data/assets/pdf_file/0020/117812/crowdworking-policy-briefing-university-of-hertfordshire.pdf (last accessed on March 30, 2018, 10:42 a.m.).

B. The Impact on the Labor Market

I. Globally

According to recent studies, about 47 percent of total U.S. employment is at risk,¹¹ and some 70 percent of total employment in Thailand or India are at risk.¹² Low-wage countries such as China, India and Bangladesh are still benefiting from their surplus of low-skilled workers, and Western companies are outsourcing their production and some services to these countries. For economic reasons, in most development countries, the implementation of (partly) autonomous systems is likely not to be worthwhile at present, since the wage costs are not much higher than the costs for acquisition, development and maintenance of the necessary equipment.¹³ On the other hand, the companies also located in low-wage countries have to promote the appropriate systems in order to improve their productivity and attractiveness vis-à-vis their competitors and remain competitive in the long run.¹⁴ Alternatively, if these companies decide to produce in their countries of origin, like Adidas in 2017, using production robots and only a few workers in their so-called "Speedfactories", the surplus of low-skilled workers will turn into a curse for developing countries. The question is how to integrate the great number of unskilled production workers into a structurally difficult labor market that depends on the demand of foreign countries and has no comparable social security systems. A possible mass unemployment could lead to human catastrophes and a large wave of migration.

In summary, it can be said that the increase of automation and digitalization is a global concern that, due to the lack of financial possibilities in many developing countries, will initially be strongly focused on the Western developed countries and Southeast Asia. In the long term, these countries will be considered the winners of Industry 4.0 because of their technological head start and better education.¹⁵ More than 80 percent of the robots sold each year are used in Japan, South Korea, the U.S. and Germany.¹⁶

II. New Job Structures

It fits to the already mentioned study from Frey/Osborne that 65 percent of Americans expect, according to a survey by the Pew Research Center that within 50 years a robot

¹¹ Frey/Osborne, "The Future of Employment: How Susceptible Are Jobs to Computerisation," 2013, p. 1.

¹² "Automat trifft Armut", *Handelsblatt News am Abend*, July 15; No. 135, p. 6.

¹³ <https://www.bcgperspectives.com/content/articles/lean-manufacturing-innovation-robots-redefine-competitiveness/> (last accessed on October 13, 2017, 02:38 p.m.).

¹⁴ <https://www.thedailystar.net/opinion/can-bangladesh-keep-1497295> (last accessed on March 30, 2018, 9:28 a.m.).

¹⁵ <http://reports.weforum.org/global-competitiveness-report-2015-2016/competitiveness-rankings/> (last accessed on October 13, 3:15 p.m.)

¹⁶ <https://www.bcgperspectives.com/content/articles/lean-manufacturing-innovation-robots-redefine-competitiveness/> (last accessed on October 13, 3:27 p.m.).

or an intelligent algorithm will be doing their work.¹⁷ Individual jobs will disappear completely, and new types of jobs will come into being. It must be noted in this regard, however, that no jobs will be lost abruptly as a consequence of "Industry 4.0", but that a gradual transition will take place, which has already commenced and differs from industry to industry and from company to company.¹⁸ What can be recognized is the continuously progressing movement of employees into the third service sector. However, the fact that not every job in this sector is secure can be seen in the insurance and financial branch, where intelligent algorithms are replacing human employees by automatically carrying out traditional back-office tasks, answering client questions via chatbots and presenting financial planning or insurance policies.¹⁹ Even well-paid and high-skilled jobs like those of stock exchange traders can be rationalized. Goldman Sachs reduced its traders from 600 in 2014 to 2 in 2017.²⁰ Their work is now performed by intelligent algorithms.

A typical example of a new job field created in recent years is **crowdworking**. Freelancers thus represent the typical worker within Industry 4.0. Freelance and independent providers benefit in that they can work at any time of the day or night. Thanks to the Internet, country borders and time differences also no longer play a role. Owing to digitalization and the internationalization of the online platforms on which crowdworkers offer their services, the applicable law is usually uncertain. More precisely, the challenge is how to define crowdworking as a freelancer relationship without integrating them in one's own or the platforms' business, how to establish working conditions for compensation and how to find out what tax regime and social security and welfare rules are applicable.²¹

It is also definite that both **blue and white collar sectors** are affected to the same extent. This can be discerned in the medium-wage sector. In this sector, routine jobs will be eliminated, with the result that a huge number of employees will—at least temporarily—drift into unemployment. However, even one third of the jobs that require a bachelor degree can be replaced by a machine or intelligent software in the next years. It is at the time expected that new jobs will be created in the service sector from data analysts to software programmers.

¹⁷ <http://www.pewinternet.org/2016/03/10/public-predictions-for-the-future-of-workforce-automation/> p. 3 (last accessed on October 14, 2017, 10:10 a.m.).

¹⁸ Brzeski/Burk, "Die Roboter kommen, Folgen der Automatisierung für den deutschen Arbeitsmarkt," 2015.

¹⁹ <http://www3.asiainsurance.com/News/View-NewsLetter-Article/id/38286/Type/eDaily/South-Korea-Insurers-to-evolve-into-integrated-service-providers-integrated-service-providers> (last accessed on October 13, 2017, 10:11 a.m.).

²⁰ <https://www.heise.de/newsticker/meldung/Computer-ersetzen-an-der-Wall-Street-hoch-bezahlte-Finanz-Analysten-3730284.html?artikelseite=all> (last accessed on October 14, 10:17 a.m.).

²¹ „The On-Demand Economy and the impact on employment law“, *International Bar Association Employment & Industrial Relations Law* September, 2016, p. 31.

III. Labor Relations

The fourth industrial revolution involves not only fundamental technical and economic changes; the role of humans within the world of work is also subject to constant change. All over the world, employee representatives have realized that new challenges are in store for employees from all professional and social classes because of robotics and the computerization of the workplace. Trade unions will pay particular attention that no "lost generation" is left behind and that there are no mass dismissals caused by the introduction of AI. Unions will advocate for further training, advanced training and retraining of employees.²²

Trade unions remain the main player to fight for employees' rights (e.g. avoid dismissals, more training to achieve digital literacy, better working conditions), and they will expand their constituency by also representing the increasing number of freelancers in the Gig Economy. Social security for freelancers, especially low-paid crowdworkers, will be a big problem.

Finally, the lawmakers will have to introduce new forms of employee representation structures to avoid their slow decline caused by decreased trade union membership and fewer employees in a company, so the required thresholds can no longer be reached. In Spain, for example, legally or economically dependent freelancers working for a company group are treated as employees with regard to participation in the national social security systems, but remain freelancers with regard to taxes and working time flexibility.²³ They are not represented by works councils or trade unions.

C. Impact on the Organization of Work

I. Outsourcing Employment and Creating New Internal Structures

Companies will focus on their core competencies and will outsource other activities in a cost-effective manner.²⁴ Outsourcing does not mean relocating production sites to low-wage countries or using temp agency workers instead of employees. It is a global trend that Work 4.0 will take place outside traditional employment structures with a rise in self-employment (especially in the gig economy).²⁵ Freelancers ("crowdworkers") residing all over the world are hired through a platform. For qualified freelancers from low-wage countries, the salary that could be earned by platform work is much higher

²² https://innovation-gute-arbeit.verdi.de/++file++540998f5ba949b358400004e/download/138.1411_digit_arbeit_RZ3_web.pdf S.25 (last accessed on October, 15, 2017, 02:24 p.m.).

²³ <http://www.portal21.de/PORTAL21/Navigation/Laender/Spanien/Dienstleistungen/pflichtversicherung.html#1337158> (last accessed on October, 15, 2017, 04:01 p.m.).

²⁴ "Understanding the Future of Work", *International Organisation of Employers Brief 06-07-2016*, p.7.

²⁵ "Automation and Independent Work in a Digital Economy", *OECD Policy Brief on the Future of Work*, May, 2016, p.3.

than the average wage in their countries of origin. Even in European countries, where the average hourly paid wage is usually higher than the salary that could be earned through crowdworking, the platform economy is becoming more and more common, and larger companies are using external workers for their purposes rather than hiring new employees. Instead of hiring a permanent employee, companies hire external freelancers for certain projects via crowdworking platforms. The crowdworker accepts only the platform's terms and conditions. Therefore, no employment relationship, but a brokerage or service contract (no obligation for either party to accept the other's offers, but payment obligation after the performance of the advertised task) can be assumed.

The main reason, however, is not the companies' intention to save money. Highly qualified young employees, especially, like their independence and will focus their work on the development of creative solutions for a changing client base. The demand for social security is no longer so high, but freedom with regard to working time, workplace and the choice of clients is more important for the so-called Generation Y.

II. Matrix Structures

A legal way to introduce these virtual groups are matrix structures. Traditional legal structures under corporate and labor law are not sufficient to solve the problems of big companies, creating transnational and cross-company working groups for certain projects.²⁶ They are characterized by the technical supervision and the disciplinary supervision of an employee being regarded separately.²⁷ As a rule, the authority to give technical and related instructions is given to different individuals who are not employed in the same establishment or the same company (so-called matrix managers). By doing this, technical supervision structures that are independent from the employing company can be introduced within a group with cross-border activities consisting of different companies.

In European countries, the representation of these employees is a big problem. The connecting factor with regard to workforce representation is the "establishment" and employee representatives should be situated at the place where recent decisions are made. But the structures of companies are changing, work is no more a place to go because work can be performed from everywhere and the digital worker needs no establishment. It is typical for a modern economy that an employee has a working contract with a German company, but works from home in Spain. His supervisors change from project to project and are often situated at the headquarters in the US or the UK, for example.

²⁶ <http://www.manager-magazin.de/unternehmen/karriere/digitalisierung-der-arbeitswelt-wie-funktioniert-arbeiten-4-0-a-1082272.html> (last accessed on September 13, 2017, 08:01 a.m.).

²⁷ Braun/Wisskirchen, *Konzernarbeitsrecht Handbuch*, p. 198.

III. Distinction Between Employee and Independent Contractor

Classical employment can become a business killer because of the high incidental wage costs in European countries.²⁸ An employee is primarily characterized by the fact that he is subject to the authority of the employer to issue instructions regarding his job assignment, working time and place of work. The borderlines between the employee's professional life and private life become blurred, too. If the place of work, in addition to working time, becomes more flexible, and if employees are granted more powers for working independently, it becomes harder to distinguish between an employee and an external freelance worker or a worker provided by a third-party company.²⁹ Even if the parties agree on a cooperation based on a freelance profile, courts can determine that an employment relationship between the parties exists. In this case, penalties for the wrongful classification of an employment relationship and the failure to pay social security contributions can be the consequence for employers.

D. Legal Aspects

Newly evolving employment structures require new reactions from the law. Companies will outsource as much work as possible because traditional employment leads to high wage costs in western countries. The number of highly qualified young freelancers will rise with the increasing demand. They enjoy their independence and will focus their work on the development of creative solutions for a changing client base.

The borderlines between digital workers' professional and private life are becoming blurred. The breakdown of boundaries also makes it difficult for the employer to check how many hours the employee actually worked. There is no factor linking the time/wage system. In the future, elements of performance-linked payment will be used increasingly also with regard to non-executive employees. If the place of work, in addition to working time, becomes more flexible, it will become harder to distinguish between an employee and an external freelancer (e.g. crowdworker) and the risk of false self-employment including fines for hirers increase. Under U.S. law, determining factors include (among others):

- The hiring party's right to control the manner and means by which the product is accomplished;
- The source of the instrumentalities and tools;
- The duration of the relationship between the parties;
- The extent of the hired party's discretion about when and how long to work;

²⁸ "The On-Demand Economy and the impact on employment law", *International Bar Association Employment & Industrial Relations Law September, 2016*, p. 27.

²⁹ "The On-Demand Economy and the impact on employment law", *International Bar Association Employment & Industrial Relations Law September, 2016*, p. 26.

- Whether the work is part of the regular business of the hiring party;
- Whether the hiring party is in the business.

Based on similar criteria, the European Court of Justice (ECJ, - 20 December 2017 - C-434/15) classified Uber as a transport service subject to authorization. The mediation service is "an integral part of a comprehensive service consisting mainly of transport services".

In this context, the ECJ also notes that the drivers working on the platform do not carry out autonomous activities that are independent of the platform. On the contrary, this activity exists solely on the basis of the platform, without which the activity of the drivers would make no sense. The ECJ also points out that controls over the economically important aspects of the urban transport service offered through its platform:

- On conditions that drivers must meet in order to take up and perform the activity;
- By rewarding drivers who accumulate a large number of journeys and informing them of where and when they can rely on a high volume of journeys and/or advantageous fares (which allows them to adjust their supply of demand fluctuations without imposing formal constraints on drivers);
- Over controls the quality of the work of the drivers, which can even lead to the exclusion of drivers from the platform, and
- By specifying the price of the service and settling the payment. All these characteristics mean that Uber "cannot be considered merely a mediator between driver and passenger."

The decision of the ECJ is of particular importance for the complete gig economy in Europe and also has implications for employment law. With the help of this dependency of the "independent" drivers on "Uber", which has now been established in the final instance, it will hardly be possible to maintain a position as a freelancer. Among other things, the ECJ used the same arguments as, for example, the London Labor and Appeals Court, which has already granted 40,000 English drivers a claim to the statutory minimum wage in the UK or a Labor Court in California regarding single Lyft and Uber drivers in 2015.

Anything else could apply only to the sharing of accommodation. In the case of "AirBnB", "Wimdu" and "9Flats", a form of joint consumption of already existing consumer goods actually takes place, whereas in the case of the mediation of driving services (Uber, Lyft, Wunder) the focus is not on community consumption, but rather on the mediation of additional journeys, which otherwise would not have taken place at all. The main reason why more and more drivers are complaining is the lack of social protection for drivers (e.g. in the event of a lack of orders or illness, or in old age). It is

advisable to use models such as those in Spain, in which "solo self-employed persons" must also pay social security contributions (pension and sickness insurance) or in Italy, where self-employed persons must provide proof of insurance.

Furthermore, the future work will be characterized by the use of connected technical wearables and the employees' own devices (e.g. data glasses or fitness trackers). With regard to the processing of the data of European customers or employees, strict European data protection rules have to be respected. In contrast to employees, self-employed contractors are not released from liability and are responsible for their own social security contributions.

Additionally, the implementation of technical innovations or innovative working time models will not be possible without the employee representatives' consent. Employee organizations have realized that new challenges are in store for employees from all professional and social classes.

E. Summary and Outlook

Several million jobs are jeopardized worldwide. A high level of unemployment in some sectors will almost be unavoidable. The consequence of these risks would be a wide gap between the salaries of well-educated employees and the salaries of less educated employees, which, in turn, can result in social tensions.

At the same time, the major share of the jobs will be shifted to a different area of work, mainly to the service sector, and new service models will be created (e.g. sharing economy, gig economy, crowdworking). AI will result in growth and prosperity: employees will benefit from flexible solutions concerning working time and workplace caused by the introduction of AI as well. Human beings are adaptable and will have an enhanced control function in the production sector.

It is definite that both blue and white collar sectors will be affected to the same degree³⁰ and that the digitalization (and automation) of services is a global phenomenon. This phenomenon is a far-reaching and diversified field of advisory services, however, particularly with regard to labor law and employment. It would be desirable if future laws, which will hopefully be secured on the international level by uniform standards, will be geared to the technological developments and the increased need for flexibility. In European countries, co-determination rights and restrictive laws (e.g. data protection laws, occupational safety regulations or the European working time directive) have to be observed during the companies' transition to a modern world of work of tomorrow. Especially for larger companies, the following points are important:

³⁰ <http://www.pewinternet.org/2016/03/10/public-predictions-for-the-future-of-workforce-automation/> p. 5 (last accessed on October 16, 2017, 10:44 a.m.).

- The use of robots and AI does not release companies from **legal responsibility** for their actions.
- Crowdworkers may be **qualified as employees**, which is why companies should be prepared for the legal consequences of employee status, such as sick pay or leave entitlements. In France, for example, at the beginning of 2018 a legal definition was introduced for workers using an electronic placement platform.³¹
- According to the new European data protection law (General Data Protection Regulation, GDPR), **any handling of employee or customer data** (such as the creation of an internal leave schedule, the inclusion of the customer address in a directory or the transfer of data within the group) must be documented, communicated to the person concerned and permitted by law or by the consent of the person concerned.
- When flexible working hours are used, **maximum limits of working hours** must not be exceeded; despite the fact that employees can be reached online, employees must be granted **time for rest and privacy**.

Even if Industry 4.0 entails a lot of change, it also offers an opportunity to lay new foundations for the world of work. All parties concerned should be ready to respond to this exciting challenge.

³¹ <http://www.dgb.de/themen/++co++7bf86424-f11e-11e7-83ab-52540088cada> (last accessed on March 8, 2018, 11:31 a.m.).