Human-AI Collaboration: A Blessing or a Curse for Safety at Work?

Lauren Waardenburg
ESSEC Business School

Corresponding author
Lauren Waardenburg
ESSEC Business School
3 Avenue Bernard Hirsch, 95000
Cergy-Pontoise, France
waardenburg@essec.edu

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Abstract
Human-AI collaboration is increasingly considered an alternative to fears of automation and large-scale job loss that are typically attributed to AI. However, the current scholarly understanding of this type of collaboration falls victim to a one-sided, rather optimistic view. More specifically, human-AI collaboration is commonly associated with augmenting or enhancing work. In this scenario, I use insights from qualitative research on the use of AI in practice to develop alternative perspectives around unexpected and unintended consequences of human-AI collaboration for worker safety. As such, I argue for future research to study human-AI collaboration in practice, to carefully unpack the ripple effects of changing or "enhanced" work practices, and to consider AI systems as being embedded in wider systems of cognition including, but not limited to, the mind, the body, and technologies.

Keywords
artificial intelligence; human-AI collaboration; worker safety; augmentation.

1. Introduction

With the exponential rise of artificial intelligence (AI) applications in evermore organizational contexts, scholars are increasingly interested in human-AI collaboration (e.g., Anthony et al. 2023; Raisch and Krakowski 2021). Its positive connotation of "collaborating" with humans, thereby offering the possibility to augment work instead of merely "taking over" jobs, has led organizational and technology scholars to consider human-AI collaboration as the bright side of AI implementation (Baer et al. 2022). As a consequence, recent work has focused on unpacking avenues of such collaboration (e.g., Benbya et al. 2021; Lyytinen et al. 2021) as well as how and which (human) skills and capabilities might evolve (e.g., Grønsund and Aanestad 2020).

The shift to human-AI collaboration is closely related to a long tradition of technology studies that looked at the relations between technology and its social context (Bailey et al. 2022). Sociologists of technology have extensively argued against a deterministic perspective on technology and emphasized its close entanglement with human action and societal pressures (e.g., Bijker and Law 1994; Smith and Marx 1994; Winner 1986). By focusing on these relationships, a relational perspective on technology fosters a nuanced understanding of how

technology is co-constituted with society and influences the dynamics of power, knowledge production, and social change. Organizational scholars have adopted this relational view and brought it into the work domain in their reference to technology as a "social object" (Barley 1990) and in the well-known "technology-in-practice" lens (Orlikowski 2000). Bringing the two scholarly traditions together helps us to see that "[t]echnologies exist within and are inseparable from the relations with the people and organizational and institutional contexts in which they are developed, implemented, and used" (Bailey et al. 2022, 5). Or, to stay close to the Science and Technology Studies (STS) tradition, technologies affect the (social) world through their relations and how these relations are enacted (Callon 1986; Latour 2005).

Taking into account this rich tradition of relationality in technology studies, it is surprising to notice that current organizational and technology research on human-AI collaboration as a "solution" to previous fears of large-scale job loss tends to overlook the unintended and unexpected consequences for everyday work practices. To emphasize the importance of bringing relationality back into the study of human-AI collaboration, in this scenario paper, I use insights from recent and current research at the Dutch Police, the U.S. police, and a large European insurance company to develop cases around how human-AI collaboration can unintentionally and negatively impact worker safety. I argue that the use of AI leads to new emotional and cognitive demands for human workers which can negatively influence psychological safety, and new bodily demands that compromise physical safety. By examining its flip side, I argue for a more nuanced and empirically grounded understanding of human-AI collaboration and its consequences for everyday work, that brings back the relationality that for so long has been at the core of technology studies.

2. From automation to human-AI collaboration

The discussion on whether AI can take over human work has been around for almost as long as the term "artificial intelligence" has existed in common discourse (e.g., Dreyfus 1967). However, about ten years ago, organizational scholars and practitioners alike started to fear the imminent downfall of many jobs due to the emergence of AI in organizational settings. In general, they claimed that the implementation of AI would inevitably lead to the automation of many tasks traditionally performed by human workers (e.g., Frey and Osborne 2013), meaning that many jobs would be taken over and little would be left in the human realm (Raisch and Krakowski 2021). The argument back then was that, since AI systems would act more comprehensively, rationally, and efficiently, it would be better to keep humans "out of the loop" as much as possible (Davenport and Kirby 2016).

Consequently, Frey and Osborne (2013), in their initial study on robotization and AI, predicted that 47 percent of the then-current jobs would be lost to AI. However, in the years that followed, this prediction did not seem to turn into reality. In later studies, scholars therefore argued that focusing on "jobs" as a unit of analysis to understand the potential consequences of automation might have led to overly negative predictions (e.g., Felten et al. 2018). Shifting their analysis toward the tasks that could potentially be automated, the results presented in these studies are much more positive and show, for instance, that it is more likely that only

nine percent[1] of all jobs may be lost to automation (Brynjolfsson and McAfee 2014; Felten et al. 2018). What is more, studies looking at the relationship between AI and work at the task level often conclude that new tasks (and sometimes even new jobs) may emerge when AI enters the workplace (e.g., Faraj et al. 2018; Kellogg et al. 2020).

Scholars typically agree that routine, cognitive tasks that are well-defined and that can be reduced into a set of rules can be taken over by AI (e.g., Jussupow et al. 2021; Susskind 2020). Moreover, given the ground-breaking developments in machine learning (ML) techniques, tasks that are less rule-based and more associated with human expertise can now also increasingly be performed by AI (Esteva et al. 2017; Manyika et al. 2017). Yet, while the boundaries between what humans and AI systems can do slowly blur, which appears to increasingly justify the initial fears of AI taking over, the scholarly debate is moving away from the one-directional focus on automation toward "human-AI collaboration" (e.g., Anthony et al. 2023; Benbya et al. 2021; Davenport and Kirby 2015; Dellermann et al. 2019; Hassani et al. 2020; Lebovitz et al. 2022; Möllers et al. 2024; Teodorescu et al. 2021).

This stream of research takes a more positive stance toward the introduction of AI in the workplace and unpacks how human work can be enhanced by incorporating and using the inputs from AI systems. For example, by arguing that work can be augmented by automating routine processes, thereby leaving more room for the human worker to perform more meaningful work. For example, automating simple tasks leaves space for human workers to have personal contact with customers or to perform more knowledge-intensive tasks (Susskind and Susskind 2015; Raisch and Krakowski 2021). Typically, scholars emphasize the collaboration between human workers and AI systems in "hybrid" forms that together produce outputs that go beyond what can be done by either humans or AI systems alone (Gal et al. 2020; Grønsund and Aanestad 2020; Lyytinen et al. 2021; Wilson and Daugherty 2018). As Malone, Rus, and Laubacher (2020) claim in their online research brief:

> The most promising uses of AI will not involve computers replacing people, but rather, people and computers working together – as "superminds" – to do both cognitive and physical tasks that could not be done before.

In the shift toward human-AI collaboration, organizational scholars are, thus, moving away from AI as being a threat to human work, toward AI being a partner of human workers. Underneath this rather optimistic narrative are two key assumptions. The first, as recently pointed out by Anthony et al. (2023), is that, similar to the automation narratives, scholars taking a human-AI collaboration perspective typically adhere to a deterministic belief in technology being the answer to the limitations of the human worker. In other words, having AI systems partner up with humans is claimed to lead to more objective, effective, and efficient organizational processes (e.g., Davenport and Kirby 2015; Miller 2018; Polli 2019). This assumption is heavily criticized in research from a variety of fields that underscore, amongst others, the biased nature of data and algorithms (e.g., Boyd and Crawford 2012; d'Alessandro et al. 2017), as well as the entanglement of AI systems in practice (e.g., Glaser et al. 2021; Jussupow et al. 2021; Waardenburg et al. 2022).

The second, and less-discussed assumption is that human-AI collaboration moves away from the negative "automation" of work toward the positive "augmentation"; i.e., the en-

hancement or improvement of work. More specifically, scholars assume that because AI systems can take over certain tasks, human workers gain time and space to handle more complex issues that require human expertise, which can make their work safer, more impactful, and more meaningful (Bankins and Formosa 2023; Davenport and Kirby 2016; Susskind and Susskind 2015). However, what is commonly overlooked is that augmentation of human work requires, for example, new or higher levels of specialization, often leading to more complex and more demanding work (Faraj et al. 2018; Mayer and Strich 2024; Strich et al. 2021).

The first assumption resides in a limited technical understanding of the capabilities as well as the dangers of AI and can be countered by bringing in critical insights from the fields of, for example, sociology and computer science. The second assumption, however, is shared amongst a variety of disciplines (Baer et al. 2022) and is an expression of a lack of deep insights from workers who are engaging in human-AI collaboration in their everyday practice. In this scenario, I use insights from recent and ongoing embedded and ethnographic research to unpack the potential and often hidden consequences of human-AI collaboration. For this, I focus on a specific aspect of work: worker safety.

3. Worker safety

Worker safety is a core concern in (almost) every work context. It is divided into two categories, physical safety and psychological safety. Physical safety considers the bodily dangers a worker can be exposed to and is often studied in high-reliability settings such as police teams (e.g., Mumford and Taylor 2015), or in extreme contexts (e.g., De Rond et al. 2019). Psychological safety, in contrast, concerns the inclusivity of one's work environment and the extent to which workers feel respected and at ease at being themselves, and do not fear repercussions when they share their thoughts, questions, or concerns or when they make mistakes (Bresman et al. 2024; Edmondson 2018).

As many organizational activities revolve around the establishment and maintenance of the psychological and physical safety of workers, it comes as no surprise that organizations have looked at technology as a means to improve such safety. As Vaughan (2021) explains, it is commonly argued that "increasing the sophistication of the technology will improve the accuracy of measurement and prediction, reduce mistakes, and therefore increase safety" (p. 4). The more sophisticated the technology, the more it is expected to enhance the safety of the employees. For example, "smart" sensors can be surgically placed into the body (Metz 2018) or worn in safety clothing to alert workers of safety-critical situations (Nag et al. 2017). They can also be used as continuous data monitors to detect and prevent employees from being exposed to toxins (Howard 2019). Similarly, smart robotic devices can assist factory workers in safety-critical tasks (Vysocky and Novak 2016) or can offer surgeons a more psychologically safe work environment (Sergeeva et al. 2020). Finally, advanced machine learning techniques can take the pressure off knowledge workers by aiding in making risky decisions (Bumann 2024; Constantiou et al. 2024; Howard 2019).

Human-AI collaboration, therefore, has the potential to fundamentally enhance worker safety. However, initial concerns are also being raised about whether algorithmic management is indeed as beneficial for workers' (psychological) safety as is generally expected (e.g., Bresman

et al. 2024; Cameron and Rahman 2022). In my embedded research on AI implementation across a variety of organizational contexts – from police organizations to airlines and insurance companies – I have also observed darker, more controversial outcomes of AI for worker safety. More specifically, I observed how, slowly and often hidden from view, psychological and physical safety was compromised when humans and AI started to collaborate. In what follows, I draw on empirical insights to develop two sets of cases that unpack some of the unintended consequences of collaborating with AI for workers' psychological and physical safety.

4. The unintended consequences of human-AI collaboration for worker safety

4.1 Psychological overload

The first set of cases is focused on workers' psychological safety. I unpack the potential consequences of the belief that, by using AI systems to automate routine tasks or to generate insights that are beyond human cognitive capabilities, human work becomes more challenging, complex, and meaningful. I use insights from recent qualitative research at a large European insurance company to discuss the potential emotional overload related to the use of an AI-driven chatbot, and examine the potential for cognitive overload by using an example from my ethnographic study of "intelligence officers" at the Dutch Police.

4.1.1 Emotional overload

Emotional sensitivity is typically considered to be a uniquely human skill that can be freed and leveraged by using AI to automate simple tasks that do not need an emotional component. However, foregrounding emotional labor without considering the potential impacts this has on existing work practices can also be detrimental and even dangerous for workers' psychological safety. The case of InsureCo[2], a large European insurance company, provides an example of such unintended and unexpected outcomes.

InsureCo recently implemented a customer service chatbot to handle simple customer inquiries. One key advantage of this implementation was its 24/7 availability, allowing customers to receive immediate support without the need for a human helpdesk worker. Consequently, the chatbot became the primary point of contact for many InsureCo customers. However, it was not designed to fully replace human helpdesk workers. Instead, it serves as a complementary tool, particularly for straightforward matters like updating a customer's address. For more sensitive or complex issues, such as claims for death insurance payouts, customers are still directed to human workers. Collectively, the helpdesk workers had years of experience dealing with a large number of customers in complex and often emotional situations, which allowed them to provide the emotional support necessary for a wide range of topics, a feature that was not (yet) available for the chatbot.

The collaboration between the chatbot and human helpdesk workers resulted in a shift in the humans' roles and responsibilities. The chatbot automated simple tasks, giving human

workers more time and focus to handle complex issues. This has led to a more targeted approach, with human workers expanding on the emotional support aspect of their work. On the one hand, this reinforced the human helpdesk workers' belief that their added value and responsibilities were maintained in the case of human-AI collaboration. This helped them to consider the AI system as a beneficial tool, instead of a threat to their work. As such, the helpdesk workers willingly collaborated with the chatbot in their day-to-day work.

On the other hand, the automation of simple customer service tasks also had an unexpected, more negative consequence for the human helpdesk workers. Whereas the performance of emotional labor made the work of the helpdesk employees meaningful, before the implementation of the chatbot, they used to take on simpler tasks as a way to unwind after handling emotional cases. This way, they could "take a breather" in between emotional requests and make sure that they stayed in control of the psychological heaviness of their work. In the new human-AI collaboration, this ability to unwind was taken away and their inherently human skill to empathize and give the right emotional response had become the sole component of their work. As a consequence, some of the helpdesk workers were struggling with their psychological health, showed signs of emotional fatigue, and reflected on their work as "being a psychologist without the proper training". Yet, they also emphasized the difficulty of openly expressing these struggles and feeling like being in a golden cache, since their ability to perform emotional labor was what made them valuable in this human-AI collaboration.

4.1.2 Cognitive overload

Another example of human-AI collaboration is the so-called "algorithmic broker" (Kellogg et al. 2020), who operates between AI systems and their users, translating the AI outputs in a way that makes these outputs useful in practice.

One of the first studies of such algorithmic brokers is my three-year ethnography of so-called "intelligence officers" at the Dutch Police, concerning the implementation of a crime prediction AI system (Waardenburg 2021; Waardenburg et al. 2022). This AI system predicted, a week in advance, where and when certain types of crime were most likely to occur. Recognizing that abstract, mathematical crime predictions would not be intuitive for police officers, national police management decided early on to create a new role for the intelligence officer, whose central task would become the translation of AI outputs into practice. To occupy this role, national management selected what was then called the "information department"; administrative back-office workers who used to aid police officers in real-time information searches (e.g., registrations on license plate numbers). However, with the large-scale digitalization of police work and the real-time access to information on the street by using smartphones, police officers depended less and less on the information department, meaning that this role would soon become obsolete. Yet, with their knowledge of police databases and their relative closeness to everyday police work, national management deemed the workers at the information department the right candidates to become the new "intelligence officers", responsible for the translation of AI outputs in practice.

The national police managers believed this was an attractive role change since information workers themselves reported their original work as "not very meaningful" and a "shelter

for police officers with long-lasting injuries". In their role as intelligence officers, the workers would become responsible for collaborating with AI to generate insights that were previously unknown within the police force. This new responsibility would make the work of intelligence officers more complex and interesting compared to their previous tasks. Indeed, the intelligence officers found their work to be more exciting and challenging, yet they also heavily struggled with the new requirements. While they were previously "simple" information workers, their augmented role required them to be knowledgeable about the capabilities of AI to identify, for example, the underlying reasons for predictions or potential faulty predictions. Such knowledge represented an elevated educational level, which was not required when the original information workers joined the police. While recruits joined with higher educational levels demanded in the new role, the "old" employees struggled with feeling not good enough and even expressing feeling "stupid" in comparison. As a consequence, many of the original information workers succumbed to cognitive overload, ending up being diagnosed with burn-out or leaving the intelligence team for other, less demanding, types of work.

While human-AI collaboration can create opportunities for workers to leverage their inherent human skills or make their work more challenging and interesting, the above examples show that such enhancement does not come without a cost. Hidden behind the positive veneer of work augmentation, workers' psychological safety can suffer from emotional overload by, for example, taking away their defense mechanisms, or triggering feelings of inferiority by enhancing the cognitive requirements without taking into account the educational level of the employees.

4.2 Physical unsafety

The second set of cases looks deeper into the consequences of human-AI collaboration for workers' physical safety. I dive into the belief that having more information available in real-time improves workers' physical safety, as well as their experiences thereof. I use insights from ongoing ethnographic research of the emergency departments of both the Dutch Police as well at the U.S. police to reflect on the relationship between the body, AI, and physical safety, and the changing risk awareness.

4.2.1 Changing bodies

One of the common assumptions on the relationship between human-AI collaboration and worker safety is that physical safety will be enhanced when AI is used. For example, smart robot arms that perform safety-critical work normally carried out by construction workers. However, even though such outcomes provide promising glimpses at potentially safer work environments, when AI systems are used to support real-time decision-making the future looks a bit less bright. In this case, I use an example of my year of full-time ethnographic fieldwork at the emergency response department of the Dutch Police.

A key part of police work is keeping themselves and others safe from harm. While, occupationally, they are allowed to enforce such safety through extreme measures such as the use of violence, the Dutch police officers consider this a last resort, when all else fails. Accordingly, one

of the main techniques they use is their own body. For example, to keep themselves safe, they stand as tall as possible and continuously scan the environment for incoming threats. In potentially violent situations, they broaden their shoulders and lower their voice to claim authority. Their bodily posture is, therefore, a key asset in safely performing their day-to-day work.

Yet, a problem for the police officers was the lack of real-time information about persons or locations whenever they were outside on the street, which police management considered a safety-critical issue. For this reason, the police invested heavily in technological development. All police officers were given a secured smartphone connected to a platform where they could have real-time access to police information wherever they were. For example, they had an app with which they could scan driver's licenses and license plates which, through the use of image recognition, would immediately result in a list of all past police registrations of the person or the car.

Such immediate access to information seemed to be the key to improving police officers' safety and they therefore readily embraced it in their real-time decision-making. However, after a while, the use of the smartphone appeared to have an unexpected consequence. Increasingly, the police officers started to reflect and even complain that the use of smartphones on the street made them "lose oversight" leading to "unexpectedly dangerous situations". What happened was that the use of smartphones made them "turn inside", meaning that they exchanged their broad-shouldered, authoritative posture for a hunched-over, closed-off stance that made them lose connection with the environment. In my time with them, I have observed numerous instances in which police officers ended up in close encounters solely because they were immersed in gathering information on their phones. While the decision support through the use of AI might have, thus, improved the information position of police officers on the street, it ended up deteriorating their physical safety by significantly reshaping the bodily posture they so depended on to keep themselves safe.

4.2.2 Changing risk awareness

Finally, a key value of AI systems is that they can predict risk; e.g., of someone committing fraud, of someone developing cancer, or of crimes being committed. Knowing such risks in advance allows organizations to act upon them. However, the most recent insights from our research at the U.S. Police also point to another potential effect on workers' physical safety.

At a police department in a large U.S. city, they have turned away from predicting individuals likely to commit a crime, toward more generic area predictions and close monitoring of the activities of police officers in these areas. They have also included more data sources. For example, in this version of the predictive algorithm, they have included previous shots fired. This gives a more substantive risk prediction, which needs to be actively countered by police officers by being present in the predicted area, at the predicted time.

However, the first indications are showing that police officers are not very keen on these predictions. Police officers have started acting against the use of these predictions. While they acknowledged that their work is by nature physically unsafe, being sent to predictably high-risk areas triggered a different kind of risk awareness for the police officers. The use of AI to predict risks, thus, added emphasis on the compromised physical safety of the police officers, which they are now actively arguing against.

Human-AI collaboration has the potential to significantly enhance the physical safety of workers. Yet, what is commonly overlooked is that physical safety is rooted in everyday practices that can become severely disrupted by the use of AI. A better understanding of the potential outcomes of human-AI collaboration for physical safety, therefore, requires a deeper knowledge of the work practices in which these systems become embedded.

5. Conclusion

In this scenario, I unpacked multiple cases that emphasize the unintended and unexpected consequences of human-AI collaboration for worker safety. These initial cases open up avenues for future research.

Bringing work (back) into relational technology studies. While a relational perspective is a well-known tradition in technology studies, a focus on work is often missing as the field tends to prioritize broader social, cultural, and political considerations over specific workplace dynamics and shed light on the social implications of technology, including issues of power, inequality, and representation. However, not including work may overlook the crucial role of work practices, labor processes, and occupational structures that shape and are being shaped by technology. By neglecting a focus on work, technology research may fail to capture, for example, the granular details of how technology impacts different types of work, workers' lived experiences, and occupational and labor relations within organizations.

In other words, integrating a focus on work within the relational perspective on technology, and specifically human-AI collaboration, is essential for a more comprehensive understanding of how technological developments intersect with the realities of everyday work life. Examining the intricate connections between technology, work practices, and organizational dynamics can provide valuable insights into the ways in which technology, for example, transforms work processes, reconfigures occupational identities, and influences labor conditions such as worker safety. By incorporating a focus on work, technology researchers can further elucidate the complex interactions between technology, work, and society, offering a more holistic understanding of the multifaceted relationships that underpin technological innovations and its social and organizational implications.

Broadening the relationality of technology. The cases presented in this scenario are meant as a first step to broaden discussions around human-AI collaboration and AI-based augmentation. While I do not question the potential of AI systems to enhance human work, it is important not to be blind-sighted. Looking closely at what such collaboration entails in practice allows organizational and technology researchers to remain critical of the "flip sides" that show the darker realities of human-AI collaboration, which can be informative to understand associated concepts such as changes in work meaningfulness or occupational meaning due to the use of technology (e.g., Nelson et al. 2023).

Moreover, particularly the cases around physical safety highlight the importance of taking the body seriously when studying technology and its relationality (e.g., Sergeeva et al. 2020). While STS literature has thoroughly engaged with the materiality of technologies, this was not always extended to the materiality of the human body, meaning that the focus

has often been on artifacts and infrastructures rather than the bodies that interact with them. Moreover, the traditional focus of STS on the production of scientific knowledge is further solidified in the case of AI, which is commonly associated with cognitive processes. However, while human-AI collaboration might be aimed at cognitive enhancement, the second set of cases emphasizes that the relationship between AI and human work is, most definitely, an embodied phenomenon. Bringing the body into the relationality of technology will help to understand better how work, as an inherently embodied phenomenon, is shaping and being shaped by technology.

Finally, the empirically grounded cases re-emphasize the need to study technology and its relationships "in the wild" (Hutchins 1995); a once prominent method in technology studies. While, theoretically, human-AI collaboration might seem to be a viable solution to automation fears, it is only by looking closely and, most of the time, longitudinally at the use of technology and its relations to work and society that we can uncover the unexpected consequences of our theorizing. Whether this is done by taking a micro, practice-based approach, or a more macro systemic approach, our theorizing benefits from taking day-to-day work seriously and from considering the ripple effects of "augmenting" work.

In sum, this scenario underscores the need to understand AI as, on the one hand, cognitive systems that can support decision-making processes (Constantiou et al. 2024). Yet, on the other hand, they should also be considered as embedded in a wider system of cognition that includes, but is not limited to, the interaction of the mind, the body, and technologies (Hutchins 1995; Waardenburg and Márton 2024; Vaughan 2021). Only then will be we able to critically evaluate the potential, as well as the consequences of human-AI collaboration.

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Notes

[1] OECD, 2016 – See https://www.oecd.org/sti/ieconomy/technology-foresight-forum-2016.htm.
[2] Pseudonym.

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