Scandinavian Journal of Information Systems

Volume 36 | Issue 1 Article 2

July 2024

From Algorithmic Management to Data- driven Labour Organising. A trade union approach to workplace datafication

Stig Nyman
Copenhagen Business School, snc.digi@cbs.dk

Olivia Benfeldt
Copenhagen Business School, ob.digi@cbs.dk

Maren Gierlich-Joas
Copenhagen Business School, mg.digi@cbs.dk

Christoffer Bagger
University of Copenhagen, cbagger@hum.ku.dk

Sine Zambach
Copenhagen Business School, sz.digi@cbs.dk

See next page for additional authors

From Algorithmic Management to Data- driven Labour Organising. A trade union approach to workplace datafication

Cover Page Footnote

Authors

Stig Nyman, Olivia Benfeldt, Maren Gierlich-Joas, Christoffer Bagger, Sine Zambach, Andreas Blicher, Somnath Mazumdar, Jacob Nørbjerg, Mads Boedker, Jose Parra-Moyano, Tina Blegind Jensen, and Torkil Clemmensen

Reflection note

From Algorithmic Management to Data-driven Labour Organising

A trade union approach to workplace datafication

Stig Nyman*, Olivia Benfeldt*, Maren Gierlich-Joas*, Christoffer Bagger†, Sine Zambach*, Andreas Blicher*, Somnath Mazumdar*, Jacob Nørbjerg*, Mads Bødker*, Jose Parra-Moyano‡, Tina Blegind Jensen* & Torkil Clemmensen*

*Copenhagen Business School
{snc, ob, mg, sz, abs, sma, jno, mb, tbj, tc}.digi@cbs.dk

†University of Copenhagen
cbagger@hum.ku.dk

‡International Institute for Management Development, Lausanne.
jose.parramoyano@imd.org

Abstract. The increasing datafication of the workplace is often cast as a means of imposing organisational and managerial control on workers. This reflection note moves beyond this view and coins the term data-driven labour organising to discuss the potential of workplace datafication as a way to inform workers about their working conditions and how to use data to advocate for their collective goals. Forging a research agenda on data-driven labour organising, the reflection note engages with the historical roots of Scandinavian IS research, particularly the trade union (TU) approach. Mobilising the TU approach as a vantage point for re-imagining research on workplace datafication, the reflection note outlines three emerging research topics critical for shifting the research focus from using data for managerial purposes to using data for labour organising. The reflection note concludes by discussing how the TU tradition also invokes a certain research ethos of practical and political engagement, prompting IS researchers to get their hands dirty by actively seeking to reshape the trajectory of digitalisation through practical engagement.

Keywords: Workplace datafication; Algorithms at work; Trade union approach; Scandinavian IS history; Worker participation; Data work; Data governance; Data literacy.

1 Introduction

> We are in a generalised crisis in relation to all the environments of enclosure — prison, hospital, factory, school, family . . . [yet] there is no need to ask which is the toughest or most tolerable regime. There is no need to fear or hope, but only to look for new weapons. (Deleuze, 1992, p. 3).

> Given the enslavement of technoscience to capitalist objectives . . . we surely do not yet know what a modern technosocial body can do. Who amongst us fully recognizes what untapped potentials await in the technology which has already been developed? (Williams & Srnicek, 2013, section 6).

Advances in sensory and computational technology have led to the increasing datafication of work, enabling the formation of a wide range of data-driven approaches to managing people (Stein et al., 2019), often referred to as *algorithmic management and control* (Kellogg, et al. 2020; Lee et al., 2015; Möhlmann et al., 2021). The proliferation of data and algorithms at work has been met with polarising views among scholars and public opinion makers (Benlian et al., 2022; Koukouvinou & Holmström, 2022). While for some, the datafication of work represents opportunities for more efficient coordination of work processes and unbiased decision-making (Guenole et al., 2017; Waber, 2013; Wamba-Taguimdje et al., 2020), for others, it heralds a dystopic new age of digital scientific management, threatening workers' basic rights, autonomy and humanity (Jarrahi, 2021; Uni Global Union, 2020; Naughton, 2023).

Despite the increase in data-driven management, we should be careful to not limit ourselves to considering workplace datafication as a source of organisational and managerial control only. Exploring the archives of labour history, Khovanskaya and Sengers (2019) remind us that trade unions in the 1940s appropriated the techniques associated with scientific management to advance their own goals. Similarly, the authors behind this reflection note sees little reason why the techniques associated with data-driven approaches to managing people should not also be available for trade unions to use. This argument is supported by an emerging body of research and activist projects indicating that increased amounts of data and the resulting transparency not only imply a reshaping of organisational control but also contain the potential for labour organising to inform workers about working conditions and processes (e.g., Gierlich-Joas et al., 2024; Nyman et al., 2023; see also Mateescu, 2023 for an overview of worker-centric data collection projects). Hence, while scholarly work on the managerial uses of data

continues to be important, we write this reflection note to highlight a possible alternative scenario of datafication that is currently not widely recognized in IS research.

To that end, we coin the term *data-driven labour organising* to describe how data can be purposefully used to advocate for workers' goals. Interestingly, the very idea of data being mobilised as a political tool brings us back to the foundations of the Scandinavian IS tradition. In many regards, the field of Scandinavian IS was forged as a response to the profound changes to the world of work wrought by the introduction of computers (Bjørn-Andersen & Clemmensen, 2017). Notably, Scandinavian researchers responded to the opportunities and challenges invoked by the introduction of information technology in distinct ways, forming a plurality of research approaches (Bansler, 1988). One such approach, later referred to as the *trade union approach* (TU)[1] by Iivari and Lytinnen (1998), sought to create substantial improvements for working conditions and workers' influence on IT development and implementation through collaborations with workers and trade unions.

The TU approach has a significant legacy in our discipline (Bjerknes, 2016; Müller et al., 2023). While its spirit and tradition seem to have faded over the years (Bannon et al., 2019; Mettler, 2023), in this reflection note, we explore how adopting a TU approach provides a compelling vantage point for re-imagining research on workplace datafication.

In the remainder of this reflection note, we first briefly revisit the history of the Scandinavian TU approach to present its core insights. Drawing upon these insights, we then sketch out three emerging research topics critical for efforts to shift the research focus from the uses of data for managerial purposes to the uses of data for labour organising. We conclude by discussing how the Scandinavian TU tradition represents a shift in theoretical understandings and scholarly concerns and how it invokes an ethos of politically and practically engaged research.

2 Origins of the Scandinavian trade union approach

During the 1960s, trade unions and employers in Scandinavia began to recognise the downsides of rapid technological development in the workplace. While unions viewed deskilling, along with workers' lack of influence and concerns for their health and safety as significant issues, employers began to face personnel- and production-related problems. In response to these challenges, trade unions and employer organisations initiated joint projects with local researchers and researchers from the Tavistock Institute in England. The aim was to improve job satisfaction and productivity by developing a more humane alternative to scientific management and its way of organising work and

technology (Ehn, 1988). However, from the beginning, the practical implementation of these projects was challenged by conflicts of interest between labour and capital. Indeed, when "deciding upon an actual program of change . . . management was primarily seeking solutions to personnel problems and possibilities for better control of wages, whereas unions viewed the experiments as part of a strategy for democratisation and union influence at various levels" (Sandberg, 1982, cited from Ehn 1988, p. 266).

Ultimately, the disappointing results of these joint projects motivated the Scandinavian trade unions to initiate their own projects. This was pioneered by the Norwegian Iron and Metal Workers Union (NJMF), which collaborated with researchers from the Norwegian Computing Center, a governmental research institute. The NJMF project served as inspiration for a series of similar projects, including the DEMOS[2] project in Sweden and the DUE[3] project in Denmark. These projects differed from previous joint projects by treating the contradiction between labour and capital as the central concept for understanding the design and use of computer artefacts at work (Ehn, 1988). The projects explicitly focused on improving democracy at work and advancing worker influence on the implementation and use of IT in the workplace. The NJMF, DUE, and DEMOS projects are considered the first generation of TU projects (Carmel et al., 1993; Iivari & Lyytinen, 1998) that aimed to collect information about the consequences of IT in the workplace and develop strategies to improve workers' knowledge about IT and work. Furthermore, these projects sought to devise explicit strategies for how workers could use this knowledge in worker-driven requirements analysis and negotiations between workers and managers regarding the implementation and use of new IT-based systems.

The projects resulted in some improvements, e.g., the mandatory reskilling of workers whose work changed due to the reorganisation and introduction of new technologies, negotiations about salary, and new work arrangements (Bansler, 1987; 1988). However, the researchers also realised that existing technology—built to increase profit through surveillance, control, and automation—limited the scope and reach of worker influence on IT design and use in the workplace (Bansler, 1988). This insight formed the basis for a second generation of TU projects, most notably the UTOPIA project.

The UTOPIA project was formed as a researcher-led collaboration between the Nordic Graphic Workers' Union and researchers from Nordic countries. Based on input from workers and unions, it aimed to design a novel newspaper production system and sought to develop an associated work organisation that would improve newspaper quality and support the skills and expertise of graphic workers (Clement & van den Besselaar, 1993; Ehn, 1988; Hirschheim & Klein, 1989; Kyng, 1991). The plan was to conclude the project with a pilot implementation at a large Swedish newspaper, where

graphic workers and journalists would use the system and experiment with alternative ways to organise newspaper production work.

While the pilot implementation was never executed due to a lack of interest from management and opposition from the journalists' union (Ehn, 1988), it fostered a wide range of techniques, tools and principles for promoting a more democratic approach to the development and implementation of information systems. An important outcome of the UTOPIA project was an increased focus on shared responsibility, collaboration, and mutual learning between users and designers (Carmel et al., 1993; Ehn, 1988; Kensing & Munk-Madsen, 1993; Kyng, 1991). As such, the UTOPIA project foreshadowed modern discussions of digital and data *literacy* by placing emphasis on workers' understanding of IT as a prerequisite for their participation in "democratisation . . . and decision-making [about computer-based technology] in work organisation" (Ehn, 1988, p. 363).

The development of participatory tools, techniques and organisational principles—the third generation of TU projects—continued in the following years and eventually became part of the emerging participatory design (PD) tradition (Clement & Van den Besselaar, 1993; Carmel et al., 1993; Greenbaum & Kyng, 1991). However, the quest for industrial democracy and alternative technological and organisational solutions receded into the background. New projects expanded to involve system designers, workers, *and* management (Clement & van den Besselaar, 1993; Kraft & Bansler, 1994). This development was later criticised for essentially neglecting the contradictory relationship between labour and capital (Kraft & Bansler, 1994; Iivari & Lyytinen, 1998). Others maintained that developing and practising (true) participatory design and the quest for workplace democracy represent two sides of the same coin (Kyng, 1994). Most recently, this debate was revitalised by researchers involved in early TU projects, who called for a re-imagining of this approach in a world where technological innovations are controlled by large tech companies outside of democratic control (Bannon et al., 2019).

Synthesising the origin story of the Scandinavian TU approach, we propose the following three core insights as vantage points to guide the re-imagination of research on workplace datafication for labour organising: The first insight is that workplace datafication is always situated within the *contradiction between labour and capital.* The second insight is that the process of negotiation should be recognised as part of the technology development process. Consequently, technology development can be approached as a matter of *democracy at work.* The third insight is that realising actual worker participation in decision-making about workplace datafication requires some

form of *literacy*. The following sections explore how these core insights can be used to structure a research agenda on data-driven labour organising in IS.

3 Data work as situated in contradictions between labour and capital

The datafication of work has been fuelled by advances in sensory- and computational technology, which has made it possible to quantify and track workers' activities and work processes in unprecedented ways (Gal et al., 2020; Mettler, 2023; Moore, 2018). While workplace datafication is often cast as a novel phenomenon, IS research has discussed the capacity of digital technology to render previously hidden aspects of work visible in great detail (cf., Sørensen, 2017). One key lesson here is that technology is never neutral but "brimming with valence and specificity in the opportunities that it creates and forecloses" (Zuboff, 1985, p.6). The TU approach reminds us of an opportunity often lost in our current experience with workplace datafication, namely that the informing capacity of data does not necessarily belong exclusively to management, even though this is often the common perception among workers (Bagger, 2021).

One illustrative example is the growing field of neuro-IS research, which uses neurophysiological tools, such as devices that produce measures of galvanic skin response (GSR) and electrocardiography (ECG), to infer people's cognitive state. The emergence of neurophysiological sensors in consumer wearables has enabled neuro-IS researchers to move their work out of the lab (Riedl et al., 2020) to design systems and managerial interventions that can optimise workflow and stress mitigation (Fisher and Riedl, 2020; Langner et al., 2023; Nadj et al., 2023). But what is seldom discussed is how to use neurophysical measures of cognitive load or other neurophysical data to change the organisation of work in ways that foreground the contradictions between managerial and worker interests.

Recent calls for a "worker data science" suggest that neuro-IS research could take a different vantage point by using data tools to document working conditions or produce counter-data to employer narratives (e.g., Gallagher et al., 2023; Zipperer et al., 2022). For instance, Calacci (2022) reported on the development of an app called WeClock that allows workers to use their phones to collect data about their working conditions and share the data with organisations seeking to promote their interests, including labour unions. However, Calacci also noticed that efforts towards what we call *data-driven labour organising* face several obstacles. Based on his experience with

WeClock, Calacci suggested that performing data-driven labour organising is not only technically daunting but also involves policy and legal hurdles (Calacci, 2022, p. 7).

Echoing the experience with WeClock, recent research has examined how the production of data insights involves complex sets of practices of data discovery, preparation and curation, often referred to as data work (Parmiggiani & Grisot, 2020). This literature highlights that data insights are not produced "in clean rooms but involve various activities, negotiations, and actors beyond the analysts" (Parmiggiani et al., 2022, p. 142). Consequently, the nature of data is political, and the meaning of data is often contested (Gorm & Shklovski, 2016; Holten Møller et al., 2021), Approached from a TU perspective, the politics of data work concerning matters of work processes and labour relations is inherently situated in fundamental contradictions between labour and capital. Hence, to paraphrase Ehn (1988, p. 362), we cannot fully grasp the complexities of data work in terms of how work gets done without recognising that the "class struggle at work is an important aspect" of data discovery, preparation, and curation.

An additional point to bear in mind when examining data-driven labour organising is that these efforts are also likely to produce significant amounts of additional work for workers and trade unions. This begs the question: Who can, will, and should undertake the work produced in the wake of data-driven organising efforts? Learning from the field of citizen science, we know that highly motivated laypersons are capable of engaging in all parts of data work, especially regarding environmental concerns (Hendrix et al., 2022; Honojosa et al., 2019; Van Oudheusden & Abe, 2021) and social justice (Williams, 2022). These cases point towards future scenarios where highly motivated workers, worker representatives, and laypeople will perform data work. However, the efforts of data-driven labour organising will likely require significant data work from other people as well. This has already been evidenced in the healthcare sector, where citizen self-tracking of health data has led to an increased amount of data work for clinicians, administrators, caregivers, workers in external organisations, and even patients themselves—even though these individuals may not be intrinsically motivated to perform such work (Pine et al., 2018).

In sum, the literature on data work thematises a complex set of practices involved in the development and maintenance of the systems underpinning the datafication of work. Here the TU approach reminds us that data work is inherently situated in the fundamental contradiction between labour and capital, shaping negotiations about how to interpret data. However, this also points towards questions regarding legitimacy in the execution of data work (Darian et al., 2023; Schenk & DiSalvo, 2023). This is related to data governance, which is detailed in the following section.

4 Data governance as a matter of democracy at work

If the work involved in preparing workplace data for collection and analysis is situated in inherent contradictions, so are the questions related to how this data should be governed. Data governance typically refers to the formal set of rules and responsibilities that enforce decision-making about data (Abraham et al 2019; Nielsen, 2017). IS scholarship, however, has recognised that data governance also involves the situated actions, relationships, and diverging interests involved in data collection (Alaimo & Kallinikos, 2022; Benfeldt et al. 2020; Paparova et al 2023; Parmiggiani & Grisot, 2020). The TU approach resonates with this view, emphasising the role of negotiation between stakeholders in system design. However, this approach also adds to current discussions suggesting that defining the rules that govern data is not solely a managerial imperative but may also be related to fostering democracy at work.

When approaching data governance as a matter of negotiation, we remind researchers of the limitations associated with attending only to the definitional stages of data governance. Pre-emptively determining what counts as (un)suitable data uses across varied labour contexts is notoriously difficult—even arguably untenable due to the relational nature of data (Jensen et al. 2023; Aaltonen et al., 2021; Alaimo & Kallinikos, 2020). Ongoing discussions about how to regulate workplace data collection indicate that workers are currently underserved by existing frameworks—such as the GDPR, which aims to protect the privacy of individuals by regulating how personal data is collected, processed, and shared (Anderson et al., 2023). Lessons learned from the TU tradition emphasise that involving workers in decision-making at all levels is essential for achieving outcomes that are flexible to changing circumstances and responsive to the needs of multiple stakeholders, especially when power imbalances exist. As such, the TU tradition can be used to support recent calls to experiment with novel approaches in order to support the collective rights of workers to negotiate about workplace data (Calacci & Stein, 2023) and to account for situated actions and day-to-day decision-making regarding data in organisations (Aaltonen et al., 2023; Davidson et al. 2023).

Meanwhile, casting data governance as a matter of democracy begs the question of how to enable negotiations between multiple stakeholders at scale; a challenge familiar to the TU tradition (Zahlsen et al., 2022). Paparova et al. (2023) suggested that data governance is not determined by organisational boundaries but by the actors involved, their relationships, and their purposes for data processing. Therefore, organising for data governance as a democratic practice revolves around authorised relationships between multiple actors specifying the boundaries of their decision-making authority, rights, roles, and responsibilities.

Here, we highlight data cooperatives as one vision for how data governance could be organised democratically. Data cooperatives are co-owned by workers who participate in governing their pooled data through distributed decision-making. Rules (bylaws) that are agreed upon by all members could establish the policies for data sharing, which would give workers greater bargaining power, allowing them to negotiate better terms with employers (Pentland et al., 2021). Yet there are multiple ways in which shared data spaces can be orchestrated (Beverungen et al., 2022; Winter & Davidson, 2019).

Polycentricity has been identified as another potential organising logic (Benfeldt, 2020; Vassilakopoulou et al., 2018). Polycentric governance relies on multiple governing units at different scales that define rules within specified boundaries that are then nested in layers within a broader framework (Constantinides & Barrett, 2015; Mindel et al., 2018). This is well-suited for settings where there are multiple actors needing to exercise independence within their own domains but also actors with cross-cutting authority that can shape the boundaries of decision-making (Ostrom, 1990; 2010). Since workers and employers have different prerogatives surrounding the same data, polycentric organising can support ongoing negotiations between these and other stakeholders in defining nested sets of rules based on their expertise, interests, and authorised relationships. Yet how the notion of polycentricity could be operationalised remains an open question for future research on data governance as a matter of democracy at work.

In re-envisioning an agenda for the design of worker data governance "based on criteria such as skill and democracy at work" (Ehn, 1988, p. 363), we observed that digital ledger technologies such as blockchain can enable workers to monitor and control data access among multiple entities with unprecedented levels of granularity (Popa et al., 2023). While new forms of privacy-aware data collection are allowing for the customisation of data filtering logics, innovations in intelligent protocols are further pushing boundaries for how data use can be controlled and negotiated. For instance, intelligent protocols could enable individual users to determine permissible routes for the flow of their data with data packet header marking, which determines where data can be stored and how data can be processed (Mazumdar & Dreibholz, 2023). Similarly, blockchain-based smart contracts, which have been pivotal in enabling transparency in data spaces and data exchanges, could allow workers to collectively define and dynamically modify the rules that govern their data—even in extreme cases where groups decide to adopt different governance setups (Parra-Moyano et al., 2020).

In sum, while the existing literature on data governance has explored the formal rules, responsibilities, and situated relationships that shape data governance, a TU approach reveals the extent to which workers can negotiate data sharing and use. This immediately begs the question of what preconditions worker participation in terms

of making such increasingly complex decisions about their data. As the legacy of TU demonstrates, negotiation and cooperation not only rely on appropriate governance mechanisms but also on the skills and knowledge of workers taking part in decision-making. Next, we outline how data literacy represents a prerequisite for fostering democratic conversations about data in the workplace.

5 Data literacy as a prerequisite for worker participation

As described above, early TU researchers in Scandinavia quickly realised that involving workers in the design process requires that workers have a certain form of technological literacy. As Ehn (1988) outlined, "the most important prerequisite for trade union participation in the traditional design process is a parallel and independent process of accumulation of knowledge" (p. 362). Lefebvre et al. (2021) similarly highlighted the role of data literacy in data democratisation: "without sufficient data literacy and a basic understanding of data and how to use and protect it, big data projects aimed at empowering users and citizens are likely to fail" (p. 13). Worker data literacy can thus be cast as a lever for a data-driven organisation that builds on data democratisation.

In IS research, discussions of literacy have evolved around computer literacy in the 90s (e.g., Wolfe, 1992) and then shifted towards digital literacy (e.g., Nelson et al. 2011) and more recently AI literacy (e.g., Heyder & Posegga, 2021). With work and life, in general, becoming datafied, data literacy has become a concern for researchers, organisations and policymakers (e.g., Sternkopf & Mueller, 2018; Langlais et al., 2023). Data literacy, as a concept, is broadly used to describe "a continuous learning journey that creates the ability to identify, understand, interpret, create, communicate, and compute pieces of information (data) to develop knowledge and the ability to participate fully in our society" (Sternkopf & Mueller, 2018, p. 5046). In IS research, data literacy is often considered "a competence that empowers employees to use data effectively to solve business problems" (Langlais et al., 2023, p. 1). However, a TU approach encourages discussions of data literacy that go beyond the scope of encapsulated business problems, suggesting that questions about data literacy are also vital to efforts towards data-driven labour organising.

However, thus far, the role that labour unions should take in promoting data literacy among workers remains an open question. Taking the latest technological advances into account, it has recently been controversially discussed whether digital technologies can overcome individuals' lack of data literacy. In the digital age, decision support systems (DSS) automate the collection, preparation, and analysis of data leading to (semi-)auto-

mated decisions (Watson, 2017). This use of digital technology enables organisational experts (employees, shop stewards) with novice-level knowledge about data to make data-based decisions and allows companies to quickly upskill or reskill workers. In line with the development of DSS, research has suggested the need "to design systems that lower the barrier for non-experts to assemble data-driven arguments about their work" (Khovanskaya & Sengers, 2019, p. 1400). Similarly, Calaci (2022) highlighted how the lack of low-code analysis or visualisation tools prevents laypeople from accessing data about their own working lives. Given rapid technological development, low-code applications could be diffused to nontechnical experts such as local shop stewards in the near future, replacing the work of the data scientist with technology. Consequently, the need for data literacy may shift beyond the previously mentioned operational facets of data literacy. Prior works have emphasised the importance of transversal data competencies (Abhari et al., 2022; Langlais et al., 2023; Sternkopf & Mueller, 2018). These competencies include the ability to use data ethically and securely, safeguard the value of data, critically evaluate data, collaborate effectively in the utilisation of data, and proficiently employ data analytics applications (Langlais et al., 2023).

Furthermore, based on past work in the TU tradition, we know that enabling workers to participate in conversations about the role of technology in the workplace requires explicit strategizing for knowledge accumulation and dissemination. Thus, while data experts and low-code technology can support labour organising efforts, a data-driven approach simultaneously risks silencing rather than supporting the voice of workers. In that light, data literacy, and in particular transversal (social and ethical) data competencies, will become an essential prerequisite for *actual* worker participation in both data work and governance practices.

6 Concluding remarks

Reviewing the landscape of IS research, Clarke and Davison (2020) have found that our field tends to privilege the perspective of businesses while devoting little attention to the interests of customers or employees, broader societal shifts, or the environmental crisis. Our reflection note touches upon this central issue of what seems to be a blind spot in mainstream IS research. By outlining a research agenda that examines workplace datafication not only as a source of increasingly sophisticated organisational and managerial control but also as a resource for advocacy regarding workers' goals, we seek to remedy what we believe is a highly problematic tendency within our field. Table 1 lays out the core insights from the TU tradition we have drawn upon as vantage points for re-imagining IS research on workplace datafication.

Research topic	*TU insight*	*TU inspired research agenda on Workplace datafication*	*Sample of research questions*
Data work	Technology in the workplace is inherently situated in fundamental contradictions between labour and capital.	Explorations of how conflicts of interest between workers and employers shape data discovery, preparation, and curation.	What obstacles confront workers and worker representatives when using data to advocate for workers' goals? How do workers engage in the production of data about working conditions? How is the meaning of data insights about working conditions negotiated (between employers and worker representatives)?
Data governance	Technology development can be approached as a matter of fostering democracy at work.	Explorations of how workers participate (or don't) in negotiations and decision-making about data sharing and use.	What data governance structures are needed to support the collective rights of workers to negotiate about workplace data? What dilemmas emerge in polycentric (or other decentralised) organised governance of data at work? How do technological innovations such as digital ledger technology (e.g., blockchain) and intelligent protocols shape workers to collectively define and dynamically modify the rules that govern data at work?
Data Literacy	Participation in decision-making about technology requires some form of technical literacy.	Explorations of the role of workers' basic understanding and competencies for participation in data work and data governance decision-making.	What strategies for data-driven labour organising promote actual participation, and which strategies risk silencing workers voices? What forms of data literacy do workers need to participate in the production of data about working conditions and/or participate in decision-making about data use? How do innovations in automated decision support systems and low-code technology shift requirements for data literacy (in the context of labour organising)?

Table 1: Vantage points for re-imagining research on workplace datafication

Importantly, this note has been written from a Scandinavian perspective and in the Scandinavian context of strong unions and constructive negotiations between workers and employers. The past has shown that unions can play a vital role in ensuring that technological progress results in benefits for workers (Johnson & Acemoglu, 2023). But it has also taught us that researchers and workers in other countries can develop approaches and research strategies for technology development and democracy at work that fit their labour-employee relations and work culture (Clement & van den Besselaar, 1993; Heaton, 1998;). Furthermore, as new work arrangements proliferate, labour organising is also happening digitally outside of established labour unions (Qiu, 2016; Woodcock. 2021). One example is the website Turkopticon, developed to rebalance the information asymmetry inherent in digital gig work by allowing workers on the Amazon Mechanical Turk platform to review job requesters (Irani & Silberman, 2013). Interestingly, Turkopticon started as an activist research project, but the project later also became a vehicle for organising as the Turkopticon presented Amazon with a Bill of Rights (Turkopticon, 2022).

The engaged nature of the Turkoption project gestures towards an important aspect of the legacy of Scandinavian TU research. Namely that the TU approach represents more than a shift in theoretical understandings and scholarly concerns. Previous TU-based projects have demonstrated the value of scholarly work based on a research ethos of practical and political engagement. We believe that this research ethos stands as a central tenet in revitalising the TU tradition as a means of dealing with contemporary data-driven work and opportunities for labour organising. As an extension, a TU approach to workplace datafication represents a call for IS researchers, particularly those employed by public research institutions, to get their hands politically and practically dirty by actively seeking to reshape the trajectory of digitalisation through practical engagement.

On a very basic level, the TU approach alerts us to the powers of market forces in shaping the trajectories of emerging technologies (Swanson & Ramiller, 1997). From this vantage point, the dominant focus of entrepreneurs and tech vendors in offering analytics technology for exclusive use by managers and employers also represents a missed opportunity. Rather than leaving recent advances in sensory- and computational technology exclusively in the hands of employers, these technologies could also be used to build tools that allow workers and the organisations representing them to collect and leverage data to support workers' interests (Mateescu, 2023). This simple observation inspired the current reflection note and initially brought the author team together in a shared effort to establish a data collective supporting workers and their trade unions by providing unions with the technical competencies, ethical aptitude, and practical

means for collecting, analysing, and governing members' digital data in order to shed light on their working conditions.

At the time of writing, the author team had initiated a collaboration with Danish labour unions under the working title "Labour Analytics". In this project, we investigate the needs, requirements and possible unintended consequences of building data-driven labour organising systems in practice. For instance, much like the many performance and HR metrics that are available for contemporary managers, we are exploring future scenarios of data-driven labour organising where shop stewards would have access to dashboards containing metrics of working conditions, with the explicit goal of such data being used in negotiations between workers and employers. It is still early days, but so far, our project has taught us that the issues we are dealing with are far more complicated than we assumed. Yet in these complications, we also find a myriad of emerging research questions and opportunities, some of which we have outlined above. In this regard, we have written this reflection note, not only as a call to arms, but also as a cry for collegial, institutional, and disciplinary support in contesting the current landscape of data and algorithms at work.

Notes

1. We use the term "trade union approach" (TU) (Iivari & Lyytinen, 1998) for what others have called the collective resource approach (Ehn, 1988), the critical tradition (Bansler, 1988) or (Scandinavian) participatory design (Bødker & Pekkola, 2010).
2. Demokratisk Styrning och Planering (Democratic Planning and Control in Working Life)
3. Demokrati, Udvikling og EDB (Democracy, Development and EDP)

Acknowledgment

The authors thank the editors at Scandinavian Journal of Information Systems Elena Parmiggiani and Henri Pirkkalainen as well as copy editor Monica Birth for their valuable comments and suggestions.

Bibliography

Aaltonen, A., Alaimo, C., & Kallinikos, J. (2021). The making of data commodities: Data analytics as an embedded process. *Journal of Management Information Systems*. https://doi.org/10.1080/07421222.2021.1912928

Aaltonen, A., Alaimo, C., Parmiggiani, E., Stelmaszak, M., Jarvenpaa, S. L., Kallinikos, J., & Monteiro, E. (2023). What is Missing from Research on Data in Information Systems? Insights from the Inaugural Workshop on Data Research. *Communications of the Association for Information Systems*, *53*(1), 17. https://hdl.handle.net/11250/3103713

Abhari, K., Davis, D., Ness, H., Pagador, J., Parsons, M., & Brodskiy, R. (2022). Data Swagger: A Systemic Approach to Train, Motivate and Engage Data Savvy Employees. *Proceedings of Hawaii International Conference on System Science (HICSS)*, 1-10. http://hdl.handle.net/10125/80082

Abraham, R., Schneider, J., & vom Brocke, J. (2019). Data governance: A conceptual framework, structured review, and research agenda. *International Journal of Information Management*, *49*, 424-438. https://doi.org/10.1016/j.ijinfomgt.2019.07.008

Alaimo, C., & Kallinikos, J. (2022). Organisations decentered: Data objects, technology and knowledge. *Organization Science*, *33*(1), 19-37. https://doi.org/10.1287/orsc.2021.1552

Anderson, C., Baskerville, R., & Kaul, M. (2023). Managing compliance with privacy regulations through translation guardrails: A health information exchange case study. *Information and Organization*, *33*(1), 100455. https://doi.org/10.1016/j.infoandorg.2023.100455

Bagger, C. (2021). An organisational cultivation of digital resignation?: Enterprise social media, privacy, and autonomy. *Nordicom Review*. 42. 185-198. https://doi.org/10.2478/nor-2021-0049.

Bannon, L., Bardzell, J., & Bødker, S. (2019). Re-imagining participatory design. *Interactions*, *26*(1), 27-32. https://doi.org/10.1145/3292015

Bansler, J. (1987). *Systemudvikling: teori og historie i skandinavisk perspektiv*. Studentlitteratur.

Bansler, J. (1988). Systems Development in Scandinavia: three theoretical schools. *Office Technology and People*, 4, 117-133.

Benfeldt, O. (2020). Towards an Organizing Logic for Data Governance in the Digital Era. Aalborg University.

Benfeldt, O., Persson, J. S., & Madsen, S. (2020). Data Governance as a Collective Action Problem. *Information Systems Frontiers*, *22*(2), 299-313. https://doi.org/10.1007/s10796-019-09923-z

Benlian, A., Wiener, M., Cram, W. A., Krasnova, H., Maedche, A., Möhlmann, M., Recker, J., & Remus, U. (2022). Algorithmic Management. *Business & Information Systems Engineering*, *64*(6), 825-839. https://doi.org/10.1007/s12599-022-00764-w

Bjerknes, G. (2016). The Basis for Scandinavian IS Research. *Scandinavian Journal of Information Systems*: *28*(2), Article 7. https://aisel.aisnet.org/sjis/vol28/iss2/7

Bjørn-Andersen, N., & Clemmensen, T. (2017). The shaping of the Scandinavian Socio-Technical IS research tradition: Confessions of an accomplice. *Scandinavian Journal of Information Systems*, *29*(1), article 4. https://aisel.aisnet.org/sjis/vol29/iss1/4

Bødker, S., & Pekkola, S. (2010). A short review to the past and present of participatory design. *Scandinavian Journal of Information Systems*, *22*, 45-48. https://aisel.aisnet.org/sjis/vol22/iss1/4

Beverungen, D., Hess, T., Köster, A., & Lehrer, C. (2022). From private digital platforms to public data spaces: Implications for the digital transformation. *Electronic Markets*, *32*(2), 493-501. https://doi.org/10.1007/s12525-022-00553-z

Calacci, D. (2022). Organizing in the End of Employment: Information Sharing, Data Stewardship, and Digital Workerism. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3533406.3533424

Calacci, D., & Stein, J. (2023). From access to understanding: Collective data governance for workers. *European Labour Law Journal*, 14(2), 253-282. https://doi.org/10.1177/20319525231167981

Carmel, E., Whitaker, R. D., & George, J. F. (1993). PD and Joint Application Design: A Transatlantic Comparison. *Communication of the ACM*, 36(4), 40-48.

Clarke, R., & Davison, R. M. (2020). Research Perspectives: Through Whose Eyes? The Critical Concept of Researcher Perspective. *Journal of the Association for Information Systems*, 2(2), 1. https://doi.org/10.17705/1jais.00609

Clement, A., & van den Besselaar, P. (1993). A Retrospective Look at PD Projects. *Communication of ACM*, 36 (6), 29-37.

Constantinides, P., & Barrett, M. (2015). Information Infrastructure Development and Governance as Collective Action. *Information Systems Research*, *26*(1), 40-56. https://doi.org/10.1287/isre.2014.0542

Darian, S., Chauhan A., Marton, R., Ruppert, J., Anderson, K., Clune, R., Cupchak, M., Gannett, M., Holton, J. Kamas, E., Kibozi-Yocka, J., Mauro-Gallegos, D. Naylor, S., O'Malley, M., Patel, M. Sandberg, J., Siegler, T., Tate, R., Temtim, A. Whaley, S. and Amy Voida. (2023). Enacting Data Feminism in Advocacy Data Work. Proc. *ACM Hum.-Comput. Interact. 7, CSCW1, Article* 47. https://doi.org/10.1145/3579480

Davidson, E., Wessel, L., Winter, J. S., & Winter, S. (2023). Future directions for scholarship on data governance, digital innovation, and grand challenges. *Information and Organization*, *33*(1), 100454. https://doi.org/10.1016/j.infoandorg.2023.100454

Deleuze, G. (1992). Postscript on the Societies of Control. *October*, *59*, 3-7. http://www.jstor.org/stable/778828

Ehn, P. (1988). *Work-Oriented Design of Computer Artifacts.* Stockholm: Arbeitlivscentrum. https://doi.org/10.1525/awr.1989.10.4.14

Fischer, T., & Riedl, R. (2020). Technostress measurement in the field: A case report. In *Information Systems and Neuroscience: NeuroIS Retreat 2020* (pp. 71-78). Springer International Publishing. https://doi.org/10.1007/978-3-030-60073-0_9

Gal, U., Jensen, T. B., & Stein, M. K. (2020). Breaking the vicious cycle of algorithmic management: A virtue ethics approach to people analytics. *Information and Organization*, 30(2), 100301. https://doi.org/10.1016/j.infoandorg.2020.100301

Gallagher, C., Gregory, K., & Karabaliev, B. (2023). Digital worker inquiry and the critical potential of participatory worker data science for on-demand platform workers. *New Technology, Work and Employment*. 1-21. https://doi.org/10.1111/ntwe.12286

Gierlich-Joas, M., Baiyere, A., & Hess, T. (2024). Inverse Transparency and the Quest for Empowerment through the Design of Digital Workplace Technologies. *JAIS Preprints (Forthcoming),* 13. https://aisel.aisnet.org/jais_preprints/131/

Gorm, N., & Shklovski, I. (2016). Sharing steps in the workplace: Changing privacy concerns over time. *Conference on Human Factors in Computing Systems Proceedings*, 4315-4319. https://doi.org/10.1145/2858036.2858352

Greenbaum, J., & Kyng, M. (1991). Introduction: Situated Design. In Greenbaum, J., & Kyng, M., *Design at Work: Cooperative Design of Computer Systems* (pp. 1-25). Lawrence Erlbaum Associates.

Guenole, N., Ferrar, J., & Feinzig, S. (2017). *The power of people: learn how successful organizations use workforce analytics to improve business performance*. Pearson Education.

Heaton, L. (1988). Talking heads vs. virtual workspaces: A comparison of design across cultures. *Journal of Information Technology*, 13*(4)*, 259-272. https://doi.org/10.1177/026839629801300405

Hendricks, M. D., Meyer, M. A., & Wilson, S. M. (2022). Moving up the ladder in rising waters: Community science in infrastructure and hazard mitigation planning as a pathway to community control and flood disaster resilience. https://doi.org/10.5334/cstp.462

Heyder, T. and Posegga, O. (2021). Extending the foundations of AI literacy. (2021). *International Conference on Information Systems*. Proceedings. 9. https://aisel.aisnet.org/icis2021/is_future_work/is_future_work/9

Hinojosa, L., Riedy, R., Polman, J., Swanson, R., Nuessle, T., & Garneau, N. (2021). Expanding Public Participation in Science Practices Beyond Data Collection. *Citizen Science: Theory & Practice*, 6(1). https://doi.org/10.5334/cstp.292

Hirschheim, R., & Klein, H. (1989). Four Paradigms of Information Systems Development. *Communication of ACM*, 32 (10), 1199-1216. https://doi.org/10.1145/67933.67937

Holten Møller, N., Neff, G., Simonsen, J. G., Villumsen, J. C., & Bjørn, P. (2021). Can workplace tracking ever empower? Collective sensemaking for the responsible use of sensor data at work. *Proceedings of the ACM on human-computer interaction*, *5*(GROUP), 1-21. https://doi.org/10.1145/3463931

Irani, L. C., and Silberman, M. S. (2023). Turkopticon: Inter-rupting worker invisibility in Amazon Mechanical Turk. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, New York, USA, 611-620. https://doi.org/10.1145/2470654.2470742

Iivari, J., & Lyytinen, K. (1998). Research on Information Systems Development in Scandinavia—Unity in Plurality. *Scandinavian Journal of Information Systems*, 10.

Jarrahi, M. H., Newlands, G., Lee, M. K., Wolf, C. T., Kinder, E., & Sutherland, W. (2021). Algorithmic management in a work context. *Big Data and Society*, *8*(2). https://doi.org/10.1177/20539517211020332

Jensen, R. H., Johansen, S. S., Hansen, N. B., Zada, A. M., & Nielsen, P. A. (2023). Tensions in Data Journey Activities: Mobilising, Processing, Producing, and Re-purposing Data in Environmental Assessment Practice. *Proceedings of the ACM on Human-Computer Interaction*, *7*(CSCW2), 1-22. https://doi.org/10.1145/3610212

Johnson, S., & Acemoglu, D. (2023). Power and Progress: Our Thousand-Year Struggle Over Technology and Prosperity. Hachette, UK.

Kellogg, K. C., Valentine, M. A., & Christin, A. (2020). Algorithms at work: The new contested terrain of control. *Academy of Management Annals*, *14*(1), 366-410. https://doi.org/10.5465/annals.2018.0174

Kensing, F., & Munk-Mad sen, A. (1993). PD: Structure in the Toolbox. *Communications of the ACM*, 36(4), 78-83.

Khovanskaya, V., & Sengers, P. (2019). Data Rhetoric and Uneasy Alliances: Data Advocacy in US Labor History. *Proceedings of the 2019 on Designing Interactive Systems Conference*, San Diego, USA, 1391-1403. https://doi.org/10.1145/3322276.3323691

Koukouvinou, P., & Holmström, J. (2022). AI management Beyond the Narratives of Dystopian Nightmares and Utopian Dreams: a Systematic Review and Synthesis of The Literature. *ECIS preceedings* 2022 Research Papers, 137. https://aisel.aisnet.org/ecis2022_rp/137

Kraft, P., & Bansler, J. P. (1994). The Collective Resource Approach: The Scandinavian Experience. *Scandinavian Journal of Information Systems*, 6(1), 71-84.

Kyng, M. (1991). Designing for Cooperation: Cooperating in Design. Communication of ACM, 34 (12), 65-73.

Kyng, M. (1994). Collective Resources meet Puritanism. *Scandinavian Journal of Information Systems,* 6(1), 85-96.

Langlais, J.-F., Mosconi, E., & Guillemette, M. G. (2023). Developing a Data Literacy Assessment Tool for the Business Workforce. *AMCIS 2023 Proceedings*, 1-10. https://aisel.aisnet.org/amcis2023/sig_ed/sig_ed/13

Langner, M., Toreini, P., & Maedche, A. (2020). AttentionBoard: a quantified-self dashboard for enhancing attention management with eye-tracking. *Information Systems and Neuroscience: NeuroIS Retreat 2020* (pp. 266-275). Springer International Publishing. https://doi.org/10.1007/978-3-030-60073-0_31

Lefebvre, H., Legner, C., & Fadler, M. (2021). Data democratization: toward a deeper understanding. *Proceedings of the International Conference on Information Systems (ICIS),* 1-17. https://aisel.aisnet.org/icis2021/gen_topics/gen_topics/7

Lee, M. K., Kusbit, D., Metsky, E., & Dabbish, L. (2015). Working with machines: The impact of algorithmic and data-driven management on human workers. *Proceedings of the 33rd annual ACM conference on human factors in computing systems,* Soul, Korea, 1603-1612. https://doi.org/10.1145/2702123.2702548

Möhlmann, M., Zalmanson, L., Henfridsson, O., & Gregory, R. W. (2021). Algorithmic Management of Work on Online Labor Platforms: When Matching Meets Control. *MIS Quarterly*, *45*(4), 1999-2022. https://doi.org/10.25300/misq/2021/15333

Mazumdar, S., & Dreibholz, T. (2023). Towards A Data Privacy-Aware Execution Zone Creation on Cloud/Fog Platform. *Proceedings of the 49th Euromicro Conference Series on Software Engineering and Advanced Applications (SEAA)*, *Euromicro*, Durres, Albania (pp. 140-149). https://doi.org/10.1109/SEAA60479.2023.00030

Mateescu, A. (2023). *Explainer: Challenging Worker Datafication*. Data & Society. SSRN 4584505.

Mettler, T. (2023). The connected workplace: Characteristics and social consequences of work surveillance in the age of datification, sensorisation, and artificial intelligence. *Journal of Information Technology*. https://doi.org/10.1177/02683962231202535

Mindel, V., Mathiassen, L., & Rai, A. (2018). The Sustainability of Polycentric Information Commons. *MIS Quarterly*, *42*(2), 607-631. https://doi.org/10.25300/MISQ/2018/14015

Moore, P. V. (2018). The Quantified Self in Precarity Work, Technology and What Counts. Routledge.

Müller, S. Jonsson, K. Pirkkalainen, H., Parmiggiani, E. and Tona, O. (2023). The Anatomy of Scandinavian Journal of Information Systems. *Scandinavian Journal of Information Systems*: *35*(1), Article 1. https://aisel.aisnet.org/sjis/vol35/iss1/1

Nadj, M., Rissler, R., Adam, M. T., Knierim, M. T., Li, M. X., Maedche, A., & Riedl, R. (2023). What disrupts flow in office work? The impact of frequency and relevance of IT-mediated interruptions. *MIS Quarterly*, *47*(4). 1615-1646. https://doi.org/10.25300/MISQ/2023/17200

Naughton, J. (2023). If you think 'bossware' surveillance culture in the workplace is new, think again. *The Guardian*, November 18. https://www.theguardian.com/commentisfree/2023/nov/18/if-you-think-bossware-surveillance-culture-in-the-workplace-is-new-think-again

Nielsen, O. B. (2017). A Comprehensive Review of Data Governance Literature. *Selected Papers of the IRIS 40*, 15. https://aisel.aisnet.org/iris2017/3

Nyman, S., Bødker, M., & Blegind Jensen, T. (2023). Reforming work patterns or negotiating workloads? Exploring alternative pathways for digital productivity assistants through a problematisation lens. *Journal of Information Technology*. https://doi.org/10.1177/026839622311816

Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action. Cambridge University Press

Ostrom, E. (2010). Analysing collective action. *Agricultural Economics*, *41*, 155-166. https://doi.org/10.1111/j.1574-0862.2010.00497.x

Paparova, D., Aanestad, M., Vassilakopoulou, P., & Bahus, M. K. (2023). Data governance spaces: The case of a national digital service for personal health data. *Information and Organization*, *33*(1), 100451. https://doi.org/10.1016/j.infoandorg.2023.100451

Parmiggiani, E., & Grisot, M. (2020). Data Curation as Governance Practice. *Scandinavian Journal of Information Systems*, *32*(1), 1. https://aisel.aisnet.org/sjis/vol32/iss1/1

Parmiggiani, E., & Grisot, M. (2019). Data Infrastructures in the Public Sector: A Critical Research Agenda Rooted in Scandinavian IS Research. *Proceedings of the 10th Scandinavian Conference on Information Systems (SCIS2019)*. https://aisel.aisnet.org/scis2019/13

Parmiggiani, E., Østerlie, T., & Almklov, P. G. (2022). In the Backrooms of Data Science, *Journal of the Association for Information Systems*, 23(1), 139-164. https://doi.org/10.17705/1jais.00718

Parra-Moyano, J., Schmedders, K. & Pentland, A. (2020). What Managers Need to Know About Data Exchanges. *MIT Sloan Management Review*, *61*(4), 39-44.

Pentland, A., Lipton, A. & Hardjono, T. (2021). *Building the economy: data as capital*. MIT Press.

Pine, K. H., Bossen, C., Chen, Y., Ellingsen, G., Grisot, M., Mazmanian, M., & Møller, N. H. (2018, October). Data work in healthcare: Challenges for patients, clinicians and administrators. In *Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing* (pp. 433-439). https://doi.org/10.1145/3272973.3273017

Popa, M., Stoklossa, S. M., & Mazumdar, S. (2023). ChainDiscipline-Towards A Blockchain-IoT-Based Self-Sovereign Identity Management Framework. *IEEE Transactions on Services Computing*. https://doi.org/10.1109/TSC.2023.3279871

Qiu, J. (2016). Social media on the picket line. *Media, Culture & Society*, *38*(4), 619-633. https://doi.org/10.1177/0163443716643012

Riedl, R., Fischer, T., Léger, P. M., & Davis, F. D. (2020). A Decade of NeuroIS Research. *Data Base for Advances in Information Systems*, *51*(3), 13-54. https://doi.org/10.1145/3410977.3410980

Schenck, L. L., & DiSalvo, B. (2023, August). From Data Work to Data Science: Getting Past the Gatekeepers. *Proceedings of the 2023 ACM Conference on International Computing Education Research-Volume 2*. https://doi.org/10.1145/3568812.3603468

Swanson, E. B., & Ramiller, N. C. (1997). The Organizing Vision in Information Systems Innovation. *Organization Science*, *8*(5), 458-474. https://doi.org/10.1287/orsc.8.5.458

Stein, M.-K., Wagner, E. L., Tierney, P., Newell, S., & Galliers, R. D. (2019). Datification and the Pursuit of Meaningfulness in Work. *Journal of Management Studies*, *56*(3), 685-717. https://doi.org/doi: 10.1111/joms.12409

Sternkopf, H., & Mueller, R. M. (2018). Doing good with data: Development of a maturity model for data literacy in non-governmental organisations. *Proceedings of HICSS*, 5045-5055. http://hdl.handle.net/10125/50519

Sørensen, C. (2017). Beyond mobile it: Ubiquitous digitality and work. *The Routledge Companion to Management Information Systems*, 466-480. https://doi.org/10.4324/9781315619361

Turkopticon. (2022). Turkers demand to Mturk. *Turkopticon Blog.* https://blog.turkopticon.net/?p=2623

Uni Global Union. (2020). *Algorithmic Management – A Trade Union Guide*. https://uniglobalunion.org/sites/default/files/files/news/uni_pm_algorithmic_management_guide_en.pdf

Van Oudheusden, M., & Abe, Y. (2021). Beyond the Grassroots: Two Trajectories of "Citizen Sciencization". *Environmental Governance. Citizen Science: Theory and Practice*, *6*(1), 13. https://doi.org/10.5334/cstp.377

Vassilakopoulou, P., Pesaljevic, A., & Aanestad, M. (2018). Polycentric Governance of Interorganizational Systems: Managerial and Architectural Arrangements. *ECIS 2018 Proceedings*. https://aisel.aisnet.org/ecis2018_rp/163

Waber, B. (2013). *People Analytics: How Social Sensing Technology Will Transform Business and What It Tells Us about the Future of Work*. FT Press.

Wamba-Taguimdje, Serge-Lopez & Fosso Wamba, Samuel & Jean Robert, Kala Kamdjoug & Tchatchouang, Chris Emmanuel. (2020). Influence of Artificial Intelligence (AI) on Firm Performance: The Business Value of AI-based Transformation Projects. *Business Process Management Journal*, *26*(7), 1893-1924. https://doi.org/10.1108/BPMJ-10-2019-0411

Watson, H. J. (2017). Preparing for the Cognitive Generation of Decision Support. *MIS Quarterly Executive*, *16*(3), 153-169.

Williams, A., & Srnicek, N. (2013). # ACCELERATE MANIFESTO for an Accelerationist Politics. *Rhuthmos*. https://criticallegalthinking.com/2013/05/14/accelerate-manifesto-for-an-accelerationist-politics/

Williams, S. (2022). *Data action: Using data for public good*. MIT Press.

Winter, J. S., & Davidson, E. (2019). Big data governance of personal health information and challenges to contextual integrity. *The Information Society*, *35*(1), 36-51.

Wolfe, H. W. (1992). Computer Literacy for the 1990's. *Journal of Information Systems Education*, *4*(1), 18-22.

Woodcock, J. (2021). Towards a digital workerism: workers' inquiry, methods, and technologies. *Nanoethics*, 15, 87-98. https://doi.org/10.1007/s11569-021-00384-w

Zahlsen, Ø. K., Parmiggiani, E., & Dahl, Y. (2022). Challenges of Scaling Participatory Design: A Systematic Literature Review. *Proceedings of the 34th Australian Conference on Human-Computer Interaction*, 143-159. https://doi.org/10.1145/3572921.3572924

Zipperer, B. McNicholas, C., Poydock, M., Schneider D., & Harknett, K. (2022). National survey of gig workers paints a picture of poor working conditions, low pay. *Economic Policy Institute*, 2022. https://www. epi.org/publication/gig-worker-survey/

Zuboff, S. (1988). *In the age of the smart machine: the future of work and power.* Basic Books.