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ALL EYES ON AI: TACKLING DIGITALISATION AND ARTIFICIAL INTELLIGENCE IN THE WORKPLACE

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industriAll
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Introduction

Is AI a new buzzword?

Since the autumn of 2022, generative AI has been the talk of the town; not least because of some of its very spectacular aspects. But let's not forget that in previous years there was also talk of cloud computing, cybersecurity, metaverse, blockchain, cryptocurrencies, fintech, virtual and augmented reality, data... and already artificial intelligence. AI is nothing new - we've been talking about it for decades before the hype died down for a while. But even in recent years, this last decade, there was already a fair amount of talk about it, and looking at the publications of several companies, we can see that in the oil industry, for example, many projects have been launched with the help of this technology for at least five years. The same applies to the telecoms and automotive industries.

A new technological revolution?

Technologies have the power to reshape the world we live in, by transforming production methods, the way businesses are organised, and social practices and relationships. From this point of view, AI also has all this potential. However, it is important to bear in mind that artificial intelligence is not a single technology, but rather a set of technologies that form part of a vast movement that can be described as digitalisation.

Escaping technological determinism

As with any technology, fatalism or a certain form of determinism need to be avoided. Technology is not neutral, but everything depends on how it is used. Technology is capable of both the best and the worst. At once a tool of surveillance and control appreciated by dictatorships, it can also be a tool of emancipation, protecting us from inquisitive eyes and encouraging the organisation of social movements.

It is likely that a new technological revolution is underway, given the scale of the changes that are taking shape.

Generative AI is particularly spectacular because of its speed of adoption. What's more, it has been made open source very quickly, which encourages its use, its dissemination and the development of new uses. In fact, it is much more accessible than other technologies.

Is generative AI creating a bubble?

The hype surrounding AI, and in particular generative AI, may give rise to fears of the emergence of a speculative bubble, given the amounts invested in companies in the sector and the funds allocated by the world's leading incubators. Billions are being sunk into AI companies, but the question of viable business models is already arising.

AI at the heart of a new battle for domination

AI is considered to be an advanced technology with a wide range of uses, including military applications. A race for leadership has been launched between the United States and China, while Europe is trying to catch up. The United Sates has banned exportations on AI along with other advanced technologies such as semiconductors and Quantum computing. Europe, on the other hand, is ahead of the game in its attempts at regulation. This is one of its strengths.

Understanding the whole AI value chain

Like wireless networks or cloud computing, AI is not an intangible, ethereal technology, even though a lot of marketing is suggesting the opposite. On the contrary, it relies on a very real, physical infrastructure made up of cables, routers, racks, bays, servers, thermal mana- gement systems, and so on: all equipment designed and manufactured by industrial companies. AI is also fed by battalions of invisible and very poorly paid «click workers». Industry and digital labour are both blind spots when it comes to AI. It is important to remember this.

Trying to assess what might happen

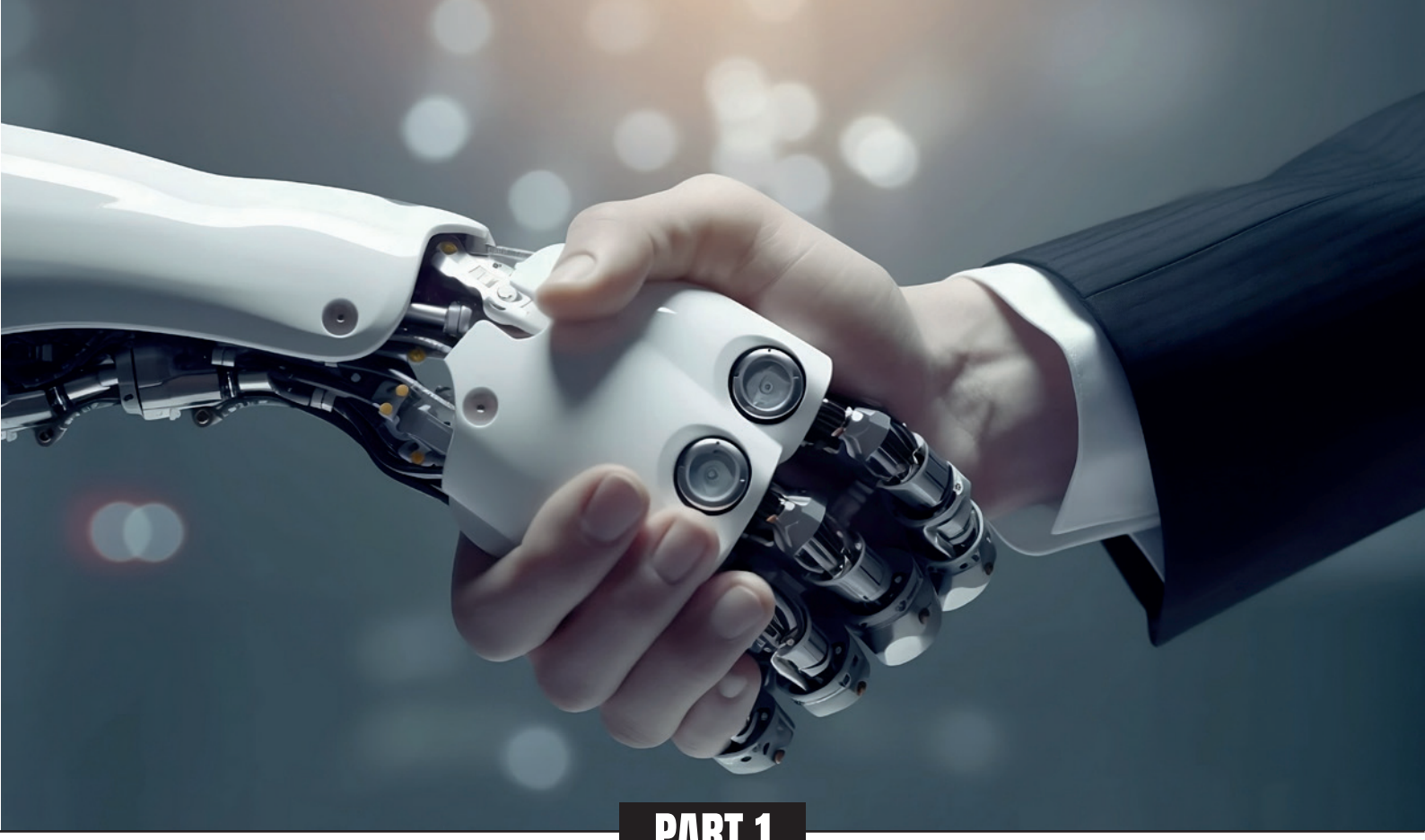
Of course, given the scale of the changes at work, it is inevitable to wonder what might happen to employment (part 1).

But it is the content of work, the different tasks that are performed, that deserves to be examined closely. This seems to be a more relevant approach than focusing on occupations (part 2).

As already mentioned, AI is not a virtual object. It is above all an infrastructure, with a lot of technical content, that is consuming a lot of energy and fed by click workers. Industry is the keystone of the AI ecosystem (part 3)

Moving on to a sectoral level brings several additional elements to the discussion. The example of the oil & gas industry provides some interesting and concrete examples of the use of AI (part 4). The same applies to pharmaceuticals (part 5), the telecom industry (part 6) and the automotive industry (part 7).

AI is generating a lot of questions due to bias (part 8). How can we meet all these challenges? What tools should we use (part 9)? Key takeaways and recommendations end this report (part 10).



PART 1

AI and employment

The difference between artificial intelligence and previous waves of technological progress and digitalisation is that the automation concerns non-routine, cognitive tasks. As a result, the tasks and jobs concerned are those of white-collar workers and managers. What's more, in an interconnected world, some of these tasks can be automated and others relocated. This raises fears about the volume of jobs in Europe.

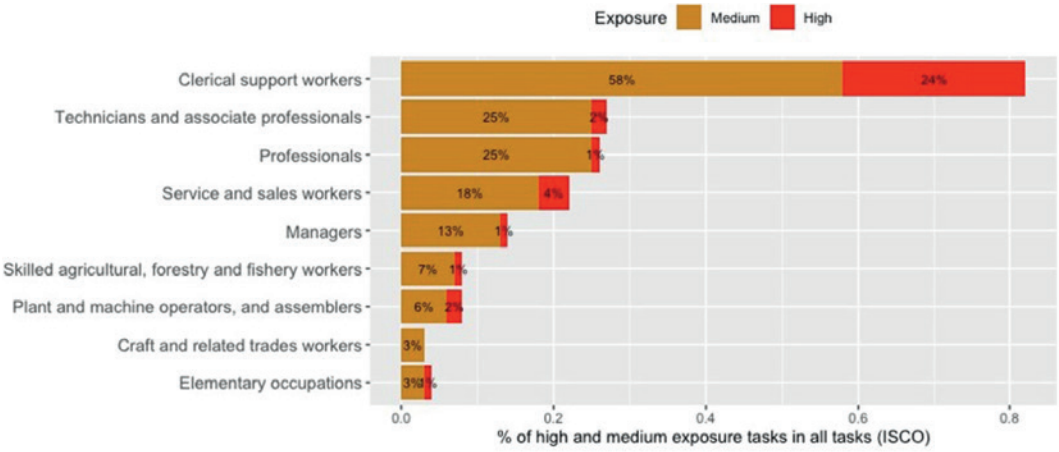
The difficulty in predicting the impact on future employment of the widespread use of artificial intelligence in companies stems from the fact that it is impossible to know exactly how artificial intelligence's learning capacity will develop. Is artificial intelligence just a super-powerful synthesis tool, or will it be able to perform new, original and difficult tasks, and produce answers based on reasoning? The number of jobs 'at risk' depends on this development. The most recent studies differ widely.

Caution is called for when examining predictive studies and their effects. In the past, studies that were often catastrophic have proved to be wrong.

According to the **ILO's August 2023[1] analysis**, only office tasks are exposed to automation via the Generative AI, and more specifically Generative Pre-Trained Transformers (GPTs). JJobs themselves would not be threatened, but only some tasks are likely to be automated: 24% of office tasks are very highly exposed and 58% moderately exposed. More specifically, the jobs most at risk are those of secretaries, assistants, bank tellers, data entry clerks, inquiry clerks, accountants and bookkeep- ing clerks. For other occupations, only 1% to 4% of tasks would be exposed to possible automation.

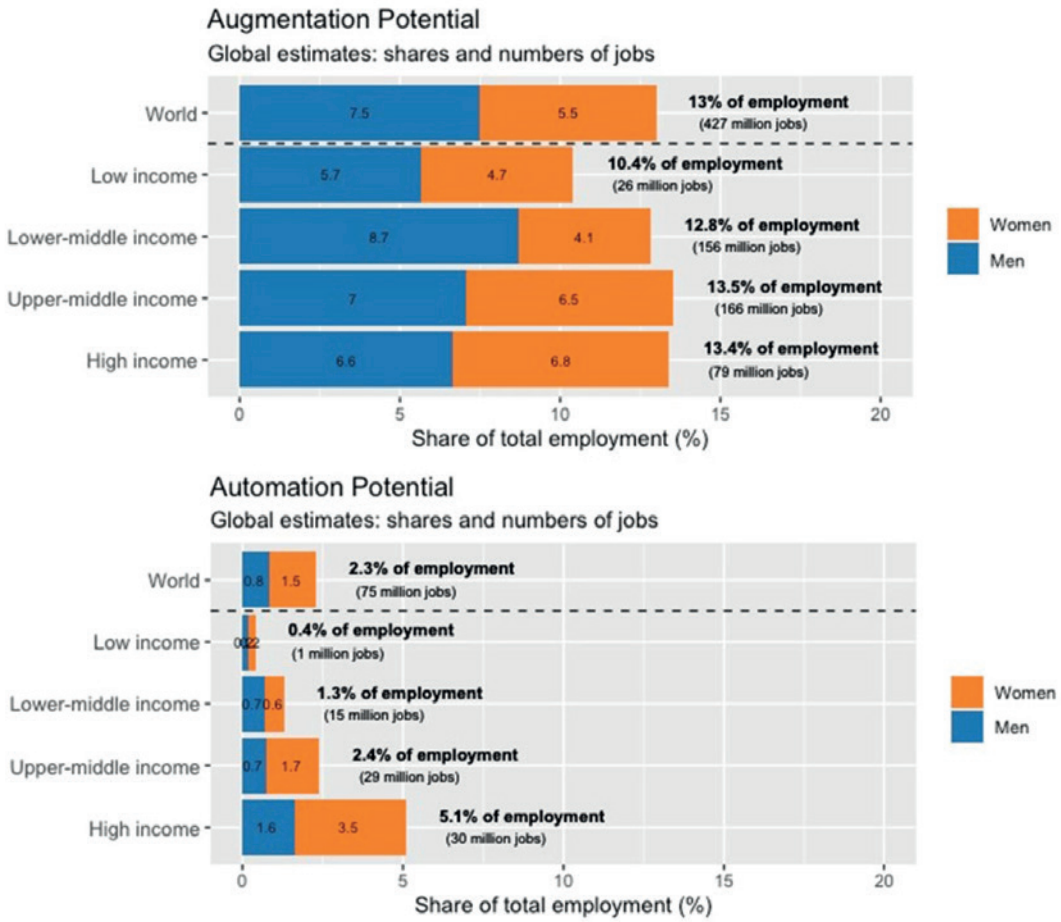
The study also points to a discrepancy between low-income and high-income countries, with automation affecting 0.4% of tasks in low-income countries and 5.5% in high-income countries. In addition, the study shows that for some professions, on the contrary, there is a potential increase in the volume of work to come. The study highlights a significant gender gap: the risk of automation concerns 8.5% of the tasks performed by women, and 3.2% of those performed by men in high-income countries. The potential for an increase in the volume

Fig.1 Tasks with medium and high GPT-exposure, by occupational category (ISCO 1-digit), ILO (2023)



Source: "Generative AI and jobs: A global analysis of potential effects on job quantity and quality", International Labour Organization 2023.

Fig.2 Global estimates: jobs with augmentation and automation potential as share of total employment



Source: "Generative AI and jobs: A global analysis of potential effects on job quantity and quality", International Labour Organization 2023.

of jobs is also higher for women: 14.7% of jobs held by women could increase, compared with 11.9% of those held by men.

Overall, this study is optimistic: according to it, the number of jobs created worldwide would be far greater than those destroyed: 427 million created compared with 75 million destroyed (and 79 million created compared with 30 million destroyed in high-income countries).

A recent **OECD study**[2] conducted in 7 countries specifically in the industrial and financial sectors shows that workers are expressing concern about the potential risk of losing their jobs because of the deployment of artificial intelligence. Looking at the results for the industry sector alone, we learn that 15% of employees surveyed from companies that have implemented AI say they know someone who has lost their job because of AI, while 14% are very or extremely concerned about the risk of losing their job within 10 years because of AI. Only half of the employees questioned are not worried at all. Another interesting result is that employees using AI are more worried than others about the risk of losing their jobs. Is this because they are more familiar with the capabilities of AI?

According to the latest **Future of Jobs study by the World Economic Forum**[3], task automation in offices is progressing slower than anticipated. With 34% of tasks automated, the increase since 2020 is only 1%, whereas that year, surveyed business leaders expected half of tasks to be automated within 5 years. Estimates for automation have been revised downwards: 42% by 2027 (35% for reasoning and decision-making and 65% for information and data processing). This study aligns with the ILO regarding the nature of threatened jobs. "*The largest losses are expected in administrative roles and in traditional security, factory and commerce roles. Surveyed organizations predict 26 million fewer jobs by 2027 in Record-Keeping and Administrative roles, including Cashiers and Ticket Clerks; Data Entry, Accounting, Bookkeeping and Payroll Clerks; and Administrative and Executive Secretaries, driven mainly by digitalisation and automation.*"

It is undoubtedly the **McKinsey study of June 2023**[4] that anticipates the greatest effect in terms of the volume of tasks that can be automated. According to this study, 70% of current tasks could be 50% automated. The rate at which companies adopt this technology will vary the time it takes to achieve the full impact of this automation. Three scenarios have been drawn up, setting this achievement between 2030 and 2060, with a mid-point in 2045. Compared with the firm's previous study dating from 2018, the timeframe has been shortened by 10 years. Like the other approaches, this study highlights the specific nature of this trend: the best-trained and best-paid employees will be the most affected.

AI is already bringing, and will continue to bring, colossal productivity gains, and therefore a surplus of added value, although they are difficult to measure today. The question is how these gains will be distributed, between sectors, across the value chain, and above all between capital and labor.

There are two ways in which companies can increase the value they produce. On the one hand, costs can be optimised by speeding up processes and automating tasks. But gains are also made in terms of sales: higher product volumes, customised offerings, innovative solutions.

According to the McKinsey study of June 2023[5], extrapolating from a field study of 63 cases and analysing the impact of automation / improvement on 16 functions, the potential additional income would eventually be between 2,600 and 4,400 billion dollars each year! AI integrated with other technologies could increase productivity by between 0.2% and 3.3% per year. This revenue could even be doubled by extrapolating the study to all business tasks.

Again, according to this study, three quarters of the value generated would come from four key functions: customer relations, marketing and sales activities, IT coding, and research and development. The breakdown of these gains varies greatly from one sector to another.

In industry, the gains would be greatest in the high-tech sector ($240 to $460 billion), followed by the basic materials sector ($120 to $200 billion), the electronics and semiconductors sector ($100 billion to $170 billion), the chemicals sector ($80 billion to $140 billion), the pharmaceuticals and medical products sector ($60 billion to $110 billion).

If productivity gains outpace the creation of new jobs and wage increases, and in our current context of corporate concentration, they will be captured by capital to the detriment of labor. Work needs to be done to ensure that these gains will be fairly distributed within each company.

The massive deployment of generative artificial intelligence is already redistributing valuations between sectors, and there could be major upheavals ahead. In particular, outsourcers whose activities are perceived to be susceptible to automation could see their share

Focus on the pharmaceutical industry

The pharmaceutical and medical-product industries could be one of the sectors to benefit most from productivity gains. According to the McKinsey study of June 2023, the additional value would be between 60 and 110 billion dollars a year, or 2.6% to 4.5% of annual revenues.

In this sector, investment in research and development is predominant, representing on average 20% of sales. What's more, research takes a very long time: 10 to 15 years to develop a drug. Artificial intelligence could make it possible to considerably shorten these timescales, and thus generate savings.

The most important impacts would be at two levels. Firstly, during the process of identifying relevant molecules, or preliminary screening, the ability of artificial intelligence to process massive quantities of data and options could save considerable time. What's more, during the drug development phase, the ability to analyse large patient databases would also save time.

However, the specific nature of the sector should not blind us to several risks: the need for a high level of human quality control, verification of the databases on which AI is based, and respect for privacy in the use of patient databases.

Fig.3 Generative AI use cases will have different impacts on business functions across industries

Note: Figures may not sum to 100%, because of rounding.
[1]Excludes implementation costs (eg, training, licenses).
[2]Excluding software engineering.
[3]Includes aerospace, defense, and auto manufacturing.
[4]Including auto retail.
Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

Source: MC KINSEY & COMPANY (2023), The economic potential of generative AI, The next productivity frontier.

prices fall sharply. For example, the share price of Teleperformance, the world leader in outsourced customer relationship management, has fallen by more than 50% since February 2023, due to the possible replacement of telephone advisers by chatbots.

The question lies between the different sectors. A polarisation is emerging between sectors where productivity will increase rapidly, leading to wage increases (but possibly a reduction in the volume of employment) and improved working conditions (for workers whose tasks have not all been automated), and sectors where productivity gains will be minimal and wage conditions worse.

The polarisation of employment by generative AI and the widening of social inequalities will be all the more marked as the jobs maintained and increased by AI are those with the highest level of education and median income. The jobs most affected are those at intermediate levels. In addition, women are more represented among vulnerable jobs, particularly in administrative professions, and gender inequalities could also increase.

Workers are aware of the risk that job polarisation introduced by AI may degrade their purchasing power and express their concerns. According to a 2023 OECD[6] study conducted in seven countries in the industry and finance sectors, twice as many employees believe that artificial intelligence will lead to decreases in their pay compared to those who believe it will result in an increase.

Polarisation in Europe could also spread between different countries. Generative AI creates a development gap by favoring high-income countries, where the potential for automation and augmentation is greater, leading to a gap in productivity gains. In addition, infrastructure constraints such as costly access to broadband connectivity and electricity are holding back the spread of generative AI in low-income countries.

1. INTERNATIONAL LABOUR ORGANISATION (2023), Generative AI and Jobs: A global analysis of potential effects on job quantity and quality, ILO Working Paper 96.

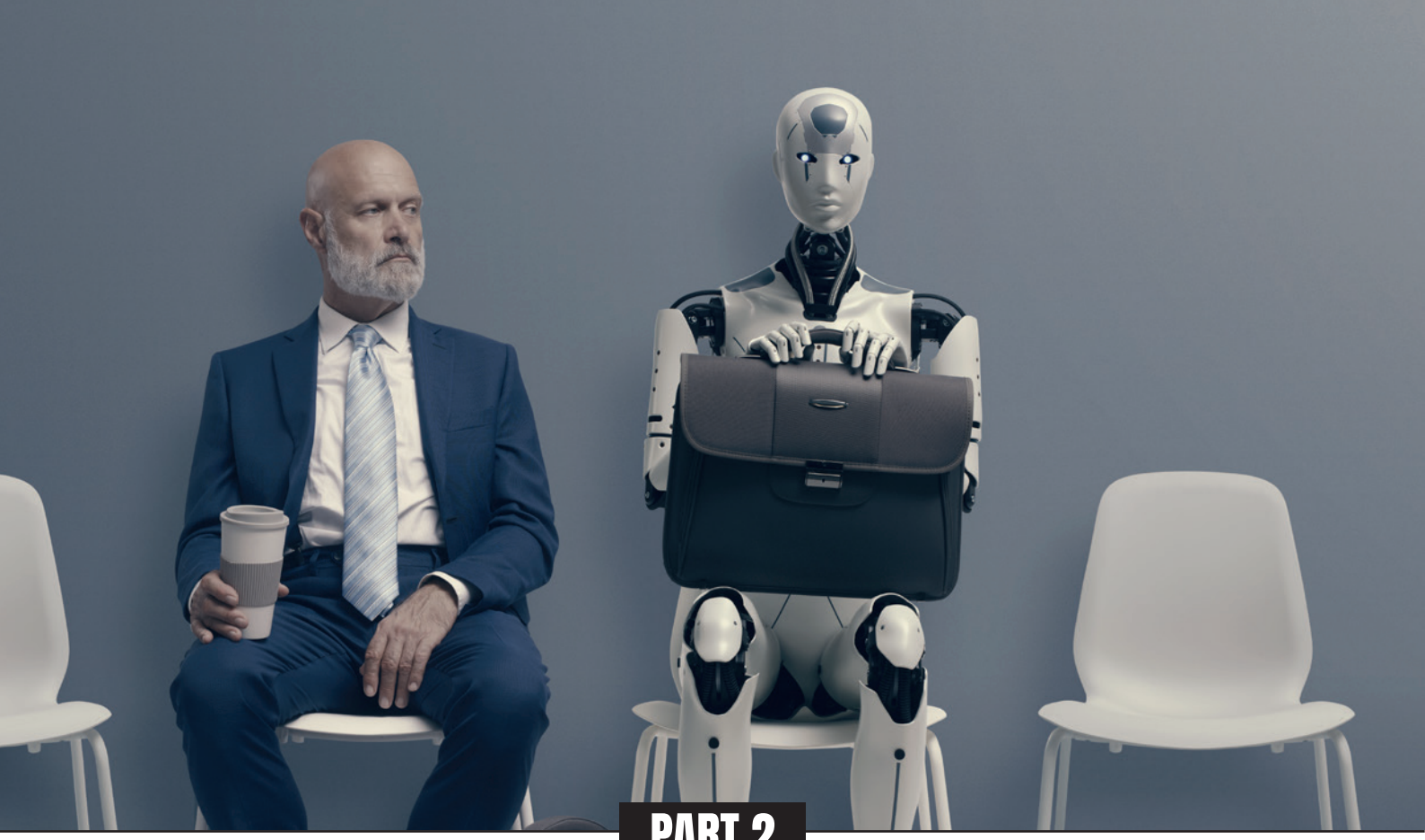
2. LANE M., WILLIAMS M., BROECKE S. (2023), The impact of AI on the workplace: Main findings from the OECD AI surveys of employers and workers, OECD Social, Employment and Migration Working Papers No. 288.

3. WORLD ECONOMIC FORUM (2023), Future of Jobs Report.

4. MC KINSEY & COMPANY (2023), The economic potential of generative AI, The next productivity frontier.

5. MC KINSEY & COMPANY (2023), The economic potential of generative AI, The next productivity frontier.

6. LANE M., WILLIAMS M., BROECKE S. (2023), The impact of AI on the workplace: Main findings from the OECD AI surveys of employers and workers, OECD Social, Employment and Migration Working Papers No. 288.



PART 2

AI and work

1. AI and work, an ambivalent relation

AI investments in the industry tend to come in the form of small modules of AI technologies, which are more easily applicable to modern manufacturing facilities than monolithic systems. Dr. H. Van Dyke Parunak calls it "Distributed Artificial Intelligence in Industry":

- AI Investments come in the form of modules, distributed along the line of the production chain.
- Implementation of those technologies tends to come step by step: from automation to data collection, to data analysis, etc.
- Those modules, coming as an add on, continuously question the compatibility of those technologies with one another. Are those technologies able to communicate with one another effectively? Are AI providers able to coordinate their activities with one another?

For instance, the automation of a production line will be implemented one production step at a time, introducing production modules one at a time. If the module is not fully satisfactory, the next module will be bought to another provider. Consequently, the production line remains flexible, able to adjust itself to its needs. But those different modules need to remain compatible, and workers need to adapt to the diversity of those modules.

The introduction of AI technologies questions the reciprocal places of human labour and machine/automated/AI labour.

- Are humans working with AI technologies at a compatible rhythm?
- Is machine labour completing/reinforcing human work?
- Are they both mutually working together?

A study published in May 2024[1] sheds new light on the ambivalence between AI and work.

This study highlights a number of crucial dimensions that provide a clear understanding of the links between the introduction of AI within a company and work.

Among the negative aspects that emerge are the contradictory expectations of employees regarding AI, which may be perceived as a valuable tool or as a threat to their expertise.

The authors also mention a process that they describe as empowerment paradoxical in that the reflection surrounding the deployment of AI makes it possible to become aware of the richness of the tasks performed by employees and, conversely, of the limits of AI.

They also mention two other paradoxes, the performance paradox and the facilitation paradox. The first is more intuitive than the second. The first refers to the productivity gains that can be generated, which can pose a threat to employment insofar as the workload can be reduced. The second case is different. It consists of the fact that the performance of difficult tasks by AI eliminates work that is considered to be unimportant, but which provides satisfaction to employees.

Other risks are also mentioned. In particular, the de-establishment of modes of recognition, fears of the dehumanisation of practices and the weakening of know-how. But also, a possible weakening of autonomy in the workplace or a destabilisation of responsibility.

But it's not all doom and gloom. There are configurations in which AI can prove to be highly complementary to human work, helping to create "augmented humans". Humans can be relieved of certain rather arduous tasks. In other cases, the performance of employees is improved by the use of AI. In further cases, AI can provide additional security in the performance of a task (proof-reading, anomaly detection, etc.).

2. AI technologies call into question the complementarity of man and machine

The subsidiarity of human work in relation to a machine is often associated with an increase in occupational accidents

In these studies, machine-driven production rates, algorithmic management and data-driven production lines are associated with higher risks of workplace injury.

In the US, Amazon has over 750,000 robots working alongside employees, taking on highly repetitive tasks, while employees focus on delivering to customers. These robots are described as working "collabouratively" with employees (Amazon website - aboutamazon page).

In fact, these robots set the pace for warehouse employees, reducing rest and downtime. This automated rhythm, disconnected from workers' individual fatigue, has been linked to injuries. The robots control the pace, the tasks and any rest periods, reducing the autonomy of each worker.

In 2022, Amazon's intelligent robots were still causing injuries in warehouses, confirming the results of previous studies carried out in 2020, reports the BBC.

The complementarity of human and machine work brings with it both the hope of a positive impact on occupational health and the risk of deterioration

The complementary components of human and machine work are often associated with the occupational benefits of AI technologies.

One of the main advantages of AI technologies is the possibility of automating time-consuming tasks, low-value tasks, repetitive work, etc. Studies show the positive impact of AI technologies on health in the workplace.

Studies show the positive impact of AI technologies on low-productivity workers. For example, when it comes to the decision-making process to save time, as explained by Brynjolfsson E, D Li, and L Raymond (2023), "Generative AI at Work".

The most optimistic vision shows workers freed from thankless tasks (consolidation of data, generation of graphs, etc.), repetitive tasks, or dangerous tasks (automation of dangerous tasks).

A French government report on AI and its influence on working conditions (March 2024), explains that AI technologies will summarise the knowledge of experts and transfer it to non-expert workers through machine learning. This process can thus increase workers' autonomy, enable them to develop a degree of expertise and enrich their work.

However, introducing AI technologies that complement human work changes work content for humans.

If the time saved by AI being introduced is used to concentrate human work on a reduced variety of tasks it can lead to monotonous work and work intensification.

Human work being complementary with AI automated work, will also deteriorate the cognitive equilibrium of

work (alternating between high-intensity cognitive work and low-intensity cognitive work, generating spaces to rest). This increases the risk of cognitive fatigue.

Human work may end up being relegated to non-production work, gaining less recognition in the process. Two authors developed a case study on flow industry, where the introduction of automation in the microchips industry had humans relegated to control and monitoring, with few to no actual production work or inputs. Human work became less and less visible, decreasing at the same time the recognition it could get.

AI assisted work questions, the responsibility spectrum of AI workers and increased stress induced by risks of errors

In their article on the "Application of machine learning and artificial intelligence in the oil and gas industry", SIRCAR and YADAV point out that, as facilities rely more and more on AI technologies, the role of consolidated data sets, algorithms, etc. become more and more crucial.

This induces an exacerbation of the crucial role of AI specialists, with bigger responsibilities. It poses the question of shared responsibilities, between AI users, AI technology itself, and programmers.

- Their role and required skillset will change. To successfully innovate in the AI-era, next to data scientists, oil and gas companies will need petroleum engineers with a strong sense of data science and the ability to identify and design tasks to be solved by AI. This will become a crucial role, as otherwise the wrong questions may be asked, and existing human mistakes amplified.
- There could be cases when an AI tool recommends an action leading to a loss in money, production, or even severe health or environmental issues. In this case, we have no clear understanding of responsibility-sharing between the AI algorithm itself, the AI algorithm user, or the AI algorithm developer.

This configuration also increases the impact of any error imputed around AI tools.

- Since the chain of responsibility is not clear, any error may be attributed to anyone.
- Lack of profound understanding of how AI tools work also lead to fear of unintelligible errors.

Case study - Impact of automation on microchips production, impact on recognition, and mental health risks underestimated in the project

In the case study "Of chips and humans", Véronique BLANC-BRUDE and Christian DEFÉLIX looked at how changes in work organisation have transformed the content of the work performed.

More specifically, they studied how it has impacted changing expectations, and how it has been supported by management.

From the introduction of automated technologies, the authors identified major changes in working conditions:

- Automation has not meant simplification. The added interface, whose role is to supervise and automate the production process, has simplified the decision-making process (no more steps). It has reduced the physical arduousness of the work but increased the cognitive load. The increase in cognitive load was not anticipated in the work plan.
- As the production stages have been automated, fewer people are working in the same team. Collective work is apparently reduced (since there are fewer workers working together at the same time), but it has never disappeared. It is simply more informal. And it often takes place outside working hours. Collective working needs spaces to exist during working hours, planned according to the teams. Otherwise, it risks generating invisible work.

In another case study involving Dassault, the "supervisors" (a new role defined to manage the automated process) had to work outside working hours, to carry out collective work that would have been carried out during working hours in the previous system.

The most important point for the authors was that this organisation tended to make workers feel under-appreciated for their contributions. Workers who informed management of certain problems were not taken into account. Their work being relegated to assisting the machine was apparently devoid of expertise and value, leaving workers with a recognition deficit.

This increases stress induced by risks of errors that could be understood directly, or not, explained or not, imputed to anyone or everyone. This stress-inducing situation may be prevented by a strong culture of acceptance around errors (valuing lessons learnt from experiencing and making mistakes). But this risky situation will be extrapolated in an error-adverse environment.

AI impacts on work's meaningfulness

The increasing use of AI technologies has consequences on the experience of meaningful human work.

Meaningful work refers to the perception that one's work has worth, significance, or an important purpose.

Meaningfulness intersections with the notion of organisational commitment at work. The normative component of organisational commitment relies on meaningfulness and values at work, according to ALLEN and MEYER.

Meaningfulness is composed of the sense of justice at work, having autonomy to contribute to your own production, understanding what one does (explicability), and one's work being non-maleficent. Those dimensions contribute directly to one's exposition to mental health risks.

BANKINS and FORMOSA studied the impact of AI on meaningful work, giving three configurations:

- AI assumes some tasks (either simple or complex) while workers remain engaged elsewhere in the roughly similar work process. This is akin to AI replacing humans in some tasks.
- AI assumes a set of tasks resulting in new human work focused on "tending the machine". This is akin to creating new types of tasks for workers.
- AI 'amplifies' or 'assists' workers by improving how human workers do their existing work. This is akin to AI assisting workers with their tasks and/or augmenting and enhancing workers' abilities.

The study shows both positive and negative impacts on all the components of meaningful work.

Two paths generate the greatest risk of harms through significantly reducing experiences of meaningful work.

- When AI replaces some tasks where it assumes more complex tasks and the worker is not afforded any new comparable or more interesting work, the risk of degraded task integrity, deskilling, reduced task significance, and constrained autonomy is greatest. This is because complex tasks generally constitute a large and significant part of the work process and undertaking them exercises a range of important skills.
- When workers are relegated to 'minding the machine' work, where work is fragmented, piecemeal, to a micro-work nature, it threatens these same aspects of meaningful work and feelings of belongingness when work is outsourced to disconnected workers.

"Managing the machine" work may increase meaningful work experiences overall through heightened administrative responsibility. It can lessen feelings of task significance by increasing distance between workers and their beneficiaries and reducing feelings of personal responsibility.

In terms of autonomy, across each path, the study shows how autonomy is supported when AI is used to free up humans to focus their time on other, more valued tasks and give them more control over their work. However, many of these positive impacts also depend on whether workers have input into how AI is deployed in their organisation. A particular risk to autonomy is the use of AI to surveil and monitor.

3. AI technologies forces companies' restructuring, thus changing the work environment

AI impacts working conditions through changes in the organisation. Changing how the work is organised changes how the work is done.

AI technologies impact working conditions through reorganisations

An OECD report has studied the impact of AI technologies on working environments through 100 case studies in 8 different countries.

The case studies show that, to date, job reorganisation appears to be more widespread than job displacement, with automation leading to the reorientation of jobs towards tasks in which humans have a comparative advantage.

AI is changing the organisation of companies even before it enters them, transforming working conditions and increasing workers' exposure to mental health risks.

Companies that develop teams of AI specialists run the risk of unequal recognition depending on the value of each person's work in relation to AI.

ANIRBID SIRCAR et al. explain that AI solutions are not generic: they cannot simply be bought. AI solutions must be adapted to the business context and the company's database.

To actively use AI in processes and products, companies need to develop in-house teams of data and AI specialists to support the development of the AI infrastructure (algorithms and datasets) and to customise the tools that companies will later use in their operations.

Companies will (partially) become data-driven businesses and trends show that AI specialists will become irreplaceable to support almost all innovation efforts in industry companies over the next 10 years... But finding and retaining AI talent is difficult, as AI specialists are relatively scarce and subject to headhunting.

This dynamic creates spaces of perceived potential inequality: it challenges organisational justice through the distribution of unequal recognition based on the value of a person's AI work.

AI also changes the role of some specific departments, now aimed towards feeding AI or maintaining it

The introduction of AI technologies means that the organisation has to be modified to support them. The objectives of certain departments are transformed. Their missions are redefined in line with AI technologies. This calls into question professional identities and increases the risk of cultural mismatches, leading to:

- Suffering, for people who do not recognise themselves in the transformed professional identity.
- Conflicts for people defending their own professional identity.

For example, companies in the pharmaceutical industry that invest in AI technologies tend to see their metrology department move from a "quality control department" to an "automation department".

It formalises the changes in the remit of the metrology department, which is now run by automation specialists rather than quality control specialists.

Case study. The Predictive Maintenance team: The transformation of maintenance jobs in the pharmaceutical industry

We are seeing the development of AI-powered predictive maintenance solutions in the pharmaceutical industry. Maintenance workers in the industry are often a scarce resource in general, and pharmaceutical companies often choose to have their maintenance workers develop expertise in both regular maintenance and predictive maintenance.

As a result, we are seeing a transformation in maintenance jobs: from "field technicians" to "project managers".

- They now work more to planned schedules (and less unplanned downtime). As a result, their work has less urgency, but less subjective importance (transformation of the way in which we can evaluate our own work.
- The advantage is that the work can be seen as "deeper", "more structural", and can be associated with greater expertise.

This also transforms the position of the maintenance department within the production facility:

- From a reactive workforce, always ready to intervene on the production lines, with stocks and resources ready for use...
- To a planning job, interacting with all the departments to plan scheduled downtime, so that all the ducks are in a row at the right time.
- The work of predictive maintenance planners relies heavily on good organisation and coordination with all departments.

Companies often choose to isolate the predictive maintenance department from the "normal" maintenance department (sometimes under the direction of the facilities management team), thereby sanctifying its specificity.

As a result, their professional identity is changing from a culture focused on quality to one focused on automation.

Some metrologists are fighting these changes: they are defending their professional identity as metrologists, turning to quality control, standardisation, conformity, and so on.

These kinds of changes are not new, and the health risks associated with changing working conditions are well documented.

- Askenazy, 2004, has documented peaks in work-related accidents following major changes in work organisation.
- Connink and Gollac 2006, have shown that the acceleration of changes in the working environment is accompanied by a growing sense of inadequacy on the part of the workers who experience them.

Changes in the roles of certain departments in relation to AI are not revolutionary in themselves but can be overlooked as a by-product of organisational change, when in fact they are at the heart of it.

AI has a huge transformative capacity. It can transform work, its content, and its organisation. Working conditions are also impacted. Relations between workers, their relationship with middle managers or AI specialists can also be affected.

Labour AI study mentions a *"conflict of rationality between managerial logic and ordinary/real work"*: leaders and managers push AI to get more efficiency and reliability. On the other side, employees are seeking to protect their experience, expertise and professional autonomy.

This remark sums up the antagonism that can exist between the aspirations of company management and those of employees. Depending on how these contradictory aspirations can be reconciled or at least taken into account, it will lead to totally different results in terms of the way AI is deployed and used and its consequences on employees' work.

1 *Étude des impacts de l'IA sur le travail*. Rapport d'enquête LaborIA Explorer. Simon Borel.

PART 3

Industry at the heart of AI

1. Industry is at the heart of the AI value chain

As is often the case in the high-tech world, the power of marketing suggests that AI is something intangible, like the cloud or wireless networks. In reality, all these technologies require infrastructures that are quite concrete.

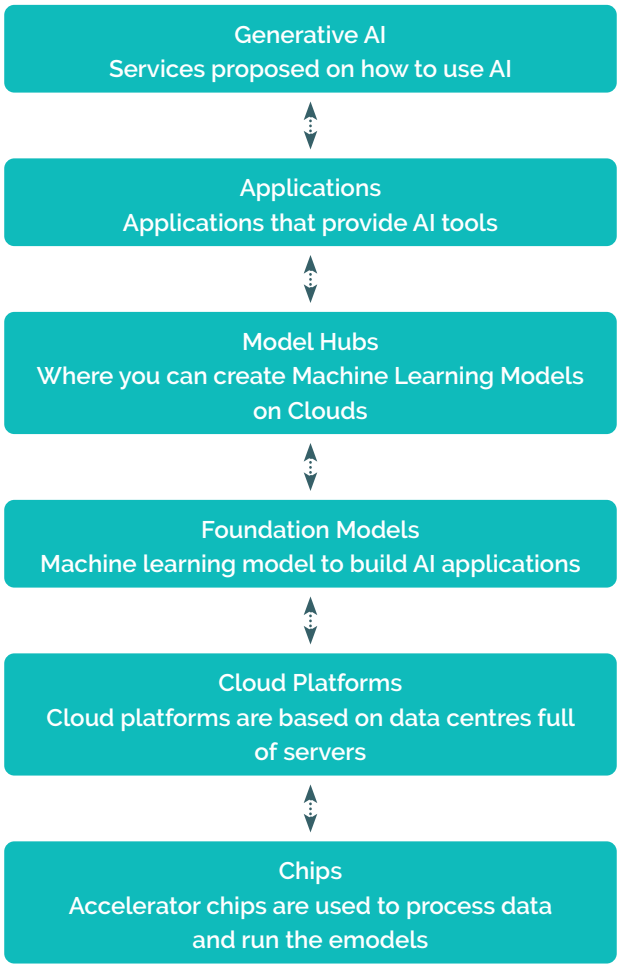
In other words, AI requires real infrastructures. From this point of view, industry lies at the heart of AI. This is undoubtedly one of the blind spots, along with energy consumption and the so-called "click workers".

If we try to retrace the path that enables us to obtain results following a query to a generative AI, we can mention the following stages:

1. **Data acquisition**: Collection of raw data from various sources such as sensors, IoT (Internet of Things) devices, databases, social media, etc.
2. **Data pre-processing:** Cleaning, normalising, and preparing data to make it usable by machine learning algorithms.
3. **Data mining:** Exploratory analysis to discover trends, patterns and relationships hidden in the data.
4. **Modelling and machine learning:** Development, training, and optimisation of machine learning models to solve specific problems, such as classification, regression, clustering, etc.
5. **Model evaluation:** Evaluation of model performance against specific metrics, using separate test datasets.
6. **Model deployment:** Integration of models into production systems for real-time prediction or classification.
7. **Monitoring and maintenance:** Continuous monitoring of the performance of deployed models, detection of failures and feedback to improve performance.
8. **Interpretation of results:** Understanding and interpreting model results to make informed decisions and iterate on the machine learning process.

But behind these various stages of data processing, hardware and software infrastructures are required.

The chips required are designed and produced by a handful of players. Today, Nvidia is the undisputed lea-



der. And TSMC produces them. But more and more players are trying to design their own chips.

The data centres (DCs) used by the major cloud players contain a wide range of equipment:

- Racks and servers (Dell, HPE, etc.)
- Power management equipment (Vertiv, ABB, Schneider, etc.)
- Thermal management (Arrow Electronics, Schneider, Siemens, Vertiv, etc.)
- Switches and routers (Cisco, Nokia, Juniper/HPE, etc.)

These companies, which are very much part of industry, are in a special position: they contribute to the development of the infrastructure needed for AI and, more broadly, for digital transformation. What's more, they themselves are using these tools internally to improve their processes, R&D, and so on.

2. AI and carbon footprint

AI requires chips and data centres. In either case, the massive use of AI raises questions about the energy transition.

Chip production poses problems in terms of energy consumption, waste recycling and water consumption. It seems that the chip industry is not at all on track with the Paris Agreement on climate change. On the contrary, growth prospects for the chip industry appear to be on a steep, upward trend.

On the DC side, the question of energy consumption also arises, even if the trend is towards improved energy performance. The energy consumption of DCs[1] is such that in the USA, the reopening of coal mines is being considered. And DCs' IT CAPEX are growing with 15% Compound Annual Growth Rate.

Companies like Google and Microsoft have recently disclosed information on their energy consumption and revealed that they won't be able to reach their target due to the rise of DCs.

3. The hidden work of micro-workers

Another blind spot when it comes to AI is that of click workers or micro-workers. Data does not exist in nature in its raw state. It's the work of these invisible workers that produces it. As Antonio Casilli[2] explains, automation work and artificial intelligence are only possible thanks to workers performing micro-tasks paid a handful of cents. These workers can be found in India or Kenya for the English-speaking world, or in Madagascar for the French-speaking world.

Several authors have explained in an article that behind a generic name, click workers fulfill several functions. They mention "AI preparation", "AI verification" and "AI impersonation".

We're talking about a material activity, but one that aims to prepare data to feed artificial intelligence. It's invisible work, but it's real, and we can't do without it. Evoking this type of work helps demystify the quasi-magical character often attributed to AI systems and shows that AI is in fact based on human labor - a lot of human work.

In a 2023 report[3], the World Bank estimates that the number of online gig workers ranges from 154 million to 435 million. The lower figure refers to workers whose occupation is the majority one, while the higher figure also considers those for whom it is a secondary, complementary, or marginal occupation. In other words, these workers would represent between 4.4% and 12.5% of the global workforce. This is far from negligible. Even if the World Bank report has a broader definition of click workers, as it also includes location-based gig jobs (taxis, delivery, etc.), online freelancing and online

gig jobs. The latter requires more skills than microwork. The World Bank believes gig work has increased by 41% between 2021 and Q1 2023. Given the rise of automation and AI, it's safe to say that the number of click workers has also risen sharply over the same period.

A 2021 analysis of the European Commission[4] was mentioned 500 platforms in the EU with 28 million of people working in the sector - a figure expected to rise to 45 million by 2025.

Speaking of invisible work, other forms of work, less precarious, within companies say recourse to AI but just as invisible can be mentioned. When an AI is acquired and implemented, some activities are required to adjust, customise, maintain, or optimise the AI. Otherwise, the AI will not perform as expected. This is also invisible work not yet recognised.

Generally speaking, there is a lack of recognition for AI supervision work (time allocation, recognition of implied skills, etc.).

1 DCs in 2020 use more electricity than entire countries such as UK (source IEA).

2 Waiting for robots. The hired hands of automation. Antonio Casilli. The University of Chicago Press. 2024

3 Working without borders. The Promise and Peril of Online Gig Work. World Bank 2023.

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PART 4

AI and the oil and gas sector

Oil and gas companies are facing multiple strategic challenges that highlight the importance of value chain optimisation, including the long-term energy demand mix variations linked to the energy transition[1] (IBM, 2021). As a consequence, these companies are betting on AI introduction to reduce costs, improve process efficiency and expand revenue[2] (Deloitte, 2024). However, it is important to note that oil and gas companies are not new to AI introduction. For example, "Total started applying artificial intelligence to characterize oil & gas fields using machine learning algorithms in the 1990s"[3] and "In 2013, Total used machine learning algorithms to implement predictive maintenance for turbines, pumps and compressors at its industrial facilities, thus generating savings of several hundred million dollars" (TotalEnergies, 2018). In fact, as BP's executive vice president of innovation and engineering Leigh-Ann Russell declared in November 2023: "We've been working with AI and machine learning for a while now"[4] (BP, 2023).

According to IBM's 2021 Research Insight "Energizing the oil and gas value chain with AI", a majority of oil and gas companies' executives declared having implemented AI across their value chain, especially for exploration and development, risk management, as well as production and operations (respectively 53%, 50% and 45% of them) (IBM, 2021). Deloitte's 2024 oil and gas industry outlook[5] indicates that AI use cases in the industry target drilling operations optimisation, exploration and reservoir optimisation, refinery processes optimisation as well as predictive maintenance.

1. Oil and gas companies are using AI for exploration and development

cf. appendix for detailed use cases

Technologies

As stated by IBM, *"The exploration of hydrocarbons is a complex and knowledge-intensive business that involves large volumes of data including geological, physical, and geochemical information to assess the likelihood of the presence and potential size of hydrocarbon accumulations"* (IBM, 2021). Oil and gas companies have thus been implementing AI to automate the analysis of subsurface and historical well performance data, as well as imaging

and interpretation by using technologies such as machine learning, computer vision and natural language processing (TotalEnergies, 2018).

Gains

In fact, they are aiming for faster, more accurate and more effective source identification by reducing the time allocated to data collection, interpretation and simulation by up to 90%[6] (BP, 2019). Using AI, data can be processed *"in a matter of days, compared with months or years previously"*[7] (BP, 2019). As a result, companies such as Chevron are increasing production by 30% through the usage of AI, compared to conventional methods[8] (Mordor Intelligence, 2024).

Impacts on the number of jobs, work content, skills and working conditions

AI usage for exploration and development is expected to impact geologists, geophysicists as well as reservoir and geo-information engineers (TotalEnergies, 2018; BP, 2019). More specifically, it is envisioned as a way to reduce the amount of *"low-value and manual analytics work"* undertaken by them, thus helping them *"to improve decision making and the identification and verification of possible alternative exploration scenarios"* (IBM, 2021). For example: *"As a petrophysicist, I'd typically have to interpret each of my wells, one by one […] Machine learning allows you to do that in bulk"*[9] (BP, 2019).

2. Oil and gas companies are using AI for precision drilling
cf. appendix for detailed use cases

Technologies

Oil and gas companies have also been implementing AI to automate precision drilling by using technologies such as machine learning algorithms trained to monitor drilling conditions[10], digitally enabled closed-loop systems to control the drilling process[11] [12], as well as algorithms and machines trained to predict the type of rock that drillers might encounter[13] (IBM, 2021; BP; ExxonMobil, 2024; BP, 2019). As an example: *"a machine learning model is trained on historical data from Shell's extensive drilling records, as well as simulations to steer the drill into the subsurface. It also takes into account data from seismic surveys, temperature, pressure, and other data points from the drill bit"*[14] (SparkCognition, 2021).

Gains

Companies are aiming for autonomous, safer and more efficient drilling by maximising rates of penetration and minimising technical issues (ExxonMobil, 2024). The usage of digital technologies gives them the ability to produce a field development plan in under a week rather than the usual three or four months, and to optimise the drilling sequence in two or three days rather than two months[15] (BP). Companies are also aiming to eliminate up to 75% of preventable causes of non-productive time as well as 15% of drilling costs (IBM, 2021).

Impacts on the number of jobs, work content, skills and working conditions

AI usage for precision drilling is expected to impact rig personnel by controlling the drilling process without human intervention, eliminating repetitive tasks and reducing the amount of *"low-value manual analytics work"* undertaken by drilling engineers (ExxonMobil, 2024; IBM, 2021). For example: "in Oman, we have drilled more than 4,000 metres of hard rock using digitally enabled closed-loop systems with drillers supervising the process rather than physically conducting it"[16] (BP).

3. Oil and gas companies are using AI for predictive maintenance
cf. appendix for detailed use cases

Technologies

Oil and gas companies are implementing AI for predictive maintenance by using technologies such as machine learning algorithms[17], by automating the analysis of voluminous data obtained from sensors installed across their assets[18] and by developing algorithms that have the ability to pinpoint precisely where sand enters wells in order to restore production (Fieldbox, 2024; IBM, 2021; C3 AI, 2022; BP).

Gains

By doing so, oil and gas companies are *"avoiding unnecessary downtime and reducing or eliminating the need for a full repair altogether"* (Fieldbox, 2024). They are also able to conduct well reviews that used to take days of live preparation. As a consequence, these companies are saving hundreds of thousands of dollars for each day of avoided downtime[19], amounting to tens of millions of dollars per year (Tensorway, 2023; IBM, 2021). For example: *"Chevron has deployed a platform in conjunction with Microsoft that has helped the company prevent 12 major accidents and save the company $12 million in the first year of deployment"*[20] (Numalis, 2024).

Impacts on the number of jobs, work content, skills and working conditions

According to IBM, oil and gas companies are implementing AI for predictive maintenance in order to allow operators to proactively reduce risks, maintenance costs, and downtime by automatically informing them beforehand (IBM, 2021). The introduction of AI-based predictive maintenance reduces the need for manual inspection: *"To give one small example, we can use AI to monitor corrosion in a way that we just can't do manually and cut manual inspections by 70%"*, declared BP's executive vice president of innovation and engineering, Leigh-Ann Russell in November 2023[21] (BP, 2023). "*Aside from robots, inspections can also be carried out with handheld devices or drones water"*[22] [23] (BP; Shell, 2021).

4. Oil and gas companies are using AI for production and operations

cf. appendix for detailed use cases

Technologies

Similarly to all operations, oil and gas companies are implementing AI for production and operations. These companies are using AI for operational insight, business optimisation and process automation[24] (BP, 2017). In fact, they are using technologies such as machine learning, digital twins for production modelling and optimisation, reservoir imaging for reservoir management, models *"simulating the impact of procedures and showing engineers how they can tweak flow rates, pressures and other parameters"*[25], as well as digital operations advisors to perform calculations on equipment and spot gaps compared to usual and optimal operations (BP, 2017; BP, 2023; BP; Shell, 2021).

Gains

By doing so, oil and gas companies are aiming at production and operations optimisation, speed and quality of decision making improvement, as well as operational risk management[26] (Shell, 2021; BP, 2017).

Impacts on the number of jobs, work content, skills and working conditions

The introduction of AI for production and operations reduces the need for manual analytics work. For example, BP's Plant Operations Advisor (POA) using AI *"performs 40mn calculations on 400 pieces of equipment on Atlantis' trees, manifolds, separators, compressors and other components, helping the engineering team to spot excursions from normal operating limits. Previously those same engineers would spend hours collating and studying the data for such excursions. This data is now available immediately on a user-friendly, color-coded, web interface. The time saved can be used to run analytics and attend to equipment or processes that might need attention. […] One of our goals with systems like POA is to enable our engineers to spend less time manipulating spreadsheets and more time engineering"*[27].

As a conclusion, the introduction of AI in the oil and gas industry does not come without consequences for the number of jobs, work content, skills and working conditions.

Fig.4 Syndex (2024), Job impacts of AI introduction in the oil and gas industry overview

Impacts of AI introduction in the oil and gas industry	Jobs impacted	Job number	Work content	Working conditions
Exploration and development	• Geologists, geophysicists, petrophysicists, reservoir and geo-information engineers	*Unidentified*	• "Low-value and manual analytics work" decrease	*Unidentified*
Precision drilling	• Rig personnel • Drilling engineers • Geosteerers • Drillers	Need for human intervention decrease	• "Low-value and manual analytics work" decrease • Repetitive tasks decrease • Replacement of physical conduction of drilling processes by supervision	• Safer drilling
Predictive maintenance	• Maintenance operators • Operations team in the control room and on the ground • Executives at headquarters in charge of overseeing daily operations	*Unidentified*	• Remote monitoring • Need for manual intervention decrease	• Decrease in the need to send workers out in difficult conditions
Production and operations	• Engineers	*Unidentified*	• "Low-value and manual analytics work" decrease	*Unidentified*

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PART 5

AI and the pharmaceutical sector

According to McKinsey & Company's 2024 "Generative AI in the pharmaceutical industry: moving from hype to reality" study, the process of bringing a drug to market is a costly and time-consuming one: on average, $1.4 billion and 10 years are required[1], with a 90% failure rate during the clinical trial period[2] (McKinsey & Company, 2024; Atradius, 2023). As a consequence, numerous companies are currently betting on Generative AI to reduce both the time required to commercialise a drug and the failure rate (Atradius, 2023). They are aiming to boost productivity with AI, especially through research and early discovery as well as clinical development acceleration (respectively expected to generate $15 to $28 billion and $13 to $25 per year in both cost savings and revenue uplift[3] in the following years).

Despite the launch of multiple AI projects since the autumn of 2022, it is important to note that pharmaceutical companies are not new to AI introduction. According to Moderna, founded in 2010: *"digital technology has been part of our programs since our early days"*[4] (Moderna, 2024).

1. Pharmaceutical companies are using AI for research and early discovery

As stated by Roche, *"Drug discovery and development is currently a lengthy, complicated, and uncertain process"*[5] (Roche, 2023). In fact, research and discovery requires identifying targets, developing validation assays to test compounds, singling out the most promising leads, and assisting in preclinical testing to determine their effectiveness. Using newer forms of gen AI, such as computer vision, virtual screening, and knowledge graphs has the potential of cutting discovery time lines in half, according to McKinsey (McKinsey & Company, 2024).

Knowledge extraction

Understanding diseases and drugs requires scientists to extract and summarise information from diverse sources such as patents, scientific publications and trial data. Generative pre-trained transformer (GPT) powered knowledge extraction using AI algorithms can allow

researchers to ask open-ended question and obtain evidence (McKinsey & Company, 2024).

Candidate identification

Drug development requires identifying and prioritising chemical compounds and complex chains of molecules that are the most likely to treat a given disease in order to test them in laboratories. As stated by Maximilien Levesque, co-founder of French in silico drug discovery start-up Aqemia, *"Artificial intelligence has the ability to invent molecules that no one has ever seen or tested. The speed of calculation makes it possible to virtually test billions of molecules"*[6] (Le Figaro (translation), 2023)

Examples of company use

Sanofi is applying AI to research through predictive modelling and automation, accelerating research processes from weeks to hours and improving potential target identification by 20% to 30%[7] (Sanofi, 2023). For target validation, the company has built target identification engines that analyse genetic, genomic, functional and cellular disease data by combining advanced AI, machine learning and experimental techniques[8] (Sanofi, 2024). For vaccines, the company is applying AI to mRNA research by creating digital models, accelerating the lipid nanoparticle prediction process from months to days (Sanofi, 2023). For drug design, the company's researchers are developing AI based models that predict both the structure and biophysical properties of potential drug candidate molecules in silico[9]. As a consequence, Sanofi declared savings of time and resources as the need to physically produce compounds in the lab is decreasing (Sanofi, 2024).

2. Pharmaceutical companies are using AI for clinical development

Given the fact that 80% of the costs generated by bringing a drug to market are associated with clinical development, Gen AI has the potential to optimise this step[10]. According to McKinsey, its usage could lead to a 50% cost reduction, an acceleration of clinical-trials of at least 12 months and a **Net Present Value (NPV)** increase of at least 20% (McKinsey & Company, 2024).

Patient identification

Clinical trials require an identification of the appropriate patients to study in order for them to respond to the treatment. Gen AI has the potential to allow companies to optimise clinical trials by using biomarkers to choose patients depending on their predicted progression or response to treatment (McKinsey & Company, 2024). Furthermore, digital twins enable the simulation of disease progression and drug response in patients, equating clinical trials[11] (Servier, 2022).

Clinical-study report writing

Gen-AI can accelerate launch timelines by accelerating submission writing and improving its accuracy. In fact, drafting the clinical-study reports, which typically requires eight or more weeks, could be cut by half. As a consequence, medical writers could be freed up to redirect their focus on complex clinical interpretations required for the clinical-study (McKinsey & Company, 2024).

Regulatory agencies' request treatment

Gen-AI can accelerate the clinical-development process by anticipating and responding with greater efficiency to regulatory agencies' requests. In fact, Gen-AI usage allows companies to predict request patterns and create appropriate answers, thus reducing their number (both first requests and follow-up). This use case has the potential to increase response speed by 30% and reduce follow-up requests by 50% (McKinsey & Company, 2024).

Examples of company use

Johnson & Johnson's researchers are applying AI and ML algorithms to voluminous anonymised datasets in order to identify and locate clinical research sites with nearby patients who are fit for the medicines studied. Clinical trial operations teams can use this information to determine the likelihood of enrolling the identified sites in their trials[12] (Johnson & Johnson, 2023).

Sanofi is applying digital twins technology to virtual patient population by *"using what is called quantitative systems pharmacology (QSP) modeling of a disease and available clinical trial data from live patients"*[13]. Virtual patients allow for deep patient profiling and extensive understanding of disease pathways and characteristics. As a consequence, the company is able to test their novel drug candidates before moving them into the clinic and at different early developmental stages (Sanofi, 2024).

As Moderna's CEO Stéphane Bancel declared, the company is using AI for regulatory interactions: *"for the report on our vaccine against RSV (respiratory syncytial virus, the cause of bronchiolitis), currently under review, we use our in-house MChat tool (designed*

on the basis of a license from ChatGPT and with the help of Microsoft's Copilot) to answer the questions we are asked daily by the health authorities about clinical trials production"[14] (Le Figaro (translation) 2023).

3. Pharmaceutical companies are using AI for sourcing, manufacturing, quality and supply chains

Procurement process

The procurement process requires category managers to evaluate requests for proposal (RPFs) by researching and analysing market conditions, supplier information and pricing data. Gen AI can improve the process by generating greater efficiency and time savings through automated analysis, as well as aiding negotiations and contract management (McKinsey & Company, 2024).

Manufacturing optimisation and predictive maintenance

Gen AI might help optimising manufacturing though virtual assistance by helping locate relevant standard operating procedures, generating checklists and operation guides, as well as helping supervisors with real-timeline performance monitoring and line management. Gen AI could also enable predictive maintenance and optimise repair and replacement procedures. This use case has the potential to generate a 15% to 35% workload reduction for maintenance technicians (McKinsey & Company, 2024).

Manufacturing deviation identification and management

As good manufacturing practices (GMP) and regulatory requirements are crucial for pharmaceutical companies, deviation identification and management are essential. Deviation identification and management can benefit from Gen AI through report automation, thus enhancing investigators' effectiveness and productivity (McKinsey & Company, 2024).

Supply and demand identification and management

As stated by Johnson & Johnson, *"Stocking products in the hospitals, pharmacies, clinics and other healthcare facilities where they're needed requires an accurate prediction of supply and demand"* (Johnson & Johnson, 2023). Gen AI can be used for historical demand and market trend analysis, supply chain disruption identification, proactive intervention assistance and real time production plan drafting (by taking into account stocks of materials, demand and operational limitations). This use case could lead to a 20% to 30% demand planner workload reduction (McKinsey & Company, 2024).

Examples of company use

Sanofi is applying AI to manufacturing and supply. On the one hand, the company developed an AI-enabled yield optimisation tool that learns from past and current batch performance. On the other hand, Sanofi uses a platform named "plai" throughout its biopharma supply chain, allowing teams to predict 80% of low inventory positions according to the company to secure supply faster (Sanofi, 2023).

Johnson & Johnson is using ML algorithms to analyse voluminous data (such as demand fluctuations and supplier performance) and to predict the real-time impacts of events that might disrupt the supply chain (such as weather or economic events) in order to enhance risk management (Johnson & Johnson, 2023).

As a conclusion, the introduction of AI in the pharmaceutical industry does not come without consequences for the number of jobs, work content, skills and working conditions.

Fig.5 Syndex (2024), Job impacts of AI introduction in the pharmaceutical industry overview

Impacts of AI introductionin the pharmaceutical industry	Jobs impacted	Job number	Work content	Working conditions
Research and early discovery	• Scientists, researchers	*Unidentified*	• Information extraction and summarisation automation • Need for physical intervention decrease through in silico technology	*Unidentified*
Clinical development	• Clinical development teams • Medical writers	• Need for human intervention decrease for regulatory interactions	• Decision-making support • Need for physical intervention decrease through digital twin technology • Clinical-study report writing support	*Unidentified*
Sourcing, manufacturing, quality and supply chain	• Category managers • Manufacturing supervisors • Maintenance operators • Manufacturing deviation investigators • Inventory and demand planners	• Need for manual intervention decrease	• Information extraction and summarisation automation • Monitoring and risk management support • Deviation report writing support	*Unidentified*

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PART 6

AI and telecom

1. AI and telecom networks equipment

Artificial Intelligence is nothing new in the telecom field. It has been used in the telecom industry since many years.

Smartphones vendors have been using AI for a long time. Smartphones are now full of AI. Voice assistants, such as Siri and Google Assistant, use AI to understand and process users' voice commands. AI is used to improve smartphone security and convenience by enabling facial and fingerprint recognition to unlock devices and even authenticate transactions. Smartphones use AI to improve the quality of photos and videos by automatically adjusting camera settings, detecting and tracking subjects, and applying special effects. It is used to optimise smartphone power and performance by analysing usage patterns, predicting resource requirements and adjusting system settings accordingly. Smartphones are using AI to track and analyze users' health and wellness data, such as heart rate, sleep and physical activity, and to provide personalised advice and recommendations. So yes, smartphones are full of AI.

AI is also broadly used in telecom networks. It is radically transforming how to manage, deploy and evolve networks. Wireless networks are evolving towards virtualisation and cloudification. This trend leads to a greater use of AI. AI can significantly enhance telecom network equipment performances in various ways. See chart below for several key applications.

2. AI is to be found everywhere in telecom networks

Network Optimisation and Management

AI can optimise network performance by predicting traffic patterns and dynamically adjusting network configurations. Machine learning algorithms analyze vast amounts of data from network operations to forecast demand, identify bottlenecks, and optimise resource allocation in real-time. Qualcomm, a major semiconductor company, manufactures chips for the orchestration of radios. Qualcomm claims that it can provide predictions of traffic loads to prevent surges and defaults.

Fig.6 Top 7 use cases of AI in the telecom industry

Source: https://tezo.com/blog/7-effective-ai-use-cases-in-telecom-industry/

Predictive Maintenance

AI-driven predictive maintenance helps telecom operators predict equipment failures and outages before they occur. By analysing data from sensors and historical maintenance records, AI can identify patterns indicating potential issues, allowing for proactive repairs and reducing downtime. AI contributes to network reliability.

Automated Network Operations

AI enables the automation of routine network management tasks such as configuration, fault detection, and troubleshooting. This not only reduces the need for manual intervention but also speeds up the resolution of issues, improving overall network reliability and customer satisfaction.

Enhanced Security

AI enhances network security by detecting and preventing security threats in real-time. Machine learning algorithms can identify unusual patterns of behavior that may indicate cyber-attacks or security breaches, enabling quicker and more effective responses. AI algorithms can also be used for fraud detection and prevention in areas like billing and subscriber management.

Customer Experience Improvement

AI can analyse customer interactions and service usage patterns to offer personalised services and support. Chatbots and virtual assistants powered by AI provide instant customer support, resolving common issues and queries without human intervention.

Network Planning and Design

AI assists in network planning and design by simulating various scenarios and predicting the impact of different configurations. AI-based network planning and design leverages deeper analytics that can predict needs. This helps in designing more efficient networks that meet future demands and reduce capital expenditure and ultimately TCO (total cost of ownership).

Smart Inventory Management

AI can optimise inventory management for telecom equipment by predicting demand and ensuring the right parts are available when needed. This reduces inventory costs and minimises the risk of shortages or overstocking. This is an important issue for telecom equipment providers that are often financially impacted by working capital issues.

Energy Efficiency

Telecom equipment providers have been very efficient in their attempts to reduce energy consumption. The energy consumption per byte has been drastically reduced these last decades. But at the same time, telecom traffic has been skyrocketing. The key question is whether telecom equipment providers can offer products than can decouple the link between data surge and energy consumption. Major players, such as Ericsson and Nokia, are claiming that their new generation products are able to cope with that challenge.

AI can help telecom operators reduce energy consumption by optimising the operation of network equipment. By analysing usage patterns and operational data, AI

can suggest ways to operate equipment more efficiently, reducing energy costs and environmental impact.

5G and 6G

AI plays a crucial role in the deployment and operation of 5G networks. It helps manage the complexity of 5G networks by automating network slicing, resource allocation, and ensuring quality of service (QoS) for different applications. AI helps to allocate efficiently the use of bandwidth based on real-time demand.

Data Analytics

AI-driven analytics provide insights into network performance, customer behaviour, and operational efficiency. These insights help telecom operators make informed decisions, improve services, and develop new business models. AI can predict potential service degradations and can launch preventive measures. Data analytics has been developed and used by telecom equipment providers for many years. When looking at companies' press releases, mentions of big data can be already found more than 15 years ago.

Fraud Detection

Fraud is something significant in the telecom business. AI can detect and prevent fraud by analysing patterns and anomalies in transaction data: unusual activity, data consumption… This is crucial for protecting revenues and maintaining trust with customers.

AI is used along the whole value chain of the telecom industry. As already mentioned, the use of AI is nothing new, but it is becoming more and more pervasive.

These last months, a lot of announcements have been made by major telco players. Cisco has launched a $1 billion investment fund focused on expanding and developing AI products and technologies. In November 2023, Ericsson announced AI analytics use, injection of AI into network management and the use of AI to save energy.

3. AI and employment

AI, R&D and jobs

The use of AI in telecom equipment companies is not new. Telecom equipment manufacturers have long been offering data analysis applications for their operator customers.

This trend has obviously been reinforced in recent years.

Because equipment manufacturers have largely outsourced their production, their core activity is R&D. Therefore, in these companies, it's the developers who are making increasing use of AI.

AI, manufacturing and jobs

When it comes to manufacturing, the telecom industry is very often de-integrated. Even if some of the players have kept their plants, most of them have become fabless or close to that. Manufacturing in the telecom equipment industry is therefore often realised by Electronic Manufacturing Services companies.

In these plants, automatisation, digitalisation and AI are heavily disseminated.

For instance, AI is used in the manufacturing process to capture and analyse big data. Jobs related to quality and efficiency benefit from this input of data. The way the production lines are being organised can be impacted too.

AI is also used in the supply chain. Jobs related to quotation, sourcing and planning are also being impacted by AI.

AI, maintenance and jobs

The other job that is impacted by AI is maintenance, which is becoming more and more predictive. Therefore, employees have begun to work differently.

They no longer need to go to the breakdown site when the breakdown is reported to them. They will be able to anticipate an incident when equipment starts to show signs of ageing. The job is changing insofar as it now involves monitoring equipment.

But it still requires on-site visits. While telecom networks are software-intensive, not everything can be done remotely. And there remains a hardware component.

PART 7

AI and the automotive sector

The automotive industry is currently facing a number of major challenges. Two major challenges are underway.

The transition to electric vehicles is the first one. Demand for electric vehicles is growing rapidly, driven by environmental concerns and stricter emissions regulations. Traditional manufacturers must adapt to this new technology and face competition from new players in the market. This transition is accelerating in Europe due to a strong regulation.

The development of autonomous driving is the second one. Autonomous cars are seen as the future of mobility, but their development and deployment pose many technical, ethical and regulatory challenges that are much more complex than initially expected.

Three other important issues also need to be considered:

- Supply chain: The automotive industry depends on complex global supply chains, which can be disrupted by events, such as the COVID-19 pandemic, political conflict or natural disasters. Automotive manufacturers are becoming more conscious of that reality and their own vulnerability.
- Cyber security: As cars become more connected and autonomous, they also become more vulnerable to cyber-attacks. Manufacturers must therefore invest in cyber security measures to protect their products.
- There are changes that are ongoing in the ownership and use of models. Car-pooling, short-term car rental and car-sharing services are gaining in popularity, particularly in urban areas. This could reduce demand for private cars in the future. But this is a long-term trend.

The automotive sector is facing huge challenges due to the technological changes that are going on, even though it has been using automatisation for decades. The digitalisation of this sector is therefore nothing new. The move towards electrification and autonomous vehicles has accelerated the use of electronics and software. Electronics now plays a major role in a car. It represents a growing part of the value of a vehicle. While the use of AI is a more recent phenomenon, it has many areas of application in the value chain.

Many automotive groups have begun to collaborate with high-tech groups. In parallel, they have also organised themselves with AI Labs, internal incubators or the set-up of internal software divisions. And, since 2023, many groups in the sector have made announcements regarding their use of AI. Some of them are even making acquisitions of start-ups to boost their internal capabilities in AI. Stellantis, for instance, has made at least two acquisitions in that field since December 2022. It has also launched an incubator to advance its move towards AI.

In the future, digital products based on artificial intelligence will play a key role, as stated by the Volkswagen Group. It enumerated several fields: "*New infotainment and navigation applications, high-performance speech recognition, extended vehicle functions and the deep integration of digital ecosystems in the car*". The carmaker has recently announced the introduction of generative AI in the second quarter of 2024. Mercedes and DS had already made similar announcements. Ford has been working on the possibility of using AI for a while.

But this list is not limited. Many other usages can be found. Here is an overview of the main uses of AI and the components of the value chain where it can be particularly beneficial:

1. Research and Development (R&D)

AI can be very useful in R&D. Design, simulation and innovation are some of the applications that can be found.

- Computer-aided design (CAD) and simulation: AI can speed up the design and testing of processes for new vehicles, enabling performance to be simulated and optimised before production.
- Product innovation: Massive data analysis helps identify consumer trends and preferences, guiding the development of new features.
- Generative design could also be of help to design cars with better aerodynamics that could improve energy efficiency.
- Computational fluid dynamics simulation can be used to optimise the heat, ventilation and air conditioning of new vehicles.
- AI can also be of help in the field of energy efficiency. Automotive supplier Bosch is currently working on an AI that would help to reduce carbon footprint. Valeo is teaming up with Google to enhance its design department. Forvia is also betting on AI with the intention to save money for its R&D spending. Bosch is investing (along with SAP) and teaming up with Aleph Alpha, a German AI start-up.

More and more R&D people will be hired with AI skills as the need for AI is growing.

2. Production, manufacturing and supply chain

AI, combined with other technologies such as robots, is transforming plants.

- Process automation: Intelligent robots and computer vision systems improve the efficiency and precision of production lines.
- Predictive maintenance: AI can predict machine and equipment failures, reducing downtime and maintenance costs.
- Stock optimisation: AI algorithms help optimise stock management and forecast material requirements.
- Volume forecasting: AI can be of help to anticipate the needs and volumes of the future.
- Supply chain management: AI enables better coordination between suppliers, manufacturers and distributors, improving responsiveness and reducing costs.
- Procurement: AI-based dashboards to compare suppliers' prices and improve visibility and capacity to negotiate.

Hyundai acquired Boston Dynamics a company dedicated to robotics and AI, in 2021, which was previously owned by Google and Softbank.

Toyota has developed a robot. AI was used to design this robot wich can carry goods. The robot uses sensors and AI to adapt its movements.

BMW has partnered with Nvidia to set up one of the most advanced plants in Debrecen, Hungary, using AI, virtual reality, metaverse, etc.

The automotive industry has always been at the forefront when it comes to automation. Productivity gains in factories have been gigantic. Workers are used to working with a lot of digital equipment, whether for assembly or monitoring.

3. Quality control

Machine learning and computer vision can detect defects more accurately than traditional methods. This is of great help in assembly plants.

AI is beginning to change the quality of business. It can replace the human eye. And this potentially leads to a gap in the control and the work carried out. It is less de-

pendent on humans who examine directly. But it is humans who examine the AI's conclusions.

4. Sales and Marketing

- Personalised customer experience: AI systems can analyse customer preferences and offer personalised recommendations.
- Sentiment and market analysis: AI helps to understand consumer opinions and analyse market trends, enabling better-targeted marketing campaigns.

This use case is not specific to the industry or to the automotive sector. Indeed, AI is more and more used in e-commerce. The role of AI in this area is still relatively small.

5. Connected and Autonomous Vehicles

The challenges of the connected vehicle are far greater than were envisaged less than 10 years ago. Now, very few vehicles are available with level 3 autonomy (5 being the maximum). But a lot of AI will be needed to achieve a fully autonomous vehicle. In addition to the need for AI, there are other parameters, such as cost and energy consumption.

- Autonomous driving: AI is at the heart of autonomous driving technologies, using computer vision, sensor fusion and decision-making algorithms to navigate and operate vehicles autonomously.
- Safety and driver assistance: Advanced Driver Assistance Systems (ADAS) use AI to improve safety by helping with obstacle detection, lane-keeping, adaptive cruise control, etc.

Volkswagen has invested a lot in that field, establishing a joint-venture with a Chinese partner. Ford has been testing an AI technology for autonomous vehicles since Spring 2023. Mercedes is also strongly involved in the field of autonomous driving.

6. Passenger experience

- Infotainment and user interfaces: AI systems enhance the user experience through voice recognition, music and route recommendations, and more intuitive interfaces. The passenger experience can be personalised.

GM has introduced conversational AI in its most recent cars. And other competitors are on the same track.

This is something quite new for car manufacturers and OEMs. A lot of infotainment content comes from big tech companies and is being customised. But new skills and profiles are now operating in the automotive sector.

7. After-sales service

- Chatbots and virtual assistants: AI-powered chatbots provide 24/7 customer support, answering common questions and helping to solve problems. This kind of application is not specific to the automotive industry.
- Predictive vehicle maintenance: In-vehicle systems can monitor the condition of vehicles and predict maintenance needs before a breakdown occurs.

In predictive maintenance, the Renault Group Software Defined Vehicle approach relies heavily on software, with some of it being AI.

Maintenance jobs are being changed by predictive maintenance. It does not prevent on-site work. But the way things are organised is quite different. Components are (or can be) changed before any incidents. Part of the work is also different due to softwarisation. Maintenance is not only mechanical, it also has a software part.

8. Automotive insurance

AI can be used to accelerate claims examination in case of damages. It could also be of help to analyse damages, and typically the situation where everything can be automatised, with a risk of having no human eyes in the process.

The lack of a human eye could generate problems. The automatisation of the whole process, including the treatment of claims, could lead to a lot of frustration when humans tryi to contest a litigation against an AI.

9. Road traffic

AI-powered traffic signalling platform, connecting drivers and sharing data that helps reduce congestion, emissions and accidents. This is something that has been existing as a promise for many years and very often called 'smart city.' But it has not yet met the big expectations that were behind it. As more and more cars are being connected, this might change in the future

AI is reinforcing a strong trend affecting the automotive world. Like the rest of industry, the automotive sector is undergoing a process of softwarisation. There are less and less workers, and more and more engineers. And coders are more and more numerous.

PART 8

Training of AI and bias

Generative artificial intelligence is based on machine learning models derived from neural networks. If this technology is "generative", meaning capable of reproducing results of a creative nature whose characteristics often cannot be distinguished from those produced by humans, it is because it is pre-trained beforehand. Pre-training involves self-learning on a vast corpus of data, during which the model learns to recognise text structures by making predictions. Following this initial learning, reinforcement learning is performed with specific tasks. This work requires a high number of contributors and labour to produce labelled data, typically done by workers on crowdsourcing platforms.

AI simply presents the results of calculations and data collected, at some point at least, by humans. Consequently, algorithms «reflect and deal with the human biases that are built in when they are programmed, when they process data and when humans interact with them.»[1] Cognitive biases are repeated patterns of thought that lead to inaccurate and subjective conclusions.

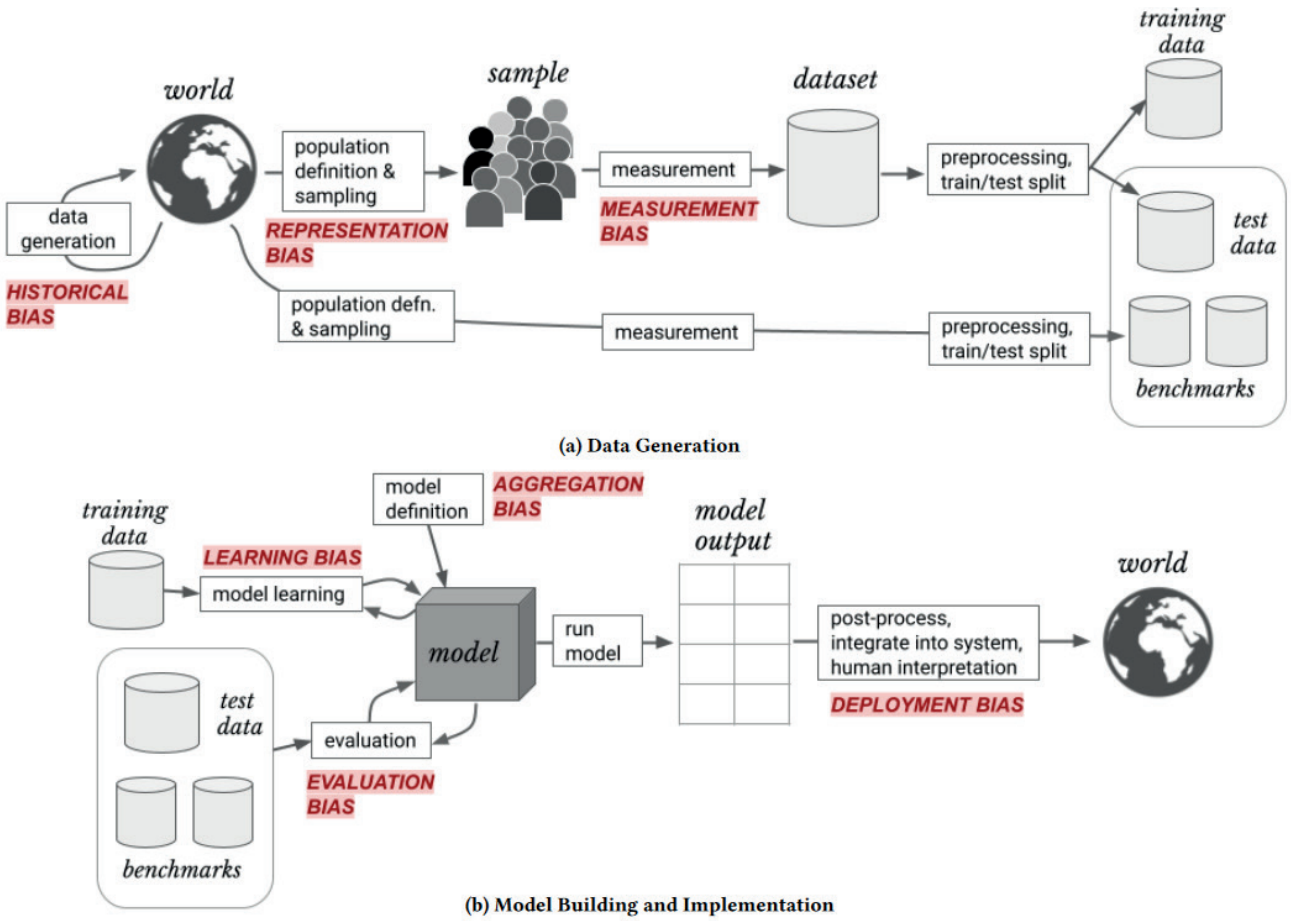
Biases in the training data can be reflected in the output of the models, leading to discriminatory or unfair results. The lack of contextual understanding and empathy limits the ability of systems to handle sensitive human interactions.

On 8 December 2022, the European Union Agency for Fundamental Rights (FRA) published a report entitled «Bias in algorithms - Artificial intelligence and discrimination»[2]. Based on the analysis of two cases: AI systems in predictive policing and in the detection of hate content, this report shows that a society's prejudices can be amplified via algorithms and lead to strong discrimination.

Different kind of biases are described by Suresh H. and Guttag J (2021)[3]:

- **Historical biases** are included in the data themselves, which are never neutral because they reflect our society and the inequalities that structure it. Cultural bias should not be underestimated either. Indeed, most generative AIs have been trained on English-

Fig.7 Diagram by Suresh H. and Guttag J. (2021)



Source: https://dl.acm.org/doi/pdf/10.1145/3465416.3483305

speaking databases, which mechanically carry Anglo-Saxon cultural biases.

- **Representation bias** arises when data is collected and sorted according to the choices made.
- **Measurement bias** occurs when labeling data, as the surrogate used may oversimplify the characteristic being measured.
- **Aggregation bias** refers to the way in which data is linked together.
- **Evaluation bias** occurs when the basic data do not reflect the population to be studied.
- Finally, **deployment bias** occurs if the model is not used for the purpose for which it was produced.

What's more, they are reinforced by the biases of the users themselves: the automation bias, which consists of having more confidence in the results of a machine than in one's own judgement, and the confirmation bias, which leads to greater confidence in results that confirm our previous prejudices.

- The biases are to be found in several places: in the corpus of data itself, but also in the various forms of data association and pathways that the AI will reproduce, i.e. the algorithm. **Algorithmic determinism** is particularly prevalent, as predictive systems often use correlations derived from historical discrimination as causal links, thus creating feedback loops.

The sheer volume of data - hundreds of thousands, if not millions - on which the algorithm is based, from its learning phase through to its decision or production, makes it impossible for us to explain its inner workings. The opacity, the "black box", of these technologies masks the origin of biases; we can't know whether they come from the data used to train the algorithm or from the algorithm itself.

It can be difficult to guarantee *a priori* the absence of bias. Indeed, the opacity described above constitutes a technical barrier. In addition, legal rules may also hinder access to source code and data, notably intellectual property and personal data protection.

However, supervisory AI can also be used to identify biases based on the company's history, but the result

can never be entirely reliable. In its August 2023 report, the Council of Europe[4] recommends the introduction of both reasonable preventive action obligations and algorithmic discrimination risk assessments. It also encourages discussion on certification mechanisms that would validate the mitigation of system biases as far as possible, as well as greater transparency for users.

The Vilani French parliamentary report of 2018[5] proposes a systematisation of audits of AI systems, making it possible to certify, not the source code itself, but the results, and to validate whether they are in line with expectations.

For Margaret Mitchell, former head of AI ethics at Google, to avoid biases, we must introduce the notion of use. Following on from the controversy surrounding Gemini, Google's AI, which systematically produced images of people from diverse backgrounds, resulting in historical nonsense: *"When you want to develop an AI model ethically, you try to think about the intended uses, how they vary according to context, and then the unintended but predictable uses. A single model capable of doing everything will never be the right solution."*[6]

She also advocates the inclusion of a broader range of skills in R&D teams working on these tools: ethicists, sociologists, specialists in human-machine interactions, and so on. In her opinion, it's possible to work on the database itself to avoid biases.

In companies, biases concerning one area of AI can have deleterious effects on employees: algorithmic management (see below).

The use of AI in management can also lead to wage discrimination, particularly in the case of platforms. While this still mainly concerns non-salaried workers, we need to be vigilant about the possible spread of this type of model within companies. Uber is a case in point, with its dynamic pricing system: the initial price offered to drivers - and disconnected from the price paid by the customer - can vary greatly for the same journey, depending on an algorithm to which the drivers have no access, and which analyses the drivers' behavioural data in particular. Veena Dubal, professor of law at the University of California, has described this dynamic pricing policy as *"algorithmic wage discrimination"*.

Fig.8 Definition and risk for workers of algorithmic management by ETUI[1]

Definition

"Automated or semi-automated computing processes that perform one or more of the following functions: (1) workforce planning and work task allocation, (2) dynamic piece rate pay setting per task, (3) controlling workers by monitoring, steering, surveying or rating their work and the time they need to perform specific tasks, nudging their behaviour, (4) measuring actual worker performance against predicted time and/or effort required to complete task and providing recommendations on how to improve worker performance (…) and (5) penalising workers, for example, through termination or suspension of their accounts (…). Metrics might include estimated time, customer rating or worker's rating of customer."

Risks

"We argue that algorithmic management is not just a tool used by companies to organise their operations, but a game-changing management approach that impacts workers on many levels. Algorithmic management systems are not neutral, they make real-time decisions about workers, plan, allocate tasks, but also profile workers, predict their behaviour and performance and even 'recognise' their emotions. For workers, these decisions are difficult to understand and almost impossible to contest. This creates risks such as loss of autonomy, bias, discrimination, income unpredictability or surveillance."

1 PONCE DEL CASTILLO A., NARANJO D. (2022), Regulating algorithmic management. An assessment of the EC's draft Directive on improving working conditions in platform work, ETUI Policy Brief.

1 COUNCIL OF EUROPE (2023), Study on the impact of AI systems, their potential for promoting equality, including gender equality, and the risks they may cause in relation to non-discrimination.

2 EUROPEAN UNION AGENCY FOR FUNDAMENTAL RIGHTS (2022), Bias in algorithms artificial intelligence and discrimination.

3 Harini Suresh and John Guttag. 2021. A Framework for Understanding Sources of Harm throughout the Machine Learning Life Cycle. In Proceedings of EAAMO '21: Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO '21). ACM.

4 COUNCIL OF EUROPE (2023), Study on the impact of AI systems, their potential for promoting equality, including gender equality, and the risks they may cause in relation to non-discrimination.

5 VILANI C. (2018), "Donner un sens à l'intelligence artificielle, pour une stratégie nationale et européenne". Rapport de mission confiée par le Premier ministre.

6 "Les géants de l'intelligence artificielle s'intéressent moins aux biais sexistes et racistes qu'à la course à la performance", La Tribune, 6 mars 2024

PART 9

Levers

1. What is the legal framework around Europe for workers' representatives?

In **Finland**, there is a cooperation law. In case there is a new programme or project, the management must inform the workers' representatives about a new IT tool, for instance. When they are ready, they must have an information consultation meeting with the workers' reps. At this stage, the reps can bring remarks. But usually, it is pretty late. Unions are asking to be included at an early stage.

In **Norway**, there is a law to "inform and discuss" that allows workers' representatives to be informed and give their view on projects that might affect employees' working conditions. This is a law applicable to digital and AI projects. Most of the time, there is real discussion between social partners and employees' concerns are being heard. However, there is a minority of companies that do not comply with the spirit of the law. The law is not strong enough to cope with such companies.

In the **Netherlands**, it seems that the legal framework is not criticised by the unions as it seems to be satisfactory regarding the way it can be used to tackle digitalisation and AI. The issue is more about the way the legal system is being used. It really depends on the quality of the social dialogue.

In **France**, the French Works Council ("Comité social et économique") must be informed and consulted if management is contemplating any technological change. This includes the implementation of digital tools and more specifically, AI tools. In that situation, the Works Council is entitled to hire an expert. This expert is hired by the works council and paid by the management and can provide support during the information consultation process. His/her analysis is focused on the working conditions and organisational aspects.

The annual information consultation on strategy can also embed technological changes. And the annual consultation on the financial situation and the company's social policy can also raise the subject of AI.

The Social and Economic Committee is informed, prior to their use, of any methods or techniques used to assist the recruitment of job applicants, as well as any modifications of these methods or techniques.

It is also informed, prior to their introduction into the company, of automated personnel management processes and any modifications to these.

The Committee is informed and consulted, prior to any decision to implement such systems *within the company, of any means* or techniques used to monitor employee activity.

In **Germany**, the codetermination rights of the Works Council ("Betriebsrat") are strong enough to tackle the issue of digitalisation and AI. The law states that:

- if work organisation is changed fundamentally
- or technology used to control or supervise performance or behaviour of workers

then the employer must inform the Works Council about the project and how it is planned. The Works Council has a right to veto that kind of project. This means in practice that the employer must negotiate the implementation of the project with the Works Council. In reality, it often happens that projects are announced too late and/or are being implemented smoothly and progressively without people noticing that new technologies are being used.

A law ("Berriebsrätemodenisierungsgesetz') amended the Works Constitution Act (Betriebsverfassungsgesetz) in 2021 to take account of IA. Three new rules were introduced:

- Article 80, concerning general missions of the Betriebsrat introduces explicitly the possibility for the Works Councils to appoint an expert *when a new AI system is introduced in the company.*
- Article 90, which deals with the Works Councils's information and consultation rights: management must inform the Works Council when new working processes are introduced, **including new AI systems**.
- Article 95, which deals with selection guidelines (recruitment, transfer, dismissal): the law confirms the Works Council's codetermination rights in this matter when AI systems are used.

Trade unions are pushing for an improvement of the legal provisions. The aim is to broaden the capacity of codetermination. If there is a good social dialogue, the current law is good. Otherwise, it is not enough.

In **Austria**, the Works Councils have strong prerogatives. There is a technical codetermination "Mitbestimmung" that obliges employers to inform the Works Council if there is the implementation of a system that collects data automatically by computer. In this case, the Works Council has to approve it. If not, the employer is not allowed to implement it. The Works Council does not need to ask to be informed about such plans. It is up to the management to take the initiative. The Works Council can hire experts to get support.

In **Spain,** the "rider law" was adopted in December 2021. Workers' representatives have the right to be *"informed by the company about the parameters, rules and instructions that form the basis of the algorithms or artificial intelligence systems that affect decision-making that could have an impact on working conditions and on access to and keeping a job, including profiling"*.

Outside the EU, the **Province of Ontario (Canada)** has passed a legislation that obliges employers to inform employees in writing that they are subject to electronic monitoring.

Whatever the country, it seems that many companies have already implemented AI. And quite often, the process began late, not allowing the workers' representatives' voice to be considered.

And this is happening even in countries which have the strongest prerogatives. Companies have a strong tendency to ignore their obligations.

It seems that, for the moment being, social dialogue is not particularly developed concerning AI. This is confirmed by the few numbers of agreements signed on the subject.

2. Collective bargaining and company level agreement

It seems that, at least for the moment being, social dialogue is not particularly developed on AI. Public Services International, the Global Union Federation, has identified around 30 agreements regarding digital tools and AI. This figure at the world level is not comprehensive, but it gives an idea of the situation today. It includes both company agreements and collective bargaining agreements in the public and private sectors.

In **Austria, France, Germany and the Netherlands**, only a handful of agreements can be found at company level. Some companies are beginning to think

about launching negotiations and/or have been asked by their unions.

Italy seems to be an exception, with several agreements already signed at company level.

In **South Korea**[1], The Korean Public Service and Transport signed a collective bargaining agreement that prohibits the use of surveillance equipment (computers, biometric, RFID and other technologies…).

In **Canada**[2], a collective bargaining agreement for public employees states that systems of monitoring cannot be used without employees' knowledge.

In the **United Kingdom**[3], a collective agreement provides protection to employees when CCTV images or recordings are being handled properly complying with the Data Protection Act.

In **Finland**, a national framework agreement was signed between social partners on digitalisation and AI.

Spain is an interesting country from the point of view of collective bargaining.

The 24th collective bargaining agreement of the banking sector (2021) has introduced a very useful provision regarding AI. An article of the agreement states the following:

"From the perspective of employees, they have the right not to not be the object of decisions based "solely and exclusively on automated variables" and to not be discriminated by decisions that might be based exclusively on algorithms. In both cases, an employee could request the intervention of a human".

"From the perspective of a worker representative, there is a right to receive information about the use of algorithms or AI, which, as required by Article 64(4)(d) ET, includes not only the data that are fed to algorithms and their opening logic, but also an assessment of the outcomes in order to see if algorithmic decisions are leading to discrimination".

More recently, still in **Spain**, the National Collective Agreement of May 2023[4] has introduced an article dedicated to AI. It states that the deployment of AI systems in companies must *"follow the principle of human control and must be secure and transparent".* The companies shall provide the legal representatives of the employees with transparent and understandable information on the processes based on it in the human resources procedures (recruitment, evaluation, promotion and dismissal) and ensure that there is no prejudice or discrimination.

At the EU level, in 2020, social partners signed a framework agreement on digitalisation that includes a section on AI[5].

In May 2024, social partners in the banking sector signed a joint declaration on employment aspects of Artificial Intelligence. This declaration states that "Banks must ensure that the applications which use AI systems are transparent, fair and unbiased and employees have to ensure that they are used accordingly". The declaration mentions several interesting principles to ensure a responsible use of AI.

3. The GDPR

The GDPR[6] regulates the processing of personal data within the European Union. It was adopted in 2016 and came into force in May 2018. Even if many have heard of it and are aware of its existence, it is not always deemed as a tool for workers' representatives. Despite its weaknesses, this text includes some useful provisions that constitute a good basis.

Indeed, there are several provisions that constitute rights for employee representatives (or the equivalent) and employees (2.1). Other provisions are not rights as such but can be relied on to provide information and visibility (2.1); see next page.

Individual and collective rights based on the GDPR

Article 5. Principles relating to processing of personal data

This Article puts on the table several principles that are to ensure that personal data are not used with safeguards. Several key notions are being used in the Article 5:

- *"Personal data shall be processed **lawfully, fairly** and in a **transparent manner**".*
- *"Collected for **specified**, **explicit** and **legitimate purposes**".*
- *"**Adequate**, **relevant** and **limited** to what is necessary".*
- *"Processed in a manner that ensures **appropriate security of the personal data**".*

Article 15. Right of access by the data subject

Employees have the right to access the data that the employer has on them and whether these data are being processed. And if that's the case, they can get the following information (among others):

- The purpose of the processing
- The categories of the personal data concerned
- The recipients
- The duration of the storage of data.

Trade unions can help and ensure that employees have access to this information. It is up to the unions to do this as it is not covered by the text.

Article 22. Automated, individual decision-making, including profiling

Employees *"shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her, or similarly significantly affects him or her".*

This Article constitutes a major protection insofar as it imposes human intervention in any decisions that may be taken against it. The weakness of this provision, however, lies in the absence of evidence if the employer claims to have participated in the decision. This provision undoubtedly has preventive virtues.

Article 35. Data protection impact assessment

Article 35 states that "*where a type of processing, in particular using new technologies, and taking into account the nature, scope, context and purposes of the processing, is likely to result in a high risk to the rights and freedoms of natural persons, the controller shall, prior to the processing, carry out an assessment of the impact of the envisaged processing operations on the protection of personal data".*

The Works Council should ask to have the right to access the assessment that has been made. And it should also organise a discussion on its content with the management.

Article 79. Right to an effective judicial remedy against a controller or a processor

"Each data subject shall have the right to an effective judicial remedy where he or she considers that his or her rights under this Regulation have been infringed as a result of the processing of his or her personal data in non-compliance with this Regulation".

This a provision that allows employees to go to court. Unions could be involved and help them with these steps

Article 80. Representation of data subjects

"The data subject shall have the right to mandate a not-for-profit body, organisation or association which has been properly constituted in accordance with the law of a Member State, has statutory objectives which are in the public interest, and is active in the field of the protection of data subjects' rights and freedoms with regard to the protection of their personal data to lodge the complaint on his or her behalf, to exercise the rights (…) on his or her behalf, and to exercise the right to receive compensation".

Unions can launch a group action for the violation of the personal data regulation. Several countries (Belgium, France, Germany, Spain…) have changed their legislation to introduce this possibility. In Austria, the Article 80 is enforceable.

Article 88. Processing in the context of employment

"Member States may, by law or by collective agreements, provide for more specific rules to ensure the protection of the rights and freedoms in respect of the processing of employees' personal data in the employment context, in particular for the purposes of the recruitment, the performance of the contract of employment, including discharge of obligations laid down by law or by collective agreements, management, planning and organisation of work, equality and diversity in the workplace, health and safety at work, protection of employer's or customer's property and for the purposes of the exercise and enjoyment, on an individual or collective basis, of rights and benefits related to employment, and for the purpose of the termination of the employment relationship."

Collective agreements can be used to help acculturate the reps to the issue. They are also needed to promote collective safeguards and rights for the employees. Indeed, AI can be used by companies in many different areas. Therefore, it is required that people know when AI is used and how they can be protected. There is a need to make AI a visible subject inside the company, which is often not always the case.

Rules on which to rely to get information and information and consultation

In all the following rules, workers' representatives can ask management how they comply to their obligation and get information about the way they proceed. In some cases, some topics can become regular information provided to the Works Council (or the equivalent).

1. Protection of employees' personal data: the GDPR imposes strict obligations regarding the processing of personal data. Workers' representatives can ensure that employees' personal information is collected, processed and stored securely and confidentially. This reduces the risk of misuse or leakage of sensitive information. The Works Councils will have to make sure that all the provisions stated in Article 5 are respected.
2. Transparency and information (Articles 13 and 14): the GDPR requires companies to be transparent about how they process personal data. Workers' representatives can use this requirement to obtain detailed information about the company's data practices and ensure that employees are well informed of their rights.
3. Right of access and rectification: Employees have the right to access their personal data and request rectification if it is inaccurate. Workers' representatives can help employees to exercise these rights, ensuring that requests for access and rectification are handled efficiently.
4. Right to be forgotten: Employees can request the deletion of their personal data in certain circumstances. Workers' representatives can support employees in this process and ensure that the company respects this right.
5. Control of data processing: The GDPR requires companies to document and justify the processing of personal data. Workers' representatives can review these documents to ensure that processing operations are legitimate and proportionate, and do not infringe employees' rights.
6. Data security: The GDPR imposes security measures to protect personal data. Workers' representatives can ensure that the company implements adequate measures to prevent data breaches and protect employees' privacy. This can become a regular topic of the Works Council.
7. Data Protection Officer (DPO): the GDPR may require the appointment of a DPO in certain companies. Workers' representatives can work with the DPO to monitor data protection practices and ensure that employees' rights are respected. They can at least ask the DPO to be invited to the Works Council on a regular basis.
8. Sanctions and remedies: In the event of non-compliance with the GDPR, companies can be sanctioned. Employee representatives can use this perspective to encourage the company to comply with legal obligations and to support employees in seeking redress if their rights are violated.

4. The AI Act

On 9 December 2023, the European Parliament and the Council reached a provisional agreement on AI legislation that had been under discussion since 2021. The text was approved on 19 April 2024 and finally adopted on 21 May 2024[7].

The legislation will apply to both suppliers of AI solutions and users deploying them. The approach adopted is a risk-based one, with graduated obligations depending on the level of risk.

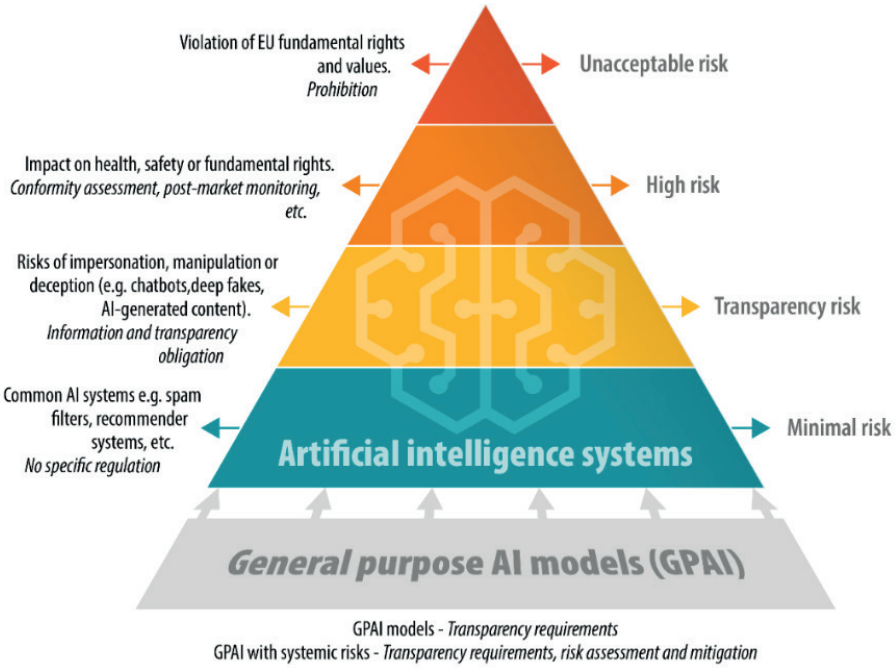
At the top of the pyramid, the systems with **risks considered unacceptable** because they infringe fundamental rights will be prohibited. They include in particular: social rating by governments, the exploitation of children's vulnerability, the use of subliminal techniques and - subject to strictly limited exceptions - the use by law enforcement agencies of certain biometric identification systems in real-time and at a distance in places accessible to the public. Deducing emotion in the workplace is also forbidden.

Secondly, AI systems presenting **risks** identified as **high** because of their potentially negative impact on the rights of individuals. The list of these systems may evolve over time. They are classified in two categories, **and the employment and management of workers are included**:

- *"Systems used as a safety component of a product or falling under EU health and safety harmonisation legislation (e.g. toys, aviation, cars, medical devices, lifts).*
- *Systems deployed in eight specific areas under Appendix III (...).*
- *Biometric identification and categorisation of natural persons.*
- *Management and operation of critical infrastructure.*
- *Education and vocational training.*
- *Employment, worker management and access to self-employment.*
- *Access to and enjoyment of essential private services and public services and benefits.*
- *Law enforcement.*
- *Migration, asylum, and border control management.*
- *Administration of justice and democratic process."*[8]

Providers of AI systems concerning the employment and management of workers will be subject to prior obligations, including an ex-ante conformity assessment. This includes AI systems used to hire or select people, analyse and filter candidates. AI used to make decisions on advancement, layoffs or working conditions, or assess people, are also included in this category. Many think

Fig.9 EU AI Act risk-based approach



Source: BRIEFING, EU Legislation in Progress, AI ACT, European Parliament Research Service.
https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698792/EPRS_BRI(2021)698792_EN.pdf

that algorithmic management falls into that category, but the debate is still open.

They will have to register their systems in an EU-wide database managed by the Commission before placing them on the market or putting them into service. They will also have to conduct their own conformity assessment (self-assessment), showing that they comply with the new requirements and can use CE marking. These obligations relate to risk management, testing, technical robustness, training and data governance, transparency, human monitoring, and cyber security.

The third category concerns systems whose **risks** are considered **limited**, such as chatbots, emotion recognition systems, biometric categorisation systems, or those that generate images or videos. They are not considered as high-risk, and only a transparency requirement is requested; the users need to be aware that they are interacting with a machine.

Finally, the last category concerns systems with **minimal risks**. For these, no additional legal obligations are required. This category encompasses most of the AI systems currently used in the EU.

If the final draft of the AI Act is disappointing in terms of workers' protection, this legislative framework can serve as a starting point for questioning within the company the typology of AI systems deployed based on risks, as well as questioning the management about its compliance with European legal obligations and transparency regarding the use of AI.

The AI Act - extracts

Transparency and Explicability

- **Article 13** (section 2). High-risk AI systems must be transparent and explainable. Employee representatives can use this provision to request information on the operation of AI systems used by the company, particularly those affecting recruitment, performance assessment or human resources management processes. This a key provision. Works Councils could ask for a presentation on the AI system and the way it works.

Risk Assessment

- **Article 9. Risk management system:** Providers of high-risk AI systems must carry out a risk and impact assessment. Employee representatives can ensure that the AIS provider has carried out these assessments and taken into account the impacts on employees, thus ensuring that AI systems are safe and do not infringe workers' rights. Works Councils should receive information on this risk and the impact assessment. *"The risk management system shall be understood as a continuous iterative process planned and run throughout the entire lifecycle of a high-risk AI system, requiring regular systematic review and updating".* Because the AI system and its management system are sort of a continuum, this gives the opportunity for the Works Councils to be informed on a regular basis.
- **Article 14.** *"High-Risk AI systems shall be designed in such a way (…) that they can be effectively overseen by natural persons".* It means that human beings must understand the capacities of the AI and correctly interpret its outputs. Again, this is something where the Works Council could be in the loop.

Supervision and Governance

- **Articles 26 to 29.** These Articles provide for the establishment of governance structures for the supervision of AI systems. Works Councils can ask to participate in these governance structures or collaborate with supervisory authorities to monitor the use of AI and ensure that it respects employee rights.
- **Article 26. Obligations of deployers of AI Systems:** This Article is key, with some important provisions regarding information that employers need to take to the Works Councils concerning, for examplehuman monitoring and training.

  "Deployers of high-risk AI systems shall take appropriate technical and organisational measures to ensure they use such systems in accordance with the instructions for use accompanying the systems, pursuant to paragraphs 3 and 6".

  "Deployers shall assign human oversight to natural persons who have the necessary competence, training and authority, as well as the necessary support".

"Before putting into service or using a high-risk AI system at the workplace, deployers who are employers shall inform workers' representatives and the affected workers that they will be subject to the use of the high-risk AI system. This information shall be provided, where applicable, in accordance with the rules and procedures laid down in union and national law and practice on information of workers and their representatives".

Employee Training and Information

- **Article 4.** Companies must provide appropriate information to users of AI systems, which includes employees. Works Councils can ensure that employees are well informed and trained in the use of AI, understanding how these systems impact their work and their rights. Here again, it's a matter of employee representatives asserting themselves in the discussion, even though it is company's responsibility to train employees.

Rights of Persons Concerned

- **Article 50. Transparency obligations for providers and deployers of certain AI systems:** *"Providers shall ensure that AI systems intended to interact directly with natural persons are designed and developed in such a way that the natural persons concerned are informed that they are interacting with an AI system, unless this is obvious from the point of view of a natural person who is reasonably well-informed, observant and circumspect, taking into account the circumstances and the context of use".* Workers' representatives can check if this obligation has been fulfilled.
- **Article 52.** Users of AI systems, including employees, have specific rights, such as the right to receive explanations of decisions made by AI systems. Staff representatives can help employees exercise these rights and obtain clear and comprehensible explanations of automated decisions affecting them.

Incident Reporting Obligations

- **Article 62.** Companies must report any serious incidents relating to AI systems to the competent authorities. Employee representatives can ensure that incidents affecting employees are properly reported and that corrective measures are taken to avoid future incidents.

Participation in Certification Processes

- **Article 49:** The AI Act provides for certification systems for AI systems. Employee representatives can be involved in certification processes to ensure that the AI systems used comply with ethical and safety standards.

The above-mentioned provisions are interesting even if they do not expressly provide for the presence of employee representatives. It is up to them to invite themselves to the discussion and try to obtain information at Works Council (or equivalent) meetings, and to try to be integrated into the various company bodies in charge of supervision and governance of AI.

5. The Platform Work Directive and AI

In February 2024, a provisional agreement was reached on the Platform Work Directive[9], which was adopted by the European Parliament in April 2024. It still has to be adopted by the Council, after which the Member States will have two years to implement it.

Although this Directive only concerns platform workers, estimated by the European Commission to be more than 28 million in Europe in 2021 (and with a forecast of 43 million in 2025) for 500 platforms, Chapter III of the Directive provides an important framework for algorithmic management[10].

In this chapter, 9 articles provide a framework for algorithmic management:

- Article 7: Platforms will be prohibited from processing certain types of personal data, such as personal beliefs, health data, data concerning emotional state, and private exchanges with colleagues and workers' representatives.
- Article 8: When processing personal data, an impact assessment must be carried out. Moreover, "Digital labour platforms shall provide the assessment to workers' representatives".
- Article 9:
  - The employees concerned and their representatives must be informed of the use of algorithmic management systems, as well as their purpose, the category of data used and their evaluation. Employee representatives must be given this information before such a system is implemented. This also applies to those undergoing recruitment procedures, if such a system is used.

- Finally, employees must have access to personal data formulated by the recipient of the service with regard to their work and the way in which an employee's behaviour affects the decisions taken by automated systems.

- Article 10: This is undoubtedly the Article with the most significant advances, with:
  - the obligation to have a human supervision of algorithmic management systems, an assessment of their impact on working conditions and the involvement of workers' representatives, who must have access to these assessments.
  - and above all, the prohibition of decisions taken solely by an automatised tool concerning the suspension, restriction or termination of workers' contracts. Such decisions must be taken by a human being.

- Article 11: Platform workers must be able to obtain explanations of the reasons for decisions concerning them taken by such systems within a reasonable time: a contact person must be designated. Individuals must have the right to request a review of these decisions and the platform must respond within 15 days. If decisions infringe people's rights, the platform must correct them without delay or provide compensation and take the necessary steps to ensure that this does not happen again.
- Article 12: Platforms are obliged to assess the impact of algorithmic management on workers' health and safety (risks of accidents in the workplace, psychological and ergonomic impact) and to introduce appropriate preventive measures. Employee representatives must be informed and consulted. Algorithmic management systems that put workers under pressure or risk their safety or mental health are prohibited.
- Article 13: This Article provides for the possibility of recourse to an expert to help formulate an opinion, the cost of which is financed by the platform for platforms with more than 250 employees in a Member State. The Member State must lay down the arrangements (frequency in particular) for this possibility.
- Articles 14 and 15: These Articles provide for employees to be informed directly if there are no employee representatives.

This Directive is an important step for platform workers. It makes it easier for these workers to be recognised as employees. It also includes some interesting aspects on algorithmic management. However, it does not exhaust the subject. But many of the Directive's provisions could form the basis of a directive on algorithmic management.

6. What can be proposed beyond an improvement of GDPR and AI the Act?

It seems that a lot of training is needed for employees and workers' representatives (or the equivalent) given the lack of knowledge. There is a need to understand what's going on, but also to detect what is currently happening if the employer does not inform employees properly. In other words, there is a need to develop an AI acculturation approach which includes AI literacy and promotes a critical mindset.

Works Council members (or the equivalent) should all have questionnaires to be able to address the right questions to their employer[11].

A specific law on the right to information and consultation could be useful if it allows to put the Works Council in the loop on several aspects of AI deployment: transparency, explainability, risk assessment, supervision, governance, etc.

Beyond this, there are other avenues to explore:

- Favour **experimentation before implementation.** Experimenting gives you an idea of the consequences, especially for those who will be using new tools. It can also be an opportunity to involve employee representatives in the experimentation, so that they can pass on feedback from users. It might lead to a more negotiated approach[12]. This approach is favoured by an official report that has been elaborated for the French government[13]. It is also close to what is called 'Social Design'.
- Favour **collective bargaining agreements** at both national, sector and company level, so as to implement AI without neglecting employees' rights: training, right of information & consultation, etc.
- **Enhance information and consultation.** AI is a technology that forms part of a larger whole. It is also evolutionary. Information and consultation procedures should therefore include at least a review clause to take account of this specificity. Social dialogue should also embed professional dialogue so as to benefit from employees' knowledge and experience. Some are talking about a technological social dialogue, which is the equivalent.
- **Labelling tools.** There is a need for a trusted third-party to guarantee the lack of bias/discrimination/neutral data to feed the AI.
- **Register.** A register should be compulsory in every company using AI tools. This register would identify all use cases in the company. This is quite comparable

to Article 30 of the GDPR for data processing.

- **Reversibility.** There is a need to avoid irreversibility. Promoting the possibility to return to the status quo ante must be a possibility.
- **Questionability of algorithm.** How can one question an algorithm decision? To whom? What are the parameters being used?

Workers' representatives should be informed and consulted about the parameters and rules of the algorithm or the AI system. These rules and criteria should be made public (in the company) and written in a clear and comprehensible language. Workers should have the right to request the intervention of a human.

1 https://publicservices.international/digital-bargaining-hub/6-digital-tools-artificial-intelligence-and-algorithms?id=13183

2 Ibid.

3 Ibid.

4 V Acuerdo Para el empleo y la negociación colectiva (V AENC). 10th May 2023.

5 https://www.etuc.org/system/files/document/file2020-06/Final%2022%2006%2020_Agreement%20on%20Digitalisation%202020.pdf

6 https://gdpr-info.eu/

7 https://www.europarl.europa.eu/doceo/document/TA-9-2024-0138-FNL-COR01_EN.pdf

8 EUROPEAN PARLIAMENT RESEARCH SERVICE, AI Act, Briefing BRIEFING, EU Legislation in Progress.

9 pdf (europa.eu)

10 Commission staff working document, executive summary of the impact assessment report (2021): IMMC.SWD%282021%29397%20final.ENG.xhtml.3_EN_resume_impact_assessment_part1_v6.docx (europa.eu)

11 Algorithm watch has developed a well-written guide containing many questions. It gives an idea of the kind of guide that could be developed. Automated decisions and AI in HR management. Guidelines for reviewing essential features of AI-based systems for works councils and other staff representatives. Sebastian Stiller, Jule Jäger and Sebastian Giessler.

12 In France, a joint project of the social partners in the metal sector was made in this spirit. The idea was to be able to test a digital transformation before implementing it. Through experimentation, user feedback, scenarios and training measures to be implemented are gathered once the technological choice has been made.

13 https://www.info.gouv.fr/upload/media/content/0001/09/02cbcb40c3541390be391feb3d963a4126b12598.pdf

PART 10

Key takeaways and recommendations

1. Key takeaways

1. AI is not something totally new, despite its spectacular nature. AI is not a single technology, but a constellation of technologies.
2. AI has become extremely visible and popular since 2022, due to the development of generative AI. Free or almost free access to this technology has multiplied its potential and possibilities.
3. The current enthusiasm should not mask the fact that a speculative bubble is at work when we look at the huge amounts being invested in AI.
4. Another point worth emphasising is that AI conceals several blind spots:
   - It requires a lot of human labour, which is largely invisible, fragmented and poorly paid; and this human labour is actually on the increase.
   - It also requires physical infrastructure: chips, data centres, cables, etc.
   - It also consumes a lot of energy, to the point of jeopardising the decarbonisation of certain digital giants.
5. The impact of AI on employment remains a question. Between the catastrophism of some and the optimism of others, it's not easy to make up one's mind. AI might boost productivity, but results are still too fragmentary to be conclusive. But it's safe to say that the upheavals are already numerous and are not likely to stop any time soon. It's worth remembering, however, that a dozen years ago, the very pessimistic predictions proved to be wrong. Even so, this does not bode well for the future.
6. Another factor to consider is that AI as a technology is not neutral. And as such, its consequences depend on how it is implemented, hence the key role of unions and workers' representatives. In other words, technology can be shaped to meet needs, even if the temptation is often the opposite, to adapt humans to technology.
7. While the wave of automation has largely exposed blue-collar workers and relatively few white-collar workers, it seems that with AI, things are different according to several studies by the OECD and ILO. With AI, white-collar workers would be more exposed.

8. AI is transforming not just jobs but work itself. AI is helping to change the way we work. But also, its organisation and its content. And once again, AI is proving ambivalent in its consequences for work. It can be used to replace a human. It can also relieve them of certain tasks, or even help them ("the augmented employee"). For their part, employees themselves are uncertain about AI. They may be wary, afraid or, on the contrary, embrace it. The deployment of AI can also bring to light some of the work carried out by employees that was not previously visible. AI can also bring work intensification. Again, it really depends on how it is implemented and with which goals.
9. Looking at four industrial sectors - automotive, oil and gas, pharmaceuticals, and telecom networks - we can see that AI is already being used in all of them, sometimes for many years. AI covers more and uses cases all along value chains, from R&D to after-sales and maintenance. More and more functions are using AI.
10. And what is also apparent is that employees and even employee representatives are not necessarily aware of the presence of AI within their company. What's needed is a real effort to get people on board. There is a strong tendency for companies to skip their legal responsibilities or to comply with them too late. And this is happening even in countries where social dialogue is usually deemed good quality.
11. The GDPR and the AI Act are important steps and interesting points of reference. It is regrettable that these major texts do not include sufficient provisions to enable employee representatives and trade unions to influence the introduction of AI within the company. But unions and workers representatives can use many provisions to get information and try to be where things are being discussed.
12. Involvement of workers' representatives, as far upstream as possible, with approaches such as social design, professional/technological social dialogue, would increase the possibility of influencing company choices.

2. Recommendations

Employees and workers' representatives need training to understand the issues at stake regarding AI. Particular attention needs to be paid to the use of algorithms in management. HR management and recruitment have been classified as 'high risk' in the AI Act.

Workers' representatives should also become familiar with many provisions of both the GDPR and the AI Act as they provide interesting levers to get information and question what is being done.

The legislation should be improved to favour the possibility to include workers' representatives in the loop. There are many aspects (transparency, explicability, risk assessment, supervision, governance, certification process, etc.) where Works Councils should be involved.

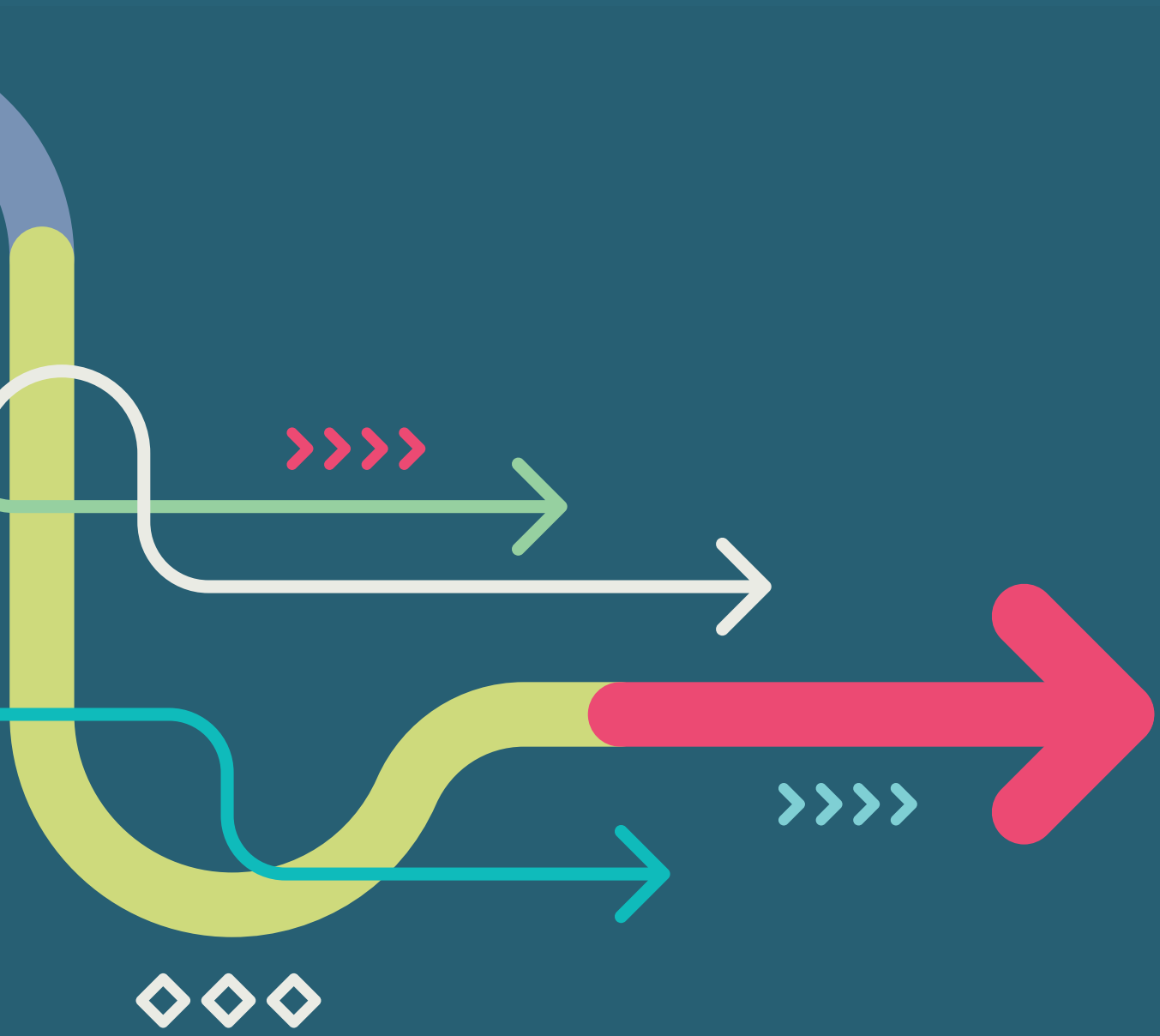
- Being part of the governance and the supervision
- Being consulted when there is something new
- Being informed on a regular basis

Labelling tools: there is a need of a trusted third party to guarantee a lack of bias/discrimination.

Companies should favour experimentation before any implementation. This would give a chance to test the technology and to make an assessment with employees and employees' representatives being involved in the discussion. This could bring a more developed social dialogue, which can be called professional or technological social dialogue.

Information and consultation must begin at the earliest stage, ideally when the options for technological choice are still open, and at the time of experimentation; and these information and consultation processes should be adapted in case of the introduction of new AI tools or AIS in order to take into account the continuous evolution of these technologies.

TABLE OF ILLUSTRATIONS



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KNOWLEDGE FOR ACTION