Introduction: Reworking the computer age

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In 1996, the UK's Post Office began to pilot a new electronic point-of-sale system known as Horizon, developed by International Computers Limited, part of the Japanese firm Fujitsu. Horizon would fully roll out in 1999 to replace paper-based tills across more than 18,000 post offices and independent post offices (known as sub-post offices). The sub-postmasters and sub-postmistresses who ran the latter could enter transactions electronically through new Horizon terminals installed in their branches which would also allow them to see their balances at the end of each week. Some, however, began to encounter glitches that caused unexplained debts in their weekly accounts. As contractors and not employees, they were responsible for any shortfalls in revenue, which the central Post Office would ask them to repay. It was only in 2009 when a *Computer Weekly* article documented seven cases of individuals who were required to pay funds back, had funds mysteriously removed, or were taken to court (resulting in bankruptcy for some) that a more widespread issue came to light.[1] The article also revealed a cover-up: problems that had been reported by sub-postmasters were dismissed by the Post Office, Fujitsu, and even the Federation of SubPostmasters which represented them. In all, up until 2013, 700 individuals were prosecuted for financial crimes or forced to reach plea deals. The restitution of justice and an investigation into the scandal have been ongoing since.

The roll-out, cover-up, scandal, and subsequent public enquiry into the software provoked strong emotional reactions and prompted reflection on the risks of using computers in the workplace. The accounts of sub-postmasters indicate that many glitches or mistakes leading to fictive losses happened without their knowledge; the subsequent false accusations and lengthy prosecutions caused significant distress and fear. As one impact statement submitted as part of the inquiry noted,

> As [my sub-postmaster brother] fought to make sense of the losses he could not explain, his personality and state of mind started to deteriorate. He had been outgoing and sociable, but during this period he began to change. He became very

1 "Postmasters under Stress," *Computer Weekly* (May 12–18, 2009). Historian Martina Heßler is currently working on a research project about the scandal focusing on technological errors in digital societies.

> depressed and withdrawn and felt he was the only one in this dire situation and so it must be all his fault.[2]

The Horizon IT scandal, as it has become known, serves as a vivid reminder that the mass computerization of modern societies has not come without consequences. Moreover, it reminds us that computerization is not a phase that modern societies have entirely completed or come to terms with; rather, computerization is an ongoing process and relationship, in which technological systems are not just developed, improved, and smoothly integrated into a welcoming populace, but one in which the understanding of their vast potential for societal and personal effects is managed, negotiated, and sometimes contested. As the scandal reveals, it often takes considerable inertia for stories about computerization problems to come to the surface, both due to organizational forces that can conceal them, employment dynamics that can silence them, and social forces that may not want to believe them.[3]

Reworking the Computer Age uses critical, historical, and global perspectives to understand where the early reactions and attitudes to computerization emerged, including the first perceptions of the scale and potential of computers on organizational and broader social phenomena, the experience of using them by non-specialists, and the forces that began to gather around them to usher in the computer age of the late twentieth century. The authors in this volume bring attention to the workplace as a specific site where these reactions were not just first experienced but where complex relationships to computers and around computerization were being forged. This includes relationships to devices, interfaces, and spaces; relationships to new social roles and professional aspirations; relationships to others connected by or through computers; relationships to senses of time and development; and relationships to powers and authorities. The chapters make clear that as much as computerization represented a promise for many of technological advancement, personal liberation, or national development, it also – perhaps equally – foreclosed opportunities for others by denying them opportunities or imposing new ideas of work, gender, and the self that often went against the broad promises of the computer age. How these contradictions were experienced and expressed animate the chapters in this book.

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2 "The Post Office Horizon IT Inquiry: Written statement regarding human impact/cost – Statement 06. No date. Uploaded September 22, 2021. Accessed: https://www.gov.uk/government/groups/the-post-office-horizon-it-inquiry.

3 In the case of the Post Office scandal, it received significantly more public sympathy when Toby Jones, a white male actor portraying Alan Bates, a middle-aged white sub-postmaster who was falsely accused, headed an ITV drama. From a sample of revealed data, 39% of sub-postmasters who were prosecuted were from Asian backgrounds.

Toward the workplace

Historical accounts have tended to center the personal computer as the marker of computerization's success. They have chronicled the process of domestication of the computer from large-scale machines operated by elite specialists to friendlier, mass appliances that could fit comfortably in the home, socializing people at a young age to the presence, ease of use, and potentiality of computers and software as revolutionary or liberating devices.[4] There is a parallel history of computerization to be told in which computers can be seen making their first inroads through workplaces, reshaping secretarial, administrative, managerial, and technical occupations and professional identities as well as bringing many non-Western workforces into the capitalist labor process through computerized work.[5]

Many aspects of computers that emerged in the 1980s were designed around office users or office imagery, such as the idea of the computer interface as a desktop populated by overlapping files which could be organized into folders or email which was patterned on categories from the work of clerks, typists, and secretaries (in-boxes, carbon copies, memos, and so on).[6] At the same time, the computer significantly influenced office architecture, furniture, technical infrastructure, and a wide range of office accessories, reshaping the workplace in both form and function.[7] Computer literacy and skills developed both at homes and in schools prepared individuals for their business and work uses.[8] Such skills were and are still frequently seen as the goal of computer education, which can be linked to future work opportunities or can lead to new forms of income and wealth. In this sense, the office is not a side story to the history of the computer, but in some ways both a starting point of the computer age and an endpoint for computerization movements.[9]

Computerization was a wholesale change in the possibilities of workplace life, changing the architecture and design of workplaces, much like the individualized

4 Stein, "Domesticity, Gender"; Markussen, "Constructing Easiness"; Baker and Geiringer, "Space, Text and Selfhood."

5 Kling and Iacono describe these in more discrete terms as "computerization movements" which are the social and organizational forces that drive computerization in a given area. See Kling and Iacono, "Mobilization of Support."

6 Campbell-Kelly et al., *Computer*, 261.

7 Kaufmann-Buhler, "Computing the Cubicle."

8 See Mahoney, "Histories of Computing(s)"; Abbate "Code Switch," S154–55.

9 Campbell-Kelly notes that the corporate software industry started already in the 1960s. While individual sales of personal computers and consumer software exploded in the 1980s, the financial scale of corporate software (with some software like Informatics' Mark IV costing $100,000 at the time) made them comparable. Campbell-Kelly, *From Airline Reservations*, 8. On the development of office computing in the United States, see also Haigh and Ceruzzi, *A New History*, 207–42.

cubicle, but extending into all aspects of spatial thinking, layouts, and modes of presenting information in office environments.[10] Computerization entailed new metaphors for how organizations operate, as well as how workers themselves might come to see themselves as information processors.[11] At the same time, computerization was a discourse amplified by different actors, with futuristic visions of technological revolution, optimistic hopes for social transformations, and doomsday predictions for the atomization of professional life and community.[12] In this book, we focus on the computer age as a time in which "technological dramas," to use the anthropologist Brian Pfaffenberger's term, were unfolding in different places around the world. These dramas show how technological objects, processes, or interfaces (or even the idea of them) could be animated for broader purposes, like opening up markets, changing organizations, or altering political landscapes.[13] Such dramas marshalled emotions of the masses in new ways – socializing them to the wonder of computers while also foreclosing or individualizing negative reactions or concerns over them.

The workplace communities where computers (or workstations) were first introduced had often not been socialized on a mass scale to computers.[14] They were and are still highly structured, gendered spaces, full of contradictions that were being critiqued at the time around the world, not least by feminist politics. In some instances, computerization re-entrenched gendered divisions of labor. For example, in the 1970s, female typists largely adopted computerized word processors around the world, significantly expanding female labor participation. At the same time, certain activities around the computer also took on social qualities as a masculine technology with its prestige qualities, like programming, evaluating information, or controlling the screen being delegated to or associated firmly with men.[15] The advent of the computer thus required the new technical and interactive affordances of computers to be worked out in changing social environments, such that women's roles and men's roles might be re-articulated in a new computer order.

At the same time, the hype of computers painted possible futures for work and society. A 1986 report suggested that the computer might finally rid Japan of the feminized labor category of the "office lady," as "women can rise in the hierarchy

10 Richardson, "Coordinating Office Space"; Saval, *Cubed*.

11 Morgan, *Images of Organization*, 76–78.

12 Hakken, "Computing and Social Change"; Pfaffenberger, "Social Meaning."

13 Pfaffenberger, "Technological Dramas," 285–86.

14 Janet Abbate notes that while work and personal devices have largely converged today, in the early 1980s they were two different devices: workstations which ran on UNIX for office settings and personal computers (or microcomputers) which emerged out of hobbyist culture and were first "build-your-own" kits. Abbate, *Inventing the Internet*, 171.

15 Van Oost, "Making the Computer Masculine"; Ensmenger, "Making Programming Masculine"; Hicks, *Programmed Inequality*.

by demonstrating that they are just as adept at using computers as their male colleagues."[16] Nevertheless, a gendered division of office labor would continue to define much of the Japanese economy regardless of the uptake in computers in offices at the time.[17] At the time, computers promised a host of new workplace futures for some which never came to be at the time, like portable computing, voice-input typing, teleconferencing, and telework.[18] They were also creating new divisions, not just around the de-skilled and skilled, but around repetitive "automated" work and higher-value "informated" work, to use Shoshana's Zuboff's terms.[19] Other kinds of professions and work crafts were effectively computerized for the first time, such as French salespeople who transformed from independent workers to those whose performance and schedules were now tied to a key new piece of software – Enterprise Resource Planning (ERP).[20]

The introduction of computers into professional settings goes beyond the sociological (re-)organization and division of work.[21] Looking into the recent past, we can see that computers represented a broad new frontier of social and ecological risk – as workers began to shift from a paper-based and machine-based world of human decision-making and production to software interfaces that mediated the world around them including the flow of money, the control of large machines, and the digitally cataloged lives of others through single terminals, new pieces of software, and keyboards. Historian Mar Hicks notes that in the UK, the threat of strikes by small groups of government computer operators in the 1960s led to fears of widespread failures in government operations, like savings and tax collecting. The newfound power of computer operators themselves could pose a social risk.[22] In this broad sense, the workplace was not only a site where computers gradually developed the forms and functions we know today, or a site where technology simply diffused at greater or lower rates of uptake. We suggest it is better to consider the workplace as a complex zone where the unfolding potentials of computers on all aspects of organizational and broader social life were being introduced and where narratives of what computers represented were being reworked. These zones of course are still

16 "Office automation challenges Japanese tradition," *UPI*, January 5, 1986. https://www.upi.com/Archives/1986/01/05/Office-automation-challenges-Japanese-tradition/8360505285200/

17 Ogasawara, *Office Ladies*.

18 Van Meel, "The Origins"; Haigh, "Remembering the Office of the Future."

19 Zuboff, *Age of the Smart Machine*.

20 Boltanski and Chiapello, *New Spirit of Capitalism*, 248.

21 For a discussion of computerization from a sociological perspective, see Burris, "Computerization of the Workplace."

22 Hicks, *Programmed Inequality*, 198. Hicks notes that the resulting decision to consolidate computer control out of fear of the workers' access to the computer system was double-edged: "[The government] had unwittingly cut the legs out from under the British computer industry and wrought havoc on their own computerization projects," 16.

unfolding today as the promissory notes of computerization are still being issued, so to speak, asking workers to make continual changes or adjustments for the sake of progress and modernization.

Workplace computers and new emotional regimes

The workplace as a site of investigation is also necessary in retelling histories of computers as it is almost inextricably defined by competing qualities of community and control. Arguably, workplaces were the first communities where the impact of computers could be seen and felt in social contexts; they were places where reactions and emotions around computer-based change could be shared and related. At the same time, workplaces are sites of different vectors of control, defined by a mixture of formal contracts, professional hierarchies, social respectability, normative group behavior, economic rationales, and market activity. Workers in office environments and organizational cultural regimes have long been under forms of emotional labor.[23] This was reinforced by firms' efforts to control emotions through interventions of industrial psychologists or trainers from the 1920s onward.[24] Alan Liu has suggested that the rise of office computerization in the 1980s and new ideas of shared corporate culture at the time is no coincidence: the power afforded by new computers also necessitated new regimes of self-control (alongside digital supervision) by which employees would regulate their emotions in daily office interactions.[25]

These factors make the introduction of and reaction to computers anything but personal or individual; instead, they are highly motivated by a number of factors. For some, computers were an object not just of acceptance but of negotiation and contestation. In the 1980s, for instance, trade unions in India negotiated over how many computers could be installed within banks as they realized both their potential and their threat.[26] Within this milieu, workers found themselves with their own pockets of control too, some forcibly collapsed by the computer age (such as the control over graphic design in lieu of a graphics department) and others shifting control to where it had not been (the slow decline in secretarial functions for typing up documents leading to executives acting as their own typists). Some of these controls also extended out into the world, where workers had new powers to add or delete huge files, to control moving objects, to move money, to start and stop heavy machinery, or to track and store large amounts of data. These diverse capacities were increas-

23 Hochschild, *The Managed Heart.*

24 Collin et al., "Bureaucracy and Emotions"; Stearns, "Prescriptive Literature."

25 Liu, *Laws of Cool*, 123–25.

26 Gothoskar, "Computerization and Women's Employment," 154–55.

ingly being located in the same kind of device – the office computer, an individuated machine with an ever-growing body of software and networked capabilities.

Within the "regime of computation," as the American literary critic N. Katherine Hayles has described the new age filled with computing devices, emotional reactions and personal experiences toward computers have been in a sense pre-packaged.[27] This is particularly true for workplaces where reactions exist within broader labor regimes that not only control and standardize work, but evaluate and reward it as well. The chapters in this volume give a more nuanced perspective to the historical reception of computers in the workplace and ways of approaching emotions and computers historically: first, focusing on global cases, the chapters reveal that different national contexts and national discourses affected some of the reception of computers. For example, *angst* has been much discussed to describe German aversions to disruptive technologies of the future. Likewise, in South Korea, technological development went together with national economic development, which nobody at the time could reasonably oppose as the government, employers, and media all promoted the new winds of office automation. Second, we point to historical cases where the "emotional regime" of computers had not yet formally settled in – that is where the imaginative boundaries around computers had not been narrowed down.[28] In particular, we highlight how many of the early reactions generated new kinds of emotional communities or shared practices of connection – whether through enjoyment, euphoria, and concern. Third, looking from the present, we also highlight the way that the advent of computers has shifted historical memory of both labor and technology from the twentieth century by relegating technologies and their users to the past as well as clouding our impressions of the success of mass computerization.[29]

The workplace computer is not a new phenomenon by twenty-first-century standards, and in some ways it has already taken on some qualities as an "old" technology. Like the automobile, however, it has had remarkable staying power as a central point of individual interaction as well as an organizer of structures, spaces, and habits. That is to say, while our screens today may be faster, thinner, and have more storage than those of the 1980s, many of us still go to work at desks which are almost ritually centered on the computer as the focus of attention, with software built around the individual user experience (or multiple connections of individual users).

27 Hayles, *My Mother Was a Computer.*

28 William Reddy provides a transhistorical, transcultural approach to the emotional regime, which he defines as "The set of normative emotions and the official rituals, practices, and emotives that express and inculcate them; a necessary underpinning of any stable political regime." Reddy, *Navigation of Feeling*, 129.

29 On the variety of emotional reactions to technologies, see Heßler, "Technikemotionen," 15.

Computers, too, are still sites for control and surveillance, with the function of business-oriented software and processes. Much like how many of our lives are shaped by highways that accompanied the advent of the automobile, organizations and the workplace experience have been largely built around the computer, even as it has evolved over fifty years and new facets continually threaten to upend many aspects of our relationship to technology. Computers were and are still a central nexus point in which human actors confront digitalization through hardware devices, graphic interfaces, and software programs that connect humans to the powers of code. More than technologies and their object histories, focusing on the earlier histories of this relationship necessarily requires looking at how human actors experienced them, both those pushing them forward and those using them for the first time with fears and concerns about their potentials. At the same time, computers also stimulated fantasies of mobile work in the future that became more feasible once the laptop started substituting personal computers and became the standard device for mobile professionals. Overall, computers and their applications have radically changed size and shape throughout the last decades integrating interactive elements and communications platforms. Computers coexisted with and displaced older technologies, gradually replacing some while coexisting with others for extended periods.[30]

Alongside and accompanying the introduction of computers as objects is the way that many around the world have been socialized to computers, including how they should feel about new computerized, digitized, or networked futures that are always around the corner. This is not just about how people came to use devices or systems, as in technical literacy; rather, it comprises the individual and collective preparation for the advent of computers, including the shaping of emotional responses and attitudes toward computers, new categories of persons in relation to computers ("luddites vs. early adopters"), new promises about what computers could offer, and a reframing of the pre-computer age and non-computerized work. These processes have been so effective at changing attitudes to computers that human reactions toward them today are largely formulaic: if one has an unfavorable reaction toward new technology, that reflects a generational lag, radical lifestyle choice, or simple a sign of being behind the times; likewise, anger at computer interfaces reflects unstable emotional selves not unstable software; software bugs are just things that will be worked out; and computer-related joy is an expected reaction to new devices or software. This coterie of reactions is promoted (and prompted) in advertisements, school and university courses, and popular media. This has all been so effective across computerized environments that managing human reactions to computing has become a technical field itself – affective computing. This field exists (with technologies of its own) to sense emotions of users and help assess what

30 Balbi and Magaudda, *History of Digital Media*, 57–64; Haigh and Ceruzzi, *A New History*, 1–7.

kinds of people are fit for certain kinds of computer activities.[31] The field delegates to computers the job of reading our emotions, albeit within a very narrow window defined in part by the success of computerization as a whole. A return to the recent past allows us to understand just how quickly attitudes have changed and provides a point from which we can rethink narratives around computers in the first place. From this perspective, a new history of computerization can be told that highlights how the social foundations were laid that have made acceptance of computers a success – in some ways more of a success than hardware or software-based achievements on their own. Nevertheless, emotionally charged discussions about computer errors and user-unfriendly software continue.

Our contributions

This volume makes a number of interventions to tell a new story of the computer age. First, we focus on cases of computerization from a close historical perspective, beginning with the widespread adoption of computer coding in the 1960s and transitions to computerized work environments in the 1970s and 1980s. These accounts have often been told from the perspective of technologies themselves or from an assumption that computerization was always in the process of becoming something known, accepted, and ultimately good for society and organizations. Looking at early cases, the chapters in this volume show that many actors at the time had not accepted the new reality of computers and indeed raised many concerns about the potential risks that computers posed. These are more nuanced and complex than common narratives around irrational technological resistance or lack of foresight. Indeed, many of the concerns aired in the 1960s and 1970s foretell some of the consequences that would ultimately befall places like the UK's Post Office. They also provide a glimpse at how different actors came to narrate computerization in collective circumstances in work groups, labor categories, or at international meetings. In contrast to the largely individual and psychologized way we imagine computer usage today, a look at recent history shows that reactions and emotions around computers were experienced collectively and that emotions were not narrowly gathered

31 A 2018 MIT Sloan business school report suggested that managers and employers could soon adopt new technologies to measure emotions at work. "Emotion-sensing technologies" or ESTs can "help people improve their focus, often with relatively minimal technological investment." Such promises of technological control over emotions appear attractive within today's business milieu for those who want to limit the influence of "negative emotions" like panic, greed, or boredom as well as elicit "positive reactions" like happiness, joy, and desire, using the latest scientific devices or sensors. "How Emotion-Sensing Technology Can Reshape the Workplace," *MIT Sloan Management Review*, 2018. Accessed: https://sloanreview.mit.edu/article/how-emotion-sensing-technology-can-reshape-the-workplace/.

around screens, lag-times, and speed – but rather the serious consequences and capabilities that computers purported to control with sometimes careless clicks. It also reveals that in contrast to the teleological image of computers evolving gradually into their current form, there were a number of visions and concerns that predicted alternative futures of human–computer–work configurations. Many of these never came to fruition but they signaled how aspirations and concerns about computerization were more wide-ranging (and futuristic) than we might think today.

Second, we address global cases of computerization, particularly from outside of the United States, including Europe, Asia, and Latin America. These were important sites where computerization (inclusive of the introduction of computers and narratives of what computers would do) were and are taking place. The American and British-centered narrative of computer hardware and software development has been well told.[32] Scholars have begun to trace the developments of internet and networking capacities in different countries. Nevertheless, significant gaps remain regarding, for example, statistical data on early global computer distribution or software production.[33]

However, other contemporaneous dynamics also played a role in both the distribution of computers and the narratives around them, in particular the Cold War, US-led global development, and modernization theory. The US is not the only site where important computers or software were developed, nor is it the only space where ideas about what the future of a computerized world would look like were discussed. But the dominant US framing of computer development, which dovetails with the gradual deregulation of the American economy, rise of financial capitalism, offshoring, and corporate downsizing, reinforces certain American-centric narratives that computerization ultimately led to a decentralization of bureaucratic and organizational forms (particularly embodied by the anti-corporate ethos of Silicon Valley). While this might be true in the context of the US, it ignores the fact that many national economies did not undergo such radical changes and large organizations continued to be sites for widespread employment alongside the introduction of computers into workplace communities. Companies like Germany's SAP (discussed in Schweickert's chapter) were pioneering new forms of software and hardware, and modes of sociological patterns, different categories of work, and different areas of reception which would ultimately shape computerization for many around the world. For those more outside the core, such as Austria (Jahrbacher's chapter) or South Korea (Prentice's chapter), narratives of national development were always laminated on top of (or at least accompanied) discussions of operational efficiency or technological development via computers. Adopting countries were also targets

32 For general overviews see, Campbell-Kelly et al., *Computer*; Cortada, *The Digital Hand*; Harris, *London's Global Office Economy*.

33 Goggin and McLelland, *The Routledge Companion*; Cortada, *The Digital Flood*, 601–13.

for office-centered marketing which promoted computers via new images of workplace relations. Sometimes, this generated counter-movements for domestically developed computers and software in the context of broader visions for technical independence (discussed in Berth's chapter).[34]

Indeed, peeling back the layers of US-centricity on our understanding of computerization reveals that many narratives of computer adoption were shaped by Americans who had long been socialized to technological transformations in the office in attempts to compress space, time, information, and communication.[35] Focusing on other global cases allows us to understand how the computer did not diffuse from one place to another with its narratives in tow, but was shaped by the complex contexts into which it was introduced. These encounters show that there were many places where computers and their associated transformations of both work and domestic life were not familiar or always welcome. These cases should allow us to look for multiple histories of computerization around the world.[36]

Third, the chapters in the volume generally approach case studies through diverse sources, including corporate archives, trade magazines, popular newspapers, early internet portals, oral history interviews, and contemporaneous academic debates. Exploring computerization through these sources is a necessary exercise in uncovering the experiences of workers, managers, and other organizational actors as they began to encounter computers and experience themselves as computerized subjects. Additionally, it is necessary to read against the institutional narratives, success stories, and colorful biographies that accompanied the computer age and its popular retellings. These sources also point to indirect or vicarious ways that the computer age was being documented at the time, particularly about the knock-on effects of computerization on others and the ways that computer-linked behaviors or behavioral types were coming into formation. These vicarious perspectives allow us to understand how narratives of computerization were being shaped in part by images of others using computers – or in the case of Glew's chapter on the lingering meaning of the "typing pool" in the computer era, those *not* adapting to computers. Vicarious images reveal many of the normative concerns that began to accompany the burgeoning computer age.

Lastly, the chapters in this volume take up computerization always with attention on the gendered dynamics of workplaces, building on long lines of scholarship.[37] Computers entered into highly gender-divided workplaces, creating a com-

34 For similar tendencies in India see Homberg, *Digitale Unabhängigkeit*.

35 Campbell-Kelly et al., *Computer*, 21–24.

36 Mahoney, "The Histories of Computing(s)."

37 Haan, *Gender and the Politics of Office Work*; Kwolek-Folland, *Engendering Business*; Gardey, "Mechanizing Writing and Photographing the Word"; Crompton and Jones. *White-Collar Proletariat*; Wagner, "The Politics of Women's Work in Computerized Environments"; Mitter and Rowbotham, *Women Encounter Technology*; Perry and Greber, "Women and Computers: An In-

plex array of new dynamics that provided new opportunities to some, appeared to reinforce existing norms to others, but ultimately changed work for almost every kind of professional activity. Computerization, for instance, offered ways of seeing how gendered the workplaces of the time were: a 1989 pamphlet by the British organization Microsyster (discovered on a library shelf at the University of Sheffield in the process of researching this volume) shows a cross-section of these reactions and experiences. The title of the pamphlet is "Not Over Our Heads," reflecting both a resistance to an image and a prevailing view of secretaries and typists as not capable enough to transition to computerized work. Detailed diagrams and illustrations prepared by the organization explain many of the basics of mainframe computers to prepare them for transition to computer-based work. A comic strip in the pamphlet also depicts a white male boss figure and black female secretarial figure staring at a computer together. The boss leans over and instructs the female employee how to use the computer "it's quite simple … like a typewriter"; the female employee corrects him saying, "why don't I use it like a computer?" reflecting how the on-the-ground practical knowledge had already created imbalances that were nevertheless still concealed by societal norms. Much of the dominant academic literature at the time highlighted some of the major global challenges that particularly affected women, including deskilling, intensification of repetitive tasks, and false promises of future liberation. Through attention to archival and other sources, the chapters here highlight cases in which the gender dynamics are not entirely predictable and reflect more nuanced accounts of how computers (and their new roles, capacities, expectations, and realities) changed both men's and women's work.

Today, we rely on glitches, breakdowns, leaks, failures, and occasionally hacks to remind us that computerization is not all that it promises.[38] This is certainly true for how mass publics take up and critique the creativity (or lack) of generative Artificial Intelligence (AI) or the biases of large language models; a series of failures and an effort to cover them up is also partly how the British public came to learn about and empathize with the victims of the Post Office scandal. While these singular events may generate mass displays of emotion like ridicule or outrage and appear to change public thinking, their ephemerality also reflects a certain acceptance of computerization when things return to normal, as we rely on computers for a variety of services, communication, transportation, and work.

Drawing attention to the workplace, where computers have been both normalized and normativized over many years, the chapters in this volume find it valuable to not focus on scandals or breakdowns as sole moments of clarity. Rather, the

troduction"; Webster, *Shaping Women's Work*; Schafer, "What the History of Women and Computing."

38 El-Ariss, *Leaks, Hacks, and Scandals*; Pow, "A Trans Historiography"; Heßler, *Sisyphos im Maschinenraum*, 176–94.

chapters broadly peel back the processes of computerization from different times and places from around the world. By highlighting different global contexts, from Austria to Indonesia, they collectively highlight how technological modernization discourses accompanying computers have never had a singular transition or convergence point. While much computer hardware and software was shipped around the world by American multinationals, sometimes along with American ideologies, there are equally many stories of localization in which Americanization was rejected and local dynamics were affected in unanticipated and diverse ways. Indeed, computerization's great transformation presented a number of problems on the ground to be resolved – how people were supposed to work, who would take control, how risk would be managed, what was and was not permissible. We highlight how in many cases, actors on the ground immediately saw through these gaps as they came to experience computers in the workplace for the first time – between what was expected and what was possible, what computers were supposed to do and how organizations were then structured – and sought out different connections and possibilities. We also highlight how the effects of computerization would not be narrativized in alternative ways until many years later, oftentimes requiring reading against the grain of both company histories and oral narratives.

This book offers selective glimpses across time and space at different contexts of workplace computerization. The eight contributions here were developed in conjunction with funding from the Elisabeth List fellowship scheme hosted by the University of Graz, beginning in 2022 and culminating in a conference in 2024. Each of the eight contributors sought to make connections between gender, emotions, and the history of computer technology. While there is considerable breadth to the topics and subjects, the authors would be the first to acknowledge that this volume is the tip of the iceberg for histories and analyses of both computerization movements and alternative histories around work. We see this volume as a starting point for future research on contemporary histories of computerization around the world and in different contexts. No doubt there is ample room for more research on computerization's effects, its conflicts at the time, the political and workplace dynamics, and the ways it has shaped both collective and individual memory. Each chapter represents what we hope can be a stepping stone to further research either in a national context or through new empirical sites to tell different kinds of stories about the computer age. As David Edgerton notes, "our future-oriented rhetoric has underestimated the past and overestimated the power of the present."[39] Many alternative accounts of the computer age, particularly outside of the US, have begun to escape historicization.

Collectively, we make no pretense about the "uniqueness" of the computer age (or, as it was amplified at the time, the information age) vis-à-vis other technolog-

39 Edgerton, *Shock of the Old*, 206.

ical ages. As many histories of technology would note, claiming epochal status for certain technologies is a recipe for being easily disproved. Indeed, if pressed, we might be reluctant to stick to such periodization – even noting when the computer age starts or ends is difficult to say with precision (punched-card processing of the 1950s was arguably the first "computing" machine in use).[40] While none will deny the huge changes in speed, scale, and domains of computers – changing the image of the home and office alike – the chapters here are ambivalent about what computerization actually brought. It is important not to confuse diffusion or use with efficiency or productivity. Thomas Landauer noted in the mid-1990s that computers had not really increased efficiency or productivity as much as was hoped or promised.[41] For the chapters here, computers brought empty promises about future liberation; fear about vast and rapid changes; retrenchment of social hierarchies; and transformations to many craft and specialist professions.

The accounts nevertheless pinpoint a period of contemporary global history which serves as a useful point of reflection against recent talk about the rise of AI. The promises and potentials of AI have been presented to publics, companies, and governments around the world as necessary, vital, and imminent. Our emotional reactions to AI have already largely been shaped by what are still untested promises. As in the early stages of computerization, emotional reactions range from euphoria to fear; there is a debate on "AI anxiety" about the unknown possible futures that AI may bring about, even as governments, organizations, and various institutions seek more AI integration.[42] (This echoes the discourse on "computerphobia" of the 1980s.[43]) While the scale and pace of today may seem much different from the early period of computerization, the studies in this volume provide valuable insights into how previous generations adapted to something that was equally presented as radically transformative for society. They also reveal how quickly the computer age has made us forget our own recent pasts. Nevertheless, understanding different social responses to computerization, from different national contexts as well as across different forms of work, can help make sense of the changes we are seeing today.

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40 Edgerton, 7.

41 Landauer, *The Trouble with Computers*, 1. Arguably, the "productivity puzzle" still holds true today even as many of the issues identified by Landauer have been solved, such as user-friendliness and literacy.

42 "AI anxiety: The Workers Who Fear Losing Their Jobs to Artificial Intelligence," BBC Series, Work: In Progress, April 18, 2023. Accessed: https://www.bbc.com/worklife/article/20230418-ai-anxiety-artificial-intelligence-replace-jobs

43 "When People Feared Computers," by Adrienne LaFrance, *The Atlantic*, March 15, 2015. Accessed: https://www.theatlantic.com/technology/archive/2015/03/when-people-feared-computers/388919/

Chapter overviews

The first two chapters look at cases of heightened affect in a mid-twentieth century shaped by different dynamics of fear, excitement, and optimism. Chapters by Martina Heßler and Anna Baumann capture workplace emotions in the early stages of both computerization and programming. At this time, computerization brought about new ways to express the emotionality of work, in terms of both fear of losing control and futurist visions for computerization at home. The chapters by Heidi Schweickert and Nina Jahrbacher examine the changing role of corporate attitudes to employees' reactions to computerization, with cases revealing management dismissive of emotional reactions to new technologies. The two chapters reveal the ways that access to the emotions of the time are shrouded in shame, ambivalence, and corporate secrecy. The following chapters, by Helen Glew and Michael Prentice, showcase how narratives of workplace computerization in national media drew from references, tropes, and understandings of the past and what was happening within broader civil society. They highlight the resilience of national tropes across time that shape public understanding of technological change. The final two chapters by Christiane Berth and Monika Arnez describe the role that public and social media have in mediating ideas about workplace technologies, particularly as they expand into new territories. These media are always at a remove from actual workplaces but attempt to move them in different directions.

Martina Heßler's chapter addresses an important period in the history of software: the NATO Scientific Committees of 1968 and 1969. These meetings were the first international venues where male software engineers could openly discuss their fears and concerns about the potentials for software errors and malfunctions in the coming computer age. Analyzing the discussions of the meetings in depth, she shows that the software developers formed an ephemeral emotional community bonded by shared concern in the first meeting, a community which subsequently broke down by competing and conflicting concerns about how to approach the software crisis. The chapter thus sheds light on one of the early periods in changing norms around masculinity, software, and emotional talk about failure.

Anna Baumann's chapter looks at intellectual debates about telework in the 1970s and 1980s. The possibility of decentralized office work by means of the personal computer and telecommunication networks, which we call now "working from home," led to new ideas for changes to work, the environment, and gender and family roles. Transnational debates about what promises and perils telework would bring largely occurred against a background in which actual telework barely existed. Nevertheless, she shows how the intellectual debates, with a particular focus on American and European debates, were still highly productive for spurring intellectual developments in the fields of feminist science and technology studies. Through the methodological lens of gender and *Technikemotionen* (technological

emotions), the analysis reveals how narratives of computerization intertwined with gendered and emotional perceptions of technology.[44]

Heidi Schweickert's chapter looks at the history of SAP software in the context of the company's evolving attitudes to its clients and users. SAP software would bring about far-reaching changes in work practices around the world, but its early history was shaped by complex emotions such as frustration when working with complex applications, shame among experienced clerks at being thrown back to beginner's level, and euphoria among tech-savvy enthusiasts at unimagined technological possibilities. The chapter highlights how SAP shifted its own attitudes to these emotional reactions, at first blaming users and later utilizing them to improve the user experience.

Nina Jahrbacher's chapter examines the relationship between technological innovation and social change at the Austrian Federal Railways (ÖBB). Focusing on gender dynamics and emotional responses to the introduction of electronic data processing, the chapter explores how the ÖBB's modernization efforts intersected with societal shifts, such as gender equality initiatives, and how these factors influenced the workplace environment. Drawing on oral history interviews, internal documents, and legal texts, her study reveals the challenges and opportunities that arose across decades of digital and social transformations at the company and in Austria more broadly. It highlights how technological advancements led to shifts in administrative workflows, which, while enhancing efficiency, also sparked concerns about job security and the future of work. The chapter further investigates the ÖBB's efforts to address gender disparities through programs like the 1981 Women's Advancement Program, contextualizing these initiatives within broader societal changes. Ultimately, the chapter underscores the importance of considering both technological and social dimensions in organizational transformation, offering insights into the complex interplay between innovation, gender equality, and employee well-being during a period of significant change at the ÖBB.

Helen Glew's chapter explores the cultural reactions to the end of typing pools in Great Britain. The typing pool had been equal parts denigrated as a "dead-end" job for women while being recognized as an essential part of office landscapes worldwide. With the advent of word processors and accompanying workplace change that signaled the typing pool's demise, however, social and cultural commentary revealed both an anxiety about women's position in office spaces and a nostalgia for a less complicated pre-computer past with clear gender hierarchies. The chapter examines these reactions in detail, using an array of newspaper and magazine coverage and examples from British popular culture. The chapter highlights the sense of social and cultural insecurity wrought by the changes to the typing pool and the fact that the advent of the personal desktop computer was seen as a point from which there

44 Heßler, *Technikemotionen*.

was no turning back. More widely, the reactions reveal the sense of unease about women's position in office hierarchies and the extent to which women's employment was still contingent and precarious as the twentieth century came to a close.

Michael Prentice's chapter looks at office computerization in South Korea from the 1980s to 1990s with a focus on tropes of intimate connection both in and out of the office. While early computerization was defined by narratives of national development via productivity and automation, South Korean office workers were drawn to their own channels and practices to connect with each other. Drawing on the linguistic concept of phatic communion, he shows how many forums served simply to connect with strangers, vent about work, and hear from office workers at different companies in simple and ephemeral ways. As these channels became popular in civil society, domestic corporations also drew on their popularity by developing their own forums that promoted intimacy among employees and managers. The chapter suggests that common computer tropes forged in this era around corporate intimacy on one side and worker-centered channels for refuge on the other, are still prevalent today.

Christiane Berth's chapter discusses the rise of the computerized office in Latin America during the 1980s and 1990s. In that period, most Latin American countries were affected by debt crises and political transition, which influenced emotional reactions toward technological change. While office employees were concerned about dismissals and feared not being able to get along with computers in daily work, political elites developed an emotional rhetoric of national pride connected to contemporary developmental narratives. In their vision, software production could open up economic opportunities for Latin American nations. Alluding to 1980s international debates on unequal access to technology and information, politicians and technical experts criticized monopolies in computer production and demanded appropriate technologies to deal with unstable electricity systems. Nevertheless, US influence remained strong and was clearly visible in Latin American offices. Analyzing advertisements and contemporary office magazines, the chapter demonstrates that visuals reproduced traditional gender roles. At the same time, there was a need to renegotiate gendered work tasks such as typing, which happened through images of humans interacting with computers. Finally, the computer was used for forecasting future trends of office work by relying on emotional repertoires, such as revolutionary transformation of routine tasks or euphoria for the globally connected office.

Monika Arnez's chapter explores computerization in the context of the popularization of drones in contemporary Indonesia. Drones represent an opportunity to think about a new terrain for emotional discourses about technology, gender, and social change. The chapter analyzes emotional responses to the introduction of drones in areas of Indonesian life, comparing men's and women's reactions. She contextualizes the perception of drones against the backdrop of highly corporatized media that have shaped the emotional contours of the technology as well as social

inequalities in Indonesia. Based on a survey with Indonesian respondents and media analysis, the chapter finds that Indonesians perceive drones as a double-edged sword, eliciting varied emotions – from happiness to fear – based on their usage, while also highlighting the ongoing reproduction of power dynamics stemming from the state.

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