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Work in and beyond the Second Machine Age: the politics of production and digital technologies

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Abstract

Erik Brynjolfsson and Andrew McAfee, in their widely read and politically impactful book, *The Second Machine Age* (2014), highlight the costs and benefits of digital technologies for the volume and quality of work and identify reforms designed to ensure that digital technologies deliver net advantages to workers and society more generally. This article offers a critique of their thesis. Specifically, it criticises the authors for their neglect of the nexus between the politics of production and digital technologies. They fail, in short, to grasp the importance of power relations for the form, direction, and outcomes of digital technologies. The article argues for an alternative view of the progress of digital technologies that is rooted in an understanding of the political economy of capitalism. In this respect, it draws on and applies ideas and concepts from Marxian political economy.

Keywords: capitalism, digital technologies, future of work, politics of production, Second Machine Age

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Introduction*

Erik Brynjolfsson and Andrew McAfee's acclaimed book, *The Second Machine Age* (2014), offers a sober but ultimately hopeful vision of the progress of new and emerging digital technologies in society. They reflect on the development of digital technologies such as driverless cars and 3D printers and highlight the huge implications of these technologies for the future of work. On the one hand, advances in digital technologies are going to sweep away many existing jobs, leading to potentially higher unemployment and greater inequality. On the other hand, such advances bring forth the possibility of a bountiful future of less toil, more creative work, and greater human freedom. Brynjolfsson and McAfee set out in their book the kind of reforms required to secure a better future for work and workers in the Second Machine Age.

Brynjolfsson and McAfee's book has been widely covered in the media and in politics. The term 'The Second Machine Age' has become something of a byword for the new technological revolution that society is now living through – a simple Google Search of the above term at the time of writing (February 2016), for example, revealed 296,000 results, illustrating the wide influence of the book's lexicon. The book was shortlisted for the *Financial Times* and McKinsey business book of the year award in 2014 and is listed as a *New York Times*, *Wall Street Journal*, and *Washington Post* bestseller, indicating its broader appeal outside of academia. In the political realm, the authors have promoted the ideas contained in their book at various high profile gatherings including the 2015 and 2016 World Economic Forums in Davos (McAfee, 2015; Klein, 2016). Some prominent public figures – e.g. Andrew Haldane (2015), Chief Economist of the Bank of England – have also invoked the

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book in speeches and articles. Politically, its ideas are seen to present both a warning of how technological progress can impose great costs on society and an opportunity to identify the kind of reforms needed to exploit the 'bounty' afforded by new digital technologies. The book is a key contribution in a broader contemporary debate focused on the implications of digital technologies for the future of work (see e.g. Mason, 2015).

Despite its modern-day relevance and significance, there has been no real critical discussion of Brynjolfsson and McAfee's book in sociological and political economy debates on work (Dyer-Witheford (2015: 184-6) is a partial exception). One objective of this article is to address this gap. The article offers a critique of Brynjolfsson and McAfee's thesis. It argues that the authors fail to uncover the linkages between the politics of production and digital technologies. Rather than being some neutral force operating behind the backs of people, digital technologies are deeply connected to relations of power. These relations, more directly, influence the form, direction, and outcomes of digital technologies, including within the work realm. The article supports and promotes an alternative view of the progress of digital technologies that is rooted in an understanding of the political economy of capitalism. In this respect, it draws on and applies ideas and concepts from Marxian political economy.

Envisioning the future of work

Brynjolfsson and McAfee's book can be seen as part of a long-standing literature that envisions the future of work and life in a technologically advanced world. Karl Marx (1976) together with J.M. Keynes (1963), for example, foresaw great transformations – for good and ill – from the advance of technology under capitalism. Others like Daniel Bell (1973) and Alvin Toffler (1970), writing from very different ideological standpoints, have tackled the

social and economic changes wrought by new technology. In the literary world, too, works such as Aldous Huxley's *Brave New World* (1970) and Kurt Vonnegut's *Player Piano* (1980) have sought to depict future technological utopias and dystopias.

The focus for Brynjolfsson and McAfee are the digital technologies of the Second Machine Age (the Industrial Revolution is seen as the 'First Machine Age'). They highlight the massive and continuous improvements in computing power and show how these improvements have created the basis for great advances in robotics and artificial intelligence. Where previously robots were limited in their use and application, they can now be used and applied in many different contexts. Of interest here is the way that the authors see digital technologies transforming the realm of work. Here they offer contrasting views – both negative and positive – of how the application of digital technologies will affect work, its volume and content.

On the negative side, digital technologies threaten to eliminate many of the jobs currently held by workers. Manual, routine jobs remain most vulnerable to automation but there is also scope for machines to replace non-manual, non-routine jobs, including several high paying ones. Advances in robotics mean that machines can replace jobs that have thus far survived automation. The task of driving a car, for example, has proved difficult for machines to master. With the advent of driverless cars, however, the human tasks of taxi driver and trucker may be under threat. Robots that can lift heavy objects and navigate their way around warehouses may extinguish the human occupations of factory and warehouse operative. The design and spread of new digital technologies capable of diagnosing diseases, translating languages, and writing media reports, may also put at risk some high paid medics, translators, and journalists. Brynjolfsson and McAfee link the rise of digital

technologies to the polarisation of the labour market. In their view, unemployment results from workers possessing ‘‘ordinary’ skills’ or the wrong education (Brynjolfsson and McAfee, 2014: 11).

Beyond displacing many existing jobs, digital technologies are also set to increase inequality (or ‘spread’) in society. Brynjolfsson and McAfee (2014: 148-9) see the prospect of a ‘winner-take-all-economy’, in which the income, wealth, and life chances of a small elite soars ahead of the rest of society. They highlight the rise in income inequality and fall in labour’s share of income in the developed world over recent decades as evidence of the regressive effects of technological change (Brynjolfsson and McAfee, 2014: 132-34).

On the positive side, the authors see scope to overcome the costs of digital technologies, provided society undergoes certain changes and reforms. Technological unemployment, they suggest (2014: 182), can be prevented by society thinking more creatively about the things it needs and wants to consume. Humans possess certain unique qualities such as ideation and creativity (191-92) that, when combined with the best available digital technologies, can be used to create new sources of consumption and work in the future. By harnessing ‘the freed-up time and energy of the people whose old jobs [have been] automated away’ (182), society can generate the employment required to prevent mass unemployment. What is needed is the imagination and entrepreneurial flair to spot the employment opportunities that will emerge. As for the quality of jobs, Brynjolfsson and McAfee imply that jobs in the future will be superior to jobs in the present. Progress in digital technologies, they suggest, will mean ‘less need to work doing boring, repetitive tasks and more opportunity for creative and interactive work’ (166). Good jobs in the future will include creative writer, digital scientist, and entrepreneur (see Brynjolfsson and MacAfee,

2015). While other less good jobs such as gardener and carer may persist (at least until digital technologies eliminate them), the economy will tend towards the creation of 'new and better' quality jobs (ibid.). The latter outcome, in essence, will result from workers finding ways to complement digital technologies. The idea of society 'racing with machines, instead of against them' is promoted by Brynjolfsson and MacAfee as a route to economic and social progress.

The authors also recommend interventions designed to combat rising inequality (or 'spread') stemming from digital technologies. As highlighted above, Brynjolfsson and McAfee's view that new sources of paid employment – and high quality paid employment at that – can and will be created in the future suggests that inequality linked to unemployment can be kept at bay. More directly, they support investment in education and infrastructure together with the encouragement of greater immigration and entrepreneurship, to help support higher employment and in turn lower inequality (Brynjolfsson and McAfee, 2014: 208-21). They also consider the merits of other policies including the adoption of a 'basic income', or better still a 'negative income tax' (ibid.: 232-38), to aid those at the bottom of the income distribution.

Notably, the authors distance themselves from more radical reforms (see also McAfee, 2015) – for example, they reject alternatives to capitalism, preferring instead to work within the confines of capitalist social relations (Brynjolfsson and McAfee, 2014: 231). Their general policy agenda, as they admit, is relatively modest, being concerned with the promotion of higher rates of overall economic growth (ibid.: 228).

Brynjolfsson and McAfee's book, in summary, highlights both the advantages and disadvantages of digital technologies for the work realm. Although their book offers no

decisive verdict on the outcomes of the Second Machine Age, it does suggest that society has the capability to maximise the 'bounty' and minimise the 'spread' from digital technologies. The book is a call for society – and more directly, policy-makers – to harness digital technologies in a way that secures a better future for work and humanity more generally.

Second thoughts on the Second Machine Age

The thesis of Brynjolfsson and McAfee, while interesting and provocative, contains critical flaws. Firstly, the authors fail to recognise how digital technologies are themselves products of unequal power – they are not neutral as such, but rather are created, harnessed, and reproduced under conditions where power resides with capital, not labour. This means that what kinds of digital technologies get produced, how they are used, and what outcomes they yield, are at least partly dependent on the interests of capital and its representatives.

There are two interrelated points to make here. The first relates to the objective of digital technologies. Insofar as these are developed under capitalism, they have as their primary objective the goal of increased surplus value production. Here the notion of 'surplus value' refers to the additional value created by workers in production that is not remunerated by wages – in effect, it represents the unpaid work time of workers and this time constitutes the source of capitalist profit (for a presentation and defence of the labour theory of value, see Elson, 1979; Foley, 2000; Fine, 2001). The point here is that digital technologies are defined and limited by the quest for surplus value – they are not unbounded. If digital technologies jeopardise surplus value production, then they will be blocked by capital. The second point relates to the consequences of digital technologies. To the extent that the latter are used for the purposes of surplus value production, they will lead to outcomes that

are favourable for capitalist employers and unfavourable for workers. Digital technologies can and often are used to facilitate exploitation and in this sense they represent no necessary friend of workers.

To illustrate the points made above, consider how digital technologies have actually been used. Take the example of Mechanical Turk, operated by Amazon (Bergvall-Kåreborn and Howcroft, 2014). Mechanical Turk is a 'crowd employment platform' that firms use to secure digital labour. It enables firms to accomplish small data processing tasks at much lower cost than if they relied on more traditional sources of paid employment. It has a key role in what some have described as the 'peer' (or 'gig') economy (see Friedman, 2014). Brynjolfsson and McAfee (2014: 243) specifically endorse crowdsourcing, including Mechanical Turk and other similar platforms such as TaskRabbit (indeed they refer to their own use of TaskRabbit in the writing of their book). 'Peer economy companies', in their view (ibid.: 245), 'are examples of innovations that increase the value of human labour rather than reducing it', and their growth ought to be encouraged by policy-makers.

As argued by Bergvall-Kåreborn and Howcroft (2014), however, Mechanical Turk (and other similar crowd employment platforms) has clear negative effects on the quality of work. Not only does it mean workers being assigned to dull and repetitive tasks, it also entails their being paid at rates well below minimum wage and with no social protection. The platform enables firms to bypass normal labour standards, and by rendering workers as less visible and more remote, leads firms to ignore their moral responsibilities. Bergvall-Kåreborn and Howcroft (2014: 221) see Mechanical Turk as a technology 'leveraged by capital to capture and alienate labour power'. It represents, in other words, a means to exploitation and profit.

Within more conventional work settings, capitalist employers can use digital technologies to increase surplus value production. For example, they can get workers to wear electronic devices that measure and monitor, on a moment-by-moment basis, their health and well-being. These devices are often marketed as part of 'wellness' programmes; however, their aim and effect is to increase the amount of work performed by workers. This increase comes about not because workers are 'happier' about their work and lives, but rather because they are subject to increased surveillance and longer hours of work (often outside the workplace) – ironically, the pursuit of 'wellness' can lead to a more stressed and anxious workforce (Davies, 2015; Cederström and Spicer, 2015). Within Amazon warehouses, to take one infamous case, digital technologies are used to measure and monitor workers' performance – the consequence of this 'digital Taylorism' is to dehumanise the workplace (Schumpeter, 2015). Capitalist employers, to give another example, can also now use sophisticated digital scheduling devices that fit workers to work in a more precise way, thereby reducing the porosity of the working day (Luce, 2015). These examples illustrate how capitalist employers are able to shape the design and operation of digital technologies to realise their own goals, at the expense of those of workers.

The problem with Brynjolfsson and McAfee is that they see digital technologies in essentially apolitical term – there is more in their book on the power of computers than on the power of capital – and as such they fail to explain how these technologies are and will be used in ways that increase the exploitation of workers. The authors, to be sure, recognise issues of power – they do so, specifically, when considering the problem of 'spread' in society. Here however, power is treated almost as an after-effect of digital technologies. What the authors fail to show is how power affects the selection and evolution of digital technologies

on an ongoing basis – that is, they fail to identify the essential political nature and content of digital technologies.

A second related point can be made here. This relates to the limits imposed by surplus value production on the replacement of labour by digital technologies. The need for capital to ensure that surplus value is produced creates a tendency for capital to use labour within production even where digital technologies may allow for its replacement. The realisation of surplus value as profit also provides a reason for capital to keep workers in paid work so as to maintain levels of effective demand. Huws (2014: 7-8), in a similar vein, shows how digital technologies have not lessened paid work, but rather have maintained and even increased it – they have done so, specifically, by creating new space and opportunities for commodification (see also Fuchs, 2014; Dyer-Witheford, 2015). Take the example of digital devices such as mobile phones. New jobs have been created not just through their production, distribution, and sale, but also via their use – these devices, in particular, have become valuable means for advertising, turning the private realm in which friends and family communicate with one another into new sources of profit-making (Huws, 2014: 14-16). The persistence and indeed expansion of paid work, as emphasised by Huws, reflects on the broader necessity under capitalism to use labour in the production and realisation of surplus value. The fact that 'more and worse jobs' can be created in the future despite, and indeed because of progress in digital technologies, is ignored by Brynjolfsson and McAfee.

There is also the argument, related to the point made above, that capital will forgo expensive investments in digital technologies where it can achieve its goals more cheaply via the use of low cost labour. Brynjolfsson and McAfee see the spread of digital technologies as a remorseless and inevitable process. They ignore how, under conditions where firms are

'financialised' and hence subject to pressure to make profits in the short-term, investments in digital technologies may be delayed or thwarted (Lapavitsas, 2011; Thompson, 2013).

Three further points can be made here. The first relates to issues of gender. Feminist writers (e.g. Wacjman, 2006; 2010) have highlighted how digital technologies both reflect and shape gender power relations. One aspect stressed is the way that women are underrepresented in the processes and practices of technological innovation and how this can lead to the reproduction of gender inequalities. 'Women's employment in the information technology, electronics and communications (ITEC) sector', as Wacjman (2010: 145) reports, 'is much lower than their participation in the workforce generally, and it is declining in most industrialised countries'. The argument of feminist writers is that the design of digital technologies needs to be opened up to more women if gender equality is to be realised. Brynjolfsson and McAfee, by contrast, have nothing to say on gender and gender differences. They show how digital technologies affect the 'spread' between rich and poor, but fail to show how the same technologies can serve to embed power inequalities between men and women. The non-neutrality of digital technologies from a gender perspective, in short, is overlooked by the authors.

The second point relates to the potential resistance of workers to digital technologies. Brynjolfsson and McAfee's book is oddly silent on workers' resistance – although they refer to the power imbalances between the winners and losers of digital technologies, they omit to say how the losers (i.e. workers) will attempt to fight back against the winners (i.e. capitalists). If, as argued above, digital technologies lead to an erosion in job quality, then their use is likely to elicit a negative response from workers. Rising inequality linked to the unequal ownership of digital technologies, too, can be expected to prompt some resistance

from workers. The point is not just that resistance is possible but also that it is necessary in ensuring that workers share in the gains from digital technologies. Without direct and collective resistance from workers, it can be argued that the fruits of digital technologies will flow disproportionately to capital.

Brynjolfsson and McAfee's (2014: 199) advice to workers is not to organise and challenge capital, but instead to gain an education in order to be ready for the changes wrought by digital technologies. Their thesis, in this sense, is incredibly reactionary if not downright conservative. Indeed, McAfee (2015) has openly defended the 'free market' and argued against greater collective regulation of business by the state and trade unions, confirming his conservative credentials. An underlying problem is that Brynjolfsson and McAfee tend to focus their attention on the individual – they are particularly concerned that individuals acquire the right education to cope with the challenges posed by the Second Machine Age. The collective dimension, including the role of class and class conflict, by contrast, is elided in their book. This blind-spot leads to a failure to see the need for collective action (including changes in ownership) to promote more equitable social and economic outcomes.

The third point concerns the authors' focus on the promotion of more paid work, as if this is the main goal to be aimed for. Their justification is that 'work is beneficial' (Brynjolfsson and McAfee, 2014: 234) not just relative to the alternative of unemployment but also in an intrinsic sense – work, they argue, gives people 'self-worth, community, engagement, healthy values, structure, and dignity' (ibid.). Here, as argued above, Brynjolfsson and McAfee fail to see how digital technologies can undermine the quality of paid work. Specifically, they ignore how the proliferation of digital technologies can be associated with the growth of insecure, episodic, intensive, and low paid work (Huws, 2014; Dyer-Witheford,

2015). In addition, the authors overlook the value of promoting a life beyond work and in their focus on creating more paid work they perpetuate the myth – convenient to capital – that wage labour is the main means to fulfilment in society. They equate a 'healthy society' with 'an economy of workers' (Brynjolfsson and McAfee, 2014: 237) when it can be argued that the former is actually better achieved in a work-less economy (that is, an economy where the volume and duration of work is minimised as far as possible).

De-fetishising digital technologies

At a political level, Brynjolfsson and McAfee identify the potential for digital technologies to lessen drudgery and to extend human freedom – in this sense they identify correctly an important goal for the use of digital technologies. As mentioned above, however, they fail to see how digital technologies can achieve the opposite outcomes (i.e. more drudgery and less freedom) where they are used by capital to increase profitability – indeed they end up endorsing the pursuit of more paid work, ignoring the benefit of alternative goals including that of achieving less work. Their book, in short, can be argued to subvert the ideal of a better future for work and workers.

The crucial problem is that Brynjolfsson and McAfee fetishise digital technologies. They see these technologies in isolation from issues of ownership and power. They fail to see how such technologies are used under capitalism to promote the interests of capital and how progress in their use for emancipatory ends requires challenging the unequal power at the heart of capitalism.

The fetishisation of digital technologies is repeated in the work of other authors. Mason (2015), for instance, sees digital technologies as creating the basis for a 'postcapitalist'

society, in which work time will be reduced and leisure time will be expanded. Work under 'postcapitalism' will occur under collaborative and non-hierarchical conditions and will aim to meet real human needs. Mason's thesis derives insight from the Marxian literature. Like the approach of Brynjolfsson and McAfee, however, it neglects the barriers to progressive change created by capital's ownership of production. That is, it fails to show how digital technologies are used to prop up capitalism, rather than negate it, and how the creation and use of digital technologies for ends beyond profit creation requires no less than the transfer in ownership of production from capital to labour.

There are two points to make here. One concerns the importance of the social, economic, and political conditions of production for the development, use, and reproduction of digital technologies. The point is that digital technologies are not to be seen in purely technical and economic terms; rather they are to be viewed as politically and socially defined. Capitalism gives to digital technologies a particular form. It also helps to shape their boundaries and influence their outcomes, both in the sphere of production and distribution. In essence, digital technologies reflect and reinforce the class antagonisms of capitalist production. Books like those of Brynjolfsson and McAfee and Mason are guilty of treating digital technologies in ways that conceal their role in reproducing the power of capital over labour.

The second point relates to the question of reform and the promotion of possible alternative futures. How can society develop and use digital technologies in ways that help to liberate humanity from toil and drudgery? There are several answers to this question. Firstly, within capitalism, support can be given to stronger state-enforced regulations that protect and promote the rights of workers in the digital economy. This could include, for example, new legal protections for workers employed in the so-called 'gig' economy

(Friedman, 2014). Secondly, moving beyond capitalism, the case can be made for forms of collective and shared ownership of production. Radically, the move to a system of worker-owned firms can be seen as the only way for society to realise the full benefits of digital technologies. The obstacles, economic and political, to the realisation of worker ownership remain formidable, but they should not deter our commitment to overcome them.

In summary, only by de-fetishising digital technologies – i.e. seeing them in their proper political context – is it possible to observe the barriers and opportunities for human flourishing in today's (and tomorrow's) technologically advanced society. It is incumbent on sociologists and political economists of work to stress this point, against those like Brynjolfsson and McAfee who seek to separate digital technologies from the politics of production.

Conclusion

Brynjolfsson and McAfee's book has popularised the idea of the Second Machine Age. Its vision of society being transformed by digital technologies has captured the attention and imagination of academics, politicians, and the wider public. While their book identifies the costs of unemployment and inequality arising from the progress of digital technologies, it also outlines the potential for such technologies to be used to create a better future for work and life. Indeed, it sets out a series of reforms that can be adopted to help maximise the benefits and minimise the costs of digital technologies.

The book's core thesis is fatally flawed, however. Its flaws can be revealed by an application of Marxian political economy – a task accomplished by this article. The book, in particular, fails to see how digital technologies reflect and reinforce capitalist social relations. The

imperatives of capitalist production require the continuous creation of surplus value – this fact necessarily places limits on the development and evolution of digital technologies. These imperatives also mean that the outcomes of digital technologies for workers are often negative. The perpetuation of low paid and low skilled work can go hand-in-hand with the advance of digital technologies. Inequalities of income, gender, and status can also be reproduced, despite and potentially because of digital technologies advancing. The regressive implications and impacts of digital technologies, in essence, stem from the class nature of ownership and the drive for surplus value – they are necessary features of the progress of digital technologies under capitalism. In supporting capitalism and dismissing radical alternatives, Brynjolfsson and McAfee push the readers of their book towards an acceptance of the status quo, in which the interests of capital take precedence over those of labour. In this case, their book blocks rather than supports progressive change both at the level of the work realm and society more generally.

A broader contribution of this article, beyond the critique of Brynjolfsson and McAfee, is to promote an understanding of digital technologies that is grounded in an analysis of the nature and dynamics of capitalism. An emergent literature linked to Marxian political economy is now addressing the politics of digital technologies within capitalism (Fuchs, 2014; Huws, 2014; Dyer-Witheford, 2015). Other modern contributions such as that of Mason (2015), again drawing on Marxian political economy, also promote critical thinking around possible alternative ('postcapitalist') futures in the digital economy. This article, in common with these contributions, supports the application of Marxian political economy in the study of digital technologies.

Two reasons can be given here for supporting Marxian political economy. The first is that it offers a way to explain how digital technologies are used and operated by capital to further the exploitation of workers – it fixes attention, in this sense, on the political nature and implications of digital technologies. Secondly, from an ideological perspective, it galvanises critical debate on the need to develop and harness digital technologies in ways that transcend capitalism. In particular, it demands consideration of alternatives to the capitalist ownership of production, including, for example, forms of worker ownership. In short, it helps to promote a radical vision of the future in which digital technologies become means to human fulfilment, rather than tools for increasing profit. In this respect, it seeks to go beyond, and indeed subvert, the ideology of the Second Machine Age.

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