

ORIGINAL ARTICLE

Harm, injustice & technology: Reflections on the UK's subpostmasters' case

M. R. McGuire¹ | Karen Renaud² 

¹Senior Lecturer, Department of Sociology, Surrey Centre for Cyber Security, University of Surrey

²Reader, Department of Computer and Information Sciences, University of Strathclyde; School of Computing, University of South Africa, Pretoria, Muckleneuk Ridge, Gauteng, South Africa

Correspondence

Karen Renaud, Reader, Department of Computer and Information Sciences, University of Strathclyde.

Email: karen.renaud@strath.ac.uk

ABSTRACT

One of the more striking recent miscarriages of justice was perpetrated by the UK's Post Office when subpostmasters and subpostmistresses were prosecuted for fraud that actually arose from malfunctioning software. Over 700 were victimised, losing homes and livelihoods. We first use a zemiological lens to examine the harms caused by these events at both a first and second-order range – referred to as 'ripples'. Yet, the zemiological analysis, while useful in identifying the personal harms suffered by postmasters, is less successful in associating with some of the wider costs – especially to the justice system itself. Additional tools are required for identifying how technology might be culpable in the damage that unfolded. We use a technological injustice lens to augment the zemiological analysis, to reveal how and why technology can harm, especially when appropriate checks and balances are missing, and naïve belief in the infallibility of technological solutions prevails.

KEYWORDS

harms, miscarriage of justice, technological justice, zemiology

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *The Howard Journal of Crime and Justice* published by Howard League and John Wiley & Sons Ltd.

It is only when they go wrong that machines remind you how powerful they are.
(Clive James: see James, n.d.)

1 | INTRODUCTION

Suspensions that technology might harm, as well as benefit, have been evident since at least the industrial revolution (Gerstle, Lichtenstein & O'Connor, 2019). The rapid transition from agrarian to industrial society brought, in its wake, a range of immediately recognisable harms. The most obvious of these: the attendant pollution, created highly toxic and often deadly environments. In the UK, industrialisation caused life expectancy between the mid-17th and the mid-18th centuries to fall to its lowest point in the period from 1540 to the present day (Davenport, 2020). Industrialised capitalism has also been associated with a range of less obvious, more invisible harms, such as social inequality and exploitation. While traditional industry continues to present health and environmental risks, our fourth industrial revolution, centred upon digital technology (Schwab, 2017), has been charged with generating newer and more subtle harms which threaten social well-being (Naslund et al., 2020). These range from moderate concerns, such as addictive screen usage (Pandya & Lodha, 2021) and cognitive damage (Carr, 2010), to more worrying impacts such as the emergence of cybercrime (McGuire 2007; Wall 2007), increased extremism (Benigni, Joseph & Carley, 2017; Winter et al., 2020) and the prospect of digital wars (Flynn, 2021; Kaiser, 2015).

More elusive and less considered harms arise from the impacts of digital technology upon the process of justice and, indeed, the justice system itself. Where these *have* been acknowledged, discussion has tended to focus upon bias (Akter et al., 2021) and the growing realisation that algorithms do not function neutrally, or independently, in evaluating outcomes. Rather, they come 'preloaded' with the assumptions of their software creators (Allen, 2019; Banerjee & Chanda, 2020; Bartz-Beielstein, 2019; Devillers, Fogelman-Soulié & Baeza-Yates, 2021) or other biases acquired from the social world (Danks & London, 2017). However, the increasing dependence of the justice system upon technology-driven solutions, means that bias may only be one variety of potential legal harm. The Science and Technology Studies (STS) literature offers a useful resource for tracking these developments, especially in the way its concept of a 'socio-technical system' or an 'actor-network' (Callon, 1992; Jasanoff, 2004; Latour 1987) helps clarify the interdependencies between human and technical agency. A more specific focus upon technology-driven disruptions to law and legal thinking has also begun to emerge within STS research. For example, Brownsword (2016, 2019), points to the regulatory function of devices like 'Intelligent Speed Assistants' (speed limiting technologies)¹ which undermine legal prohibitions against speeding and thereby replace normative law with purely technical management. In this article, however, we want to point towards a more comprehensive impact of technology upon legal process. By drawing upon an older, more polemical literature on technology – especially the significantly undervalued contributions of Marcuse – we will suggest that overdependence upon technology is not just threatening justice itself but our very capacity to understand such threats. Marcuse was an early critic of the coercive, control aspects of technology which had become evident from the mid-20th century and argued that a form of 'technological rationality' had emerged which increased public compliance towards such controls (Marcuse, 1941). In this article, we point to the risk of technological rationality contributing to a shift towards what we call *technological justice*. This is not technological justice as an ideal aimed at 'reconcil(ing) ... technological advances and aspirations with greater social justice and equality between societies' (Ortega, Pérez & Turianskyi, 2018, p.2). Rather, this is a technological justice which reorients traditional judicial processes and

goals towards machinic objectives and practices – a development which threatens to undermine rather than to enhance justice. We situate such risks in the context of the British subpostmasters/subpostmistresses (SPMs) scandal, where hundreds were unjustly prosecuted and convicted of fraud or related offences – almost entirely on the basis of evidence generated by digital technology. The case represents an instructive example of how the diversion of legal systems away from social towards technical norms is likely to pose new kinds of jurisdictional challenges.

Section 2 provides a high-level overview of the Post Office miscarriage of justice, which will be used as a vehicle to support this discussion. By utilising a zemiological framework (see section 3), we will first demonstrate how technological justice in the SPMs' case created both short and long-lasting harm (section 4). Second, we will explain why, though zemiology can be sensitive to concepts of technological harm (see, in particular, Wood, 2021), more remains to be done in highlighting precisely how technology generates the objects and conditions for this. Fundamental to this critique is a rejection of an 'instrumentalist' view of technology (Feenberg, 2010) – its naïve conceptualisation as a neutral, causally inert force, wholly dependent upon human action for its significance. We conclude, in section 5, by evaluating the risks posed by technological justice and whether the subservience of legal norms to what Hildebrandt (2009) has termed 'technical normativity' means, as she has argued, the 'end of law'. While this may be a step too far at present, it does emphasise how insidious the influence of Marcuse's technological rationality upon legal process may now be. For, with it comes a shift towards what Borgmann (2017) calls: 'the artificial slave gradually subverts the rule of its master' (Winner, 1977, p.227). Further miscarriages of justice of the kind evidenced in the UK's SPM case are likely to follow.

2 | A CATALOGUE OF HARM

In the early 2000s, the UK's Post Office introduced Horizon, a new computer accounting system meant to manage transactions more efficiently across its network of local offices. The system cost £1 billion and was designed and developed by ICL/Fujitsu Services (Flinders, 2015a; Jee, 2015). Soon after Horizon was deployed, a number of accounting shortfalls were reported by SPMs. Rather than investigate the cause of these, the Post Office's immediate and unquestioning assumption was that the shortfalls were due to theft. As a result, many SPMs were forced to recompense the Post Office under threat of prosecution. Though all initially claimed innocence, 76% were coerced into admitting guilt (Evidence-Based Justice Lab, 2021), with over 700 prosecuted for false accounting and theft (Pooler & Croft, 2020). The majority of these cases relied wholly upon evidence generated by Horizon (Wallis, 2021).

Figure 1 shows the number of prosecutions the Post Office has engaged in since 1989 (Post Office, 2020). Some SPMs were given a custodial sentence despite their avowed innocence and some despite reimbursing the Post Office. In 2019, this saga came to a head during the Post Office Horizon IT trial (Pooler & Croft, 2020; Wallis, 2021) when Justice Fraser found the associated prosecutions to be unsound. He said: 'In my judgement these submissions by the Post Office are bold, pay no attention to the actual evidence, and seem to have their origin in a parallel world' (The Honourable Mr Justice Fraser, 2019, #138). Justice Fraser fined the Post Office £58 million, and, since then, many of the convictions have been overturned (Shaw & Whitelam, 2021).

The implications of these unsound prosecutions have been significant. Not only have they damaged the lives of the victims and their families, but they have also harmed the justice system and public trust in its fairness. In the next sections, we develop a framework for analysing these implications, one which also explains why justice miscarried so profoundly.

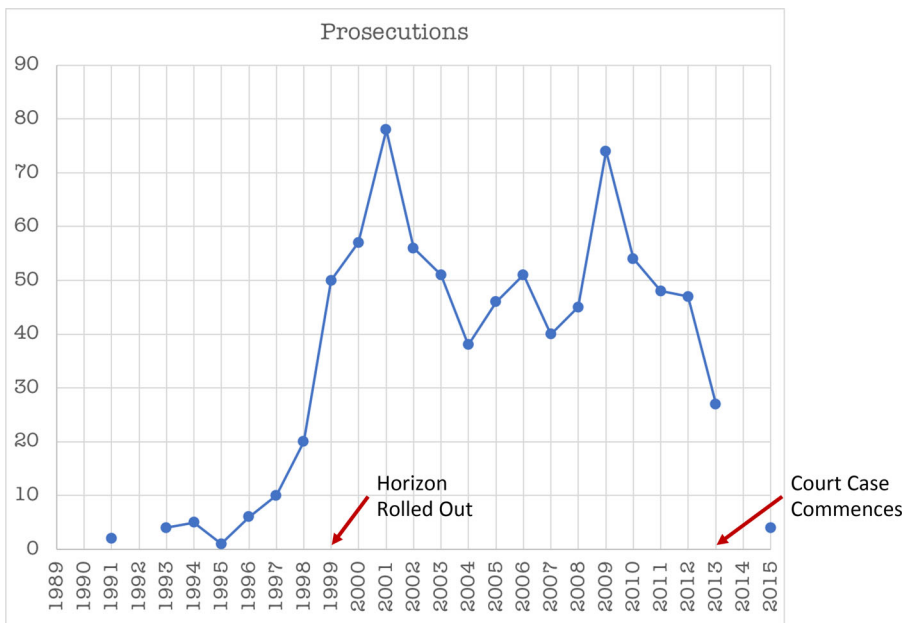


FIGURE 1 Post Office prosecutions

Source: Produced from information provided to FOI request (Post Office, 2020).

3 | HARM EVALUATION LENS – ZEMIOLOGY

We start where a zemiological approach seems to work best – with the immediate harms experienced by the victims themselves. The suffering of those who were falsely accused of wrongdoing is clearly an essential component of any harm-related discussion. In many cases, the consequences for these victims do not sit straightforwardly within legalistic conceptions or the scope of legal redress. In this context, zemiological analysis (Tombs, 2018) provides an important resource for augmenting our sense of what was ‘wrong’, whether through commission or omission, on the part of the Post Office and its associates.

However, zemiology is not yet a complete tool, with at least two interrelated weaknesses that are relevant in this context. First, there is the challenge of it being either too restrictive *or* too generous (cf. Kotzé, 2018). On the one hand, the concept of harm can be fairly blunt, lacking in the fine-grained detail required to distinguish its differing subjects, objects or intensities. For example, should harm to a non-human subject like a computer network be regarded as less significant than harm to an individual even when the former creates wider societal damage? Can constructs such as ‘harm indexes’ (Van Ruitenburg & Ruiters, 2022) successfully distinguish between differing severities of harm? On the other hand, the obvious subjectivities within the concept of harm could permit almost anything to count as a harm if so interpreted. Were SPMs harmed by their lack of technical expertise, by what those with technical expertise did to them, or by a large institution with the power to do so? Were the software experts harmed by their training, which seemingly limited their capacity to develop resilient code? As the following discussion shows, zemiology has been reasonably successful in responding to this first challenge by setting out more nuanced ways of defining how harms can be articulated. For example, Hillyard & Tombs (2007) and Pemberton

(2008) suggest that a more developed zemiological taxonomy might distinguish between several *distinct* varieties of harm: *physical*, *psychological* and *financial*, with other categories like cultural harm also worthy of consideration. More recently, further categories such as harms of recognition and harms of autonomy have also been offered (Canning & Tombs, 2021).

As we will see, this more expanded zemiological framework appropriately characterises the wide range of damage suffered by SPMs, forming an immediate region (or 'ripple' as we will term it) of harm and damage centred upon the wrongly convicted. Harms included within the immediate ripple cover at least three of the above zemiological categories and these, in turn, correspond well with other analyses of harms associated with miscarriages of justice (see, e.g., Cole, 2009).

However, as Cole (2009) notes, while this framework works well in the context of *individual* harms, it is less clear how it functions in the context of more dispersed harms, such as those associated with collectives or abstract social entities (like institutions). And while zemiologists have been keen to emphasise that harm should not be read in purely individualistic terms in order to encompass 'mass harms' of the kind produced by corporate and state entities, it rather blurs the question of how (or whether) harms can also occur to key institutions. There are cases where we might want to be able to make statements like: 'The NHS has been harmed by funding cuts', or: 'the UK has been harmed by Brexit', and not simply mean the mass of individuals who constitute such institutions but something intrinsic to the institution itself. For example, we might think that there is something in the institution which is also worthy of preservation from harm since it endures beyond the mass of individuals who make it up at any one time. And though the concept of *social* harm seems like it might provide some purchase here (Canning & Tombs, 2021), the term is used interchangeably with the term 'zemiology' and is therefore more of a catch-all phrase for harm in general, rather than one which captures these more abstract harms.

Thus, in the second, less concrete ripple of harm, we discuss, the efficacy of the zemiological framework becomes less clear. It is by no means obvious that zemiology allows us to identify the less tangible harms in the SPM case – in particular, the potential damage to our legal system. As Pemberton (2008) notes, it is also incumbent upon zemiology to create appropriate 'aetiologies of harm' (p.87) whether to distinguish between 'intention and indifference' or simply to be better at allocating responsibility for harm. This is difficult enough where responsibility is distributed – as with corporate wrongdoing. We suggest that the SPM case presents an even more difficult challenge to the zemiological approach. For responsibility here does not lie exclusively in the hands of human agents but rather in the combined impacts of technology, technological change and a socio-technical system where technological rationality has come to prevail. We return to this point in section 3.2. First, we present the zemiological analysis.

3.1 | First ripple

3.1.1 | Physical harm

Prima facie, the idea that SPMs experienced *physical* harm seems implausible. However, the stresses and inability to earn a living due to their criminal records did indeed lead to a number of evidenced health issues. In some cases, the physical harm endured was fatal. Among the more serious problems that were recorded include:

Worsened health conditions: Victims with pre-existing physical conditions were especially vulnerable. In one case, the Post Office pursued Julie Carter for theft and Tweedie (2015) writes: 'Mrs Carter is wheelchair-bound due to multiple sclerosis, a condition that her husband believes has been made worse by the stress of a six-year ordeal'.

Long-term health impacts: Some of the unjustly accused and prosecuted have had long-term health issues. For example, Nichola Arch (HEAR THE TRUTH: The ONRECORD Podcasts, 2021) describes health issues which persist some 21 years after the event. Similarly, Miss Burgess-Boyd collapsed on the second day of her trial. She has not worked since, and suffers from depression.

Harm to foetuses: One pregnant subpostmistress was exposed to risk of miscarriage from extreme stress (Alexander, 2020).

Loss of life: In at least one case, the Post Office's victimisation of a SPM ended in suicide (Caveen, 2019).

3.1.2 | Psychological harm

The physical harms experienced by victims also had a psychological dimension. Alexander (2020) writes: 'Some victims remain in a fragile state, their recovery not helped by the lack of justice and redress to date'. Nicki Arch says: 'We will never get that time back. I have suffered with depression and panic attacks ever since and take anti-depressants daily to enable me to get on with life' (The Post Office Trial, 2019). Noel Thomas spent his 60th birthday in prison, describing it as: 'hell on earth and it took me a long time to get over it' (Thomson, 2009).

3.1.3 | Economic harm

Bankruptcy: One accused couple from Newcastle-upon-Tyne owned a four-bedroom detached house and a convenience store employing 14 staff. They now live in a council-owned bungalow and receive benefits (Tweedie, 2015). Judy Ford also went bankrupt (Thomson, 2009).

Losing Everything: Tom Hedges was forced to sell his Post Office, retail business and comfortable home at a distress price. He has lived on benefits ever since (Alexander, 2020). One victim's family ended up living in a van and others lost their homes (Rack, 2020).

3.1.4 | Social harm

Accused SPMs: Tom Hedges obtained two jobs after his prosecution, but both were withdrawn when his criminal conviction was revealed. Several people shunned his family in his village (Alexander, 2020).

Their Families: The SPMs' children were stigmatised and bullied (Alexander, 2020; Campbell, 2020). Seema Misra was jailed on her son's tenth birthday, while she herself was pregnant (Mason, 2015).

3.2 | Second ripple

The previous section talks about what we could call 'first-order' harms – immediate harms to SPMs themselves, their families and communities. This ripple also extended to other harmed individuals. However, a second 'ripple' of harm, now centred upon the indirect effects of the scandal, can also be discerned and, to some extent, handled within a zemiological framework. Harms here appear to have impacted equally upon institutions and involved collective agents – not least the

Post Office itself. While the first ripple is concerning enough, the implications of this second ripple are potentially far more wide reaching, operating at a societal scale. Moreover, the tools provided by a zemiological approach to cope with this is likely to need augmentation. Among the range of harms that might be considered the following can be included.

3.2.1 | Trust in the brand

Commenting on the case, Sam Stein QC, who represented five of the appellants, told the Court of Appeal: ‘The Post Office has turned itself into the nation’s most untrustworthy brand ... through its own behaviour and its own fault over many years’ (Tobin, 2021). This stark assessment highlights the significant impact these miscarriages of justice have had upon the affection and trust the British public held in the Post Office brand before these events occurred. For example, it is interesting (though not of course definitive) to note that a recent UK-based TrustPilot ranking (accessed 17 December 2022) shows the Post Office with a score of just 1.5 (out of 5), with 84% of respondents rating the company as ‘Bad’.

3.2.2 | Harm to Post Office managers, investigators and lawyers

Because of her role in the matter, Paula Vennells (former CEO of the Post Office), was forced to step away from her NHS post and her post as part-time vicar (Daily Mail Reporter, 2020; Peacock, 2021). In tandem, there have been calls for investigations into the Post Office lawyers (Cross, 2021; Hyde, 2021), and Post Office executives (Dixon, Sawyer & Diver, 2021). At the time of writing, Vennells still holds a CBE (Commander of the British Empire) although there are calls for her to be stripped of this honour (Robinson, 2021). The government, in response to public pressure, announced that the planned investigation into the Post Office trials would be statutory (Williams, 2021b). It was also announced that reparations would be paid to the SPMs that fell victim to miscarriages of justice (BBC, 2022). If, as some have speculated, British taxpayers will fund this (Gerstle, Lichtenstein & O’Connor, 2019), the entire citizenry is, arguably, harmed as a consequence of the miscarriage.

3.2.3 | Harm to wider public – increased prices

Tweedie (2015) says that: ‘the Post Office – one of the last bastions of nationalisation – has used millions of pounds of taxpayers’ money to pursue people through the courts and silence criticism via an army of expensive lawyers, while continuing to deny to Parliament that there was ever anything amiss’. Given the fact that this money was essentially wasted, it is likely that the Post Office had to increase their prices to make up the shortfall, meaning that all the citizens of the country are, once again, being forced to pay for the failures of the authors of this disaster.

3.2.4 | Harm to the justice system

During the course of this flawed process, hundreds of individuals were prosecuted and convicted, with a number being incarcerated (Wallis, 2021). The transparent inequities of process and the willingness to overlook the lack of evidence cannot but fail to have damaged the credibility of a

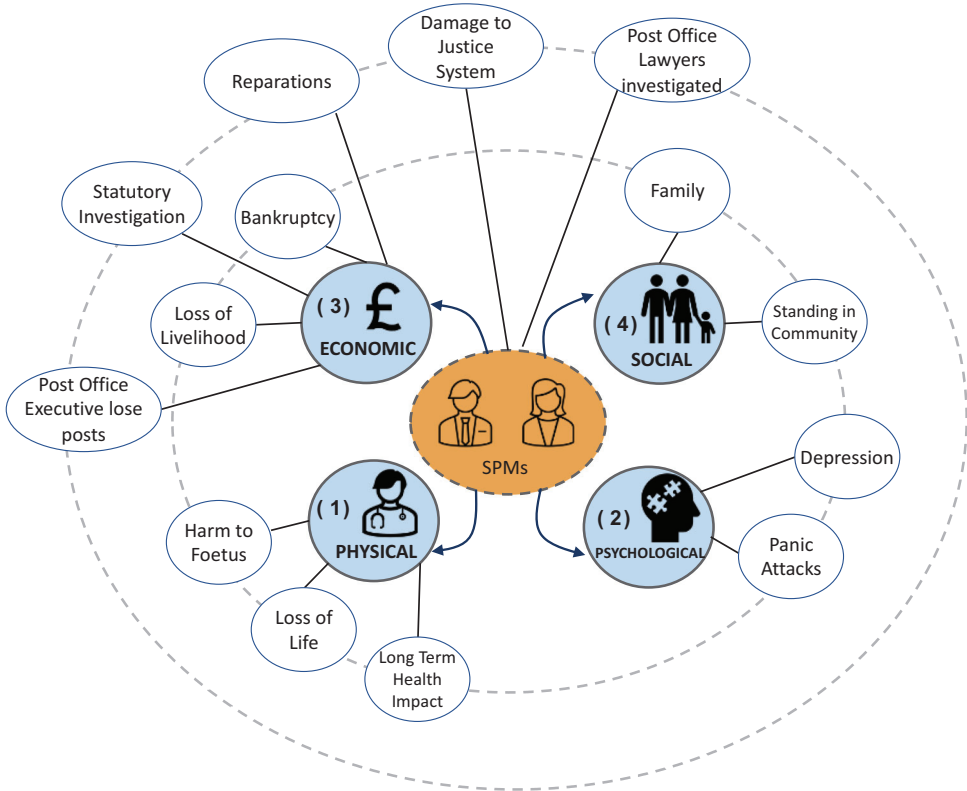


FIGURE 2 Visualisation of zemiological analysis of harms in the SPM case

system the public has already begun to question more than ever before. A recent (2021) survey by the UK Victims’ Commissioner (2021) has suggested that only 43% of crime victims would now report a crime again based upon their experience of the justice system, with just 17% believing that they would get justice when reporting incidents to the police. Less than 9% thought that the courts were dealing with cases promptly and effectively. Only around 10% thought that the justice system was fair or effective.

Figure 2 depicts the zemiological analysis.

4 | ZEMIOLOGICAL GAPS – TECHNOLOGICAL INJUSTICE LENS

Where harm involves more abstract entities such as groups, institutions or indeed processes such as justice, the dynamics of harm and the links between perpetrator and victim, which seem clear enough at the individual level, start to blur. This issue is especially relevant to the argument of this article where, in addition to the damage done to individual SPMs, there are less obviously concrete ranges of perpetrators, victims and harms which seem worthy of attention. Somewhat ironically, while the Post Office counts as an obvious perpetrator in the scandal, there are also plausible reasons (discussed below) for it itself becoming a victim of ensuing harms.

Our central interest is the possibility that the institutions of justice, and indeed the justice system as a whole, have also been harmed by the case; for example, in the loss of public faith in its impartiality and rigour. Calculating the costs here (see Cole (2009) for one attempt) is complex, but important questions about how best to construe the relationship between harm and injustice cannot be avoided. In this context, concepts of crime and their status as a zemiological tool become relevant. If, as it has often been claimed (Copson, 2018), zemiology can ‘do without’ notions of crime and the laws underpinning them, where are we left when the criminal justice system has identified clear injustices which also seem undeniably harmful? As Michael Naughton (2003) has put this: ‘how can you have an alternative based in zemiology, and yet say we can retain a notion of crime/law in the present term?’ (p.256). Naughton therefore questions whether miscarriages of justice can be entirely accommodated within a zemiological framework (Naughton, 2007), and concludes that, while zemiology can help us in considering the kinds of harms arising from miscarriages of justice in the short-to-medium term, it is deficient in other respects when harms to justice itself are being considered.

Questions about the utility of a zemiological approach here also feed directly into those around the aetiology of the harms. *Prima facie*, in the SPMs case, the most obvious causes of the errors lie in investigative and prosecution failings, not least the wholly inadequate evidence base (Renaud et al., 2021; UCL Laws, 2021). What legal scholars have called ‘*factual innocence*’ (Risinger & Risinger, 2013) obtained in the case – that is, the prosecuted individuals concerned were (in fact) not guilty of the frauds for which they were prosecuted. But why, more precisely? While we might agree that justice was *not* served and that this was (in some sense) harmful, this does not seem enough to properly explain *why* this is so. It is at this point that our relationship with technology, and its increasingly significant role in determining justice, comes more sharply into focus.

4.1 | Allocating responsibility/agency & culpability

Prima facie, the causes of the injustices suffered by the SPMs and the agents of this seem obvious enough. We have an error-prone Horizon system and the repeated unwillingness on the part of the Post Office, together with Fujitsu, to acknowledge that it was not fit for purpose. Their failure to do this and the dissembling that followed were – seemingly – therefore the primary sources of the harms. QED. However, this simple story demands further interrogation. A far deeper focus is also needed on the influence of technology upon the attitudes of key players such as the Post Office and legal professionals contributing to what unfolded. It is here that we begin to see a more fundamental force at work in these events – the imperatives of the technology-driven rationality identified by Marcuse, which is being subtly integrated into our justice systems.

In the received version of events, ‘bugs’ in the Horizon system created phantom shortfalls in branch accounts – shortfalls subsequently unquestioningly attributed to fraud. While it is a given

that no software operates perfectly at all times, one might reasonably ask why a system which cost over £1 billion to produce was so poorly constructed and so inadequately monitored? The glitch in question appears to have arisen whenever there was a break in an Internet connection, which disrupted transmission of transactions to the main servers. When the connection was re-established, the transaction would then be retransmitted, but the system would consider this a new transaction (Završnik, 2020). Fujitsu and the Post Office signalled their implicit awareness of the problem by naming these glitches after the branches where they occurred. Thus, in the 'Dalmellington Bug' (Christie, 2021) a SPM attempted to register receipt of an £8,000 cash payment. When the system froze, the SPM (as many of us would) continued to hit the keyboard. Each time she did so, the system logged this as receipt of a new transaction (for £8,000). This resulted in an apparent shortfall of £24,000, for which *she* was held responsible. Problems were also apparent with the database, as in the 'Callendar Square' bug, where duplicate copies of non-existent transactions were recorded, with the local SPM being held responsible for the spurious shortfall.

Records of the problems were kept in files called PEAKS, referred to Fujitsu through a helpline. Information about bugs was also available to Fujitsu via known error logs (KELs) where it stored information about them, as well as their responses. Christie (2021) has pointed to the poor management of the system, and the fact that it was possible for maintenance staff to log into local devices to correct issues, such as amending details or even inserting entirely new transactions. This occurred without any audit trail and without the SPMs being aware of it.

The culpabilities of both the Post Office and Fujitsu in obscuring the problems with their technology are evident enough in this. Thus, Renaud et al. (2021) point to the rigid assumption made by Post Office investigators that SPMs were guilty of fraud, even in cases where no corroborating evidence was provided beyond that displayed by the Horizon system. Confirmation bias further reinforced the myopia of Post Office investigators, preventing them from being able to entertain any idea that SPMs might be innocent. In turn, the Post Office's (unhelpfully titled) 'help desk' reinforced these attitudes by seeming incapable, or at least too technically under-resourced, to support SPMs who called for assistance when inexplicable shortfalls appeared (HEAR THE TRUTH: The ONRECORD Podcasts, 2021). Many of these problems had been known since at least 2009 (Worstall, 2021), but the Post Office consistently denied that there were any issues with the Horizon system (Flinders, 2015b). Among its many false or misleading claims were suggestions that there was no way of reporting faults with Horizon, or that the KELs had any relevance to the cases. Instead, the Post Office argued that KELs contained 'only trivial errors' and not 'the kind of bugs, errors and defects that the claimants wish(ed) to pursue' (Munbodh, 2020). Similarly, the Post Office's insistence that access to the KELs were 'outside their control' was shown to be false when it emerged that the Post Office had a contractual right to be provided with access. Thus, over 5,000 KELs only emerged after the first Bates trial, with the Post Office claiming that Fujitsu had told them that these had not been retained – when it was perfectly clear that they were.

The uncertain status and imperfect reporting of the KELs emphasises the parallel culpabilities of Fujitsu in the travesty. Their background has been one of close connection with UK government in terms of IT provision, with an income stream worth more than £2 billion between 2016 and 2021 alone and a status as the fifth-largest provider of public sector technology in the UK (Williams, 2021a). However, the problems with many of these other contracts could, with hindsight, have served as forewarning of what was to happen with Horizon. For example, in 2002 Fujitsu was awarded a contract worth over £900 million to digitise NHS patient administration records, but a series of errors and problems was the main outcome. By 2006, Fujitsu had only managed to install systems at three trusts, in spite of initial promises to cater for 17 acute trusts, 36 community trusts and eight mental health trusts (Bowers, 2006). Their contract was eventually terminated

in 2008 – with losses of over £2.7 billion to taxpayers. In spite of this catalogue of disasters, they managed to successfully sue the UK government for damages (Wheeler, 2014) when the contract was withdrawn, winning around £700 million in 2014 (Jones, 2019). Fujitsu was also associated with problems in the management of the UK's police national computer (PNC) (Mellor & Clark, 2021), which is hosted on a Fujitsu mainframe. The PNC is vital to the operations of a range of enforcement agencies. In addition to the police themselves, there are the National Crime Agency (NCA), HM Revenue and Customs, MI5, MI6 and the Serious Fraud Office. In 2021, over 150,000 vital records relating to DNA, including fingerprints, were accidentally deleted from the PNC, and though the software was Home Office provided, the functionality of Fujitsu's system would have impacted upon this (Mellor & Clark, 2021).

There have also been issues around the reliability of Fujitsu systems elsewhere. For example, in 2005, a glitch on the Fujitsu systems used to power the Tokyo Stock Exchange (TSE) led to stock and bond trading being scrapped for an entire morning session. The glitch arose from an upgrade to the trading system where a previous bug had to be patched but Fujitsu provided the wrong instructions on how to apply it (Williams, 2021a). Nonetheless, they were still awarded over \$250 million to then build the next generation TSE. This, too, unravelled in 2020 when the 'arrowhead' system they had developed caused the worst ever outage on the TSE, with trading suspended for a full day (Canellis, 2020).

The warning signs around Fujitsu's capacity to handle Horizon were apparent from early stages. For example, in 1999 a House of Commons Select Committee (1999) noted: 'repeated delays and failure to reach important milestones', and doubts about the 'resilience and relative obsolescence of the technology', with an apparent overfocus on the part of ICL (the UK software company that was taken over by Fujitsu) to ensure their own profits (for example, by increasing transaction charges), irrespective of any other damage (Moorhead, Nokes & Helm, 2021, p.6). Despite all this evidence, and in the face of doubts as to the reliability of the system, political pressure to deploy the Horizon system seems to have been applied (Witherow, 2022).

Fujitsu's conduct throughout the Horizon case was equally suspect. It was no accident that Horizon lacked any mechanism for challenging or disputing the shortfalls which were the source of the prosecutions, since this appeared to be part of the original design for the Post Office. As a result, users could only challenge shortfalls through an alternative, wholly inadequate and poorly-monitored reporting system. The SPMs were not aware of Fujitsu's ability to access their terminals. Fujitsu initially denied that this capacity for remote intervention existed, and it was never disclosed to any of the SPMs' legal representatives during their trials. In principle, this ability to intervene remotely was used to correct errors, though it seems never to have been properly monitored and it was only fully admitted during the Bates case in 2019 (Moorhead, 2021).

This recurring lack of candour or openness was especially relevant in respect to the known problems with Horizon which Fujitsu repeatedly sought to downplay (Moorhead, Nokes & Helm, 2021). For example, it eventually emerged that Fujitsu was aware of problems such as the Callendar Square Bug, but they only disclosed them at the last possible instance. Similarly, information about the known receipts/payments mismatch bug was withheld because of fears that it might have an impact upon 'ongoing legal cases where the integrity of Horizon Data was a central issue' (Moorhead, Nokes & Helm, 2021, p.23). Perhaps worse still for the victims, evidence suggests that Fujitsu frequently mis-characterised PEAK records as indicating user error rather than potential or actual Horizon errors.

The potential financial benefits for Fujitsu under their contract with the Post Office is a clear factor in all this dissembling. As the judge in the Bates trial observed: 'the contracts appear to have had the potential to incentivise over-recording of user error as an explanation of Horizon

problems and discouraged the full investigation of Horizon problems during the investigation and prosecution stages of the case' (Moorhead, Nokes & Helm, 2021, p.7). It is ironic that in 2021, in spite of their demonstrable culpabilities, Fujitsu won a £42.5 million contract from the Post Office to 'continue maintaining the Horizon system' (Clark, 2021).

4.2 | From harm to injustice: the role of technological rationality

The attempts by the Post Office and Fujitsu to evade responsibility in this case therefore have a clear basis in corporate self-interest. And this cannot easily be treated separately from the asymmetries of power at work here. Both Fujitsu and the Post Office were able to deflect responsibility for Horizon's failure towards the SPMs because their greater resources and influence *allowed* them to do this. However, a further (ir)rationality is also worth considering. This centres upon what has sometimes been referred to as the 'Titanic syndrome' (Zhexembayeva, 2019), a mindset which leaves us (and large organisations especially) so convinced of the perfections of the technologies they use that they become incapable of understanding its shortcomings. For Fujitsu and the Post Office the Horizon system was simply 'too big to fail' and no other explanation of its flaws other than criminality was possible. Thus, in spite of four independently commissioned reports which provided clear evidence of failings in Horizon, the Post Office continued to maintain that there was 'nothing wrong' with its systems. Similarly, Fujitsu repeatedly insisted to the court – in spite of all the evidence to the contrary – that Horizon was like 'Fort Knox' in terms of security (Meddings & Smith, 2021). Such slavish myopia about the virtues of Horizon seems to have gone beyond typical corporate deflections of responsibility into a genuine inability to see things any other way. At the root of this, we suggest, is the influence of technological rationality which subverts autonomous critical reflection and substitutes it for the 'dictates of the apparatus' (Marcuse 1941, p.145)

As the Titanic story also warns us, misplaced faith in the reliability of technology has certainly not been restricted to the main players within the Post Office case. It can be seen across the social world more generally – at both individual and institutional levels. Indeed, this case underlines how even our justice systems are no longer immune to these insidious articles of faith. A striking example of this has been the way that presumptions about the trustworthiness of technical artefacts like digital evidence have not just been assimilated by legal practitioners. They have now been directly coded into legislation and legal practice. In the UK, for example, prior to 1999, there had been a requirement for any prosecutor using digital evidence to *prove* that the system from which it had been obtained was functioning correctly. However, a new clause added to the Police and Criminal Evidence Act (PACE) 1984 removed that responsibility (Flinders, 2015b). In so doing, it highlighted a crucial shift in the relationship between technology and justice. The new ruling was that digital systems (such as a software system) could *always* be assumed to be functioning correctly – unless a very strong level of evidence could be produced to demonstrate the opposite. This legal shift was directly responsible for sustaining a key dogma within the prosecution case: that 'the computer producing the evidential record was working properly at the material time and that the record is therefore admissible as real evidence' (Crown Prosecution Service, 2017). As a result of this subtle but significant shift in legal thinking, the onus is now on the accused to provide evidence of malfunction in any case involving technology. Thus, not only was it procedurally challenging for the court to question the reliability of the Horizon software system but because only the Post Office itself was in the position to provide such evidence, it was also well-nigh impossible for the accused to do so.

When we recall that it was *entirely* upon the basis of evidence provided by the Horizon software system that the convictions of the SPMs were secured, the implications of this stance become even more damning. In effect, the ‘word’ of a computational system was considered to be of a higher evidential value than the opinion of legal professionals or the testimony of witnesses. This was not merely therefore a problem with digital evidence per se, but also the response to it. Similar assumptions about the reliability of the technology and failures to scrutinise these effectively were clearly evident in the conduct of legal professionals in supporting the case. Did the solicitors and barristers who were instructed by Fujitsu and the Post Office conduct the litigation properly? Did they advise their clients correctly or supervise the available evidence effectively? (Moorhead, Nokes & Helm, 2021, p.39). Did they simply act in line with the new court requirements around technology-based evidence? Or were they, too, subject to the dictates of technological rationality? The obvious partiality of the expert witnesses used by the Post Office, led the judge to complain about ‘a raft of slanted analyses’ and an ‘egregious failure to maintain the necessary standard of impartiality’ (Moorhead, Nokes & Helm, 2021, p.34). Where cases *did* go to court, it was striking how readily and unquestioningly the Horizon evidence was accepted. In a webinar organised by University College London (UCL Laws, 2021), one of the speakers points to the fact that many of the judges who presided over these cases lacked the technical expertise to be able to question the Post Office’s assertions. She argued that the time for taking pride in not understanding technology had passed, given the ubiquity of software-generated evidence in courts today. It is telling that Justice Fraser,² who found for the SPMs in 2019, had a far greater awareness of technical issues having been the Judge in Charge of the Technology and Construction Court since February 2018.

The often naïve level of trust in the reliability of digital evidence has increasingly been challenged (Van Buskirk & Liu, 2006) with a variety of studies suggesting that the dependence of the justice system upon this can be significantly flawed (Reedy, 2021). For example, digital forensics has been charged with operating with ‘the least robust forms of management when compared to bodily fluid, DNA, and fingerprint forensics in the UK’ (Page et al., 2019). Repeated cognitive errors and flaws, such as those arising from the sheer volume and complexity of digital evidence (Sunde & Dror, 2019) have been but one factor in this. Underlying this is the assumption that there is a lower threshold in holding technology to account than there is with human witnesses. This represents a further indicator of a sea change in legal process that parallels the increasing, more general readiness to delegate authority to mechanisms.

The subversion of legal norms to technical norms was especially notable in the absence of that most basic of legal standards – the requirement to demonstrate criminal intention (a mens rea) – in every one of the SPM cases. During a parliamentary debate on the issue, Darren Jones, MP, chair of the Institute of Artificial Intelligence, highlighted this failure of process, commenting that the technical errors did not merely cause ‘*untold human suffering*’ but were a ‘tragedy’ for the UK legal system (Marshall & Mason, 2021).

While unchallenged technical errors were bad enough, we contend that there is a greater tragedy here – the seemingly inexorable assimilation of human-centred rationalities into what Marcuse (1941, p.65) called the ‘rationality of the apparatus’ or ‘technological rationality’. This goes beyond the *zweckrational* or instrumental rationality proposed by Weber (1968, pp.24–26). This is not just about acting in accord with reaching goals, but in terms of an assimilation into machinic thinking. Thus, Marcuse argued that technological rationality produces forms of human agency which (citing Veblen (1898)) now: ‘supplement ... the machine process, rather than make(s) use of it. On the contrary, the machine process makes use of the workman’ (Marcuse, 1941, p.65). Subservience to technological rationality threatens to become so all-pervasive that social norms become ‘mechanical norms (which appear) not only perfectly rational but also

perfectly reasonable ... There is no personal escape from the apparatus which has mechanized and standardized the world. It is a rational apparatus, combining utmost expediency with utmost convenience' (Marcuse, 1941, p.66). Marcuse's conclusion is disturbing but, as the SPM case suggests, also highly prescient. For, 'in manipulating the machine, man learns that obedience to the directions is the only way to obtain desired results. Getting along is identical with adjustment to the apparatus' (Marcuse, 1941, p.144).

In this way, a 'mechanics of conformity' emerges; one which generates thought and action which increasingly embodies the machine process. For Marcuse and commentators like him, this embodiment was largely about everyday life and the social world, but the SPMs' case emphasises why we also need to evaluate how technological rationality is generating a subservience to devices at the heart of our most fundamental institutions. The surprising volume of technologies now integral to the functioning of the contemporary justice process is just one indicator of this (Mason, 2015; McGuire, 2012). While technology has been an important tool of investigation and prosecution since the mid-19th century, and the origin of forensics, its role has now become so prominent that is hard to think of many cases where technology does not play some part in determining judgments around criminal culpability. The use of mobile phone data, CCTV, or biological technologies such as DNA profiling, chemical technologies such as toxicology testing, through to more traditional varieties like fingerprinting, are now not just essential but a prerequisite to making justice 'work'.

If this level of dependency upon technological solutions to justice were not enough, we are now being confronted by one with still more profound implications. The expanding power of *autonomic* decision-making systems in our legal system, where judgment and evaluation are almost wholly machine driven represents a new horizon for which we are barely prepared. This is not just the technological management of law identified by (2019). From the identification of criminal risk, the likelihood of recidivism paying fines or granting bail (Hildebrandt, 2009; Završnik, 2020) through sentencing itself (Hao, 2019), artificial intelligence technologies are acquiring a real and distinctive role in shaping the legal process. Indeed, with the evolution of deep learning and neural net technologies, some argue that even the prospect of automated judges may not be very far away (Fabian, 2020; Volokh, 2019). If technological rationality is impairing our capacity to distinguish between human wrongdoing and machine error as fundamentally as the SPM case suggests, it is surely not too dystopian to be concerned about where these still more pervasive forms of dependence upon the evidence of technology may be leading us.

4.3 | The process of justice

Judgments about how effectively (or independently) our justice systems are functioning depends very much on what we take justice to be. It is fair to say that this is a highly contended concept. Most would probably accept Aristotle's premise that justice is about striking the right kind of balance, a 'reciprocity in accordance with a proportion' where outcomes are in some sense 'fair' to all parties, whether victim or perpetrator. For Rawls (2005), perhaps the most important contemporary theorist of justice, this meant that fairness was the central concept of justice and was very much about equality. Critics of Rawls, such as Nozick & Williams (2014), saw fairness as more about our entitlement to the fruits of our labour (Nozick & Williams, 2014) or, like Sen (2009), more as a call to arms than an academic debate centred upon challenging injustice. However, none of these commentators had very much to say about the reliability of technology in shaping or attaining these objectives.

What is clear from the previous discussion is that one of the key factors in the SPMs' case relates more to the *process* of justice than its outcome. That the outcome was 'unfair' – ergo unjust – is not in doubt (however fairness is conceptualised). Few are likely to disagree that the case involved a significant miscarriage of justice, termed by some the 'biggest miscarriage in British history' (Dixon, Sawyer & Diver, 2021).

However, neither traditional theories of justice nor a purely zemiological evaluation of harm seems to be sufficient for supporting a proper evaluation of the elephant in the room: the role of technology in framing *attitudes* to what we see as unjust and therefore harmful. Profound questions about this connection have recently been taken up by Albert Borgmann (2017). Borgmann, like Heidegger before him (Heidegger 1977), has pointed to a 'distancing' effect between what is produced and the means used to produce it, which technology has gradually, and all but invisibly, generated. For example, light was once a natural commodity produced by stars, until humans learned how to capture it by way of the (Promethean) gift of fire. Yet, though its production thereby became artificial, the *method* by which it was produced remained familiar and transparent. However, with the advent of modern (electrical) lighting technologies, a distance has come into being and even the well-informed amateur can barely explain how it functions.

A similar form of distancing has arguably now been produced in the interactions between technology and justice, producing a separation between what Borgmann calls '*deep justice*' and '*shallow justice*'. The consequences of this separation are producing their own special varieties of harm. Borgmann argues that justice becomes shallow when the administration of justice escapes the competence and comprehension of the citizenry and is absorbed into machinery. The converse is true as well. When the administration of justice becomes complex and intricate and a sophisticated machinery deals with complexity and intricacy, justice escapes the participation and understanding of most people: it becomes shallow (Borgmann, 2017, p.680). It is not that technology has not had previous associations with processes of crime and justice, for this relationship arguably extends far back into even the pre-modern era (see McGuire (2017) for a long history of the connections). Nor is it the case that workings of the legal process have always been transparent to every citizen, though it is true than an enthusiastic layman could, with sufficient reading, have made sense of this – an unlikely prospect in the age of DNA profiling and digital forensics.

It is not even that the shallow justice associated with technology is wholly dysfunctional because 'shallow justice can work' (Borgmann 2017, p.681) – at least up to a point. Just as individuals expect planes to fly, their Internet to have a connection and their food to be on supermarket shelves, 'when a crime has been committed they expect the machinery of criminal justice to find the perpetrator and deal with him lawfully' (p.680). But, this only holds up to the point that the machine *functions correctly*. When it breaks, and when even legal professionals no longer understand the evidence they are handling without the intervention of technical experts, shallow justice is manifested and becomes problematic. With this, one of the starkest outcomes of a shallow, technological justice becomes clear – one so vividly manifested in the SPMs' case. In surrendering proper comprehension of how justice works, we surrender to shallow justice, and, in so doing, risk becoming indifferent to injustice.

Seen from this broader perspective, the harms experienced by the SPMs may be better seen as just one instance within a latticework of more abstract harms being done to the process of justice and to the justice system more widely. Not only did the machine 'break' and foster indifference to the victims in this case. It is also clear that an ascendancy of technological justice – the shallow counterpart to deep and substantively human engagements with justice – was demonstrated. Though on this occasion the error in the machine was ultimately recognised, this was only due to the perseverance of individuals such as Alan Bates, one of the few defendants willing to take

on the Post Office. This is concerning. If, as Rawls once suggested, justice is one of the primary virtues of any social order, just as truth is to any system of knowledge, then harm to the justice system threatens every one of us – not only the victims of the Horizon case.

5 | SUMMARY AND CONCLUSION

We have reviewed the harms of what has been called the greatest miscarriage of justice in British legal history: the complex sequence of harms which arose from the miscarriage of justice seen in the SPM case. By applying a zemiological framework – especially some of the more recent sophisticated taxonomies incorporating physical, emotional and financial dimensions, it becomes clearer how to identify and track these harms. As the sections above suggest, this framework makes it clear that it is not only the unjustly accused who were harmed. Rather, the actions of key perpetrators like the Post Office and Fujitsu produced harms which rippled out to the families and friends of the SPMs, and to their communities. In turn, the NHS had to deal with the health impacts and the benefit system is having to provide victimised SPMs with the means to live where previously they were able to support themselves. In 2021, more Post Offices closed (Munbodh, 2020), depriving small communities of their services. Arguably, every single British citizen has been harmed by these events, as has the reputation of the British justice system, confounding their efforts to increase public confidence (Mirrlees-Black, 2001).

However, as Michael Naughton has suggested, applying a zemiological approach to miscarriages of justice is less than straightforward. When it comes to the role of technology in generating such harms, further explanatory gaps seem to emerge. This is not limited to how best to analyse the kinds of harms generated, but in omitting to account for the way our very capacity to conceptualise harm is being reshaped by the imperatives of technologies. Zemiology is not alone in this, for it is clear that there has been a general failure to respond to Marcuse's warnings of a world where technology increasingly shapes how we think and reason. If a shallower, less critical system of technological justice is the outcome of this technological rationality, we need to be better prepared for the consequences.

ORCID

Karen Renaud  <https://orcid.org/0000-0002-7187-6531>

ENDNOTES

¹Such devices became mandatory for all new UK vehicles from September 2022 (Sommerlad, 2022).

²Available at: <https://www.judiciary.uk/publications/mr-justice-fraser/> [Accessed 8 May 2023].

REFERENCES

- Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y.K., D'Ambra, J. & Shen, K. (2021) Algorithmic bias in data-driven innovation in the age of AI. *International Journal of Information Management*, 60, 102387.
- Alexander, M. (2020) *A safeguarding referral to the Church of England regarding Rev Paula Vennells, former Post Office Ltd CEO & current chair of Imperial College Healthcare NHS Trust*. London: Alexander's Excavations. Available at: <https://minhalexander.com/2020/02/29/a-safeguarding-referral-to-the-church-of-england-regarding-rev-paula-vennells-former-post-office-ltd-ceo-current-chair-of-imperial-college-healthcare-nhs-trust/> [Accessed 20 July 2020].

- Allen, K. (2019) *Chinese driver gets ticket for scratching his face*. London: BBC News. Available at: <https://www.bbc.com/news/blogs-news-from-elsewhere-48401901> [Accessed 14 March 2021].
- Banerjee, D.N. & Chanda, S.S. (2020) AI failures: a review of underlying issues. *arXiv preprint arXiv:2008.04073*.
- Bartz-Beielstein, T. (2019) Why we need an AI-resilient society. *arXiv preprint arXiv:1912.08786*.
- BBC (2022) *Post Office scandal victims still waiting for compensation*. London: BBC News. Available at: <https://www.bbc.co.uk/news/business-61187241> [Accessed 13 May 2023].
- Benigni, M.C., Joseph, K. & Carley, K.M. (2017) Online extremism and the communities that sustain it: detecting the ISIS supporting community on Twitter. *PloS One*, 12(12), e0181405.
- Borgmann, A. (2017) Justice and technology. In: McGuire, M.R. & Holt, T.J. (Eds.) *The Routledge handbook of technology, crime and justice*. Abingdon: Routledge.
- Bowers, S. (2006) Fujitsu under spotlight for NHS failures. *Guardian*, 24 October. Available at: <https://www.theguardian.com/business/2006/oct/24/politics.society> [Accessed 11 December 2021].
- Brownsword, R. (2016) Technological management and the rule of law. *Law, Innovation and Technology*, 8(1), 100–140.
- Brownsword, R. (2019) *Law, technology and society: re-imagining the regulatory environment*. Abingdon: Routledge.
- Callon, M. (1992) The dynamics of techno-economic networks. In: Coombs, R., Saviotti, P. & Walsh, V. (Eds.) *Technological change and company strategies: economic and sociological perspectives*. London: Academic Press.
- Campbell, J. (2020) Post office worker ‘wrongly jailed for £59,000 fraud caused by computer glitch’. *Mirror*, 11 June. Available at: <https://www.mirror.co.uk/news/uk-news/post-officer-worker-wrongly-jailed-22173274> [Accessed 16 March 2022].
- Canellis, D. (2020) Fujitsu apologizes after Tokyo Stock Exchange suffers worst ‘crash’ in history. *TNW*, 1 October. Available at: <https://thenextweb.com/news/fujitsu-tokyo-stock-exchange-worst-service-crash-in-history> [Accessed 11 December 2021].
- Canning, V. & Tombs, S. (2021) *From social harm to zemiology: a critical introduction*. Abingdon: Routledge.
- Carr, N. (2010) *The shallows: how the internet is changing the way we think, read and remember*. London: Atlantic Books.
- Caveen, S. (2019) My uncle took his own life after the Post Office went after him – this High Court ruling is too little, too late. *Independent*, 19 December. Available at: <https://www.independent.co.uk/voices/postoffice-scandal-high-court-ruling-subpostmaster-a9253236.html> [Accessed 3 April 2020].
- Christie, J. (2021) The Post Office Horizon IT scandal: part 1 – errors and accuracy. Available at: <https://clarotesting.wordpress.com/tag/fujitsu-fraud/> [Accessed 11 December 2021].
- Clark, L. (2021) Post Office awards Fujitsu a £42.5m contract extension for the IT system behind wrongful subpostmaster prosecutions. *The Register*, 7 April. Available at: https://www.theregister.com/2021/04/07/post_office_fujitsu_horizon_extension/ [Accessed 24 February 2022].
- Cole, S.A. (2009) Cultural consequences of miscarriages of justice. *Behavioral Sciences & the Law*, 27(3), 431–449.
- Copson, L. (2018) Beyond ‘criminology vs. zemiology’: reconciling crime with social harm. In: Boukli, A. & Kotzé, J. (Eds.) *Zemiology: reconnecting crime and social harm* (critical criminological perspectives). Cham, Switzerland: Palgrave Macmillan.
- Cross, M. (2021) Academics call for probe into Post Office lawyers. *The Law Society Gazette*, 4 August. Available at: <https://www.lawgazette.co.uk/news/academics-call-for-probe-into-postoffice-lawyers/5109454.article> [Accessed 9 August 2021].
- Crown Prosecution Service (2017) *Computer records evidence*. London: Crown Prosecution Service. Available at: <https://www.cps.gov.uk/legal-guidance/computer-records-evidence> [Accessed 7 September 2021].
- Daily Mail Reporter (2020) Now disgraced ex-Post Office boss Paula Vennells is forced out of her £55k NHS job. *MailOnline*, 8 December. Available at: <https://www.dailymail.co.uk/news/article-9028555/Nowdisgraced-ex-Post-Office-boss-Paula-Vennells-forced-55k-NHS-job.html> [Accessed 13 May 2023].
- Danks, D. & London, A.J. (2017) Algorithmic bias in autonomous systems. In: *Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI 2017)*, 17, 4691–4697.
- Davenport, R.J. (2020) Urbanization and mortality in Britain, c. 1800–50. *Economic History Review*, 73(2), 455–485.
- Devillers, L., Fogelman-Soulié, F. & Baeza-Yates, R. (2021) AI & human values. In: Braunschweig, B. & Ghallab, M. (Eds.) *Reflections on Artificial Intelligence for humanity*. Cham, Switzerland: Springer.

- Dixon, H., Sawyer, P. & Diver, T. (2021) Call to prosecute Post Office bosses over 'biggest miscarriage in British legal history'. *Telegraph*, 23 April. Available at: <https://www.telegraph.co.uk/news/2021/04/23/post-office-scandal-39-former-subpostmasters-have-names-cleared/> [Accessed 7 September 2021].
- Evidence-Based Justice Lab (2021) *Post Office project*. Exeter: Evidence-Based Justice Lab. Available at: <https://evidencebasedjustice.exeter.ac.uk/current-research-data/post-office-project/> [Accessed 6 November 2021].
- Fabian, S. (2020) Artificial Intelligence and the law: will judges run on punch cards. *Common Law Review*, 16, 4–6.
- Feenberg, A. (2010) *Between reason and experience: essays in technology and modernity*. Cambridge, MA.: MIT Press.
- Flinders, K. (2015a) Post Office ends working group for IT system investigation day before potentially damaging report. *Computer Weekly*, 11 March. Available at: <https://www.computerweekly.com/news/2240242064/Post-Office-ends-IT-system-investigation-day-before-potentially-damning-report> [Accessed 12 December 2021].
- Flinders K. (2015b) Post Office IT support email reveals known Horizon flaw. *Computer Weekly*, 18 November. Available at: <https://www.computerweekly.com/news/4500257572/Post-Office-IT-support-email-reveals-known-Horizon-flaw> [Accessed 6 May 2023].
- Flynn, M. (2021) Winning the digital war: cyber ideology and the spectrum of conflict. *Journal of Strategic Security*, 14(4), 87–102.
- Gerstle, G., Lichtenstein, N. & O'Connor, A. (2019) *Beyond the new deal order: US politics from depression to the great recession*. Philadelphia, PA.: University of Pennsylvania Press.
- Hao, K. (2019) AI is sending people to jail – and getting it wrong. *Technology Review*, 21 January. Available at: <https://www.technologyreview.com/2019/01/21/137783/algorithms-criminal-justice-ai/> [Accessed 16 March 2022].
- HEAR THE TRUTH: The ONRECORD Podcasts (2021) The Post Office scandal: the outrageous investigation and prosecution of Nichola Arch. Available at: <https://www.youtube.com/watch?v=cDQvi7vge9k> [Accessed 7 September 2021].
- Heidegger, M. (1977) The question concerning technology. In: Heidegger, M. *Basic writings* (Ed. Krell, D.F.). New York: Harper & Row.
- Hildebrandt, M. (2009) Technology and the end of law. In: Claes, E., Devroe, W. & Keirsbilck, B. (Eds.) *Facing the limits of the law*. Heidelberg, Germany: Springer.
- Hillyard, P. & Tombs, S. (2007) From 'crime' to social harm? *Crime, Law and Social Change*, 48, 9–25.
- House of Commons Select Committee (1999) *The Horizon Project for automated payment of benefits through Post Offices*. London: UK Parliament. Available at: <https://publications.parliament.uk/pa/cm199900/cmselect/cmtrdind/50/5004.htm> [Accessed 23 May 2023].
- Hyde, J. (2021) New call for lawyers to be probed in Post Office inquiry. *The Law Society Gazette*, 2 November. Available at: <https://www.lawgazette.co.uk/news/new-call-for-lawyers-to-be-probed-in-postoffice-inquiry/5110366.article> [Accessed 6 November 2021].
- James, C. (n.d.) BrainyQuote.com. Available at: https://www.brainyquote.com/quotes/clive_james_125465 [Accessed 19 May 2023].
- Jasanoff, S. (Ed.) (2004) *States of knowledge: the co-production of science and the social order*. London: Routledge.
- Jee, C. (2015) *Post Office obstructing Horizon probe, investigator claims*. London: Computerworld UK. Available at: <http://www.computerworlduk.com/news/public-sector/3596589/post-office-obstructinghorizon-probe-investigator-claims/> [Accessed 29 March 2021].
- Jones, T. (2019) *UK and Fujitsu reach agreement in dispute over NHS system*. London: Global Arbitration Review (GAR). Available at: <https://globalarbitrationreview.com/uk-and-fujitsu-reach-agreement-in-dispute-over-nhs-system> [Accessed 11 December 2021].
- Kaiser, R. (2015) The birth of cyberwar. *Political Geography*, 46, 11–20.
- Kotzé, J. (2018) Criminology or zemiology?: yes, please! on the refusal of choice between false alternatives. In: Boukli, A. & Kotzé, J. (Eds.) *Zemiology: reconnecting crime and social harm* (critical criminological perspectives). Cham, Switzerland: Palgrave Macmillan.
- Latour, B. (1987) *Science in action*. Cambridge, MA.: Harvard University Press.
- Marcuse, H. (1941) Some social implications of modern technology. In: *Studies in philosophy and social sciences*, vol. ix. New York: Institute of Social Research.
- Marshall, P. & Mason, S. (2021) *Digital evidence and computer reliability on the parliamentary agenda in the wake of the Post Office Horizon scandal* (bulletin 12 March). London: Institute of Advanced Legal Studies, University of London.

- Mason, S. (2015) Case transcript: England & Wales – Regina v Seema Misra, T20090070. *Digital Evidence and Electronic Signature Law Review*, 12, 45–55.
- McGuire, M.R. (2007) *Hypercrime: the new geometry of harm*, Abingdon: Routledge.
- McGuire, M.R. (2012) *Technology, crime and justice: the question concerning technomia*. Abingdon: Routledge.
- Meddings, A. & Smith, E.K. (2021) Japanese giant Fujitsu still stamping on Post Office victims. *The Times*, 16 May. Available at: <https://www.thetimes.co.uk/article/japanese-giant-fujitsu-still-stamping-on-postoffice-victims-0m88fmh02> [Accessed 13 December 2021].
- Mellor, C. & Clark, L. (2021) Dratted ‘housekeeping’, eh?: 150k+ records deleted off UK’s Police National Computer database. *The Register*, 15 January. Available at: https://www.theregister.com/2021/01/15/pnc_records_deleted/ [Accessed 23 January 2021].
- Mirrlees-Black, C. (2001) *Confidence in the criminal justice system: findings from the 2000 British Crime Survey*. London: Home Office. Available at: <https://www.ojp.gov/ncjrs/virtual-library/abstracts/confidence-criminal-justice-system-findings-2000-british-crime> [Accessed 17 December 2022].
- Moorhead, R. (2021) Mutually assured irresponsibility: an example from the Post Office. *Lawyer Watch*, 18 September. Available at: <https://lawyerwatch.wordpress.com/2021/09/18/mutually-assured-irresponsibility-an-example-from-the-post-office/> [Accessed 16 March 2022].
- Moorhead, R., Nokes, K. & Helm, R. (2021) *Working paper I: issues arising in the conduct of the Bates litigation*. Exeter: University of Exeter. Available at: <https://evidencebasedjustice.exeter.ac.uk/wp-content/uploads/2021/08/WP1-Conduct-of-the-Bates-Litigation-020821.pdf> [Accessed 23 May 2023].
- Munbodh, E. (2020) 31 Post Offices closing as part of convenience store shake-up - see the full list. *Mirror*, 11 June. Available at: <https://www.mirror.co.uk/money/convenience-store-chain-close-31-24288254> [Accessed 16 March 2022].
- Naslund, J.A., Bondre, A., Torous, J. & Aschbrenner, K.A. (2020) Social media and mental health: benefits, risks, and opportunities for research and practice. *Journal of Technology in Behavioral Science*, 5(3), 245–257.
- Naughton, M. (2003) ‘Miscarriages of justice: exception to the rule?’ (unpublished PhD thesis, University of Bristol).
- Naughton, M. (2007) *Rethinking miscarriages of justice*. Basingstoke: Palgrave Macmillan.
- Nozick, R. & Williams, W. (2014) *Anarchy, state and utopia*. Oxford: Princeton University Press.
- Ortega, A., Pérez, F. & Turianskyi, Y. (2018) *Technological justice: a G20 agenda* (Economics discussion papers no. 2018–58). Kiel, Germany: Kiel Institute for the World Economy (IfW).
- Page, H., Horsman, G., Sarna, A. & Foster, J. (2019) A review of quality procedures in the UK forensic sciences: what can the field of digital forensics learn? *Science & Justice*, 59(1), 83–92.
- Pandya, A. & Lodha, P. (2021) Social connectedness, excessive screen time during COVID-19 and mental health: a review of current evidence. *Frontiers in Human Dynamics*, 3, published online 22 July, <https://doi.org/10.3389/fhumd.2021.684137>.
- Peacock, R. (2021) *Former Post Office chief steps aside as vicar*. London: Religion Media Centre. Available at: <https://religionmediacentre.org.uk/news/former-post-office-ceo-steps-aside-as-vicar/> [Accessed 13 May 2023].
- Pemberton, S. (2008) Where next?: the future of the social harm perspective. In: Hillyard, P., Pantazis, C., Tombs, S., Pemberton, S., Gordon, D. & Dorling, D. (Eds.) *Criminal obsessions: why harm matters more than crime*. London: Centre for Crime and Justice Studies.
- Pooler, M. & Croft, J. (2020) Bankruptcy, jail, ruined lives: inside the Post Office scandal. *Financial Times*. Available at: <https://www.ft.com/content/0138cd7d-9673-436b-86a1-33704b29eb60> [Accessed 16 March 2022].
- Post Office (2020) *Prosecutions and convictions since 1990* (Freedom of Information request to Post Office Limited by Nick Wallis, 9 April). Available at: https://www.whatdotheyknow.com/request/prosecutions_and_convictions_sin?unfold=1 [Accessed 16 March 2022].
- Rack, S. (2020) *Post Office IT fiasco: ‘decade of hell’ for accused*. London: BBC News. Available at: <https://www.bbc.co.uk/news/uk-england-50747143> [Accessed 20 July 2020].
- Rawls, J. (2005) *A theory of justice*. London: Harvard University Press.
- Reedy, P. (2021) The risks for digital evidence. In: Reedy, P. *Strategic leadership in digital evidence*. London: Academic Press.
- Renaud, K., Bongiovanni, I., Wilford, A. & Irons, A. (2021) PRECEPT-4-Justice: a bias-neutralising framework for digital forensics investigations. *Science & Justice*, 61(5), 477–492.
- Risinger, D.M. & Risinger, L.C. (2013) Miscarriages of justice: a theoretical and practical overview. *John Marshall Law Journal*, 7, 375–414.

- Robinson, J. (2021) Ex-Post Office boss Paula Vennells could be 'stripped of her CBE' amid government plans to launch a review into Horizon subpostmaster scandal. *MailOnline*, 25 July. Available at: <https://www.dailymail.co.uk/news/article-9823117/Ex-Post-Office-boss-PaulaVennells-stripped-CBE-amid-government-review.html> [Accessed 12 December 2021].
- Schwab, K. (2017) *The fourth industrial revolution*. Geneva, Switzerland: Penguin.
- Sen, A.K. (2009) *The idea of justice*. Cambridge, MA.: Harvard University Press.
- Shaw, N. & Whitelam, P. (2021) Joy at last as Lincolnshire postmaster Tom Hedges finally has name cleared. Available at: <https://www.lincolnshirelive.co.uk/news/joy-last-lincolnshire-postmaster-finally-5333310> [Accessed 16 March 2022].
- Sommerlad, J. (2022) Speed limiters: what are they and what is the new law concerning them? *Independent*, 1 September.
- Sunde, N. & Dror, I.E. (2019) Cognitive and human factors in digital forensics: problems, challenges, and the way forward. *Digital Investigation*, 29, 101–108.
- The Honourable Mr Justice Fraser (2019) Judgment (No.6) 'Horizon Issues'. Case No: HQ16X01238, HQ17X02637 and HQ17X04248. Available at: <https://www.judiciary.uk/wp-content/uploads/2019/12/bates-v-post-office-judgment.pdf> [Accessed 16 March 2022].
- The Post Office Trial (2019) I hate everything about it: I will not go into a Post Office. Available at: <https://www.postofficetrial.com/2019/09/i-hate-everything-about-it-i-will-not.html> [Accessed 16 March 2022].
- Thomson, R. (2009) Bankruptcy, prosecution and disrupted livelihoods – postmasters tell their story. *Computer Weekly*, 11 May. Available at: <https://www.computerweekly.com/news/2240089230/Bankruptcy-prosecution-and-disrupted-livelihoods-Postmasters-tell-their-story> [Accessed 20 July 2020].
- Tobin, S. (2021) Post Office 'turned itself into nation's most untrustworthy brand', court hears. *Evening Standard*, 22 March. Available at: <https://www.standard.co.uk/news/uk/post-office-ccrc-court-of-appeal-high-court-horizon-b925550.html> [Accessed 16 March 2022].
- Tombs, S. (2018) For pragmatism and politics: crime, social harm and zemiology. In: Boukli, A. & Kotzé, J. (Eds.) *Zemiology: reconnecting crime and social harm* (critical criminological perspectives). Cham, Switzerland: Palgrave Macmillan.
- Tweedie, N. (2015) Decent lives destroyed by the Post Office: the monstrous injustice of scores of subpostmasters driven to ruin or suicide when computers were really to blame. *MailOnline*, 24 April. Available at: <https://www.dailymail.co.uk/news/article-3054706/Decent-lives-destroyed-Post-Officemonstrous-injustice-scores-sub-postmasters-driven-ruin-suicide-computers-reallyblame.html> [Accessed 20 July 2020].
- UCL Laws (2021) Justice for sub-postmasters in the Post Office case. Available at: https://www.youtube.com/watch?v=Qk_P8AHaf24 [Accessed 7 September 2021].
- Van Buskirk, E. & Liu, V.T. (2006) Digital evidence: challenging the presumption of reliability. *Journal of Digital Forensic Practice*, 1(1), 19–26.
- Van Ruitenburg, T. & Ruiters, S. (2022) The adoption of a crime harm index: a scoping literature review. *Police Practice and Research*, published online 8 October, <https://doi.org/10.1080/15614263.2022.2125873>.
- Veblen, T. (1898) The instinct of workmanship and the irksomeness of labor. *American Journal of Sociology*, 4(2), 187–201.
- Victims' Commissioner (2021) *Victims' experience: annual survey*. London: Victims' Commissioner. Available at: <https://victimscommissioner.org.uk/document/2021-victim-survey/> [Accessed 13 May 2023].
- Volokh, E. (2019) Chief justice robots. *Duke Law Journal*, 68, 1135–1192.
- Wall, D.S. (2007) *Cybercrime: the transformation of crime in the information age*. Cambridge: Polity.
- Wallis, N. (2021) *The great Post Office scandal: the fight to expose a multimillion pound IT disaster which put innocent people in jail*. Bath: Bath Publishing.
- Weber, M. (1968) *Economy and society, an outline of interpretive sociology*, vol. 1. New York: Bedminster Press.
- Wheeler, B. (2014) *Government 'loses £700m NHS IT legal battle with Fujitsu'*. London: BBC News. Available at: <https://www.bbc.co.uk/news/uk-politics-28464002> [Accessed 23 May 2023].
- Williams, O. (2021a) The £2bn question: how did Fujitsu emerge unscathed from the Post Office scandal? *New Statesman*, 27 April. Available at: <https://www.newstatesman.com/science-tech/2021/04/2bn-question-how-did-fujitsu-emerge-unscathed-post-office-scandal> [Accessed 11 December 2021].
- Williams, Sir Wyn (2021b) *Post Office Horizon inquiry WILL be statutory*. London: CWU. Available at: <https://www.cwu.org/news/post-office-horizon-inquiry-will-be-statutory/> [Accessed 7 September 2021].

- Winner, L. (1977) *Autonomous technology: technics-out-of-control as a theme in political thought*. Cambridge, MA.: MIT Press.
- Winter, C., Neumann, P., Meleagrou-Hitchens, A., Ranstorp, M., Vidino, L. & Fürst, J. (2020) Online extremism: research trends in internet activism, radicalization, and counter-strategies. *International Journal of Conflict and Violence*, 14(2), 1–20.
- Witherow, T. (2022) Tony Blair knew of flaw with Post Office's Horizon IT system but went ahead anyway, report claims. *MailOnline*, 22 August. Available at: <https://www.dailymail.co.uk/news/article-11132861/Tony-Blair-knew-flaw-Post-Offices-Horizon-went-ahead-report-claims.html> [Accessed 17 December 2022].
- Wood, M. (2021) Rethinking how technologies harm. *British Journal of Criminology*, 61, 627–647.
- Worstall, T. (2021) *The Post Office scandal proves the rule of law is vital for a functioning economy*. CAPX. Available at: <https://capx.co/the-post-office-scandal-proves-the-rule-of-law-is-vital-for-a-functioning-economy/> [Accessed 11 December 2021].
- Završnik, A. (2020) Criminal justice, artificial intelligence systems, and human rights. *ERA Forum*, 20(4), 567–583.
- Zhexembayeva, N. (2019) Titanic syndrome: why companies sink and how to reinvent your way out of any business disaster. *Mindspace*, 30 November.

How to cite this article: McGuire, M.R. & Renaud, K. (2023) Harm, injustice & technology: Reflections on the UK's subpostmasters' case. *The Howard Journal of Crime and Justice*, 62, 441–461. <https://doi.org/10.1111/hojo.12533>