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Sustainable Employment in the Age of Digitalisation: challenges, obstacles and opportunities

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Transversal analysis

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Introduction

Digitalization has affected the way we live, work, and produce. It generated job displacement (Charles et al., 2022) and a shift in education and skills demanded (Balsmeier & Woerter, 2019), often demanding upskilling (Ilanes et al., 2018). In parallel, it pushed for a digitization and hybridization of the workplace (Petani & Menges, 2023), giving origin to remote work, the gig economy, and platform workers (Vallas & Schor, 2020). This enhanced new trends such as expectations of availability and instantaneity (Scribano, 2019). As changes are progressively introduced in the labour market, governments are slowly asked to intervene to safeguard jobs and regulate the new socio-economic paradigm derived from the current technological revolution, often with welfare and education measures (Focacci & Perez, 2022). In Europe, digital trends have significantly affected the organisation of work, as well as de-standardized the relationships between employers and employees (De Stefano & Aloisi, 2018). Low-cost workforce, lowering transaction costs, barriers to entry and information asymmetries have become the norm, together with the blurring of boundaries between work and private life. While technologies contribute to 'making work and lives considerably innovative' (De Stefano & Aloisi, 2018), the aim is to ensure jobs remain sustainable.

In this document, we focus on the impact of digitalization on different types of workers in Belgium. Particularly, we consider how digitalization has affected customer-advisors (CA), recruiters (RE), middle managers (MM), R&D managers (RD), and assembly-line workers (ALW). We also offer insights into the transformation of the work performed by assembly line workers. This category stands apart from other professions due to its association with production and blue-collar jobs, which entail distinct concerns. However, we will observe that they share certain concerns with the other categories of professions under investigation. Owing to the widely perceived repetitive and highly standardized nature of assembly line work, the literature often characterizes these occupations as being 'vulnerable' to automation and potential obsolescence (Goyannes Gusmão Caiado & Luiz Gonçalves Quelhas, 2020; Pfeiffer, 2016).

Belgium represents an interesting case study for analyzing how technology and employment intertwined in the past years. In 2022, when the EU digital economy and society index, measured by human capital, connectivity, integration of digital technology, and digital public services, was equal to 52.3, Belgium scored 50.3. Historically, the industrial Walloon region was renowned for its industries in iron and coal. Today, the secondary sector keeps thriving and the regional GDP account for circa 23% of Belgian economic output. Regional initiatives are fundamental to the economic growth of the region, as Belgium is a federal state, where each region forms its own parliament and government and pursues its own foreign policy. As regards digitalization, this has been integrated into the local economic strategies of the Walloon region since the Plan Marshall 4.0 of 2015.[1] As of 2020, 85% of Walloon aerospace companies indicated they had implemented automation and robots (Garneau et al., 2023). In parallel, the rate of

[1] https://economie.wallonie.be/content/plan-marshall-40.

unionization is high (around 50%), trade unions still consider digitalisation 'as a threat to employment', and they are not involved in organizations dealing with technological innovation (Garneau et al., 2023).

The situation changes across regions. In Brussels, for instance, 65.3% of the population was employed in 2022. On the other hand, in the Flanders, the employment rate was around 76.7% in the same year. While in Brussels, Actiris serves as the public employment service, within Flanders, the Flemish public employment service VDAB offers career services, training programs, assessment of skills, and other employment services focused on active labour market policies (OECD, 2020). With respect to digitalization, Flanders dominates the Belgian landscape, being home to Europe's leading university business accelerators IMEC and benefitting from its proximity to other digital and economically prolific hubs in Europe —namely, Amsterdam, Paris, and London. With Brussels, they a strong concentration of American and European IT multinationals, especially in regard to integration and business process outsourcing. In 2023, 92% of the Flemish businesses have an online presence. The digital strategy of Flanders focuses on: (i) valorisation of data as a raw material, (ii) concentration on the government service itself, and (iii) development of digital talents. In Brussels, too, digital support is provided to companies with the Regional Plan for Innovation.

The focus on the categories composed by 13 customer advisors and 17 recruiters, by 21 middle managers and 13 R&D managers, and by 11 assembly-line workers is justified by the use they make of technologies, where technologies can be collaboration technologies, facilitating the sharing of ideas and organization; tracking technologies, used to monitor and collect data; automation technologies, able to perform tasks or processes automatically, without human intervention; and interaction technologies, requiring the interaction between humans and machines. In the case of assembly line workers, automation technologies are used to regulate and achieve quality standards, to carry heavy loads or to transport pieces with the help of remote-controlled trolleys. Tracking technologies are used for inventory and logistics purposes, and to monitor the production process in general. Communication technologies are quite present too: screens are omnipresent and display daily objectives, performances, and information on the production process. Finally, integrated systems allow to program machines, track components and the production. and allow managers to check which machines are operating or not at a specific time.

While, in general, middle managers and R&D managers can successfully use technologies to collaborate (Attaran, 2020), as well as strengthen their processes and results through data-driven decisions thanks to automation, for customer advisors and recruiters, technologies are experienced mostly for their substitution purpose (Hunkenschroer & Kriebitz, 2023). The concern for the digital divide (Lythreatis et al., 2022), where digitally skilled people are in a position of advantage, is significant for them, as the perspective on digitalization appears rather group-oriented.

In connection to this, it is relevant to note that perceptions may also differ because of digital skills and what skills should be prioritized. Recent evidence shows that, while flexible skills are increasingly in demand, soft skills are progressively scarce (Schislyaeva & Saychenko, 2022). As for assembly line workers, their fear of eventually being replaced by machines is counterbalanced by the reduction, or even disappearance, of the most physically demanding tasks (Margherita & Braccini, 2021). However, these observations must be tempered by the fact, reported by Pfeiffer (2016), that some human interventions continue to be essential and irreplaceable, demanding skills that are challenging to replicate, such as cognitive abilities, problem-solving (Fletcher et al, 2020), ability and flexibility (Oberc et al., 2019), as well as dexterity and sensitivity (Oestreich et al., 2019). Following a thorough analysis of semi-structured interviews (50-80 minutes) carried out in Belgian companies of different sectors, our aim is to provide detailed insights on how digital tools affect the way in which certain categories of workers perceive digital tools and use them.

1. Methodology

Firstly, a narrative literature review per occupation has been carried on. A narrative literature review aims at providing a comprehensive, critical, and objective analysis of the current knowledge of the topic (Onwuegbuzie & Frels, 2016). The literature reviews featured in this section primarily rely on empirical evidence, although other types of publications were also incorporated, often serving the purpose of providing context and delineating specific terminologies. Table 1 below displays an overview of the different categories of papers mobilized for the literature reviews.

Occupation	N° of papers analysed	Paper type						
		Empirical paper				Non-empirical paper		
		Quantitative methods	Qualitative methods	Mixed methods	**Subtotal**	Literature review	Other*	Subtotal
Assembly line workers	32 (100%)	3 (9,5%)	10 (31,5%)	7 (22%)	**20 (63%)**	4 (12%)	8 (25%)	12 (37%)
Customer advisors	20 (100%)	5 (25%)	5 (25%)	7 (35%)	**17 (85%)**	2 (10%)	1 (5%)	3 (15%)
Middle managers	18 (100%)	3 (17%)	8 (44%)	2 (11%)	**13 (72%)**	4 (22%)	1 (6%)	5 (28%)
Recruiters	35 (100%)	12 (34%)	10 (29%)	5 (14%)	**27 (77%)**	4 (11,5%)	4 (11,5%)	8 (23%)
R&D managers	33 (100%)	9 (27,5%)	9 (27,5%)	7 (21%)	**25 (76%)**	2 (6%)	6 (18%)	8 (24%)
All occupations	138 (100%)	32 (23%)	42 (31%)	28 (20%)	**102 (74%)**	16 (12%)	20 (14%)	36 (26%)

* E.g. conceptual or technical papers

Table 1 - Methodological overview of the papers selected for the narrative literature reviews

Table 1 — Strategy for Literature Review

We conducted a search for empirical papers in both white literature (peer-reviewed papers) and grey literature (institution reports, consultant reports, conference proceeding, book chapters, working papers, case studies, research reports, commissioned reports) within sources such as electronic databases (ScienceDirect, Business Source Premier, Scopus, Jstor, Web of Sciences, Google Scholar), international research institutes (Eurofound, ILO, OECD), governmental organisations, Europeans employers and unions federations (ETUI, BusinessEurope), consulting organisations and manufacturers associations.

Keywords used included the occupation name or synonyms in combination either with digital-related keywords (digitisation OR digitalization OR digital transformation OR industry 4.0 OR industry 4.0 OR the fourth industrial revolution OR the 4th industrial revolution OR smart manufacturing OR smart production OR smart factory OR smart factories OR cyber physical system OR cyber physical production system OR internet of things OR industrial internet OR big data OR algorithms OR RPA OR robotic process automation OR RDA OR robotic desktop automation OR artificial intelligence OR digital tools OR digitization OR technological innovation) or specific occupations-related keywords derived from first searches. We covered a period starting from 2010 to document the evolution of the situation, with a focus on the most recent papers (starting from 2015) regarding actual uses of the technologies. We looked mostly for English papers but in some cases French or Dutch ones could be included. From this literature review, we then designed appropriate research protocol and interview guidelines for our fieldwork for the five selected occupations. The research protocol has been organised around a qualitative methodological approach based on semi-structured interviews.

As regards the recruitment strategy, to create a representative sample of professionals from the five targeted occupations, we engaged in the recruitment of interviewees by reaching out to the relevant professional associations representing these occupations, which then assisted in disseminating our request. For assembly line workers, we enlisted the support of trade unions. Furthermore, we extended our outreach to potential interviewees through posts on LinkedIn and direct solicitations within our personal networks. We elaborated on the interview topics based on the structure of the literature review (types of technologies, contextual factors, changes in work content, changes in working conditions, changes in work status, and sustainability). Interview grids were the same across occupations. All the interviews were recorded with the consent of the people involved and then transcribed in full. The empirical data were then analysed using NVivo software. The coding grid was drawn up jointly by the researchers involved and validated by triangulation. Information on the sample is provided in Table 2 below.

Occupations	**Assembly line workers**	**Customer advisors**	**Middle Managers**	**R&D Managers**	**Recruiters**
Interviews number	N=11	N=13	N=21	N=13	N=17
Definition	Workstations wherein a product is assembled progressively by different workers or machines, each of them executing a subset of the needed assembly operation (Moreira et al., 2015)	Workers who interact with customers after the purchase of goods/services. Their main aim is usually to provide service and support to clients to increase customers' satisfaction (Jasmand, Blazevic, & De Ruyter, 2012)	Managers who typically head a function, team or office and supervise day-today operations (Chen, Berman, & Wang, 2017).	Managers responsible for the research, planning and implementation of new programs and protocols. They also supervise the development of new products from the initial planning phase to implementation or production (Study, 2020).	Workers in charge of recruitment (the act of building a pool of potential candidates for a vacancy) and selection (assessing the capabilities and fitting of those candidates for the said vacancy) (Stone et al., 2015)
Size	3 small (<50) 8 big (>250)	1 small (<50) 2 big (>250) 4 large (>1000)	Missing information	2 small 7 large 3 missing	2 small (<50) 2 medium (<250) 8 big (>250) 6 missing
Sector	2 pharmaceutics 2 metal works 1 motor cycle manufacturer 1 beverage 2 construction materials manufacturer 2 mechanical mechanisms 3 car manufacture	12 bank/insurance sector: daily banking operations, credits, investment, insurance 1 retail	3 Motor vehicle parts & manufacturing 3 construction materials 3 production 2 logistics 1 tutoring 3 construction 1 retail 5 bank & insurance	1 HR sector 2 construction 2 research org 2 agriculture 1 building materials and chemical 1 IT 1 textile 1 financial 1 missing	5 public 2 banking 1 distribution 1 transport 1 energy 2 social secretariat 4 HR 1 education

Table 2 — Number and definition of categories interviewed

2. Results

Following a thorough analysis of semi-structured interviews (50-80 minutes) carried out in Belgian companies of different sectors, we provide evidence on how digitalization affects i) work content, in terms of changing tasks, complexity, fragmentation, role clarity, flexibility, and workload; ii) perception of control, in terms of autonomy, control, and evaluation; iii) relation to time, also considering work pace and predictability; iv) effective uses of digital tools and perceptions; and v) skills, in terms of skills needed, training, and career opportunities.

Table 3 below depicts the main digital tools used by each occupation in our sample.

	MM	R&D	ALW	CA	RE
Automation	Computer assistance, computation, data mining, machines for packing, sorting planning & prioritizing orders, measurement	Digital modelling, AI, remote control.	Regulation and achievement of quality standards Transports/carriage	Chatbots, online interfaces to externalize operations to the clients (bank-insurance), self-scanning and self-checkout (retail)	Chatbots, automatic generation of administrative documents or replies, job matching
Tracking	Tracking products and activities, work time and access management.	Activity tracking and cost calculation, market performance analysis, customer needs assessment	Inventory and logistic purposes Process monitoring	No specific use detected in our observations	No specific use detected in our observations
Collaboration	Meetings, invoicing, emails, chat box, intranet	Telecommun-ication, meetings, real-time collaborations	Screens displaying daily objectives, performance and information on the production process	Remote meetings, data sharing Online appointment scheduling tools	Remote meetings or interviews, multiposting on social media, data management
Interaction	Content management	No specific use detected in our observations	Integrated systems // Industry 4.0	No specific use detected in our observations	No specific use detected in our observations

Table 3 – Main digital tools used, by occupation

In the case of middle and R&D managers, tracking technologies are the most frequently used: they are used for monitoring people and objects, as well as optimizing and streamlining the work process. Automation technologies are also used by managers for data mining and project management (planning, prioritization, filtering options), as well as for calculation and measurement tools. Among the collaboration tools used by middle and R&D managers, we find tools for coordination purposes or remote meetings.

As regards assembly-line workers, automation technologies are the technologies most used following digitalization. These include tools for regulation and achievement of quality standards and tools for transportation and carriage. Tracking technologies serve various functions, encompassing inventory management, logistics, and process monitoring. Concurrently, assembly-line personnel employ interaction technologies, specifically integrated systems.

Customer advisors and recruiters utilize automation and collaboration technologies in similar proportions. Automation tools empower them to proficiently handle job-matching data, and daily operational tasks, and facilitate the automatic dispatch of emails and documents. Notably, certain client interactions, such as responding to inquiries or information requests, are automated through the integration of chatbots. In the realm of collaboration technologies, customer advisors and recruiters leverage them for conducting remote interviews, virtual meetings, and the online assessment of potential candidates.

2.1 Work content

Work content has been significantly affected following digitalization for all categories under investigation. For middle managers, collaboration tools have made tasks more digital and faster but also more fragmented due to the continuous communication and sharing of information (with Teams and Zoom, 'it's convenient (you can use it, but you don't have to) and it's easy to plan' [supervisor of bank insurance, 30]). Automation tools have made tasks more complex, as well as increased workload due to the progressive acceleration in output. For R&D managers, collaboration tools made it possible for them to be less on-site and work remotely, transforming the way these managers communicate, collaborate, and manage their projects. For automation, this has increased their focus on modelling and data analysis instead of physical experiments. Assembly-line workers' tasks have become less administrative and less routine-based thanks to automation tasks, on the one hand ('It's much more, cognitive. I hardly ever go into the workshop anymore' [ALW02]). On the other hand, more data coding has increased repetitiveness, while decreasing handling tasks. Customer advisors were able to outsource operational, administrative, and support tasks to clients thanks to chatbots, while digitalization has increased the tasks related to double-checking errors. Recruiters were also able to outsource simple, low added-value tasks to clients thanks to automation, while collaboration tasks increased standardization and fragmentation levels, due to the

multiplication of tools ('Already knowing which drive is which information, it is not very clear. On each shared drive, there are a multitude of things that most certainly need to be cleaned, we don't worry too much about it. Not easy' [RE04]).

As regards complexity, we observe that middle managers' tasks have increased in terms of complexity because of the increased number of stages in the processes, as well as the more pointed and cognitive tasks linked to automation (a little more complex because there are a lot more stages in the process, 'a lot more knowledge at the IT level' [site manager, 32]). For R&D managers, collaboration technologies generated confusion due to the emergence of unstructured shared workspaces and made information search more complex. Tracking tools led to extra reporting duties and new protocols. For assembly-line workers, certain procedures reduced task complexity, thanks to new methods and interfaces workers had to learn and get used to ('it was always necessary to output a line to be able to be up to date to have a truly regular follow-up of the documents, […] whereas now, everything is digitalized, and it is already entered in the files' [ALW04]). Tasks for customer advisors became more commercial-oriented, mobilizing expertise and advice skills. Following digitalization, they were also able to fill clients' demands performed upstream and outsource operations dealing with 'venting' tasks, shifting their focus on the more complex cases. Recruiters benefited from automation tools, which allowed them to decrease the number of administrative and low-added-value tasks, allowing them to focus on more complex tasks. Overall, they experienced a standardisation of processes and information, now easier to share and compare, but a higher number of platforms and tools to handle ('the tool supports us in this interchangeability to the extent that as it standardizes both processes and practices, it makes it possible to smooth out the methods of each, to direct them to a single practice which is dictated and decided thanks to the system and therefore it is much easier to be interchangeable' [RE18]).

In general, all categories describe higher levels of fragmentation of tasks following digitalization. For middle managers, the tools have made tasks more fragmented. Assembly-line workers claim there has been an increase in fragmentation, repetitiveness, and automatization ('it's almost more repetitive than before, a little bit... Because before, for each program I had to go to the workshop, so it varied a little bit' [ALW02]). For customer advisors, it has progressively become more difficult to judge between the many interfaces available and the different types of tasks ('that's something quite complicated too, this constant movement, this needs to always adapt and always change processes, it's very tiring, it's very tiring' [CA01]). Recruiters also describe higher fragmentation levels, due to the multiplication of tools and, consequently, of tasks ('Ultimately these tasks have multiplied, so ultimately it's doing the same task but on different platforms, and what's more the platforms are not the same, so it takes a lot of time' [RE03]).

The introduction of digital tools has also meant effects on role clarity. In particular, we observe an increase in a supporting and coaching role towards employees on behalf of middle managers (a bit like [being] an orchestra conductor' [construction R&D manager, 47]), leading them to work more due to people management, as well as more

empowered teams ('moved to self-managed teams' [responsible for operations, 30]) and a flatter organization overall ('hierarchy is gone, as you will be gathering people from different departments into teams and having them work on topics' [responsible for operations, 30]). R&D managers registered an increased need for effective leadership skills ('it becomes annoying' as '[they] spend a lot of time training a person' [construction R&D manager, 40]) due to collaboration technologies and the possibility of working remotely. For assembly-line workers, we observe the now prevailing role of IT technicians in day-to-day operations and in case of problems ('so a few minutes to see where the fault comes from, and then if it doesn't work, they call the technicians' [union representative at a car manufacturer]). For customer advisors, the effect is more contradictory. Although they feel primarily responsible for helping the client through building trust, advice, and support, digitalization seems to mainly serve commercial purposes at the expense of the client service ('I've been working at the bank for 21 years, I've always been taught to work in a certain way, with respect for contact with my customers, with respect for the relationship, it's something that counts a lot for our client, to have a good relationship with his banker, to know him…' [CA01]). Additionally, there appears to be a strong contradiction between the official speech surrounding digitalisation ('we need to focus on the clients', 'we want to ensure the well-being of workers') and the actual motive behind it (namely, reducing costs). Similarly, recruiters perceive their role to have become more commercial, proactive, and present on social networks ('Our organization will eventually have someone who will be fully involved in recruitment marketing. I don't know how familiar you are with Facebook and social media marketing. (…) It is an ongoing process [RE11]). Their role of attracting candidates who are difficult to find in a tight job market sometimes clashes with the need to adapt to certain target audiences and the concern about the digital divide.

Some digital tools also made tasks more flexible. For middle managers, collaboration tools enabled them to work from home, leading to more flexibility in schedules ('a lot more freedom in how they do things and when they do them' [supervisor of bank insurance advisors, 30]), better coordination, and higher levels of organization. R&D managers also experienced a higher degree of freedom and flexibility in their work, as they are now able to determine the order of their tasks, exploit methodological freedom, as well as choose their working hours ('Voilà, I had a quiet coffee - I have a beautiful yard - I went outside to clean my yard. I didn't have to rush' [R&D manager, 55]). Customer advisors, on the other hand, need to be flexible in the way in which they interact with digital tools. When technologies do not work properly, customer advisors need to be able to adapt, find solutions, and sometimes go back to old manual practices ('If the client tells me "I can never send this mail, these links never work for me", I move away from this technology a little and I say to him "Maybe it's simpler if we send everything back by post"?' [CA12]). Recruiters, on the other hand, experience higher flexibility due to collaboration technologies, which allow remote meetings and remote interviews ('today, with our online platform, everything is there. There are assessments, motivational questionnaires. There are personality tests, video interviews' [RE17]).

Finally, as regards workload, we observe that for middle managers workload has increased ('a lot more charges' [mechanics middle manager, 38]) either due to automation technologies, which fasten the processes and allow for higher productivity ('even if the tools have facilitated the tasks, there are always other tasks, so the time saved is used for other things' [site manager, 32]), or because of the need to spend more hours working to get the same result due to technology-related issues or coordination problems across teams ('you have to spend more hours on your work to get the same result' [site manager, 32]). For R&D managers, collaboration technologies seem to burden them with increased complexity and, therefore, higher workload ('you have to give yourself time to think, to imagine new things, you have to spend time surfing, reading articles that may be of no use' [agricultural R&D manager, 46]). Automation tools, on the contrary, allow them to reduce their workload on some occasions. For assembly-line workers, we observe an overall intensification of work, especially in big assembly lines, because of an increase in the workload ('If you put on a slider, before you were perhaps busy 75% of the time of your day, now you are busy 85 or 90% of the time' [ALW01]). This is particularly true when tools are dysfunctional and workers must go back to the manual procedure, meaning they are also faced with a heavier workload as the workforce has been reduced. Customer advisors experience an intensification of work, as they have a larger number of quantified objectives and are now working in a competitive environment ('we are regularly evaluated on the time we spent in "ready", the time we spent in "busy", also on break, lunch, etc' [CA01]). Recruiters experience a reduction of the workload thanks to automation tools: they must send fewer messages and documents and compute fewer encodings, as well as they can benefit from the automation of recruitment schedules ('By digitizing a certain number of processes, these support tasks, it is possible to be much more efficient and gain speed in onboarding' [RE17]).

2.2 Perception of control

Table 4 hereunder displays the forms of control exercised through technologies, and the effects these have on workers' perceived autonomy. This dimension also has implications for the performance evaluation methods to which they are subjected, whether intentionally adopted or implemented for accountability or quality, particularly in the context of managerial functions. Consequently, middle managers and R&D managers experience heightened autonomy, as the responsibility of monitoring their teams is partly delegated to these technologies, allowing them to reallocate their time to other tasks. "*Control is much more complete than before', as well as tasks are done '100 times faster*" (MM, bank&insurance). It is perceived as "[being] *an orchestra conductor*" (MM, construction company). They also admit that employees get *"a bit of a Big Brother feeling*" (middle managers, wood line production).

Apart from the surveillance of their activities, which in some cases constrains their operational flexibility, assembly line workers are additionally subjected to a secondary form of peer control. As a worker mentioned, "Nothing escapes the system". Nevertheless, it doesn't necessarily imply changes in the perceived autonomy since this control is

performed by technologies and less by direct superiors on site. As a worker explains: "*People have the impression that they are more autonomous because they perform a whole range of tasks, they have the impression that the quality department is no longer behind them, (…) and so they really have this feeling of autonomy*". Additional implicit control is manifested through the continual dissemination of information related to performance and productivity targets across the organization, facilitated by collaboration technologies. Younger workers, especially those who are in a more precarious employment situation (e.g. temporary workers), are said to be more sensitive to those techniques because they still have to prove themselves: "They've entered the 'race for jobs', either as temporary workers or on fixed-term contracts, and so they're used to reacting to these performance indicators (...) they're chasing figures, basically. Always being positive, always being in the green" (ALW10, pharmaceutics).

Lastly, customer advisors and recruiters experience heightened control due to increased visibility of their activities, now monitored through data generated by the technologies employed for organizing and executing their tasks. One recruiter gives some details: "We can find out how many minutes a day consultants are on the phone, how many CVs they send out, how many candidates they see, whether they are using H-Interview properly, how many times they have used it, for how long, how many videos they have recorded, so these are all things we can monitor" (RE14). Nevertheless, they perceive these technologies as affording greater autonomy by enabling remote work and facilitating self-organization of their tasks. These perceptions appear therefore in a tension.

The digitization of control methods raises human resources (HR) concerns regarding worker evaluation, as the tools and data they generate serve as additional inputs, notably in quantitative terms, for assessing performance. A customer advisors explain for example: "At the start of the day, we have to be in 'ready' status, which means we're ready to pick up the phone if a customer is calling into our department. (...) We're regularly assessed on the amount of time we've spent in 'ready' status, the amount of time we've spent in 'busy' status, on break too, lunch, etc., and we're checked on this. And if we don't have enough hours when we're ready, we say "Hey, what did you do? How come you've had so little time?" (CA12). Similarly, an R&D manager explains that the tool can be used to feed an assessment item, such as the degree to which tasks are completed, and that the data will be able to "objectify something that was already somewhat in everyone's head, but which was not necessarily objective" (RD12, pharmaceutics). In the case of customer advisors and recruiters, this evaluation also incorporates data from their interactions with customers or candidates, introducing external parties into the assessment process and thereby intensifying the perceived pressure on workers in their interactions with these stakeholders. An example is given by a customer advisor: "In terms of indicators, there's also what we call the [ranking system], which is a score that the customer gives us, so it's the satisfaction surveys [...] And so the customer can give feedback, but the problem is that here too we have a target in terms of figures." (CA09)

MM	RD	ALW	CA	RE
Control				
Tracking technologies ,lead to easier more frequent monitoring and more 'detailed monitoring of both products and people in the company	Tracking features, not intended to be used for performance reviews but rather increasing self-responsiveness	Tracking technologies: increased control, leaving workers less room for manoeuvre. Prevents workers from delivering a product that does not comply with quality standards Collaboration: Omnipresence of screens displaying daily objectives, performance and information on the production process, encouraging self-control among workers	More visibility (through online appointment systems, agenda and status), lead to less direct supervision of managers, but more control through (real-time) remote monitoring and surveillance tools and software	Data generated by digital tools increases the visibility on the tasks carried out by recruiters, and consequently the control of their activity
Autonomy				
Increased autonomy as regards organization. Progressive disappearance of the original hierarchical structure of companies, leaving space to self-organized teams	Higher flexibility and freedom, allowing them to explore new innovative ideas and work on their own terms. BUT the constant influx of digital interactions and the need for rigorous reporting can sometimes threaten this autonomy	Increased feeling of autonomy when it allows workers to be less dependent on other occupations in the factory BUT limitation of the autonomy by the generalized control (surveillance) performed through digital systems, sometimes underestimated by workers because it is not performed by humans	Collaboration tools (remote work) allowing more autonomy to self-organize work	Collaboration tools (remote work) allowing more autonomy to self-organize work
Evaluation				
More frequent evaluation opportunities	Unchanged: the scientific process	Relies more and more on (real time) quantified	More based on quantified objectives/performances	Data on the use of digital tools

thanks to collaboration and tracking technologies.	requires space to be creative and achieve innovative results, which cannot be measured with a « stopwatch". Importance of trust-based relationships	performance indicators. Process is sometimes itself digitalized	and data recorded by digital tools or reported by advisors: numbers of calls, number of digital appointments. Encouraging the clients to use digital tools is also part of what is evaluated. Also partially externalized to clients, through requests for feedback after each interaction (rating emails, satisfaction survey, etc).	provides quantitative indicators used to assess their performance. Also partially externalized to shared feedbacks on social media

Table 4 – Perception of control and autonomy, modalities of evaluation, by occupation

2.3 Relation to time

Digital tools affect professional categories also concerning a new relation to time, their work pace, and their tasks' predictability. As regards relation to time, middle managers experience both an increase in workload and time saved thanks to automation making tasks more accelerated. This, consequently, can eventually lead to a feeling of emptiness ('sometimes [hopes] to have problems, because there are times when it's too quiet, in fact, the day is very long' [mechanics middle manager, 38]). R&D managers, on the other hand, claim that collaboration technologies force round-the-clock availability, while automation technologies allow for larger amounts of time dedicated to cognitive tasks (they can invest 'more time working with information', 'put ideas in place' and 'see how [they] can push [into new directions]' [responsible of operations]). For assembly-line workers, automation disrupts the usual distribution of time normally dedicated to each type of task, also causing an increase in acceleration and occupation rates ('It generates stress because the guy is panicked because he doesn't have time to do that, there he is, he is forced to continue doing the tasks but speeding them up' [ALW01]). Customer advisors mention collaboration tools as responsible for extending working hours, which makes it difficult for them to disconnect, giving them the impression that the workflow is a never-ending process ('the minutes I spend on the phone, the number of video calls I make, the duration of a video call, all of these are actually very measurable' [CA12]). In the case of recruiters, there has been an acceleration of the processes and time savings due to automation tools, especially as regards the selection process and data management, and to collaboration tools, with particular reference to remote interviews and data sharing ('It's just 1 page that you have to look at and where you can see everything. And that makes things easier' [RE19]).

Middle managers claim digitalization has made tasks quicker ('100 times faster' [project manager]) and, therefore, increased their work pace ('work more efficiently,

faster, more thoroughly' [retail and wholesaling manager, 41]). R&D managers also describe meetings occurring at a rather rapid pace, in parallel with the heightened expectation from colleagues and clients to be highly responsive ('It is 2 p.m. there. He doesn't realize that it is night time for you' [construction R&D manager, 47). Assembly-line workers also claim the work pace increased, while the downtime was reduced ('If you take my task at the end of the 2000s and my task now, obviously all these things have accelerated my work because I have not been given extra time' [ALW01]). As the occupation rate increased, higher levels of acceleration were needed to meet the productivity standards. Customer advisors also perceived acceleration of their work: the fact that the humans behind the interfaces are 'invisible' generates unrealistic expectations of instantaneity, reactivity, and availability on behalf of the clients ('today we say to ourselves "no, that's more what the customer wants, he only wants digital, he wants to be able to reach us wherever he wants, whenever he wants"' [CA01]). For recruiters the pattern is similar. On the one hand, there are expectations of instantaneity, reactivity, and availability from the candidates ('If you have little time, whether you feel well or not, with or without corona, my job is to see 4, maximum 8 people a day. It's just too mentally demanding' [RE12]). On the other hand, work has accelerated overall due to automatization and collaboration tools (e.g. setting up of videoconference interviews), which allow them to reduce physical traveling and, therefore, traveling times.

Finally, as regards predictability, middle managers think digitalization has made it easier to predict tasks. Some of them even benefit from automation tools that allow them to estimate and anticipate future workload ('see how much [they] sell per week, what is [their] average, what did [they] do last week' [branch manager, 59]). For assembly-line workers, there is also an increase in predictability, as workers are better able to visualize the incoming workload. However, in case of malfunctions, they find themselves having to adapt the procedures and highly depend on technicians ('There is a better overall view. Since there are quite a few possible filters, depending on how I filter I can see a little bit of the load that will arrive on this or that machine' [ALW02]). As regards customer advisors, we observe higher levels of predictability in tasks because of the 'by appointment only' policies, as well as the online screening of clients' demands. Malfunctions and the constant changes in methods and tools can also make tasks less predictable. This is also true for recruiters, who can experience an increasing number of interruptions and changes in priorities, making day-to-day tasks less predictable ('And so the networks, we add a layer with this multitude of tasks. We are constantly interrupted in our work' [RE03]).

2.4 Effective technology uses

We observe differences between what the finalities and prescribed uses of technologies are, and what the effective uses are. As explained by Leonardi (2012), 'the perceptions of what functions an artifact affords (or constraints) can change across different contexts even though the artifact's materiality does not'. In other terms, individuals utilize technological infrastructure to shape a viewpoint, indicating that

technology may either hinder their ability to achieve goals or present an opportunity for accomplishment. Table 5 below delineates the tangible applications of available technologies by users and the associated perceptions. These perceptions can be construed as the workers' rationales concerning the technologies, serving as explanations for their utilization in alignment with their originally intended purposes (i.e., prescribed uses analogous to scripts).

In the realm of managerial functions (middle managers and R&D managers), compliance with the protocol is predominantly observed. Their practical utilization of tracking and collaboration tools aligns with the prescribed scripts, as the rationalities of these actors do not conflict with the tools, or sometimes because no fundamental change is perceived in work. On the contrary, these tools are regarded as supportive elements that facilitate the optimization of their managerial roles without replacing them. Within these professional categories, there is a distinct emphasis on the irreplaceable human dimension of their roles, although digital tools contribute to objectivizing certain processes. As stated by a middle manager: 'the human aspect cannot be underestimated', especially 'empathy, and motivation', which are very important qualities in management" (MM07, bank-insurance).

Assembly line workers express a more nuanced stance: while they appreciate the reduction or even elimination of physically demanding tasks now automated, they harbour concerns about potential replacement by machines. This apprehension underscores the perceived irreplaceability of humans for certain complex tasks or due to specific skills, especially the ones related to perception, manipulation, or hard-to-reach areas. Assembly line workers also highlight the added burden of certain procedures, at times prompting deviations or bypassing to save time. For example, a worker explains the following situation: "Sometimes we have to fuss a little. In the case of certain revisions, for example, usually the draftsman sends it back for cutting, and then I have to reprogram it, which involves reserving material, re-encoding a time, and so on. But sometimes, in fact, we simply take the piece again; sometimes a hole is missing (...) we won't reuse material, we'll just put the piece back and redo the hole. But then, if they put it back into the [software], I must reserve material that doesn't exist, that isn't used. So sometimes, we place it "en stoemeling" (informally) (...) I create a small program without going through the [software] because it's faster. There are so many special cases that it would be complicated to encode them all. " (ALW02) However, these deviations often necessitate justification, ultimately resulting in an increased workload. This leads to a narrowing of their maneuvering space in task execution, constrained by the automation of these processes. As explained by a worker: "Now, if you have that, you have to enter the system, a deviation system, and explain it, you see, why you reduced, blah blah... You have to justify your every action, it's always doable but you have to justify everything. So, naturally, what does it create? Well, it creates a workload" (ALW01).

Finally, it becomes evident that customer advisors and recruiters may deviate from prescribed uses of both collaboration and automation technologies. Concerning collaboration technologies, deviations from prescribed procedures are observable when

customer advisors interact with clients, particularly when clients are unwilling or unable to use digital channels. This leads to advisors assuming their counselling role differently than anticipated by the inherent nature of the digital tool. Moreover, while company directives lean towards extensive technology usage and maintaining quality relationships with customers, there exists a paradoxical directive perceived by customer advisors regarding the use of digital tools, as illustrated by the following quote: “What the customer can do, in technical terms, remotely, we have to push to get it through there, which is extremely uncomfortable (...) because you know you're sawing off the branch you're sitting on. The decline in the number of agencies over the last few months has been staggering. (...) we're no longer in the service and advice business, we're purely and simply in the sales business”. (CA05)

Similar dynamics apply to recruiters who may opt to bypass collaboration tools or diverge from parts of the automated process to align with their targeted audience. Their explicit defence of human and non-fully technological relationships with clients and applicants, coupled with concerns about the digital divide, reflects a group-oriented perspective on digitalization. In general, these two professional categories exhibit a certain scepticism towards data-driven decision-making and adopt a defensive stance towards technologies perceived as a threat to their profession in the way they conceive it in interaction with the end consumer. Beyond concerns about data security, their primary apprehension revolves around the risk of dehumanization in their professions. One recruiter gives an example: “During the reasoning test, the candidate is a little late and finds it difficult, or he takes his time and sees that the result is not very good. It is possible to situate certain test results better and explain them at the next stage. Based on these tests, you can already give them advice and tell them that you will be contacted by your recruitment manager. It's the human element that we've always put between us, although originally the process says that in principle there shouldn't be a recruiter at this stage (...), it's the scenario that theoretically applies to the situation. For us, it's easier and the candidate likes the experience better (...) that they've still had contact with the recruiter somewhere." (RE16). Finally, recruiters tend to misuse or 'circumvent' specific automation tools or functionalities, seeking increased flexibility in the selection and recruitment process. These rationalities aim to tailor the tools to their priorities and the specificities of each recruitment process, attempting to avoid standardization of these processes and, by extension, their approach to the candidates themselves. As explained by a recruiter: “There's less flexibility, you're tied to what the system allows you to do. For example, if you want to publish on a certain channel, but it's not within the range of the tool you're working with, it simply won't work (...) You can't work very bespoke, everything is pretty tight, pretty automatic and there's less room for a more personal approach. ” (RE10)

MM	RD	ALW	CA	RE
Effective uses				
Usually follow the prescribed uses, no reported off-script deviations	Usually follow the prescribed uses, no reported off-script deviations	Interaction: Sometimes deviation or bypass of digital procedures but interactions with the machine leads to necessary justifications of these deviations and thus additional workload	Collaboration: Sometimes deviate from the prescribed procedure to assume counselling role properly towards the client, e.g. when reluctant or unable to use digital channels	Automation: Bypass of the prescribed functionalities foreseen in the tools or their uses to add more flexibility Collaboration: provide extra information or help the candidates with the use of digital tools (bypassing them if necessary)
Rationalities: perception of the tools				
Mixed perceptions, digital tools are not potential substitute to human qualities, necessity to keep human intervention	Means to optimize and objectify processes, providing structure and reducing certain subjectivity, particularly in HR processes BUT the human element remains equally important	Mitigated fear of being replaced by machines counterbalanced by the reduction, or even disappearance, of the most physically demanding tasks	Threatens older worker's habits and question their knowledge and skills built for years (feeling of obsolescence). Data-driven decisions perceived as risky (+risks in terms of security and fraud). Lack of human interaction damages the trust-relation built with the customer	Better sharing of information between colleagues (leading to more interchangeability) and with external stakeholders BUT lack of flexibility (technical limitations of the tool), for less standard or more specific cases (counter-productive effect of the standardisation of information within the system). Strong techno-dependency. Perception of a dehumanization of contacts with the candidates

Table 5 – Effective uses and rationalities

2.5 Skills development and needs

As regards training, we observe a low level of investment in training and skills development for all categories analysed. Most of the training initiatives are limited to self-training via online tools or learning-by-doing approaches. However, there are requirements for more targeted higher-skilled profiles related to the utilization of digital tools. The level of involvement of the professionals in the development and support of the uses of digital tools is also quite low, except for R&D managers who mention more often

participatory approaches in the selection and implementation of technologies, allowing for better acceptance and support from staff. For the other job categories under study, most of the time, involvement appears as limited to key users in support and information channels. In some cases (mentioned by customer advisors) functions of "digital experts", "technical coaches" or "digital ambassadors" emerge to help workers/clients use technologies. IT support is often partially outsourced abroad, meaning that in case of a problem, workers are sometimes dealing with people from different contexts and with different qualifications. Middle managers agree on the fact that there is no real investment in training on behalf of their companies — some claim they are 'in prehistory' from this point of view. Learning often occurs through interactions within their teams, facilitated by collaboration technologies, while individual opportunities are usually provided online ('a half-hour training, with a PowerPoint' or webinars) and are very general. For them, it is relevant to develop 'soft skills' but also to understand how to convey them in a digital format (e.g. remote meetings). The position of a manager has historically necessitated a certain level of interpersonal skills. However, according to the insights garnered from interviews, there is a heightened emphasis on effective leadership skills due to the integration of collaboration technology and the growing prevalence of remote work. Training is also necessary to grasp complex situations and make sense of the results of automated tasks. In other words, the focus is on their ability to blend insights and experience with the outputs of automation. Finally, a challenge for middle and R&D managers is represented by the judgment essential to determine when technology is suitable and when it is not.

When expressing their needs in terms of skills to be developed or enhanced due to their job's digitalization, the people interviewed highlight various positions towards the nature of skills they need to acquire or strengthen depending on their occupations and on the type of technology they mainly use. Assembly line workers, customer advisors, and recruiters also insist on the centrality of certain human skills, which they consider irreplaceable by the machine. In this respect, their comments appear to reflect a defensive stance against the risk of their jobs (or certain parts of them) being replaced by machines., Table 6 summarizes their discourses.

MM	RD	ALW	CA	RE
No specific new skills, but a new and 'sharper ' approach to work	Collaboration technology and the ability to work remotely increased the need for effective leadership skills and other 'soft skills' and how to convey them in a digital format.	Decline in the quality of unskilled jobs Digital skills as a source of valorisation Irreplaceability of certain skills such as cognitive abilities, problem-solving, ability and flexibility, dexterity and sensitivity	Increase of digital skills with the use of digital tools. AI tools considered as external memories for "basic" information, allowing workers to mobilize and develop more occupational expertise (advising, analyzing) skills. Importance of the soft skills as human component of the advisors-client relation (building trust, understanding clients' requests and needs)	Digital skills to understand and use the tools they use. In addition to "traditional" occupational skills, development of mixed skills at the intersection of digital and occupation (e.g remote interviews, interpretation of automatic cv selection, data security) Soft skills: importance of "compensating" or "counterbalancing" the digitalisation by being able to show empathy and establish quality interactions with candidates

Table 6 – Skills needs

Technological advancements have prompted managers to cultivate enhanced communication and organizational proficiencies. Simultaneously, the process of digitalization has afforded certain managers the occasion to acquire digital and technical competencies, facilitating collaboration with machines and software. Rather than the emergence of distinctly new skills, the prevailing trend is characterized by a refined and more discerning approach to work in the digital era. For the managerial functions (middle managers, R&D managers), the shift is less obvious, insofar as their function is primarily focused on interpersonal and people management skills.

For assembly line workers, the utilization of digital tools equates to a decline in the quality of unskilled jobs. Numerous interviewees have emphasized the insufficient provision of training opportunities, engendering stress among the workforce, thereby fostering a sense of isolation. This issue is notably more pronounced for older employees, who may be less acclimated to technological interfaces. Moreover, there is an observable trend toward the digitization of training activities, as employees are increasingly required to partake in online training modules. Notably, within smaller enterprises, a discernible

shift towards personalized training and support mechanisms is evident. In such contexts, designated individuals often assume the role of a point of contact, responding to inquiries, providing guidance, conducting assessments, and offering constructive feedback. However, these digital tools also provide assembly line workers with the opportunity to enhance the appeal of their work and to develop their skills profile, even though they are frequently adapting to new technologies through a "learning-by-doing" approach, often grappling with challenges stemming from the lack of formal training. Anyway, the mobilization of digital skills increases. The cultivation of these skills can serve as a means of valorisation for certain employees, notwithstanding the inherent challenges associated with the learning curve. The acquisition of advanced technological competencies may, in turn, catalyse the formulation of novel training initiatives within corporate settings. Within the pharmaceutical sector, there is a discernible surge in the prominence of IT-related roles and desk-based occupations. Nevertheless, it has been underscored that some specific skills, particularly those associated with perception, manipulation, or intricate spatial domains, elude replication by robotic systems.

Automation tools help mitigate the risk of errors and the repercussions associated with them, especially in industries with a strong emphasis on product quality, such as the pharmaceutical and automotive sectors. Yet, within the same job roles, we have observed a shift towards recruiting more targeted and highly qualified professionals possessing digital skills. The qualifications required for various positions have changed. This transformation is evident in the automotive industry, where the necessary educational qualifications have been elevated, and technical competencies have gained prominence. Similarly, in the pharmaceutical sector, we have witnessed a surge in information technology (IT) and office-based roles.

The skills development needs expressed by customer advisors and recruiters concerning technology use primarily pertain to cognitive aspects. They require a deep understanding of the digital tools they use, including their functionalities, purposes, and underlying principles. Their main concern is to compensate for digitalization by focusing on the human component of their job since they are eager to avoid dehumanization. From this perspective, they stress the importance of keeping face-to-face interactions or meetings. Consequently, acquiring proficiency in the appropriate use of digital tools will enable them to mitigate their perceived limitations. They also show scepticism toward data-driven decisions and stress the necessity to avoid a fully automated approach. In other respects, the increasing array of complex tasks they must manage necessitates the development of their professional expertise, enabling them to offer better advising and analysing services. These two aspects suggest a certain defensive response stemming from the apprehension of these roles being supplanted by automation ('we will always be more and more qualitative than a machine'). Customer advisors exhibit a distinct preoccupation with the establishment of trust-based relationships with clients compared to the relationships between recruiters and their candidates. Customer advisors tend to express more anxiety about being replaced by digital tools and express greater scepticism toward them. In contrast, recruiters exhibit a more optimistic perspective, viewing

human-machine interactions in terms of collaboration rather than outright full substitution.

For recruiters, this evolving landscape necessitates the acquisition of specific skills related to the utilization of digital tools. These skills represent a convergence of business acumen and digital proficiencies, which are further amplified by the increasing diversity and quantity of tools in use. Additionally, these skills demand regular reactivation and updates due to the evolving nature of technology. To a lesser extent, due to the limited proliferation of such tools, some recruiters have also alluded to the importance of the skill of interpreting resumes using artificial intelligence. In our perspective, this skill exists at the nexus of digital competencies, encompassing a deep understanding of the tools, their underlying principles, and functionalities, as well as business acumen, in terms of effectively interpreting a curriculum vitae. Another critical skill is data protection, straddling the intersection of digital proficiencies, encompassing IT security aspects, and business acumen, regarding legal data protection requirements.

3. Discussion

Our results present contrasting perspectives on the rationales of actors in response to the rationales assigned to various technologies implemented in their work. While the changes experienced by middle managers and R&D managers appear to be of limited scope, with technologies being perceived as tools supporting process efficiency not fundamentally transforming the work and role of these actors, the reality is quite different for assembly line workers, recruiters, and customer advisors. For these three job categories, digitalization resembles more an intensification of control over their work performance, as well as a risk in terms of potential substitution by machines for a fundamental part of their work, and deskilling (for assembly line workers).

In this scenario, the rationales of the actors, displayed in their actual use of technologies, involving the adoption of off-script practices, or choosing not to use them as intended by the company, align more closely with coping strategies and, in some cases, resistance. These strategies aim to regain control over their workload or work pace, particularly for assembly line workers, or to preserve the quality of the relationship with their end customers. These strategies are notably driven by a concern for the risk of the digital divide, particularly for recruiters and customer advisors.

In our view, it seems relevant to categorize recruiters and customer advisors into an analytical group since they seem likely to respond similarly to technology. These occupations show similarities both in terms of the technologies employed and the comparable nature of tasks performed. The same rationale applies to grouping middle managers and R&D managers. The category of middle managers and R&D managers is characterized by the predominance of people and project management, as the customer advisors and recruiters are primarily engaged in interactions with end customers with digital divide concerns. As for assembly line workers, they are in a separate category

characterized by the changing nature of their jobs towards less physical and more standardized process tasks.

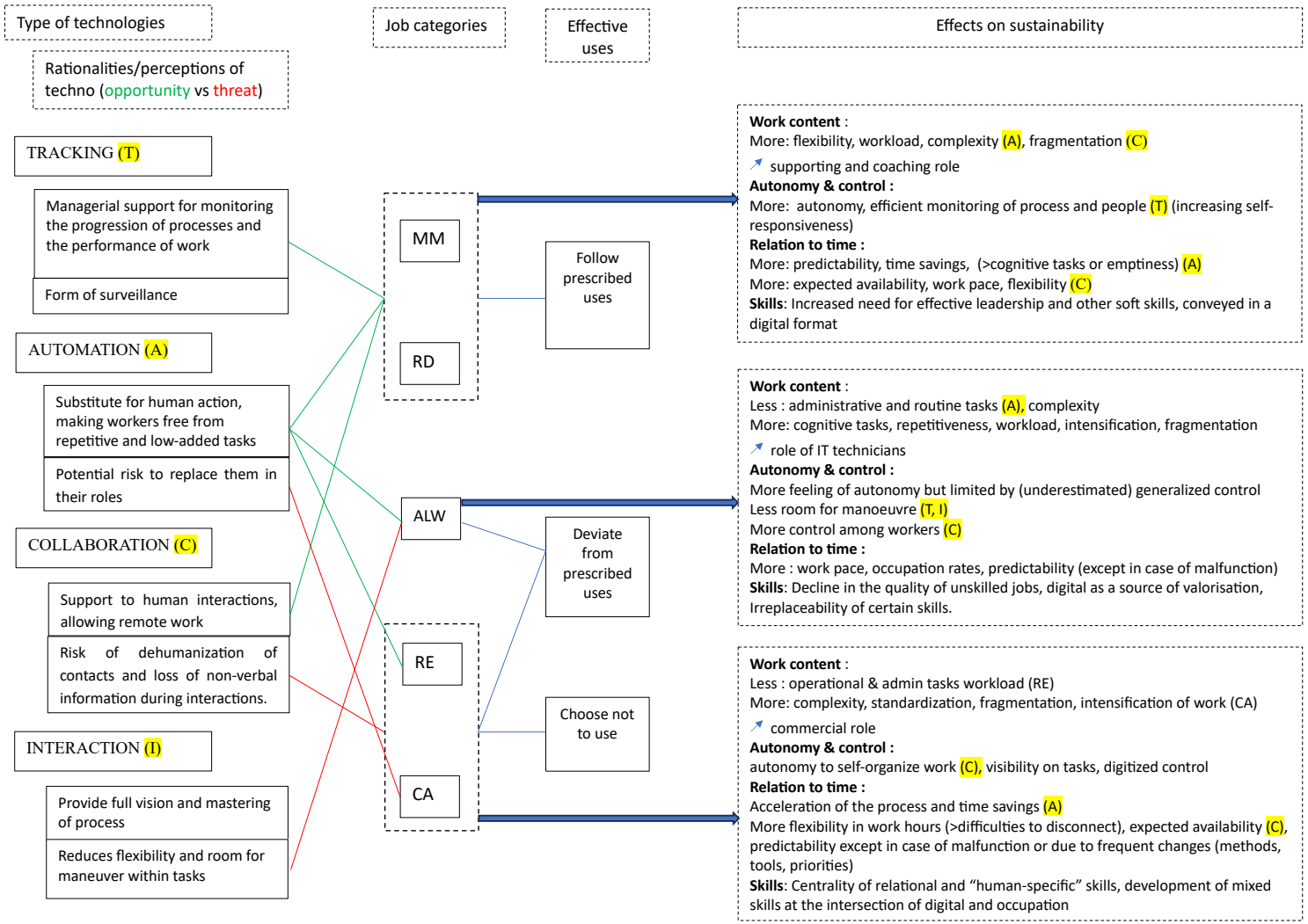
Furthermore, our results demonstrate that the job categories, in the way we group them, exhibit fairly similar perceptions of digital tools and the transformation in their roles, display similar perceptions of threat and subsequently possibility or will of deviating uses. These perceptions depend on their purposes as well as their rationalities: tracking technologies can be perceived either as a form of surveillance or as managerial support, monitoring both the progression of processes and the performance of workers in their contributions to these processes. Automation technologies can be primarily seen as a substitute for human action, making workers free from repetitive and low-added tasks or posing a potential risk to them in their roles. Lastly, collaboration technologies can be primarily viewed as a support to human interactions, either without a deep transformation of associated (managerial) roles or posing a risk of dehumanization of contacts and loss of precious non-verbal information during interactions.

Consequently, in the case of middle and R&D managers, the risk of being substituted by the technology is not present or is very low. As regards tracking and automation technologies, managers follow the protocol and prescribed uses most of the time. Technologies are seen as a mean to optimize processes, reduce subjectivity, and drive efficiency. Concerning collaboration, a new coaching role is generated for managers to guide their employees on the use of digital tools. Thus, overall, there is an individual-oriented perspective on digitalization: managers are concerned about how digital tools will affect their tasks and responsibilities, rather than their category altogether. These results appear as convergent with the literature (e.g. Carter et al., 2011; Taylor, 2013) which highlights the technology rationalities of extended surveillance exerted by managers, discipline, and control, more often based on digital measurement and monitoring.

Customer advisors and recruiters, using automation and collaboration technologies in the same proportions, share a common perception of digitalization as a potential threat to the human side of their jobs, which is central to them as they appear as group-oriented and show concerns about the digital divide towards their end-customers. In response to the perceived threat of substitution, they employ similar coping strategies and choose divergent uses or non-use of the technologies, following their rationalities. They also place a strong emphasis on the human component of their job and the irreplaceable skills associated with it.

Assembly line workers, finally, display both apprehension of being replaced by automation tools on the one hand, and appreciation for the prospect of alleviating physically demanding tasks and the reduction of potential errors that could be detrimental to them., on the other hand. Their use of automation technologies, mainly, tracking and interaction technologies, can be perceived as making the job boring and repetitive or as bringing more interest and fewer routines into it, depending on the context. Digital tools are perceived as both a threat (for unskilled jobs) and an opportunity (to learn) in the transformation of their jobs. It leads them to display rationalities that

highlight the irreplaceability of some specific skills, particularly those about perception, manipulation, or challenging-to-access places, that could not be effectively replicated by robot systems. From their perceptions, their rationalities are reflected for instance in their attempts to deviate from prescribed uses of technologies from time to time. In this case, the unavoidable justifications they must provide for these off-script uses result in an additional workload, illustrating the limited flexibility they have in their technology use.
The diagram below summarises the relationships between the main variables. The green arrows indicate the perception of technology as an opportunity, while the red arrows indicate the perception of technology as a threat (for the occupation in the way that the actors see it).


Type of technologies
Rationalities/perceptions of techno (opportunity vs threat)
Job categories
Effective uses
Effects on sustainability
TRACKING (T)
Managerial support for monitoring the progression of processes and the performance of work
Form of surveillance
AUTOMATION (A)
Substitute for human action, making workers free from repetitive and low-added tasks
Potential risk to replace them in their roles
COLLABORATION (C)
Support to human interactions, allowing remote work
Risk of dehumanization of contacts and loss of non-verbal information during interactions.
INTERACTION (I)
Provide full vision and mastering of process
Reduces flexibility and room for maneuver within tasks
MM
RD
ALW
RE
CA
Follow prescribed uses
Deviate from prescribed uses
Choose not to use
Work content :
More: flexibility, workload, complexity (A), fragmentation (C)
supporting and coaching role
Autonomy & control :
More: autonomy, efficient monitoring of process and people (T) (increasing self-responsiveness)
Relation to time :
More: predictability, time savings, (>cognitive tasks or emptiness) (A)
More: expected availability, work pace, flexibility (C)
Skills: Increased need for effective leadership and other soft skills, conveyed in a digital format
Work content :
Less : administrative and routine tasks (A), complexity
More: cognitive tasks, repetitiveness, workload, intensification, fragmentation
role of IT technicians
Autonomy & control :
More feeling of autonomy but limited by (underestimated) generalized control
Less room for manoeuvre (T, I)
More control among workers (C)
Relation to time :
More : work pace, occupation rates, predictability (except in case of malfunction)
Skills: Decline in the quality of unskilled jobs, digital as a source of valorisation, Irreplaceability of certain skills.
Work content :
Less : operational & admin tasks workload (RE)
More: complexity, standardization, fragmentation, intensification of work (CA)
commercial role
Autonomy & control :
autonomy to self-organize work (C), visibility on tasks, digitized control
Relation to time :
Acceleration of the process and time savings (A)
More flexibility in work hours (>difficulties to disconnect), expected availability (C), predictability except in case of malfunction or due to frequent changes (methods, tools, priorities)
Skills: Centrality of relational and "human-specific" skills, development of mixed skills at the intersection of digital and occupation

These observations lead us to inquire about the flexibility potential of technologies for each occupational category and the latitude they have to influence the configuration of these tools (e.g. recruiters) or their use (e.g., customer advisors in paradoxical requests, assembly line workers with little or no flexibility, pushed towards prescribed use). These results illustrate the structuring power of technologies and the variable flexibility of the scripts associated with them. From a socio-material perspective, these findings offer an illustration of the affordances of technologies for various job categories. This refers to the action possibilities that technologies provide in each context. In other words, our results shed light on how the characteristics of technologies influence the interactions and professional practices of workers, creating specific opportunities or constraints depending on the nature of tasks and employment contexts. This latitude is assessed, particularly considering the degree of involvement workers have in the selection and implementation of technologies within their organization (relatively low in our observations except for some R&D managers), as well as in the materiality of the technologies themselves in terms of prescribed usage and possible workarounds. In other terms, it shows if workers' agency is low or not, allowing for deviations or not.

4. Conclusions

Our results highlight the significance of context in explaining variations in technologies and how people respond to them. This considerable complexity depends on various factors: the types of technologies introduced, and the rationales associated with them, both by the company and the actors. Professionals' utilization of technology is markedly shaped by their interpretations of it. The adoption of unscripted uses, and at times, the deliberate deviation from prescribed uses or abstention from using technologies, closely resembles coping strategies. When implemented, these strategies aim at safeguarding a profession or practices perceived to be under threat by this digital evolution.

Our results also illustrate the mutual influences between technologies and users from a socio-material perspective that extends beyond the impacts of technologies or the appropriation by actors but rather focuses on the intricate interplay between them and the professionals embedded in specific professional contexts and logics.

Stable jobs in which employees' creativity and productivity can flourish and their wellbeing safeguarded make for sustainable careers. Recently, De Vos et al. (2020) defined sustainable careers as careers that make individuals happy, in terms of satisfaction and career success; healthy, in terms of well-being, stress management, and physical health; and productive, in terms of performance and employability. At the same time, for individuals to be proactive in their capabilities, an environment rich in resources needs to be guaranteed (De Vos et al., 2020).

The challenges, obstacles, and opportunities posed by digitization in the context of sustainable careers vary across the analysed job categories. To assess job quality and

quality of work life, various dimensions are explored, including the technologies used and the changes workers undergo in executing their tasks. We have thus investigated the content of work, the conditions under which it is performed, as well as employment conditions and work relationships, while also probing workers about their experiences in terms of physical and psychological well-being.

In terms of complexity, the higher mental charge and potential conflicts are compensated by enriching cognitive tasks, where employees experience satisfaction in resolving problems and using new skills. As regards connection, the risks brought by digitalization include a loss of hierarchy, responsibility, structure, and purpose as employees tend to not always know what they are supposed to do and how. On the other hand, for some, it may increase role clarity as technologies help keep track of tasks and performance, as well as increase organizational efficiency. Going back to socio-materiality, tracking technologies may create opportunities for people management but also risks losing human interactions while increasing pressure on employees.

Another risk is associated with employees' growing reliance on technology to execute their tasks. This dependency can manifest as a source of stress and anxiety when faced with unavailability due to technical issues or difficulties encountered during usage, as well as when the problems encountered by the workers can only be solved by technicians, which can also cause frustration depending on other actors. This risk highlights the potential implications of such technological reliance and warrants further consideration in the context of workforce well-being and performance. This also connects to the transformation of the workplace, which creates unrealistic expectations of instantaneity and availability, affecting employees' ability to remain focused, as well as creating feelings of obsoleteness. Associated with obsoleteness is the age gap present in a company. Automation technologies, for instance, are likely to decrease critical thinking in the younger segments of the working population. On the other hand, there might be strong resistance on behalf of older segments, less keen on accepting significant changes in the way they work. The digital divide may, however, be counterbalanced by the opportunity to share knowledge between intergenerational workers, as well as create a more inclusive culture.

While the results we have presented are specific to each category, they nevertheless allow us to extract certain cross-cutting messages. Overall, we observe both positive and negative aspects linked to flexibility, especially concerning their relation to time and to the control they perceive in their work. Techno-dependency affects all categories depending on their tasks. On this subject, a fear of substitution is generated for recruiters and customer advisors, specifically when the human-machine relationship becomes threatening. As regards task complexity, technologies allow one to focus on more complex tasks, while the simpler ones can be entrusted to machines, support staff, or outsourced to the customer (in the case of customer advisors) or the candidates (in the case of recruiters). As regards monitoring and evaluation, these processes are partly entrusted to machines, including the monitoring of activity data, or clients in the case of customer advisors via feedback on social media. This also connects to the emergence of a

group-oriented versus individual-oriented perspective on digital tools — the first attributed to recruiters and customer advisors, who are committed to the frontline; the latter attributed to managers, who are exclusively concerned with management. Assembly-line workers should be placed in between the two categories. As regards training and skills development, these usually occur on a voluntary basis. While technologies are progressively introduced, training programs remain limited, digital, and general, causing employees to misunderstand the effective use of certain technologies, as well as require assistance from the higher profiles where possible. In other words, the analysis shows that training programs are not provided in adequate quantity and quality.

Based on our results, we recommend the following actions. First, to ensure that the expected and effective use of technologies coincides, it is necessary to provide employees with *ad hoc* training. This training should be designed according to the needs of both the profile of the employee —the tasks of a middle manager differ from the tasks of an assembly-line worker—, and the sector of reference —using an automation technology in the logistics industry certainly requires different skills than using it in the financial business. What emerges from our analysis is that the difficulty in complying with the adequate use of the technology, and consequently the rise in dissatisfaction or inefficiency at work, is proportional to the low range of training programs offered and the lack of incentives to take part in them. In connection with this, companies looking for higher-skilled profiles should be prepared to invest more significantly in training programs. From a more general and policy perspective, regional policymakers in Belgium should shift their focus on active labour market policy investment to guarantee that their companies' workforce is prepared to use technologies via skills development and human capital investment, as well as aware of the changes in ways of working and organizing work due to the new techno-economic paradigms brought by the technologies (Focacci & Perez, 2022).

In connection with this, further attention should be brought to labor market institutions and other stakeholders interested in the impact of digitalization. While they are not directly involved in debates concerning digital tools within firms, trade unions' political power and attitude towards technologies may indirectly affect public policies concerned with the impact of digitalization on working conditions, from issues about constant monitoring to physical and mental health, and work and private life conflict (Carlson et al., 2023; Lott & Abendroth, 2023). The centralised level of collective bargaining in Belgium allows for a high union coverage rate, with unions having a more proactive role in policymaking. What emerges from our analysis is a total or insufficient disregard for trade union engagement in discussions about the introduction or development of digital tools. In this regard, we recommend policymakers enhance a social dialogue that comprises parties both in favour and against technologies to reach an agreement that benefits firms, employees, and society more in general. While skills development is crucial to enhancing productivity and understanding of the technology, attention should be paid to the mental and physical consequences of introducing digital tools abruptly or without the necessary forms of support, including social support. While,

in most cases, employees were able to voice their doubts and questions thanks to the increase in meetings and forms of communication, we believe more space should be granted to employees and their representatives to answer their specific needs in terms of quality of working life. As such, the role of trade unions may need to be reconsidered at the company level. The dialogue between labour market institutions and economic agents should be promoted also to account for the risks brought by digitalization concerning the sustainability of certain job profiles.

Finally, further attention should be brought to the sociological implications of introducing technologies at work. While companies welcome digitalization to stay competitive in the national and international markets, our transversal analysis shows that, independent of their role in the company and the extent to which they use digital tools, all three categories of workers insist on maintaining a certain level of human component in their work. This was particularly evident for those working closely with members of the society external to their company, including recruiters and customer advisors. Indeed, in addition to being concerned about the threats posed by digitalization to their relationship with customers and candidates, as well as how the digital divide may affect them, advisors and recruiters also care deeply about their category being replaced. In the case of managers, instead, the lack of a direct link with the external world allows for a more individual-oriented perspective on digital tools and their use. In this sense, managers only need to worry about the threats they may experience at the individual level, such as how their tasks will be affected by the introduction of digital tools, or how responsibilities towards their staff will increase or decrease. While the risk of being substituted is lower if not inexistent, new issues emerge as tasks are accelerated or taken over by technologies. In parallel, managers have attributed a new coaching role, as they are asked to guide their employees concerning the usage of and problematics linked to digital tools. With new responsibilities, on the one hand, and the possibility of emptiness in time usage, there is a new need for managers to justify their role and understand their digital selves (Chan, 2022). To avoid the emergence of extreme individual-oriented attitudes, where excessive overwork is accompanied by feelings of emptiness, or group-oriented attitudes, where concerns of substitution and digital divide lead to a dismissive or inadequate use of technologies, experts such as occupational psychologists should meet regularly with employees to ensure balance and a 're-humanisation' of work and management (Taskin et al., 2023).

Our study is limited to Belgium and the presentation and analysis of qualitative evidence. However, the range of occupations analysed, together with the interest posed on the implications of digitalization for a wide range of occupations and factors, from changes observed at the structural level of the company to those impacting the quality of working conditions and so on, justify the relevance of this study. By carrying out a qualitative transversal analysis, we overcome the well-studied dichotomy of technology and productivity and investigate the equally necessary multi-variable world of employees' perceptions. Our results are, therefore, useful for other scholars interested in understanding how technology affects employment in their country of reference, as well

as they can be used to identify patterns in countries or sectors like the ones analysed in this study. Finally, they shed light on the various dimensions of technological change in the workplace from the perspective of the employees themselves. This is particularly relevant in a world where technology 'meddles' in the social (Bailey et al., 2023).

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