



Enterprise content management systems and the application of Taylorism and Fordism to intellectual labour

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abstract

Enterprise Content Management (ECM) Systems confer numerous advantages to corporations including superior data management, streamlining of office workflows and potential costs savings. However, a content analysis of ECM system technical white papers reveals that such systems are potentially disastrous to intellectual workers. The trends of increasing management control, routinization and deskilling observed and critiqued by Harry Braverman in the 20th century in industrial labour are fully realized in intellectual labour by such systems. In addition to the detailed surveillance capabilities of content management systems (CMS), the employer captures and retains the entire iterative history of the documents produced by its workers. Content management systems deskill workers by subdividing intellectual tasks into the smallest possible constituent parts and automating as many tasks as possible. Content management systems provide some potential opportunities for the reskilling of workers, but a critical examination of the effects of these systems is necessary to determine their exact influence on digital work

Introduction

Business to business (B2B) software is rarely the subject of public discourse, which is unsurprising given that the name implies that it does not concern individuals. However, in the same way that theories of scientific management and assembly line production techniques revolutionized industrial labour in the 20th century, B2B software is reshaping intellectual labour in the 21st century. Over the past 25 years there has been a proliferation of enterprise wide information systems including Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) software and knowledge management systems and yet there has been a distinct lack of studies on Enterprise Content Management (ECM) systems. Though there is a lack of empirical evidence on such systems, the product literature produced by ECM system vendors displays a strong potential for the deskilling and degrading of intellectual labour. ECM systems extend both Taylorist and Fordist principles to intellectual labour giving management unprecedented control over the work process. ECM systems not only allow but encourage the subdivision, routinization, and where possible automation of workflow processes. These systems incorporate sophisticated systems for surveilling workers while on the job and advanced auditing capabilities for analyzing performance. They

facilitate the creation of an intellectual assembly line, while providing management panoptic surveillance over each employee and piece of work. Despite the lack of empirical studies about the implementation of ECM systems, the product literature from vendors of such systems suggests ECM systems possess considerable potential to routinize intellectual work. Through a review of such vendor literature, this paper shows how ECM systems threaten to fulfill predictions of information capitalism's tendencies towards technological de-skilling.

As the techniques of Taylor and Ford became increasingly popular last century, criticism of the Taylorist/Fordist work paradigm also flourished. One of the most thorough and insightful critiques that emerged was Harry Braverman's deskilling thesis. Though Braverman did explore some trends in office work, his work predated the emergence of technologies that could pervasively expand management's control over intellectual labour. With the 21st century poised to be dominated by prevalence of the intellectual/knowledge worker it is clear that ECM systems possess the potential to revolutionize such work. It therefore becomes necessary to analyze whether such systems present the same threat of deskilling for the intellectual labour using the framework provided by Braverman.

The first part of this paper will examine Braverman's deskilling thesis and his observations on intellectual work. A review of the applications of Braverman's thesis and literature on content management systems is provided for context. A content analysis of ECM product literature from EMC vendors then explores how these systems represent a tool of management, decrease employee control over the labour process, and subdivide and routinize work. The paper concludes by exploring some possibilities for minimizing the deskilling effects of such systems and calling for empirical studies of such systems to critically evaluate whether the potential for deskilling inherent in the design of such systems is realized in practice.

Braverman's deskilling thesis

No author has more comprehensively explored the potential ability for technology and management techniques and tools to cause the deskilling of workers than Harry Braverman. In its simplest form his 'deskilling' thesis suggests that owners and management (the agents of capital) seek to use technology and management tools to constantly subdivide and routinize the labour process to gain more control over it. This trend in turn decreases the need for skilled labour, and facilitates its substitution with general, unskilled (deskilled) labour. Braverman stressed two important factors in his deskilling thesis. First, technology alone does not deskill. Braverman rejected such a technologically determinist framework, arguing that deskilling is a result of the use of technology by management seeking increased control. Second, deskilling is not the only effect when management uses technology to gain more control over the labour process as there must be some workers or managers who are re-skilled or up-skilled.

Although his seminal 1974 work, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, was focused primarily on physical/industrial labour, the framework he provides can still be used to examine intellectual labour. Braverman

highlighted several nascent trends in the deskilling of intellectual work. He noted that in the 1970s the trends toward rationalization and mechanization, so prevalent in industrial labour, were starting to emerge in office work, and were coupled with increasing rates of dissatisfaction among white collar workers (1998: 23-4). Much of Braverman's criticism of the deskilling of office work was focused on the increasing numbers of low paid, female clerical workers, who were needed to help management coordinate its increasing control over the production process (1998: 90, 170). He noted that the increased mechanization of offices facilitated greater supervision of employees by management, which in turn allows the machine-pacing of office work (1998: 230). Focusing specifically on secretarial work, Braverman noted that it was increasingly being routinized. He argued that work in stenographic pools had shifted from the drafting of documents, to simply the arrangement of pre-written paragraphs (1998: 238). Surveillance and routinization reinforced the subdivision of office work into ever smaller tasks. The result was the deskilling of clerical work, and increased alienation among clerical workers as they lost their personal relations and connections with management (1998: 239). Braverman emphasized that one important factor limited the deskilling trends at play in office work, noting that

[t]he greatest single obstacle to the proper functioning of such an office is the concentration of information and decision-making capacity in the minds of key clerical employees. (Braverman, 1998: 239)

However, he also noted that this limitation on management's control of office work could be overcome if management had the ability to record and move all information in a mechanical form (1998: 239). Thirty years after Braverman's analysis of office work, such a management technology has finally been realized in ECM, which provides management the means for achieving an inordinate level of control over office work.

Applications and critiques of Braverman's deskilling thesis

Braverman's work has attracted significant attention from labour process theorists. Critics have suggested that Braverman uncritically characterized traditional craftwork (Meiksins, 1994: 48; Heisig, 2009: 1642), underemphasized the role of cooperation in capitalist production (Knights and Willmott, 2007: 1370), oversimplified his conception of skill (Huws, 2003: 119; Meiksins, 1994: 46), and exaggerated the degree to which capitalist workplaces embody Taylorist principles (Friedman, 1977: 44; Meiksins, 1994: 49). Specifically Friedman has argued that in many workplaces Taylorist direct control has not increased, and instead that there is an expansion of responsible autonomy which, while not eliminating the alienation felt by workers, reduces its effects (1977: 53). While Thompson notes that deskilling is a major tendency in the capitalist labour process (1989: 118), Adler argues that the long term trend under capitalism has been one towards increasingly complex work (2007: 1314). Numerous empirical studies have, however, supported Braverman's thesis that deskilling occurs in some work conditions. Deskilling has occurred in occupations as diverse as nursing (Rinard, 1996), librarianship (Hannah and Harris, 1996), journalism (Liu, 2006), and even law (Wall and Johnstone, 1997). This broad range of occupations in which deskilling has been noted suggests that Braverman's thesis can be applied to intellectual as well as industrial forms of labour. Scholars have also examined other types of enterprise wide

information systems and found evidence of deskilling. Knowledge management systems have been found to have a deskilling effect (Hasan and Crawford, 2003), and computer integrated manufacturing was found to deskill machine operators while upskilling managers (Agnew et al., 1997).

While there is no academic consensus on the deskilling thesis (Littler and Innes, 2003: 73; Carey 2007: 94), some authors have suggested that the criticism of Braverman reflects a trend of increasing political conservatism (Meiksins, 1994: 46; Spencer, 2000: 239). Furthermore, Braverman did not posit that deskilling was an invariant law of capitalist labour processes (Spencer 2009: 63). The primary value of Braverman's thesis lies not in objective tests of whether it is invariably correct, but as an analytical tool for the examination of the dynamic interaction between management policy, technology and workers skill (Huws, 2003). Despite a considerable volume of literature on content management, there is a lack of literature scrutinizing content management systems using Braverman's insightful and applicable framework.

The failure of business process reengineering

While critical literature on ECM systems and their deskilling of workers is absent, one central component of such systems, workflow software, has been critiqued for the deleterious effects it has on workers. In the early 1990s there was considerable interest in what was then called Business Process Reengineering (BPR). BPR was conceived in management and business schools (Davenport and Short, 1990: 11), and found its intellectual roots in Taylorism (Davenport, 1993: 316). Its early proponents stressed that it empowered workers and increased their skill base (Hammer and Champy, 2001: 245); however, they also emphasized BPR's ability to deliver cost savings in the form of staff reductions. Michael Hammer highlighted that Ford Motor Company used reengineering to reduce its North American accounts payable division from 500 to 125 employees (Hammer, 1990: 106), while Taco Bell was able to cut the number of area supervisors it employed by two-thirds even while increasing the number of restaurants (Hammer and Champy, 1993: 250). Unsurprisingly, academic criticism followed. Iden noted BPR had the potential to limit the flexibility and creativity of workers (1995:76). Vanderburg labeled BPR the 'intellectual assembly line', and noted that the literature on BPR empowering workers was contradicted by the Taylorist and Fordist principles embodied in BPR (2004: 333). Grey and Mitev argued that BPR inevitably resulted in layoffs for some workers, while remaining workers would be subject to intensification (1995: 11). Several scholars noted that BPR was particularly threatening to middle management as their duties would be automated and the managers themselves made redundant (Vanderburg, 2004: 336; Grey and Mitev, 1995: 11). While Abbott and Sarin did find that while some users benefited from BPR, these outcomes were not universal, and that BPR had the potential to exacerbate problems in some workflows (1994: 113). These criticisms were not lost on Hammer, who when profiled by Time in 1996 noted that reengineering had been misinterpreted and hijacked by CEOs who achieved 'efficiencies' through staffing reductions (Time, 1996). While Evans (1994) contends that the majority of attempts at BPR failed due to worker resistance, a major empirical study of corporations that attempted BPR projects found that the primary source of failure was the inability of management to effectively plan for change (Grover et. al.,

1995: 139). Willmott (1994: 40) noted that BPR proponents and management adopted an overly simplistic view of workers as passive commodities stating:

it is not BPR's inflated sense of novelty so much as its shallow, technicist appreciation of human dimension of organizational change that renders it vulnerable to failure. (Willmott, 1994: 40)

The early corporate enthusiasm for BPR in the 1990s attracted scholarly attention, which included some criticisms of reengineering. However, these criticisms were muted by the proponents of BPR who emphasized the success that could be achieved through such projects (Teng et. al, 1998; Carr and Johansson, 1995; Sedera et. al. 2001). Though BPR (now called Business Process Management) is a central component in ECM systems, these wider systems have not received the same critical examination.

While there is a fairly extensive body of professional literature on ECM systems, there has been relatively little critical scholarly attention. Andersen notes that much of the professional literature, found in publications such as KMWorld, and Infonomics Magazine (formerly AIIM E-DOC) is written by and CEOs, CIOs, marketing directors and vendors and therefore lacks critical analysis (2008: 68). Her examination of the rhetoric used in these publications finds that technical writers become increasingly isolated and less able to resist strategic control by management (2008: 72). Iverson and Burkart's analysis of ECM systems for nonprofit organization highlights the dangers of reification and alienation of workers (2007: 414). They note that by reifying and automating business workflows into computer programs, workers' ability to be creative is stifled, and the ECM focus on making content permanent and reusable accelerates trends towards commodification (2007: 413-414). Both of these studies highlight some of the potential dangers of ECM systems. Neither uses Braverman's framework, but both articles fail to examine in detail the technical white papers provided by ECM companies that explain the full range of management controls provided by these systems. Examining the ECM product literature is necessary because there is a distinct lack of empirical and unbiased investigations on such systems, though there are many brief and positive case studies provided by ECM vendors that trumpet the institutional benefits of their software (ECM, 2010: 21-24; IBM, 2009; IBM, 2010b; Xythos, 2010a; Xythos, 2010c). Before examining how content management systems further extend management's control over the labour process it is necessary to examine the computer software that comprises an ECM system.

An enterprise content management system overview

The term 'content management system' describes a diverse number of applications used by both individuals and institutions to manage information and documents. At the institutional level these systems incorporate a wide variety of software modules that facilitate the management, storage, capture, preservation, and delivery of information, and are often differentiated from personal content management systems by being referred to as 'Enterprise Content Management' systems (AIIM, 2008b). At their fullest, ECM systems incorporate a broad range of software including document and records management, email and web portal management, video and audio file management (referred to as 'Digital Asset Management'), indexing, classification and retrieval software, collaboration technologies, security functionality including digital

and information rights management software, and Business Process Management software (BPM). The various modules in an ECM system are unified through a central, institutional repository in which all content is stored. Though different organizations may use only some of the modules within an ECM system, the primary advantage is that it allows the coordination (and control) of not only structured content (final versions of documents that have historically been the purview of records management), but also all unstructured content (documents drafts, emails and other related materials) (Blair, 2004: 65). Simply, ECM systems coordinate all the steps in the production of documents and capture and retain all the content that is produced in the process.

ECM systems are differentiated from other enterprise information systems such as CRM and ERP by their unique focus on unstructured content. Estimates suggest that roughly 80 percent of the information within large enterprises is unstructured (Shegda and Gilbert, 2009: 4), and that office employees spend 40 percent of their work time managing and repurposing unstructured content (Oracle, 2007b: 3). Furthermore, time spent searching for such information decreases productivity (Laugero and Globe, 2002: 51). As office workers produce content in an increasingly diverse array of formats, enterprises are looking to strategically manage such information to increase productivity and profits.

Two major impetuses are driving the increased adoption of ECM systems by organizations. Content management allows for the more efficient management of information within an organization as employees produce and use large volumes of electronic documents. ECM systems aim to ease searching and retrieval of information for employees, while at the same time ensuring that information is properly classified and stored on the central repository. Equally important is the need for large institutions to manage their information securely and in compliance with legal regulations on document management. As the amount of electronic information has significantly increased over the past 15 years, so too has the amount of compliance legislation. These include the Sarbanes-Oxley Act, Health Insurance Portability and Accountability Act (HIPAA), and Department of Defense Regulation 5015.2 in the United States, the Data Protection Directive (EUDPD) in the European Union, and the Personal Information Protection and Electronic Documents Act (PIPEDA) in Canada (Saxena, 2008: 282-289).

Despite the complexities of implementation and the costs involved, the global ECM market has grown considerably over the past decade generating an estimated \$2.7 billion (USD) worth of revenue in 2007, and industry consolidation has resulted in the market being dominated by a few large ECM providers (EMC, IBM, Oracle, Microsoft, and Open Text) (Bell et al., 2009). The numerous advantages offered by ECM systems to employers suggest that such systems will become increasingly popular for large organizations, and this is reflected in continued expectations of growth in the ECM sector (Natividad, 2007). The benefits offered by ECM systems and the increasing burdens of regulatory compliance have resulted in numerous corporations and government organizations adopting such systems. Major corporations such as AT&T, Boeing and Con Edison have implemented content management systems (IBM 2009: 4, 11, 14). ECM vendors and other proponents of such systems are quick to highlight

successful cases where return on the investment (ROI) in these expensive systems can be achieved through staffing reductions. Wells Fargo, Standard Bank of South Africa, Equitable Life Insurance Company, the Miami-Dade County Clerk of Courts office and the New Jersey Department of Revenue all implemented ECM systems that resulted in staff reductions (IBM, 2009: 6-7; Christian, 2004: S5; Joelson, 2010). IBM suggests that ECM systems are particularly well suited to any industry that processes large volumes of information, faces regulatory challenges, incorporates complex work processes, or is content-centric, and specifically notes that this includes the communications, financial services, healthcare, government, manufacturing, retail, transportation and utilities industries (IBM 2009: 3).

While ECM systems offer clear benefits to employers, they also have the potential to be quite useful for employees. An important aspect of content management is collaboration software, and AIIM stresses that working collaboratively can increase motivation, participation, reflection, and engagement by workers (AIIM, 2008a). Optical character recognition (OCR) and intelligent character recognition (ICR) technologies can be leveraged to reduce the amount of data workers must enter manually (AIIM, 2008a). Improved indexing and searching capabilities can allow workers to retrieve documents more effectively and with less frustration (AIIM, 2008c). Finally, some ECM systems allow for employees to personalize the types and subjects of information they receive (AIIM, 2008b). However, concomitant with potential advantages to employees are the pervasive control powers that accrue to management. Foster, Banthorpe and Gepp even note that 'by automating the process where possible, cost savings through reduction and de-skilling of the workforce are achieved' (1998: 350). Others cast deskilling in a more positive light by arguing that it is beneficial to workers as it removes the drudgery from many tasks (Brunwin, 1994: 29; Jobshout, 2009). Given the experiences with BPR and staffing reductions in the 1990s and the fact that even proponents of ECM systems acknowledge (and in some cases support) deskilling, it is necessary to critically examine enterprise content management systems and their potential for deskilling.

ECM systems as a tool of management

Bravernman's framework necessitates the presence of two factors for deskilling to occur. He does not suggest that technology alone is the source of deskilling. The introduction of a new technology to a workplace only becomes a mechanism for deskilling when it is accompanied by a desire by management to examine and decompose work processes to its most granular level so that the tasks involved can be subdivided (1998: 180). Numerous facets of an ECM system show the desire by management to pre-coordinate and control work processes. Nowhere is evidence of an ECM system as a management tool clearer than in the business process management (BPM) module. BPM software, which governs workflows by pre-coordinating tasks and the workers responsible for those tasks within an overall project, demonstrates that a content management system is not just a piece of technology, but also a management tool (AIIM, 2008b). Further evidence that an ECM system is a management tool is provided by the inclusion of the security controls that restrict document access and editing to specific groups, and auditing applications that allow management track every minute change in a document's history (EMC, 2006: 3). IBM uses Taylorist language

such as, 'processes can be broken down into their component parts for subsequent analysis', (2008a: 10), and 'BPM's graphical process definition provides consistent, comprehensive view of the processes under management' (2008a: 14) in promoting their ECM software. ECM system literature is explicitly aimed at CIOs and other senior executives, evincing that the adoption of ECM systems is driven from the top-down (EMC, 2008a: 5; EMC, 2009b: 5). ECM product literature contains explicit references to expanding management's power. IBM emphasizes that their monitoring software when combined with the BPM system provides, 'a whole new level of control'. (IBM 2008a: 14). Oracle notes that their information rights management software, 'enables organizations to expand their enterprise content management vision to desktops and places beyond their corporate reach' (Oracle, 2007a: 7). IBM explicitly notes that its BPM software can maintain employee discipline, which it suggests is a key component for successful implementation and use of ECM software (IBM, 2008a: 13). Thus, it is clearly evident that an ECM system is not just a piece of technology, but also a tool by which management gains greater control over the content creation, distribution and storage processes. Since an ECM system is both a technology and management tool, it is justifiable to examine whether a content management system can lead to the deskilling of workers as set out by Braverman.

ECM systems and the loss of employee control

According to Braverman's thesis, deskilling occurs when technology is combined with management tools to subdivide a skilled task into smaller components, which can then be preformed by a greater number of individuals with less skill (and at less cost). The first element of deskilling is a shift of control. The work process changes from one governed by skilled workers (who know all the required elements in a process) to one where control is concentrated in the hands of management with individual workers given increasingly simple and routine tasks (Braverman, 1998: 170). An ECM system has such an effect. Management and system administrators predetermine a myriad of factors in the content production, editing and storage process. Electronic document and record management systems operating in accordance with policies determined by management control who and at what stage documents can be accessed by employees (EMC, 2006: 2). The ability of an employee to access various documents created by the company is restricted on a pre-coordinated basis. Access controls can limit employees' ability to forward, print, copy and paste not only entire documents, but specific sections of documents (EMC, 2006: 2). The level of control provided is granular enough that employees using spreadsheet software can be restricted from editing or viewing specific cells or even the formulas used within cells (Oracle, 2010a: 12). These control features are complimented by an ECM system's ability to include automatic expiration dates for documents preventing employees from accessing documents longer than management feels is necessary (EMC, 2006: 4). Furthermore these controls do not end when an employee leaves their employer. ECM software can extend or revoke access to information after termination even if the employee has copied documents to their own storage medium (Oracle, 2007a: 3). Users can even be prevented from deleting documents they personally create, further extending management's control (EMC, 2009b: 18). An ECM system's access controls are dynamic, allowing systems administrators to revoke access even after documents have been distributed (EMC,

2006: 4). While it is not unreasonable to suggest that there should be some restrictions on what internally produced materials an employee should be able to access, the extent of control provided ensures that management and system administrators have the ability to restrict workers' access to content to a minimum, depriving them a broader knowledge of the work going on within their own institution. The potential limiting of access to information supports Braverman's accusation that owners frown on knowledge sharing (1998: 57). Knowledge is taken and separated from employees and reified into capital in the form of the ECM system.

The power of ECM systems to strip employees of control is not limited to pre-coordinated document restrictions, as auditing applications also increases management's control over the work process. The sophisticated information rights management software that is incorporated into ECM systems allows for usage restrictions to extend to laptops and mobile devices used by employees that are outside of the institutional firewall (Oracle, 2010b: 2). So advanced are ECM systems in their information management that documents stored on USB drives, CDs, DVDs and home computers can be audited and subjected information rights management restrictions (Oracle, 2010a: 6). EMC, a major ECM system provider, notes that:

An enterprise-ready IRM [information rights management] solution should provide a granular audit trail of what recipients did with documents and when they did it, as well as who was denied access and from what IP [internet protocol] address a denied access attempt was made. Auditing should also be continuous, online and offline. (EMC, 2008b: 7)

The use of documents and email offline can be monitored (Oracle, 2010a: 10). In the most extreme scenario management can monitor the exact amount of time an employee worked on a document (and using the audit trail they can determine the exact amount of work an employee did in that specific time period). While the product literature does not explicitly detail the exact nature of the monitoring capabilities (namely if the software logs individual keystrokes), ECM vendors note that the auditing capabilities, 'provide evidence of who did what when' (IBM, 2007: 7), and allow one to, 'track who accessed a piece of information, when, and what they did with it' (EMC, 2009a: 18). Audit trails that document worker activity are complimented by the ability to monitor workers in real time (EMC, 2010: 17). Even if such Orwellian oversight is not employed by management, its specter alone represents a considerable degree of control over the work process.

ECM systems are also designed to foil attempts to circumvent their extensive controls. ECM systems rely on a trusted system clock for monitoring and auditing instead of the local PC clock that could be manipulated by employees (Oracle, 2010a: 16; EMC, 2009a: 8). Embedded watermarks can be placed on printed documents to allow tracking (EMC, 2009b: 19), and the ability for employees to perform screen captures can also be eliminated (Oracle, 2010a: 16; EMC, 2009a: 17). These tamper-proofing measures along with the advanced security and auditing functionality give management, not employees, control over information. Given the degree of control that ECM systems provide management, it is necessary to examine how this control manifests itself in terms of changes to the labour process. Specific attention must be paid to the ways in which management employ such technology to routinize and subdivide work ultimately deskilling the workers involved.

BPM and the subdivision and routinization of work

Of all the modules in an ECM system, the Business Process Management module provides the greatest degree of control over the work process. The aim of BPM (and BPR, which went before it) is to make work processes more efficient through automation (AIIM, 2008b). A BPM module allows workflows to be programmed into the system as a series of steps involving both content and users. The BPM system then moves content between users according to steps in the workflow, which are pre-coordinated in advance by management and system administrators. While at first glance such a system may appear innocuous or even beneficial to employees who participate in such workflows, BPM software puts an inordinate amount of control over such processes in the hands of management.

Control over workflows begins with the conceptualization of work processes. While end users can be consulted in the conceptualization phase, before they are subjected to being managed by the BPM module, literature by ECM providers suggests that only management and business and process analysts need be involved in the design and deployment of workflow software (EMC, 2008a: 5-6). Even if users are consulted in the design of workflows, the degree of control which management exerts over the workforce is considerable. Management encourages the most granular subdivision of tasks, as each minute task in the workflow can be assigned a deadline (IBM, 2008a: 14). As with the extensive auditing capabilities of ECM systems generally, the BPM module identifies missed deadlines or bottlenecks in workflows and alerts management to such delays (Open Text, 2010). EMC's BPM system updates management every five seconds, allowing management to be updated on delays 12 times in one minute (EMC, 2008a: 19). Through an easy to use graphical interface, managers can monitor an individual employee's workload (IBM, 2008a: 14). If an employee has too much work waiting in his or her queue, that work can be reassigned to another employee (EMC, 2009b: 9). Though this may prevent a worker from becoming burdened with too much work, it can also be used to ensure that no worker is ever idle. EMC celebrates the ability of its BPM module to intensify work volumes (EMC, 2009b: 7). Workflows can be altered by management, but not employees, at any time resulting in a work environment where, 'users are simply presented with tasks in accordance with the new version of the process and may even be unaware of the change to the process' (IBM, 2008a, 13). EMC systems give management a panoptic view of any work process within the BPM module, realizing an unprecedented level of control over office workers.

Through BPM software individual workers may be reduced to nothing more than employees of an intellectual assembly line where they simply perform their predetermined responsibility to a document, and then send it along to the next employee. Furthermore, when the system requires tasks to be performed within a specific (often narrow) timeline, the 'intellectual assembly line' more closely resembles its Fordist counterpart (the subject of Braverman's critique). Workflows become a reification of the human process of content creation. No more is the work process an exchange of ideas and responsibilities between human agents, but instead it becomes a simple algorithm preprogrammed into a BPM module that is controlled and administered by management and the system administrator. Ironically, the more

complex the workflow, the simpler and more routinized the tasks within that workflow become. BPM software does not just facilitate subdivision and routinization of a workflow; it is premised on such a concept.

Deskilling

As individual employees lose control over the work process and are given increasingly smaller, routine tasks, they become deskilled. While an employee may have been free to perform a wide range of tasks before the deployment of an enterprise content management system, such software ultimately casts the employee's role within a narrow range of simple, scheduled functions. Within this narrow range of responsibilities a worker is not only deskilled, but also easily replaced. However, even though there is a decline in the level of skill of the worker, Braverman argues that the reduction of an understanding of the labour process is an even greater loss to the worker (1998: 294-5). Thus not only is an employee faced with a loss of their skill (making them easily replaceable), they no longer are knowledgeable of the broader work process, and as such they have virtually nothing to offer their current or future potential employers. It is not the loss of specific skill that is the greatest impact of an EMC system on a worker, but the loss of knowledge over the work process in general. The more knowledge is codified and reified within the ECM system, the more the worker becomes an appendage of the machinery alienated from his own intellectual labour. This problem is compounded by the access restrictions enforced by an EMC system. An EMC's ability to limit access to information ensures that workers will be deskilled in both the absolute and relative sense.

The decline in skill of office employees under an EMC system is compounded by copyright laws. The copyright for material produced by an employee under the scope of employment is the employer's, unless there is a written agreement to the contrary (United States Code). Given an EMC system's ability to capture content not only the final version of documents, but all the ancillary and supporting content including draft versions and electronic communications, a prodigious number of copyrights accrue to the employer. More importantly, an intellectual worker's most important resource, his or her own knowledge, is transformed from tacit knowledge, which is theirs exclusively, to the legally protected property of the employer. The ability of ECM systems to capture tacit knowledge is one of their primary attributes, with IBM noting that their system can, 'capture critical undocumented information from the aging workforce' (IBM, 2010a: 3), and stating that companies, 'need to capture all of their [workers'] undocumented knowledge and experience without disrupting day to day operations' (IBM 2009: 3). Thus employees working for an organization using an ECM system see themselves deskilled on three fronts: the loss of skill as work is subdivided and routinized, the diminishing of knowledge about work processes in general, and the transformation of their own knowledge into the private property of their employer. For Braverman, automation and Fordist assembly lines were the implements of the degradation of physical/industrial work in the 20th century. The same potential for the degradation of intellectual labour in the 21st century is present in enterprise content management systems.

Reskilling and minimizing the negative effects of an ACM system

Braverman's analysis of industrial labour in the twentieth century reveals that deskilling is not the only outcome when management deploys technology to gain greater control over the work process. While deskilling is the fate of most employees, some must be reskilled or upskilled, and he specifically notes that computerization creates a special group of skilled administrators (Braverman, 1998: 234). Several authors have noted that the introduction of computer technology does not deskill intellectual workers in the same linear manner as machinery deskills manual labourers (Thompson, 1989: 115; Meiksins, 1994: 49; Heisig, 2009: 1645). Zuboff specifically notes that the introduction of computer technology can result in significant upskilling of intellectual workers (1998: 243). The crucial question must not be simply, do ECM systems deskill? Instead, one must ask how are the skills of creative workers changed, and how is their work experience changed (Thompson, 1989: 120). If skills are being transformed by such systems into those that are more easily routinized and quantified, then workers face an increased danger of being made expendable (Huws, 2003: 165-166). As work becomes increasingly reified within ECM systems and measured by performance indicators, the work process loses its spontaneity and the workers lose their autonomy (Huws, 2007: 10). While literature from ECM proponents highlights the advantages of such systems to institutions (not necessarily the employees) and vendor literature speaks of 'enabling people' (IBM, 2008b: 2), there is a need to empirically study this claim. Optimistic accounts of ECM implementations by software vendors fail to discuss how such systems change the skill levels of employees.

Information technology departments clearly benefit from upskilling by ECM systems. System administrators require considerable technical skills to operate EMC systems. Furthermore, as content and content management systems become increasingly important to an organization, so too do the system administrators. The information rights management and auditing protocols extend not only to the office workers, but to all aspects of the organization. As such, EMC system administrators have the potential to access information from the highest ranking officials. Because of the complexity of such systems, IT departments may have to hire additional workers to administer and maintain the system or spend time upskilling existing employees. While EMC systems pose a threat to both employees and middle management, they are a source of considerable reskilling for system administrators.

But while the reskilling of system administrators is inevitable in a work environment that uses an ECM system, there is no reason why reskilling must be limited to this group. The efficiencies gained through automation do not have to necessarily result in staffing redundancies, and can instead lead to a more productive workplace. The introduction of an ECM system at Brigham and Women's Hospital in Boston has allowed staff there to better coordinate grant proposal writing, helping them to secure over \$40 million in new funds since the introduction of the system (Xythos, 2010b). Mundane tasks can be eliminated, and instead of eliminating those who perform such tasks, these workers could be reskilled for other more complex functions. While a review of the technical literature on ECM systems identifies the potential for deskilling, there also exists a potential for upskilling and using the collaborative features of such

software including blogs, wikis and instant messaging, to make work more social, though workers must remember that even new mechanisms for social exchange created by information systems can fall under the panoptic control of management (Zuboff, 1988: 382). The limited case studies provided by ECM providers that highlight how such systems can provide a return on investment are not a substitute for the critical examinations of how the content management software both quantitatively and qualitatively changes the labour process.

Conclusion

Enterprise Content Management systems are filled with contradictory potential. As their proponents claim, they do have the capacity to remove much of the drudgery from office work and empower employees. Collaboration and other software within an ECM system can enrich the working environment. However, it would be naïve to believe that such systems offer only benefits. ECM systems are clearly a tool used by management to gain greater control over the labour process. The pervasive surveillance and monitoring capabilities deprive employees of control. BPM not only allows for but is focused on subdividing and routinizing tasks. Does the increased automation offered by ECM systems really remove drudgery from intellectual work, or does constraint by a computer automated workflow make the creative work more repetitive and tedious?

ECM systems do not merely embody a dynamic tension between the deskilling and reskilling potentials of digital technology: they also crystallize a more general dyadic contradiction over the nature of work. On the one hand such systems reflect a broader trend of large institutions to rely on capital in the form of enterprise software to increase efficiency and profitability, while at the same time standardizing the labour and processes involved. On the other hand ECM systems could allow for the radical democratization of labour processes because of their ability to coordinate complex labour processes and the degree to which they facilitate cooperation between various individual laborers, who would thus become transformed into a 'collective worker' (Marx, 1976: 469). However, any such gains will be limited by the degree of alienation produced by such systems as employees are separated from their most important productive capability – tacit knowledge.

The increased adoption of ECM systems by large organizations suggests that Braverman's deskilling thesis continues to possess analytical potential in the digital workplace. While several commentators have suggested that Braverman's analysis was based on a romanticized view of traditional manual labour that has become outdated (Meiksins, 1994: 52; Heisig, 2009: 1642), the Taylorist underpinnings of ECM systems emphasize that the managerial trend of worker control and profit maximization remain. Despite the empiricist critiques of Braverman (Spencer, 2000: 228, Adler, 2007: 1314) his work continues to highlight the importance of viewing work as a dynamic process comprised of living labourers and not simply a reified production algorithm. Future research must be aimed at determining the effects of these systems on workers once deployed. A failure to critically examine such systems will ensure that the worst traits of Taylorism and Fordism that befell industrial labourers in the 20th century will extend to office workers in the 21st century.

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