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CHAIR DIGITAL, GOVERNANCE AND SOVEREIGNTY

TECHNOCHAUVINISM

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Contents

Executive summary

- **Section 1** describes 'technochauvinism', a term coined by Meredith Broussard to describe ways of thinking about digital technologies which involve beliefs that they are the solution to a wide range of social problems; which exhibit blind optimism about the transformational power of digital technologies and lack concern for their impact; which display white male bias in technology and a lack of concern for social issues; and which are accompanied by beliefs in individualism and disruptive innovation.

- **Section 2** locates technochauvinism as a particular strand of technological utopianism. As a form of techno-utopianism, technochauvinism has links with several other utopian ways of thinking about digital technologies and society: the Californian Ideology, technological solutionism, and datafication and dataism. This section puts technochauvinism in its context, drawing out key concepts, similarities, and distinctions, and showing the fundamentally conservative nature of many tech-utopian visions and projects, including technochauvinism.

- **Section 3** addresses technochauvinism directly by discussing core assumptions that underpin technochauvinist and other utopian perspectives on digital technologies. First, by challenging the technochauvinist belief in the power of technology over and above humans to solve human problems, arguing that the idea that technologies can be 'better' than humans at particular tasks is a subjective one that should be critically examined. Second, by discussing whether technologies are suited to solving human problems that originate in social and economic causes; arguing that, given the social nature of technologies, many technological solutions will be a product of the same social and economic circumstances that produced the problems they are supposedly to solve.

- To attempt to combat technochauvinism, **Section 4** proposes a series of questions to ask when considering whether to use digital technologies to help solve human social and economic problems: What is the nature of the problem? Are technological interventions suited to addressing its causes? What other ways of addressing those causes might exist? Are people with a sufficient range of background, perspective, and expertise part of the process of developing, deploying, and using new technologies to address human problems? Though the questions proposed here are not exhaustive, they require careful consideration if the pitfalls of technochauvinism are to be avoided.

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1. What is technochauvinism?

The term 'technochauvinism' was coined by Meredith Broussard in her 2018 book '*Artificial Unintelligence: How Computers Misunderstand the World*' [1]. Broussard describes technochauvinism as "the belief that tech is always the solution"[2]:

> "smart and well-intentioned people act like technochauvinists when they are blind to the faults of computational decision making or they are excessively attached to the idea of using computers to the point at which they want to use computers for everything—including things for which the computer is not suited"[3]

For Broussard, technochauvinism is characterised by blind optimism about technology and a lack of caution about how digital technologies will be used[4]. "Somehow", she says, "in the past two decades, many of us began to assume that computers get it right and humans get it wrong" [5]. She also argues that technochauvinism is often accompanied by what she calls "fellow-traveller beliefs"[6]: in the ideas of Ayn Rand; in techno-libertarianism; in maximalist constructions of free speech; in the supposed objective and unbiased nature of computers; and in the idea that social problems would disappear if only the world used more computers.

While Broussard provides the brief definition of technochauvinism as believing that tech is always the solution, she then uses the remainder of her book to elaborate on this idea. In doing so, she explores a range of common problems and troublesome assumptions with digital technologies and their use in solving the problems of society.

[1] Broussard 2018.
[2] Broussard 2018 p.7.
[3] Broussard 2018 p.12.
[4] Broussard 2018 p.69.
[5] Broussard 2018 p.8.
[6] Broussard 2018 p.8.

Technochauvinism as described by Broussard has essentially five core, interrelated, and overlapping components:

1. **Blind optimism and lack of caution** about technology, including beliefs in the reliability and objectivity of machines. As Broussard argues through her book, however, "digital technology works poorly and doesn't last very long"[7]. The blind optimism about technology exhibited by technochauvinists in the face of the many flaws in computer systems has, according to Broussard, found its way into broader society as a general assumption that the users of computers are responsible when they go wrong: "Computers have become so pervasive in every aspect of our lives that when something goes awry in the machine, we assume that it's our fault, rather than assume something went wrong within the thousands of lines of code that make up the average computer program. In reality, as any software developer can tell you, the problem is usually in the machine somewhere. It's probably in poorly designed or tested code, cheap hardware, or a profound misunderstanding of how the actual users would use the system"[8]

2. **Lack of concern for social issues**. Broussard shows how the field of computing inherited the gender and other biases of its mathematician progenitors, and showed little concern for social issues and questions around the societal impact of what they were doing[9]: "Disciplines like math, engineering, and computer science pardon a whole host of antisocial behaviors because the perpetrators are geniuses. This attitude forms the philosophical basis of technochauvinism, in which efficient code is prioritized above human interactions". Though Broussard argues that technochauvinists are typically unconcerned with social issues in general, lack of concern for gender issues is a particular hallmark of technochauvinism. Due to their lack of concern for social issues, they may exhibit serious misconceptions about how they arise and around the ability of technology to solve them: "The people who believe that math and computation are

[7] Broussard 2018 p.156.
[8] Broussard 2018 p.8.
[9] Broussard 2018 pp.67-85.

'more objective' or 'fairer' tend to be the kind of people who think that inequality and structural racism can be erased with a keystroke"[10].

White male bias[11]. Broussard argues that, as a result of cultural and systemic factors in the society more generally and the computing industry specifically, the developers of digital technologies often exhibit a bias towards a white male point of view. She argues that the technology industry has inherited the gender stereotypes associated with mathematics, with the effect that "even today, women and people of color are rarely considered math or tech geniuses"[12]. The result, she argues, is that STEM subjects (science, technology, engineering, and mathematics) – including computer science – impose masculinised norms and expectations on those who study them, which carry over into industry and the culture around digital technologies more generally. For Broussard, this can exacerbate technochauvinism lack of concern for social issues: "When development teams are small, like-minded, and not diverse, this kind of thinking can come to seem normal"[13].

3. **Individualism.** Technochauvinists generally show a strong individualism, which Broussard locates as having first evolved on the online communities of the early Internet[14]. She ties this to the more general lack of concern for social issues exhibited by technochauvinists and the origins of these kinds of ways of thinking in the masculinised culture of mathematics and other STEM subjects (science, technology, engineering, and mathematics) – in particular, the "genius myth"[15] in STEM culture and crediting individuals for advances in technology[16] produces a way of thinking that individuals should be essentially unbound by social obligations or restrictions.

4. **Disruptive innovation.** Technochauvinists often believe in disruptive innovation as a way of generating huge profits[17]. However, as Broussard shows, the chasing of investment changes the incentive structure for technological development, placing

[10] Broussard 2018 p.156.
[11] Broussard 2018 p.83.
[12] Broussard 2018 p.84.
[13] Broussard 2018 p.156
[14] Broussard 2018 p.82.
[15] Broussard 2018 p.83.
[16] Broussard 2018 p.25.
[17] Broussard 2018 p.163.

more emphasis on hype and poorly thought through ideas than on producing technologies that truly work to resolve some pressing social or economic problem. As a result, she talks about the "disruptive innovation myth" [18] kept alive by technochauvinists.

Tying these factors together, Broussard summarises technochauvinism:

> "To recap: we have a small, elite group of men who tend to overestimate their mathematical abilities, who have systematically excluded women and people of color in favor of machines for centuries, who tend to want to make science fiction real, who have little regard for social convention, who don't believe that social norms or rules apply to them, who have unused piles of government money sitting around, and who have adopted the ideological rhetoric of far-right libertarian anarcho-capitalists."[19]

[18] Broussard 2018 p.171.
[19] Broussard 2018 p.85.

2. Locating technochauvinism

Technochauvinism as both a worldview and a concept links to and has similarities with various other concepts and phenomenon, some of which have been put forward as frames for critique or identified as ways of understanding the role of technology in society. Indeed, as noted above, Broussard identifies technochauvinism as often being found alongside various other "fellow-traveller" beliefs that together inform the worldview of technochauvinists[20]. She traces the history of computing, showing how and where many of these ideas became associated with the culture around computer science and digital technologies[21] – the development of a hyper-libertarian strain of thought on early online communities, for instance, leading to the adoption of a form of "radical individuality"[22]. This section of the report first locates technochauvinism as a form of techno-utopianism, before discussing where the radical individuality that emerged online found a home within a broader techno-utopian ideology, the Californian Ideology, then discussing the relation of technochauvinism to techno-solutionism, datafication, and dataism.

2.1. Technological utopianism

Technochauvinism – with its *blind optimism* about technology and the capacity of technology to change the world – can be broadly understood as a form of technological utopianism, with many historical antecedents in politics, government, and popular culture. The Italian futurist movement of the 1910s to 1930s, for example, emphasised speed, dynamism, and technology, glorified modernity, and thought that electrification would help banish poverty, disease, and work[23] (on the topic of techno-utopianism and electricity, it is worth briefly noting Michael Angelo Garvey's 1852 prediction that a "perfect network of electric filaments" could bring the "social harmony of humanity"[24]).

[20] Broussard 2018 p.8.
[21] Broussard 2018 pp.67-85.
[22] Broussard 2018 p.82.
[23] Berghaus 1996; Bowler 1991; Poggi 2009.
[24] Garvey 1852.

The futurists also embraced nationalism, violence, war, and the National Fascist Party of Benito Mussolini, whom they viewed as a modernising force.

Elsewhere, the 1933 World's Fair in Chicago was a celebration of scientific and technological progress under the slogan 'Science Finds, Industry Applies, Man Adapts'[25]. Similarly, the 1939 World's Fair in New York glorified technology under the slogan 'Dawn of a New Day'. The 1939 Fair promised visitors a view of the 'World of Tomorrow', where 'rational planning' could harness the power of technology to bring about a utopian future[26]. While the Italian futurism was linked to fascism, the utopian visions of the 1933 and 1939 World's Fairs were rooted firmly in visions of the triumph of American capitalism and liberal democracy (though in 1939 there were exhibits from the Soviet Union, Fascist Italy, and Imperial Japan, each promoting a rather different take on the future). Yet the 1939 World's Fair's optimistic vision of the future was somewhat at odds with the current affairs of the day, with the Czechoslovakian pavilion representing a country that no longer existed following its annexation by Nazi Germany, and was arguably wholly undermined by the outbreak of World War II four months after the Fair opened – the Fair's second season, in 1940, had a rather more nostalgic and melancholic tone[27].

Techno-utopian visions have also found their place in popular culture (though they tend to be less common than dystopias). In The Jetsons, an American cartoon from the 1960s about a family living in an imagined 2062, for example, the imagined future married futuristic technologies like flying cars and jetpacks with new ways of living and working in cities in the clouds[28]. The Jetsons depicted a society which is happy, efficient, and with no discernible social ills or divisions. The show's characters are largely preoccupied with trivial problems while technology takes care of most of the daily grind. (The Jetsons can be contrasted with Futurama, another animated series set in the far future, which – despite being named after an exhibit from the 1939 World's Fair[29] – eschews utopianism without straying into dystopia).

[25] Ganz 2012.
[26] Duranti 2006.
[27] Duranti 2006.
[28] Novak 2012.
[29] Geddes 1940.

While the futurists became fascists and the World's Fairs and The Jetsons reflected visions of capitalist techno-utopia, Harold Wilson, the British Prime Minister in the 1960s and 1970s, sought to use state planning to harness the "white heat" of the scientific and technological revolution, in particular the potential transformations brought by automation, for national economic renewal. In a 1963 speech, Wilson contrasted his socialist utopia ("the conscious, planned, purposive use of scientific progress to provide undreamed of living standards and the possibility of leisure ultimately on an unbelievable scale"[30]) with a dystopian vision of a society where technology served the interests of private profit: "technological progress left to the mechanism of private industry and private property can lead only to high profits for a few, and to mass redundancies for the many"[31]. In Wilson's view, the state could use the potential productive power of science and technology through directed, planned research and economic intervention to drive economic prosperity and bring about a transformation in living standards.

The socialist government in Chile in the early 1970s also sought to combine new technologies and state planning, but in a different way. Where Wilson's vision was to use economic planning to direct technological development, the government of Salvador Allende's Project Cybersyn sought to combine new technologies of surveillance and control with the insights of Stafford Beer's cybernetic theories to manage the Chilean economy with the aid of a distributed decision support system[32]. Allende's government sought to use these technologies to decentralise economic planning and maintain the democratic role of workers, rather than adopting a Soviet-style centralised command economy. The Cybersyn experiment – and the Allende government – ended with the CIA-backed coup that brought the military dictator Augusto Pinochet to power in 1973.

More recently, in the 1990s, the Clinton administration in the United States sought to leverage the 'information superhighway' to promote economic growth and

[30] Wilson 1964.
[31] Wilson 1964.
[32] Beer 1993; Medina 2006; Medina 2011.

improvements in education through technological development. In the late 1980s, Al Gore (who became Clinton's Vice-President) had predicted that the Internet would be central to "increasing industrial productivity, creating new products, and improving access to education". Even by the mid-2000s, Gore still viewed the Internet as the "greatest source of hope" for re-establishing the "conversation of democracy"[33]. Also in the 1990s, in one of the more infamous techno-utopian statements of its time, John Perry-Barlow's Declaration of the Independence of Cyberspace, claimed that online communities were beyond the reach of the "weary industrial giants" and promised a virtual world of human flourishing: "We are creating a world that all may enter without privilege or prejudice accorded by race, economic power, military force, or station of birth. We are creating a world where anyone, anywhere may express his or her beliefs, no matter how singular, without fear of being coerced into silence or conformity"[34].

These are only a handful of examples of techno-utopia over the decades (and of how some of them collided with reality). Despite their differences in politics and worldview, these techno-utopian visions and projects each sought or depicted an optimistic future where new technologies have brought about a widespread transformation such that the daily lives of ordinary people have been dramatically changed for the better. Yet what they do not depict can be as instructive as want they do. While techno-utopians typically show new technologies as bringing about economic progress and an increase in living standards, only occasionally do they envision significant upheavals in more fundamental aspects of the social order. They rarely portray technology as bringing about a major change in contemporary social hierarchies or in the position of minoritised or marginalised groups. In part, this may be because the techno-utopias of the past were envisioned – primarily – by white men, who uncritically reflected their own societies' treatment of others (the *white male bias* that Broussard identifies in technochauvinism not being a phenomenon new or unique to computing culture). In that sense, the techno-utopian vision is often somewhat conservative in nature, *lacking in concern for social issues*, and working to reinforce the social conditions of its time rather than to reject or improve upon them.

[33] Gore 2008.
[34] Barlow 1996.

In The Jetsons' imagined world of the 2060s, for example, the fundamental social dynamics idealised in mainstream US culture in the *19*60s remain essentially unaltered. The Jetsons are a nuclear family, with two happily married heterosexual parents and two children (a boy and a girl, naturally), and their pet dog. George, the father, is the sole breadwinner. He travels to work in a flying car rather than by public transport, and while he seems to have a futuristic job (as a 'digital index operator' at Spacely Space Sprockets), he ultimately still works in an office doing repetitive menial labour under an overbearing boss. Jane, the mother, is a homemaker whose primary role is as a wife and a caregiver (it is also notable that the family's robot maid, Rosie, is coded as female – a trend carried forward by the Google, Amazon, and Apple's AI-powered assistants [35]). The characters in The Jetsons are all white. None are LGBT. Interestingly, for a fundamentally techno-utopian show, The Jetsons does not show a world where technologies have solved *all* problems – the characters complain about inconveniences brought by their fancy gadgets (though this is largely for comic effect). But that does not prevent it from being utopian in nature, in that it shows a technologically transformed society with many daily chores swept away and no signs of poverty or social division. It is only a much later 1990s reimagining of The Jetsons which reveals that they live in a city in the clouds because of ground-level smog[36] (a retcon that came after the Jetsons had lost most of its cultural relevance).

Of course, The Jetsons was a cartoon for children (and it is not always helpful to overthink these things), but it undoubtedly influenced the way that many who grew up with it thought about technology and the future. Yet the utopian vision that it offered its young audience was essentially rooted in an idealised cultural understanding of 1960s middle class America that was outdated even then. Though The Jetsons portrayed imagined technologies and a futuristic world, the utopia it depicted was ultimately of its time, rather than of the future. Elsewhere, the futurists' utopian vision glorified misogyny[37] and the 1939 World's Fair failed to imagine women as much more than sexual objects. Even in later decades Wilson's 'white heat' of technological progress

[35] Chin and Robison 2020.
[36] Maloney 2017.
[37] Poggi 2012

and Allende's Project Cybersyn, which each sought socialist economic transformation, had little to say about the liberation of women, people of colour, LGBT people, or people with disabilities (though they were at least concerned with addressing inequalities of class).

Similarly, techno-utopian visions, projects, and worldviews of today – including technochauvinist ways of understanding and discussing the role of technology in society – often also *show little concern for issues around gender or racial equality or the rights of LGBT people or people with disabilities*. Broussard shows how technochauvinist thinking is typically unconcerned with social issues like these or with the social impact of technologies[38] – even while technochauvinists pursuing 'disruptive innovation' seek to solve problems they think they have found in society. Indeed, Broussard discusses both '*white male bias'* and the role of *disruptive innovation* at several points in her writing on technochauvinism (as will be discussed later in this report), pointing out that even obvious steps that may benefit women – such as the inclusion of a period tracker in Apple's health app – are often overlooked[39].

While techno-utopians may have the vision to imagine an optimistic world of the future where technology has brought great social and economic change, they often lack sufficient perspective and understanding of the world of today to imagine a more radical departure from its social hierarchies and inequalities.

[38] Broussard 2018.
[39] Broussard 2018 p.157.

2.2. Californian Ideology

Many of the 'fellow-traveller' beliefs identified by Broussard hark back to the 'Californian Ideology' described by media theorists Richard Barbrook and Andy Cameron in the mid-1990s as being fundamental to the Silicon Valley worldview[40]. This Californian Ideology was characterised, according to Barbrook and Cameron, by "a profound faith in the emancipatory potential of the new information technologies"[41], promoting "an impeccably libertarian form of politics"[42], while being wilfully blind to racism, poverty, and environmental degradation[43]. Many of those who adopted this particular form of techno-utopian worldview were influenced by the work of Marshall McLuhan, who emphasised that the (then still only predicted) rise in electronic media would bringing about the end of individualism and a new collective freedom where all could participate in a 'global village' without fear of censorship[44] (a similar idea is found in Howard Rheingold's writings about the 'virtual community'[45], which were also popular with some adherents[46]).

At the same time, many adherents of the Californian Ideology turned to right wing libertarian ideas, promoting entrepreneurship, discourses around an "electronic [free] marketplace", and a belief that technology would "empower the individual, enhance personal freedom, and radically reduce the power of the nation state"[47]. Recognising the tensions between *libertarian politics* and *beliefs that technology could bring about collective freedom*, Barbrook and Cameron describe the Californian Ideology as involving a "contradictory mix of technological determinism and libertarian individualism"[48]. These two contradictory ideas – that new technologies will inevitably bring about a kind of collectivised freedom and a better world, on one hand, and that individuals will be free from traditional constraints to pursue their own (economic) self-

[40] Barbrook and Cameron 1995.
[41] Barbrook and Cameron 1995.
[42] Barbrook and Cameron 1995.
[43] Barbrook and Cameron 1995.
[44] McLuhan 1962; McLuhan 1964.
[45] Rheingold 1993.
[46] Barbrook and Cameron 1995.
[47] Barbrook and Cameron 1995.
[48] Barbrook and Cameron 1995.

interest, on the other – are at the core of the Californian Ideology, just as they are at the core of technochauvinism.

Barbrook and Cameron, in describing the Californian Ideology, set out these tensions between the techno-utopian spirit of collective emancipation and the more capitalist discourse of the "electronic marketplace" and economic libertarianism. Just as the core beliefs of technochauvinism are questionable (at best), if not downright fallacious, core tenets of the Californian Ideology around free market libertarianism similarly rely on myths and false histories. As they point out, while adherents promote the benefits of capitalist free markets and private enterprise, "the iconic technologies of the computer and the Net could only have been invented with the aid of massive state subsidies and the enthusiastic involvement of amateurs"[49]. Indeed, much of the technological foundations for contemporary tech-capitalism developed in public research labs, or with public funding, or by volunteers making it available for free. Yet, according to Barbrook and Cameron, "Capitalist entrepreneurs often have an inflated sense of their own resourcefulness in developing new ideas and give little recognition to the contributions made by either the state, their own labour force or the wider community"[50].

Barbrook and Cameron were writing in the mid-1990s, when the political economy of digital technologies was quite different to that of today. It is not clear whether the ideology they describe still holds the sway it once did. Yet core elements of the Californian Ideology undoubtedly survive in technochauvinist ways of thinking, and the legacy of the Californian Ideology's techno-utopian spin on free market libertarianism and individualism can still often be seen in the tech industry more generally. This is particularly the case with the industry's focus on '*disruptive innovation*', which is discussed by Broussard at various points in her book[51]. Some adherents of the Californian Ideology attacked the state for "interfering with the spontaneous dissemination of new technologies by market competition"[52], and these kinds of anti-

[49] Barbrook and Cameron 1995.
[50] Barbrook and Cameron 1995.
[51] For instance, Broussard 2018 163-174.
[52] Barbrook and Cameron 1995.

state, anti-regulation views are still found in technochauvinist disruption and innovation discourses.

Yet – even setting aside the question of the state's important role in technological development – the industry around digital technologies is now far from a functioning free market. Instead, it is dominated by the so-called 'Big Tech' companies – Google, Amazon, Facebook, Apple, and Microsoft – with lock-in and network effects driving consolidation across markets and centralisation within markets[53], and venture capital warping incentives around innovation and technological development[54] (as this report discusses in Section 3.1). Just as the libertarian spirit of the Californian ideology was based in myths about the role of government in the development of computers and the Internet, so too the free market logics of technochauvinism are grounded in a conception of the market that does not exist.

While the legacy of the Californian Ideology can be seen in technochauvinism, however, there is one key difference. Barbrook and Cameron write that the Californian Ideology shows a *lack of concern for social issues* around racism, poverty, and environmental degradation (indeed, Barbrook and Cameron are strongly critical of its racial politics), But Broussard is clear that a *lack of concern for gender issues* and a *white male bias* are also significant problems with technochauvinist ways of thinking. Indeed, Broussard's recognition of the gender issues apparent in technochauvinism is a particularly distinctive feature of her critique as compared to others. As described in Section 1, Broussard connects this to a wider problem in that STEM typically subjects impose masculinised norms and expectations, and discusses how new technologies may systematically fail women as a result. Yet this also relates to the wider limitations of techno-utopianism discussed above, which often fails to envision more fundamental changes to the social order to liberate minoritised and marginalised groups. The failure of technochauvinists – as a variety of techno-utopian – to pay heed to these issues means that, like other techno-utopians, their worldview is a more fundamentally conservative, less radical one than they might like to admit.

[53] Moore and Tambini 2018.
[54] Taplin 2017.

2.3. Technological solutionism

The technology critic Evgeny Morozov describes a particular way of thinking about machines and digital technologies such that they are often assumed to be capable of resolving problems with deep-seated socio-economic causes, are offered as the solution to problems to which they are not suited, or are proposed as the answer the supposed 'problems' that are not in fact problems at all[55]. He calls this 'technological solutionism'. Crucially, as Morozov notes, technological solutionism is not just another take on the old maxim 'for someone with a hammer, everything looks like a nail', nor is it simply about the unsuitability of technological fixes for certain problems. Rather, for Morozov, the key issue with solutionism is that "what many solutionists presume to be 'problems' in need of solving are not problems at all…these vices [of inefficiency, ambiguity, and opacity] are often virtues in disguise"[56]. That is to say, there are areas where inefficiency, ambiguity, or opacity are in fact desirable or serve some socially beneficial purpose. In criminal justice, for instance, inefficiency looks like insisting on a fair trial – the presumption of innocence, effective legal representation, respect for human rights, due process, and so on – even for defendants who might seem obviously guilty[57]. In seeking to strip these inefficiencies, ambiguities, and opacities away through technological interventions, Morozov says, techno-solutionists risk doing more harm than good.

Morozov argues that technological solutionism is typically "shortsighted and only perfunctorily interested in the activity for which improvement is sought"[58] and that "solutionism presumes rather than investigates the problems that it is trying to solve"[59], often out of a desire to "get rich by saving the world"[60]. Even where there are real, serious problems (however identified), Morozov points out, "the urgency of the problems in question does not automatically confer legitimacy on a panoply of new,

[55] Morozov 2013.
[56] Morozov 2013.
[57] This point made with credit to John Naughton.
[58] Morozov 2013 p.5.
[59] Morozov 2013 p.6.
[60] Morozov 2013 p.X.

clean, and efficient technological solutions"[61]. Simply because a problem exists does not mean that a particular technology is the answer; nor does it mean that *any* technological solution is the answer. Rather, the most productive way forward may be some other approach entirely, which may be obscured by appeals to technology: "the quick fixes [solutionism] peddles do not exist in a political vacuum. In promising almost immediate and much cheaper results, they can easily undermine support for more ambitious, more intellectually stimulating, but also more demanding reform projects"[62].

There are clear resonances here with Broussard's technochauvinism: "the belief that tech is always the solution"[63], typically accompanied by *blind optimism* in the power of technology. For Broussard, there are many problems which require a more nuanced, careful, multi-faceted – often non-technological – approach. Morozov agrees. However, he also goes further: many supposed 'problems' to be solved by technology in fact result from technologists' lack of real interest in or understanding of the phenomena with which they are supposedly concerned. This resonates with Broussard's observation that technochauvinists are often *unconcerned with social issues* like gender inequality (in particular) or with the *social impact of their own technology*. Bringing Broussard and Morozov together, it seems that technochauvinists are often more interested in 'disruption' for their own benefit than in finding the appropriate solutions to real social problems.

2.4. Datafication and dataism

Van Dijck describes a utopian belief in the objectivity of *datafication* as a mechanism for helping understand people's behaviour. Datafication is the process of turning people's lives, behaviours, and interactions into quantified data that allows for tracking and predictive analysis[64]. Van Dijck says that datafication is becoming a leading principle that the transformation of many aspects of everyday social and economic life into data points, aggregation of those data points into big datasets, and analysis of those data sets provides new means to access, understand, and monitor people's

[61] Morozov 2014 p.7.
[62] Morozov 2013 p.9.
[63] Broussard 2018 p.7.
[64] Mayer- Schönberger and Cukier 2013.

behaviour[65]. She argues that this is grounded in the ideology of *dataism*: involving "a widespread *belief* in the objective quantification and potential tracking of all kinds of human behavior and sociality through online media technologies" accompanied by "*trust* in the (institutional) agents that collect, interpret, and share (meta)data culled from social media, Internet platforms, and other communication technologies"[66]. Yet, as van Dijck shows, this is often based in faulty assumptions – that data obtained from online platforms simply reflect people's actual behaviour while the platforms themselves are neutral facilitators. As she says, researchers may describe Twitter data, for example, as akin to "a thermometer to measure feverish symptoms of crowds reacting to social or natural events" as if Twitter were a neutral technological channel and its users' interactions weren't shaped by Twitter's design, features, affordances, and business model[67].

Van Dijck describes dataism as relating to data about sociality obtained from social media[68], but ideologically data*ist* perspectives and discourses are often seen in relation to digital technologies across domains. Indeed, the idea that ever more data about people and their behaviour's, interests, and relations – merely 'collected' from supposedly neutral technological channels – when subject to algorithmic analysis can allow for more effective resolution of social problems is increasingly widespread. Dataist ways of thinking have taken hold even in the public sectors of some countries, combining with the longer-standing transformations of New Public Management – which emphasises marketised performance metrics and market-oriented logics – in digitalisation and automation programmes[69]. The UK Government's National Data Strategy, for instance, engages extensively in dataist language and framing:

> "Better use of data can help organisations of every kind succeed – across the public, private and third sectors. It can support the delivery of existing services, from manufacturing to logistics, and it can be used to create entirely new products. It is a driver of scientific and technological

[65] van Dijck 2014.
[66] van Dijck 2014 p.198.
[67] van Dijck 2014 p.199.
[68] van Dijck 2014.
[69] Cobbe et al 2020.

> innovation, and central to the delivery of a whole range of vital public services and societal goals, from tackling climate change to supporting the National Health Service. […] On an individual level, the use of data benefits us every day – from the lives saved due to data-driven medical discoveries, to personal budgeting, understanding how much we have exercised and identifying better transport routes."[70]

The dataist idea that data and technology can provide an objective, neutral take on human social behaviour which can guide interventions to improve social issues can be readily seen in the technochauvinist worldview described by Broussard. As she argues, technochauvinism involves a belief in the supposed objectivity of data and computers; yet, as she notes, all data is social, and computers are far from neutral technologies. Indeed, the 'first principle' of her writing on technochauvinism, Broussard says, is that "data is socially constructed"[71]: "We tend to think of data as immutable truth, but we forget that data and data-collection systems are created by people"[72]. Moreover, the claimed benefits of data production and analysis are often not distributed equally – it is important to consider who might actually benefit. In discussing dataism, van Dijck describes how analysis of social media data is claimed to provide "useful knowledge" about people, and askes "useful for whom?" [73] As she notes, the beneficiaries are often police, intelligence services, and marketers who seek information on actual or potential behaviour, and risks conflating analysis and projection, and deduction and prediction.

[70] Department for Digital, Culture, Media & Sport 2020.
[71] Broussard 2018 p.18.
[72] Broussard 2018 p.57.
[73] Van Dijck 2014 p.200.

3. Understanding technochauvinism

Broussard's critique of technochauvinism largely (though not exclusively) rotates around a persuasive and extended demonstration of the limitations of computers and computational thinking. She insightfully shows that reaching for computers often obscures interventions which, while arguably more mundane, are potentially more effective at helping address certain problems. While this is correct, it's not the whole problem – there are more basic issues with the assumption that technologies (digital or otherwise) are well-suited to solving human problems if only they can be better designed and used. What Broussard only occasionally flirts with, however, is the more fundamental idea that many problems are simply beyond the scope of any technology to solve, digital or otherwise. Nor does she engage with Morozov's insight that many of the 'problems' that computers are supposed to solve are not in fact problems at all, but features.

Common among many of the concepts and themes discussed in Section 2 is the idea that machines possess some intrinsic capacity above and beyond that of humans and which can be readily leveraged to resolve human problems. Two related and fundamental assumptions underpin this belief, which will be explored next in turn:

- *First*, the idea that machines are better at certain tasks than humans and their use will consequently bring about a general improvement of some nature
- *Second*, the corresponding idea that machines can solve human problems (in a way that humans can't) if they can just be leveraged in the right way

In both cases, there may be some truth to some extent in relation to certain types of machine or certain types of problem. But technochauvinists wrongly generalise from that grain of truth such that they often seemingly conclude that technology is inherently better than humans and can solve virtually any social problems, if only it can be

leveraged in just the right way. Fundamentally, however technologies – digital or otherwise – are social phenomena. Their design, deployment, and use are of the society that produced the problems they are supposedly to solve.

3.1. Machines are better than humans

A common assumption among utopian worldviews, including technochauvinism, is the idea that machines are in some way better than humans at a wide range of tasks as Broussard says:

> "Technochauvinists like to believe that computers do a better job than people at most tasks. Because the computer operates based on mathematical logic, they think that this logic translates well to the offline world. They are right about one thing: when it comes to calculating, computers do a far better job than people alone. Anyone who has ever graded a student math paper will happily admit that. But there are limits to what a computer can do in certain situations."[74]

The idea that computers *are* (rather than *could be*) better than humans at a wide range of tasks has been current in mainstream techno-utopian narratives around technology for some time – in Harold Wilson's 'white heat' speech in 1963, for instance, he claimed that "the computers have reached the point where they command facilities of memory and of judgment far beyond the capacity of any human being or group of human beings who have ever lived"[75]. This was not true in 1963, nor is it true in 2022 – while computers undoubtedly have a significant advantage over humans in terms of memory, humans are generally still preferred where discretion, reasoning, understanding, consideration, and other characteristics of judgment are required.

In principle, of course, computers are better than humans at certain tasks – particularly those involving some form information storage and retrieval or mathematical computation. And computer networking – including the Internet – is a significant

[74] Broussard 2018 p.29.
[75] Wilson 1964.

advance in communications technology that permits people to interact in ways they otherwise could not. Other machines have in the past and the present been 'better' than humans at a wide range of things – the power weaving loom, for instance, is generally accepted to be 'better' than handweavers at producing woven fabrics *en masse*, at low cost, and at speed. But even this reveals the nature of what the power loom was 'better' at: producing woven fabric (a) quickly, (b) cheaply, and (c) in large quantities. These are all priorities of a particular form of political economic rationality – that of the industrial capitalism of mass production that emerged in the late eighteenth and early nineteenth centuries, and of the subsequent forms of capitalism that followed (in particular, the globalised 'fast' consumer capitalism of the late twentieth and early twenty-first centuries). Even common understandings of what constitutes a 'better' technology are inherently situated within – and a product of – the social and political economic context of the time.

The steam engine provides another example[76]. The traditional story of the steam engine says that the English engineer Thomas Savery invented the first commercially successful example – a water pump – in 1689, with crucial improvements subsequently made by Thomas Newcomen (who developed a mechanism for transmitting power to a machine) and James Watt (who significantly improved the efficiency of Newcomen's design). The development of the steam engine had a dramatic effect in the industrial revolution, helping to power mills and factories and allowing them to be situated away from rivers (which had previously provided a power source). Yet it is also known that the ancient Egyptians had steam turbines in the first century AD[77], operating to essentially the same principles as the engines of Savery, Newcomen, and Watt. These were mainly used by engineers to demonstrate the properties of steam, rather than being put to work in any project of political economic transformation. And steam engines of various kinds found niche uses in the centuries before Savery.

Why was the steam engine so much 'better' than alternatives as to be transformational in the industrial revolution of the eighteenth and nineteenth centuries, when it was not

[76] Landes 2014; Kitsikopoulos 2013.
[77] Kitsikopoulos 2013.

so in ancient Egypt? For the ancient Egyptians – who had the Nile for transport and, crucially, a large, cheap workforce of both slaves and skilled labourers and no factories – there was no need to look to the steam engine or other advanced technologies for help. In eighteenth-century England, however, there was no slave workforce (though the crucial role of slavery and the Atlantic slave trade in the industrial revolution should not be ignored) and other political economic developments – in particular, the development of the factory – meant that a power source was needed that would reduce the dependence on rivers and watercourses. Put simply, political economic conditions demanded power for factories, and the steam engine was – by the then-relevant measures – a better source of power than available alternatives.

However, the burning of coal and other carbon-based fuels for steam engines and in subsequent industrial power sources produced pollution that damaged the population's health and has over time had a devastating effect on the environment. In the twentieth century, hydroelectric power became widespread, and today's search for clean and reliable renewable energies has brought a renewed focus on tidal power. Though steam turbines in various guises are still widely used in electricity generation using hydrocarbons, water may again offer a 'better' power source than many other alternatives, according to certain measures by which these things are now evaluated in the twenty-first century (though the building of dams for hydroelectric power brings its own social and environmental problems).

It is important, therefore, to understand what is meant by 'better' in many discussions of digital technologies. Typically, when machines are described as being better than humans at a particular task, what is being referred to is an ability to perform that task faster, more accurately, more consistently, and at lower cost. These are often collected under the misleadingly innocuous sounding heading of 'efficiency', with little regard for harmful or damaging external consequences of the use of the machine – which are themselves generally written off as 'externalities'. Often, in that sense, it is not the case that a human could not complete the task given enough training, time, or resources, but that – by the measures of the market – a human will take too long, or will cost too much, or will produce inconsistent outputs, compared to a machine. By those

measures, machines are indeed often better at humans at particular tasks. However, though it may often be the case that a machine is better than a human at a given task (according to the market-oriented measures described above), it is not the case that machines will outperform a human at *any* task. Nor does it follow that it is *possible* to design and build a machine that is better than humans at any task. For almost all kinds of machines – from the steam turbine to the weaving loom to the most advanced computer – there are many tasks which are outside of their capabilities. It may be the case that there are certain tasks which are beyond the ability of any machine to do satisfactorily.

When a machine is considered to be 'better' at a particular task, it is worth also considering who is served by the measures on which that conclusion is grounded. That is to say, for *whom* is the machine better? Let's return to the industrial revolution, to the well-worn narrative of the transformations in the technology and political economy of weaving that took place in that time[78]. Before the late eighteenth century, weaving was primarily done at home by a workforce of skilled craftspeople in the domestic (or 'putting-out') system, where they would be contracted to produce fabrics from raw material. The spinning jenny, developed in 1760s by James Hargreaves and then improved by Richard Arkwright, allowed individual weavers to work many more spools of thread than was previously possible, greatly reducing the labour required to produce cloth. The power loom, invented in 1786 by Edmund Cartwright, later allowed cloth production to be mechanised, and, eventually, automated, significantly reducing the need for skilled handweavers (one kind of power loom, the jacquard loom, was one of the earliest programmable machines, if not *the* earliest, allowing for complex patterns to be woven according to instructions contained in punch cards – a binary system, just like modern computers).

The move from small home looms (which were affordable for individual weavers) to more complex technologies like the spinning jenny and the power loom (which were not) was accompanied by a significant change in the ownership of the means of

[78] Landes 2014.

production[79]. Instead of looms being purchased by home weavers (who could no longer afford them), they were purchased by a factory owner (who could), who also purchased the weavers' labour to operate them (home weavers being left with no hope of competing with the factory on the critical market measures of cost, speed, or volume of production). The factory system thus replaced the domestic system. This transition to the industrial capitalism of the factory system also produced clear negative 'external' consequences. Livelihoods, lifestyles, ways of being, of living, of relating to each other, and of living in traditional communities were swept away as a result of the social and economic disruption it brought. Industrialisation forced home weavers into factories and into positions of dependence on (and exploitation by) factory owners. Where previously these (mostly) women sold the product of their labour themselves (with the resulting profit allowing home weavers to significantly improve their standard of living), they were instead forced to sell their labour directly to the factory owner in exchange for a low wage, who himself owned the product of their labour and sold it on the market for his profit (for the factory owner was always *him*, rather than *her* – a point that resonates with Broussard's observations about gender and the contemporary technology industry).

The invention and wide adoption of new kinds of weaving technology does not stand alone as the sole cause of this shift – it was one complex process of many that contributed to and constituted the industrial revolution and was inherently intertwined with other significant processes of social, legal, technological, and political economic change that remade whole societies in that period. But developments in weaving technology – resulting in machines that were 'better' at producing cloth than home weavers according to market-oriented measures – played a major role in political economic transformations that enriched factory owners while forcing home weavers into new positions of subordination and exploitation as workers in the factory system[80].

In this sense, 'better' is an ambiguous term. Even if machines are better than humans at certain tasks – and they often are – that does not mean that they can bring about

[79] Marx 1847; Marx 1867; Polanyi 1944; Landes 2014.
[80] Marx 1847; Marx 1867; Polanyi 1944; Landes 2014.

some general improvement, rather than a specific (financial) improvement for a particular actor, often at the expense of others and with negative external consequences. As Broussard shows[81], narratives of disruptive innovation – which often seek a similar kind of specific improvement, even when wrapped in the language of general improvement – are common in technochauvinist ways of thinking. Such narratives are often grounded in uncritical assumptions that new ideas, new technologies, and new uses for technologies are inherently *better* than old or established ways of doing things. As Morozov argues[82], these are often accompanied by appeals to efficiency and other market-oriented logics. Even when they are not, appeals to the supposed objective, rational nature of computers often conceal these kind of ideological views.

Yet, by looking historically, it is possible to see that what technochauvinists call 'disruptive innovation' isn't new. The development of factories and the transition from the putting-out system to the factory system was undoubtedly a disruptive process – in that it dismantled existing social and economic relations and interdependencies and remade them in such a way that factory owner was at the centre, and workers were dependent on them. Factory owners were of course dependent on their workers as well, but – in the absence of collective movements like trade unions, which had not yet developed – the dependence of the factory owner on each individual worker (who could easily be replaced by one of the many former weavers who were now seeking employment) was far less great than the dependence of each individual worker on the factory owner (who perhaps provided the only source of income for a family). A 'better' technology thus allowed an economic system whereby individual weavers could sell the product of their labour for income themselves to be disrupted and replaced with one whereby individual workers were dependent on the factory owner, who paid them a wage in return for their labour and himself sold the product of their labour on the market for his profit.

[81] For instance, Broussard 2018 163-174.
[82] Morozov 2013.

That said, the explicit pursuit of 'disruption' and 'innovation' – and, indeed, 'disruptive innovation' – as goals in and of themselves does mark a significant shift in techno-capitalism. While this shift is perhaps primarily a discursive one, discourses around technologies and around political economic developments are important and represent systems of thought and knowledge that help shape the social world[83]. Disruption and innovation discourses – which are common in discussions around new and emerging technologies – influence how we come to understand new technologies, how we come to understand the ways of doing and being that existed before new technologies, and how we come to understand the relationship between the old and the new. As such, these discourses – and the prominence they hold in contemporary techno-capitalism – are important to interrogate and understand.

Central to these discourses is the pursuit of *optimisation*[84]. Optimisation is a general organising principle in certain kinds of digital system, as Bogdan Overdorf at al argue[85], and is itself a profoundly market-oriented idea; it seeks "maximum extraction of economic value"[86] by maximising on key metrics aligned with commercial imperatives. Optimisation is a core logic of technochauvinist and disruptive innovation ways of thinking. When new digital technologies are described as being 'better' than those that came before them, or capable of producing 'better' 'outcomes' than the current state of affairs, this often means eliminating 'inefficiencies' and prioritising speed and cost according to optimising logics (precisely the kind of thinking decried by Morozov). Indeed, what proponents of disruptive innovation are often seeking is to persuade others of the need for optimisation or some social or economic system or process using the particular technology from which they hope to profit. Negative – and often costly – external consequences are often dismissed as simply 'externalities', beyond concern (much as the negative consequences of industrialisation may be dismissed on the same terms). As Broussard argues[87], technochauvinists typically show *little regard for the social impact of their technologies*. These disruption and innovation discourses serve particular goals and interests, primarily those of the start-ups backed by venture

[83] Foucault 1972.
[84] Overdorf et al 2018.
[85] Overdorf et al 2018.
[86] Overdorf et al 2018 p.1.
[87] Broussard 2018.

capital (and the start-ups still seeking venture capital backing) that seek to remake some slice of the world in their image for profit.

Broussard talks at points about the influence of venture capital on the technochauvinist drive towards disruptive innovation[88] (though, in general, she offers little substantive discussion of the role of capitalism in producing technochauvinism[89]). Venture capital plays a significant role in the tech industry of today and in efforts to get start-ups off the ground and into strong market positions. Uber, for example, can lose billions of dollars each year because it is backed by venture capitalists who are happy for Uber to undercharge customers and lose money in the short term with the goal of undercutting the competition, forcing them out of business, and establishing Uber as a monopoly[90]. Yet venture capital has also warped the incentives for start-ups[91] – often, their goal isn't so much to develop a company with a great product that can sustain itself and make a profit. The goal instead is often to produce a technology or dataset valuable enough that Facebook, Google, Amazon, Apple, or Microsoft will buy the company for intellectual property reasons and thus produce a return on investment. This helps produce a start-up culture which promotes hype (per Broussard[92]), dataist ideas about the power of social data to transform the world (per van Dijck[93]), and shallow understandings of the social issues that start-ups are ostensibly trying to address (per Morozov[94]). In some cases, even the lightest examination shows such claims to be obviously spurious. As Broussard says of the claim by proponents of self-driving cars that 95% of fatal car accidents are caused by human error, for instance: "Of course humans are responsible for driving errors. Humans are the only ones driving cars!"[95].

As was noted previously, techno-utopian visions, projects, and worldviews often neglect to seek more fundamental changes in socio-economic relations and

[88] For instance, Broussard 2018 163-174; See also Taplin 2017.
[89] Other than a brief mention of 'greed' as a motivator at p.138; and very briefly talking about misaligned priorities between society and investors at p.147.
[90] Horan 2017.
[91] Taplin 2017.
[92] Broussard 2018.
[93] van Dick 2014.
[94] Morozov 2013.
[95] Broussard 2018 p.136.

hierarchies. Accordingly, 'disruption' in the discourse of technochauvinists usually doesn't mean disrupting class, gender, or racial hierarchies and structures. Rather, what is usually to be disrupted is either some form of social relation (which is to be marketised through the disruption) or some existing form of market, principally to benefit the disruptor. While a technology promoted by a technochauvinist under the banner of disruption may be 'better' at serving the (generally economic) goals of the technochauvinist, there is no guarantee that it will provide any such benefit for anybody else. It may promise convenience, cost-saving, or efficiencies (in line with the logics of optimisation), but at the same time these apparent benefits may themselves undermine any prosocial or otherwise beneficial features of the social relation or market being disrupted (as Morozov argues[96]).

3.2. Machines can solve human problems

Machines can offer a wide range of capabilities, many of which are helpful in addressing certain real, human social or economic issues. Yet, as Broussard argues, technochauvinists may wrongly assume that technology of some kind can help solve any human social or economic issue. This logic is faulty for two related reasons:

(1) many social and economic issues originate in socio-economic and political choices and thus are not necessarily problems of a kind to be addressed with computers

(2) machines are human-made and reflect the worldview, assumptions, goals, and priorities of those who design, develop, deploy, and use them, which may align with the ways of thinking that produced the problematic social or economic issue in question in the first place. That is to say, technochauvinist ways of thinking often rely on misconceptions and misunderstandings about the nature and causes of social problems and about the nature and capabilities of computers.

[96] Morozov 2013.

3.2.1. Human problems are often not of a kind that machines can intervene against

There are some things that computers are particularly good at. These broadly relate either to computers' capabilities as information technologies (information storage, retrieval, processing, including mathematical, logical, and statistical functions) or as communication technologies (allowing one-to-one, one-to-many, and many-to-many text, image, video, and audio communications of many kinds through networking). It is not difficult to conceive of many kinds of problems where the information processing power of computers is useful or where their networked communications capabilities can be beneficial – indeed, the rapid and widespread adoption of computers throughout society in recent decades is testament to how useful they can be.

However, as Broussard says, "computers are good at some things and very bad at others, and social problems arise from situations in which people misjudge how suitable a computer is for performing the task"[97]. Though computers undoubtedly have certain benefits, there are many things that they cannot do well and many domains where their uncritical use in place of other (human and organisational) ways of addressing issues, perhaps due to blind optimism in their capabilities, is likely to make things worse. Many social issues have deep-seated, long-standing, and ingrained socio-economic and political roots. Indeed, many social problems are arguably unresolvable without structural social and political economic change. Simply introducing some computer system into a set of social or economic relations that are *structurally* broken in some way in the expectation that this will somehow resolve the issue is characteristic of the *blind optimism about technology* that Broussard identifies as part of technochauvinism.

It is of course true that social and political economic challenges throughout history have been solved with the aid of new technologies. Flint knapping allowed the production of better tools to improve hunting and food preparation. The wheel and axle allowed for easier transportation of people and goods over longer distances. Aqueducts provided reliable water supplies for growing settlements located away from fresh water sources.

[97] Broussard 2018 p.87.

The compass allowed ships to more accurately navigate the oceans. Optical lenses allowed people with vision problems to see better and helped scientists understand the nature of the world. The steam engine, as discussed above, provided a power source that allowed factories to be located further away from rivers. Refrigeration allowed food to be transported over longer distances and to be kept for longer and in hotter climates without spoiling.

All of these technologies were able to aid in addressing some difficulty because their particular design, capabilities, and affordances lent themselves to doing so (though, of course, using some of these technologies to solve a particular problem in turn produced new social, economic, or environmental issues that themselves required some other kind of solution). But the fact that some problems have been solved or eased with the help of certain technologies does not lead to the conclusion that all problems can be solved with technology, or that, where a technology has been helpful in one particular area, it will be similarly helpful in resolving any other problem. Yet technochauvinist ways of thinking are often grounded in faulty assumptions that a technology that may serve a purpose or assist in dealing with an issue in one context will offer the same or similar benefit in another. But just because a computer system might be good at one thing, does not mean that it can do any other.

Moreover, as Morozov argues[98], many 'problems' posited for technological intervention are not actually *problems* at all when understood properly in their context; they are features in that they are socially desirable or beneficial in some way, but they are framed as problems according to market logics by people who see them as opportunities for or obstacles to capital. Consider again the issue of inefficiency in the criminal justice system, for example, which is supposedly pressing enough that an array of computerised tools intended to improve things have been devised[99]. More generally, inefficiency is often framed as a problem to be solved through optimisation[100] (which, as discussed, is a core logic of disruptive innovation and technochauvinist ways of

[98] Morozov 2013.
[99] Cobbe 2020.
[100] Overdorf et al 2018.

thinking). Yet, as noted in Section 2.3, in criminal justice, inefficiency might mean insisting on a fair trial even for defendants who might seem obviously guilty.

It is important therefore to consider how things come to be understood as problems amenable to particular interventions. To be intervened against (whether using computers or through some other mechanism) social issues must indeed first come to be understood *as problems*. That is to say, they must be recognised, conceived of, and rationalised as something that is 'a problem' for which some kind of remedy is required. A key aspect of this process of *problematisation*[101] is that the supposed problem will be framed as being amenable to forms of calculation, intervention, and transformation and will be accompanied by ideas for resolving it. In some cases, the process of problematisation involves careful consideration of various potential mechanisms for addressing the problem and, ultimately, identification of some kind of intervention attempted at achieving that goal. In other cases, a particular form of intervention will have been considered, desired, or intended in advance. In all cases, this process of problematisation is political– undertaken with goals and outcomes in mind, on the basis of certain social, technological, legal, and political-economic logics, and according to particular ways of thinking, knowing, understanding, and intervening. Through this process of problematisation, some social, legal, political economic, or technological issue comes to be understood as a problem according to some measure or standard and as amenable to resolution through some intervention or reform.

In some cases, viewing social issues through a technochauvinist lens means routinely coming to problematise those issues such that they are – in theory – amenable to being addressed with the aid of computers' information processing power or their communications capabilities. In that sense, subscribing to a technochauvinist worldview can lead people to identify real, difficult social issues but in doing so misunderstand either their causes or solutions (or both) such that more technology seems like the best way forward. In other cases, however, problematisation according to a technochauvinist worldview is inextricably linked to the techno-capitalist logics of disruptive innovation. That is to say, in those cases, often the desire isn't so much to

[101] Rose and Miller 1992; Miller and Rose 2008.

create a 'solution' for a problem, but to create a product that will bring a profit; the solving of the problem is supposedly the means to get there, but is ultimately incidental to the actual goal. The goals of the tech producer are therefore often not aligned to – and may conflict with – the solving of the problem.

It is a mistake therefore to assume that the technochauvinist starts from a position of actually desiring to solve a problem and simply goes wrong because of false beliefs about the power of technology (though in some cases this may be what happens). Rather, technochauvinists are often not so much interested in creating a solution that will solve a problem, as in creating a problem that will sell their solution (indeed, as Morozov notes[102], techno-solutionists are often essentially disinterested in the specifics of the problems they purport to solve). However, false beliefs in the power of technology and other technochauvinist logics certainly play into *rationalising* the problematisation (both internally and externally) such that a particular intervention can be framed as a convenient way to address a real and pressing problem, rather than the understanding of the latter having been created for the benefit of the former. But the fact that a particular social, economic, or political issue has been problematised in one way does not mean that it could not be problematised in another, perhaps to bring intervention of another kind – perhaps with a different kind of technology, which may be more effective (yet more expensive, or slower), or with no technology in particular. Nor does it mean, necessarily, that it is actually a problem at all (as Morozov is keen to point out[103]).

As such, problematisation according to technochauvinist thinking – with blind optimism in the power of technology; solutionist approaches to identifying issues to be addressed; dataist beliefs in the power of tracking and analytics; pursuit of optimisation and disruption as key logics; and lack of real concern for social issues with a white male bias – often fundamentally mistakes the issues that are being framed as problems to be solved by or with computers. Many social issues have their roots in chronic underfunding of social services and welfare programmes, in underfunding of education, in lack of employment opportunities, in economic inequalities and exploitation, and in

[102] Morozov 2013.
[103] Morozov 2013.

other issues stemming from political and ideological choices made by politicians, policymakers, and governments.

The technochauvinist, however, in considering these issues, might view them as problems of cost or efficiency that can be solved by introducing computers in some form: reducing staffing levels through automation; producing more data about social phenomena in the hope of generating insights into the problem; introducing systems that can optimise human processes to save money; and so on. Fundamentally, these computational interventions can – at best – hope to address consequences, rather than causes. That is to say, where a public service is chronically underfunded, for instance, seeking to reduce staffing levels or to optimise processes is not addressing the cause of the problem (i.e., the underfunding) but a consequence of it (i.e., the fact that expenditure on staff is higher than the too-low budget which it allows). The core problem – the underfunding – is not one that can be solved either by computers' powers as information technology or by their capacity as communications technology. To that extent, technochauvinist interventions may be able to *mitigate the effects* of some problems, to some extent, but they cannot hope to *resolve* the problems themselves.

3.2.2. Machines are political

As Broussard argues [104], the blind optimism about technology exhibited by technochauvinists typically includes false beliefs in the reliability and objectivity of machines. Similarly, van Dijck is clear that dataism involves unfounded beliefs in the objectivity of data and the technologies that produce and process it. Broussard and van Dijck are right to highlight that these beliefs in reliability and objectivity are unfounded. As critical scholars have shown[105], data is neither simply collected nor merely gathered. Rather, it is *produced* according to certain logics and worldviews and with certain goals in mind[106]. Data is not a raw material that can be mined for insights – there is no such thing as 'raw' data; all data is 'cooked'[107]. The technical repositories, architectures, and

[104] Broussard 2018 p.69.
[105] For example, Hacking 1982; Kitchin and Lauriault 2014; Iliadis and Russi 2016; Dalton, Taylor, and Thatcher 2016.
[106] Kitchin and Lauriault 2014
[107] Kitchin and Lauriault 2014

systems for producing, processing, and analysing data are similarly not neutral or objective, but are complex socio-technical systems which are produced by people to achieve particular goals in particular ways[108]. Indeed, as noted above, Broussard posits as the 'first principle' of her book the idea that "data is socially constructed"[109].

Yet it is not necessary to look to new and complex digital technologies to understand the social, political nature of technology. Knives, spoons, and forks, for example, are all types of cutlery – technology to assist with eating food. Yet each affords the user a different capability, making them suitable for different actions relating to the eating of food. We also have plenty of evidence from history that knives afford the ability to more easily harm another person than spoons, which is why (in the UK at least) the sale and carrying of certain kinds of knives is subject to more legal restrictions than the sale or carrying of spoons. A classic (and possibly apocryphal[110]) example comes from the work of Langdon Winner, who described how bridges in New Jersey leading to a new state park were designed to be low enough that cars (primarily owned at the time by middle class white Americans) could safely pass under them, but buses (primarily used by Black, Latino, and working-class Americans) could not[111].

It is therefore not just the case that technologies are socially constructed, as Broussard says, but also that they afford different kinds of behaviour and interaction and therefore afford certain social effects and relations. Yet what technologies afford is not definite and consistent across all those who use them. The affordances of technologies – the potential capabilities and uses that a particular technology offers a user – are shaped both by the intention of the designer and by the perception and intention of the user[112]. The perception and intention of the user is itself shaped by the technology, of course, but also by their context, perspective, and understanding of the task for which they are using the technology. Different people will therefore perceive the same technology differently and come to different understandings of how it can be used and what it can be used for. That is to say, technologies will afford different things to different people

[108] Kitchin and Lauriault 2014
[109] Broussard 2018 p.18.
[110] Joerges 1999.
[111] Winner 1980.
[112] Verbeek 2005.

according to their subjective understandings of them in different contexts. Ultimately, then, all technologies are social phenomena: they are produced in certain contexts, according to certain contingencies, worldviews, assumptions, priorities, blind spots, and goals; and they afford certain kinds of behaviours, actions, and interactions that also depend on context and perspective.

The fact that technologies are social phenomena that affect social relations is implicitly understood in technochauvinist discourse – after all, if technology could not affect social relations, then the idea of using technological interventions to address social problems would not make any sense at all. But what is often not understood by those proposing technological interventions is that – because technologies are social phenomena – *how* technologies can affect social relations is dependent on the interaction of a large number of influences and processes, almost all of which are not technological in nature. How a particular technology is designed, deployed, used and what impact its use will have will depend on related social issues, legal limitations or permissions, political economic context, and other structural and systemic factors that influence its designers, deployers, users, and anyone affected by it.

Yet these are often the kind of social issues with which technochauvinists are unconcerned. Broussard rightly argues that technochauvinists show a lack of caution for how their technologies will be used, as well as a lack of concern about social issues relevant their technologies (particularly around gender), and a white male bias in the design and use of technologies. Barbrook and Cameron argue that the Californian Ideology involves a wilful blindness to racism, poverty, and environmental degradation. This lack of concern for the social context of technology is a fundamental problem when – for instance – using computers to make decisions about people and their rights, interests, entitlements, and relations. Focusing only on the technology and what it can supposedly do – treating the decision as a technological problem to be solved – simply does not account for other factors that are relevant and important to such decisions and thus risks producing outcomes that cause significant harm. In the context of algorithmic decision-making, for example, this risks biases in datasets and algorithms producing decisions that reflect and repeat systemic socio-economic inequalities. As

Broussard says, “Part of the reason we run into problems when making social decisions with machine learning is that the numbers camouflage important social context”[113]. Where those responsible for such technologies do not care to make the effort to understand that social context, serious problems can result.

Because machines are political, because they embed human values and intentions, claims to the objectivity of technology may also obscure or conceal real motives and ideological goals. An example can be found in the digitalisation of welfare programmes in certain countries. Philip Alston, formerly the UN Special Rapporteur on extreme poverty and human rights, assessed the burgeoning digital welfare states of several countries in 2018[114]. What he found was that – across countries and digitalisation programmes- the supposed scientific rationality of digital systems was used to provide cover for ideological desires to automate, predict, identify, surveil, detect, target and punish”[115]. In his view, claims to the supposed objective and neutral nature of computers – a core aspect of technochauvinism – were used to provide justification for systems that in fact “reflect values and assumptions that are far removed from, and may be antithetical to, the principles of human rights”[116].

For some, despite their political nature, machines seemingly offer a kind of technocratic tinkering with some of the symptoms of social and economic problems without addressing their origins in our political economic order (the foundations of which may be felt to be unchangeable and largely beyond criticism). Indeed, the idea that machines can solve social and economic problems without requiring deeper, more radical interventions to address their origins can be alluring – not least because they promise to do so in ways that are immediately recognisable as being compatible with and sitting well within the current political economic frame: by increasing efficiency; by reducing cost; by reference to concepts of individual empowerment, fairness, and rationality; through extensive quantification, data production, and statistical analysis. These are hallmarks of the market-oriented and other logics which dominate liberal

[113] Broussard 2018 p.115
[114] Alston 2019.
[115] Alston 2019.
[116] Alston 2019.

capitalist political economy. Yet because technologies are social phenomena, because they are produced in particular social, legal, and political economic contexts, they are often a product of and reflect the very ways of being, of thinking, and of doing that underpin the problems they are purported to solve. Because they are social, technologies are often *of* the problem and therefore unable to *solve* the problem.

That said, promotion of certain technologies is generally accompanied by a *professed* belief that they can produce widespread, structural political economic transformations. An example of such a technology is blockchain, which has been claimed by proponents to offer a means to radically rethink and remake organisations, institutions, governance mechanisms, and relations of power across societies[117]. Discourses around blockchain – and associated technologies like NFTs[118] – typically exhibit (sometimes to a rather extreme degree [119]) the hallmarks of technochauvinist thinking: utopianism, libertarianism, white male bias, lack of concern for social issues (in particular, around gender), and pursuit of disruption. As with the other utopian visions discussed earlier in this report, however, the white male bias and disregard for social issues that characterises much of the discourse around blockchain betrays the fact that – for all its ostensible libertarian radicalism – it is a fundamentally *conservative* project.

The logic underpinning NFTs and other crypto-backed digital 'assets', for instance, is to provide some technical foundation for a form of artificial scarcity[120] in a determined effort to maintain a capitalist hierarchical political economic order in the face of the abundance of freely available and easily reproducible and distributable information. For all the heady talk of decentralisation, 'code as law', and building a new 'meta' world backed by blockchain and other crypto technologies like smart contracts, it is not unknown for NFT advocates to appeal to centralised state institutions for restitution when things go wrong. As is the case with many such projects grounded in the technochauvinist discourses of disruptive innovation, the only 'disruption' ultimately sought by NFT advocates is to position the creators and 'owners' of NFTs (many of

[117] Magnuson 2020.
[118] 'Non-Fungible Tokens'.
[119] Golumbia 2016.
[120] Dormehl 2021.

whom are already wealthy, given the price charged for such ‘assets’) somewhere nearer the top of that hierarchy than they may otherwise have been.

The technochauvinist (and related) concepts and discourses outlined in this report thus generally serve to obscure and distract from the need for a much broader understanding of problems and a much wider set of interventions – often structural, systemic interventions that upset established hierarchies and balances of power in favour of those affected by problems – than technochauvinists usually understand or are willing to admit. This is often the case even where logics of disruption are explicitly pursued (the technochauvinist wants to disrupt some things – but not too much, and primarily to their benefit). Yet these are fundamentally political interventions made on the basis of political calculations and political choices. Choosing one technological intervention supposedly intended to address some social issue that has been problematised accordingly is itself a political decision that often means to actively select against some other possible intervention – perhaps a more mundane, slower, or more expensive human, social, or organisational one. Technochauvinist appeals to the objectivity and rationality of technologies – and to the goal of ‘optimising’ systems and processes through technology – thus work to depoliticise inherently political interventions and to obfuscate their political nature.

4. Policy recommendations

Broussard offers a hopeful tone to her work, and a prescription for challenging technochauvinism and its consequences:

> "Once we understand how computers work, we can begin to demand better quality in technology. We can demand systems that truly make things cheaper, faster, and better instead of putting up with systems that promise improvement but in fact make things unnecessarily complicated. We can learn to make better decisions about the downstream effects of technology so that we don't cause unintentional harm inside complex social systems. And we can feel empowered to say "no" to technology when it's not necessary so that we can live better, more connected lives and enjoy the many ways tech can and does enhance our world"[121].

Even this, however, flirts with a belief that if we increase the general understanding of how computers work, then we can arrive at a future where computers are built better, or are used more judiciously, and can then have something approaching the digital future that techno-utopians have long promised us (or, if not, at least a future better than the one we might otherwise have). Ultimately, in rejecting technochauvinism, Broussard seems to conclude that the problem with technology is grounded primarily in the culture around technology, rather than in more fundamental issues with the social and political nature of technologies, how we come to identify socio-economic issues as problems suitable for technological intervention, and the capitalist logics, incentives, and imperatives that drive these ways of thinking and intervening. That is to say, though Broussard provides an insightful critique of certain ways of thinking about computers, she at times seems unwilling to fully depart from the idea that computers can bring about important transformations if only they are carefully designed and used in just the right way.

[121] Broussard 2018 p.12

Yet addressing the proper role of digital technologies in our societies is not simply a matter of better understanding how computers work and demanding better quality in their design and use from that point. As this report has sought to show, there are more fundamental questions: about how we come to understand social and economic processes as problematic and worthy of intervention in the first place, and about the nature of technologies - digital or otherwise, high quality or not – and their capacity to bring about fundamental changes in human social, political, and economic conditions. Computers may well help us address some problems – alongside other technologies and interventions – but this potential will only be realised by developing a thorough understanding of *how* we come to understand things as problems in the first place, what *kinds* of problems computers can help with, of *how* they can help with those problems, and of *where* they can be most effectively leveraged to achieve that. Correspondingly, we must also develop better ways of understanding where the problems we are faced with are not of a kind to be solved by machines, and of where things that are being framed as 'problems' are in fact socially beneficial and desirable features that have been problematised simply because they stand in some way of capital's march towards profit. Moreover, we must also recognise that many deep-rooted socio-economic problems require careful *human* intervention.

On its own terms, technochauvinism is a useful concept for understanding and critiquing initiatives to introduce computer technologies into social and economic life. But, as this report has sought to show, technochauvinism is by itself insufficient a frame to understand and avoid the pitfalls of using digital technologies can help solve society's problems. Combining Broussard's many valuable insights (in particular, but not limited to, those relating to the gendered nature of technochauvinism, which are generally missed by male authors) with those of other writers, however, offers ways forward. Whether we understand these issues through the lens of technochauvinism, technological solutionism, dataism, quantification and rationalism, or techno-capitalism (or some combination thereof), the common themes discussed in this report point us towards five key questions to ask when

1) **Is this really a problem?** It is important to consider whether the supposed 'problems' to be solved using technology bring any benefits. What would be lost if the supposed problem was solved, and what are the possible downsides? Who does framing a particular phenomenon as a problem serve? How has it come to be framed as a problem? If the phenomenon being problematised serves some desirable and socially beneficial purpose, then it is quite possible that it is not in fact a problem at all. That is not to say that it is necessarily perfect – there may be real improvements of some kind that can be made. But the phenomenon itself may turn out to not be a problem at all, when fully understood in its context.

2) **If so, what kind of problem is it?** If something is genuinely a problem, then it is important to understand what kind of problem it is. What are the proximate causes of this problem? Where do its origins lie? Even if something is accepted as a problem, then the particular way that it has been problematised may not be the only possible way of understanding it as a problem. How else could this phenomenon be problematised? What other ways of understanding this as a problem might there be? Different ways of understanding issues as problems may point in the direction of different kinds of interventions, some of which may be more appropriate or effective than others.

3) **Is this kind of problem amenable to computerised intervention?** Once it has been determined what kind of *problem* is to be addressed, the next question is to ask what kind of *solutions* might be needed. What are the possible interventions that might help address the causes of this problem? Which of those require digital technologies, and which involve some other kind of change to human organisational or structural factors? Choosing to intervene with computers may obscure some other – perhaps more mundane, perhaps more cautious or demanding, but potentially more effective – way of addressing the causes of the identified problem. To what extent is the problem one where better information processing or communications technology can really help? Which aspects of the problem can be aided with information processing or

communications technologies and which require some other kind of approach. What other things are also needed?

4) **If so, is this the right kind of technology for this kind of problem?** If it is clear that the causes of the problem can be helped in some way using some kind of digital technology, it should then be considered whether the proposed solution is appropriate. What does this particular technology afford? Do the affordances of this technology support the kind of change that is needed? How does that differ from other possible technologies? Who will benefit from using this particular technology and who will this intervention make the situation 'better' for? Who will potentially be disadvantaged? Intending to use one particular technology from the outset may obscure other technologies that may in fact be better suited to helping address the problem.

5) **If so, who are the right people to develop that technology?** Because technologies are social phenomena, it matters who is involved in their design, development, deployment, and use. Do the people involved in these developing these technologies have sufficient understanding of the social context of the problem and its causes? Do they have sufficient understanding of the potential consequences of implementing their technology? Even questions 1 to 4 proposed here can only be asked and answered according to the backgrounds and perspectives of those who are asking and answering them. It is crucial, therefore, that in asking and answering these questions the people who are likely to be affected in some way by new technologies are properly centred in the process and that their voices are heard and their rights, interests, and wishes are respected. In particular, given the white male bias that characterises technochauvinism, it is important to ensure that women and people of colour are properly involved in decision-making.

If at the end of an honest appraisal of these questions, undertaken in good faith, a computer-based intervention seems to be the most appropriate, then a computer-based intervention may be what is required. Note, however, that these five questions

are not exhaustive, and in practice there are likely to be other things that should be considered. There is no doubt that computers can be enormously helpful in some areas and where they can bring genuine benefit they should be used. However, identifying the best way to use computers to address the problems they are suited to can only be achieved by rejecting technochauvinism. This requires an honest assessment of how socio-economic problems arose in the first place – often because of structural inequalities, ideological projects, economic factors, and past misguided attempts to solve social issues with technology. It also requires acknowledgement that the important work of addressing human social, economic, and political problems often cannot be delegated to machines.

5. Bibliography

Philip Alston, 'Digital welfare states and human rights - Report of the Special Rapporteur on extreme poverty and human rights' (2019) *United Nations Office of the High Commissioner on Human Rights* A/74/48037

Richard Barbrook and Andy Cameron 'The Californian Ideology' (1995) 1 *Mute* <https://www.metamute.org/editorial/articles/californian-ideology>

John Perry Barlow, *A Declaration of the Independence of Cyberspace* (Electronic Frontier Foundation 1996) <https://www.eff.org/cyberspace-independence>

Stafford Beer, *Designing Freedom* (House of Anansi Press 1993) <https://monoskop.org/images/e/e3/Beer_Stafford_Designing_Freedom.pdf>

Günter Berghaus, *Futurism and Politics: Between Anarchist Rebellion and Fascist Reaction* (Berghahn 1996)

Anne Bowler, 'Politics as Art: Italian Futurism and Fascism' (1991) 20 *Theory and Society* 763 <https://www.jstor.org/stable/657603>

Meredith Broussard, *Artificial Unintelligence: How Computers Misunderstand the World* (MIT Press 2018)

Caitlin Chin and Mishaela Robison, 'How AI bots and voice assistants reinforce gender bias' (2020) *Brookings Institute* <https://www.brookings.edu/research/how-ai-bots-and-voice-assistants-reinforce-gender-bias>

Jennifer Cobbe, 'Legal Singularity and the Reflexivity of Law' in Simon Deakin and Christopher Markou (eds) *Is Law Computable? Critical Perspectives on Law and Artificial Intelligence* (Hart Publishing 2020) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3858474>

Jennifer Cobbe, Michelle Seng Ah Lee, Heleen Janssen, and Jatinder Singh, 'Centring the Law in the Digital State' (2020) 53 *IEEE Computer* <https://doi.org/10.1109/MC.2020.3006623>

Craig M Dalton, Linnet Taylor, and Jim Thatcher, 'Critical Data Studies: A dialog on data and space' (2016) *Big Data & Society* <https://doi.org/10.1177%2F2053951716648346>

Jenny Davis, *How Artifacts Afford: The Power and Politics of Everyday Things* (MIT Press 2020)

Department for Digital, Culture, Media & Sport, *Policy Paper: National Data Strategy* (2020) <https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy>

José van Dijck, 'Datafication, dataism and dataveillance: Big Data between scientific paradigm and ideology' (2014) 12 *Surveillance & Society* <https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/datafication>

Luke Dormehl, 'NFTs and the explosive rebirth of artificial scarcity' (2021) *DigitalTrends* <https://www.digitaltrends.com/features/nfts-artificial-scarcity>

Marco Duranti, 'Utopia, Nostalgia and World War at the 1939-40 New York World's Fair' (2006) 41 *Journal of Contemporary History* 663 <https://www.jstor.org/stable/30036413>

Michel Foucault, *Archaeology of Knowledge and the Discourse on Language* (trans AM Sheridan Smith, Pantheon Books 1972)

Cheryl R Ganz, *The 1933 Chicago World's Fair: A Century of Progress* (University of Illinois Press 2012)

Michael Angelo Garvey, *The Silent Revolution, Or, The Future Effects of Steam and Electricity Upon the Condition of Mankind* (William and Frederick 1852)

Norman Bel Geddes, Magic Motorways (Random House 1940) <https://archive.org/details/magicmotorways00geddrich/mode/2up?view=theater>

David Golumbia, *The Politics of Bitcoin: Software as Right-Wing Extremism* (University of Minnesota Press 2016)

Al Gore, *The Assault on Reason: How the Politics of Blind Faith Subvert Wise Decision-making* (Bloomsbury Publishing 2008)

Ian Hacking, 'Biopower and the avalanche of printed numbers' (1982) 5 *Humanities in Society* 279

Andrew Iliadis and Federica Russi, 'Critical data studies: An introduction' (2016) *Big Data & Society* <https://doi.org/10.1177%2F2053951716674238>

Hubert Horan, 'Uber's Path of Destruction' (2019) *American Affairs* <https://americanaffairsjournal.org/2019/05/ubers-path-of-destruction>

Bernward Joerges, 'Do Politics have Artefacts' (1999) 29 *Social Studies of Science* 411 <https://doi.org/10.1177%2F030631299029003004>

Rob Kitchin and Tracey P Lauriault, 'Towards critical data studies: Charing and unpacking data assemblages and their work' (2014) *The Programmable City Working Paper 2* <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2474112>

Harry Kitsikopoulos, 'From Hero to Newcomen: The Critical Scientific and Technological Developments That Led to the Invention of the Steam Engine' (2013) 157 *Proceedings of the American Philosophical Society* 304 <https://www.jstor.org/stable/24640398>

David Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (2nd edn, Cambridge University Press 2014)

William Magnuson, *Blockchain Democracy: Technology, Law and the Rule of the Crowd* (Cambridge University Press 2020)

Devon Maloney, 'The Jetsons is actually a bone-chilling dystopia' (2017) The Verge <https://www.theverge.com/2017/11/3/16598440/jetsons-dystopia-dc-comics-future-apocalypse>

Karl Marx, *Wage Labour and Capital* (1847)

Karl Marx, *Capital: Volume 1* (1867)

Viktor Mayer-Schönberger and Kenneth Cukier, 'Big Data. A Revolution that will transform how we live, work, and think (John Murray Publishers 2013)

Marshall McLuhan, *The Gutenberg Galaxy: The Making of Typographic Man* (University of Toronto Press 1962)

Marshall McLuhan, *Understanding Media: The Extensions of Man* (McGraw Hill 1964)

Eden Medina, 'Designing Freedom, Regulating a Nation: Socialist Cybernetics in Allende's Chile' (2006) 38 *Journal of Latin American Studies* 571 <https://www.jstor.org/stable/3875872>

Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile*, (MIT Press 2011)

Peter Miller and Nikolas Rose, *Governing the Present: Administering Economic, Social, and Political Life* (Polity 2008)

Martin Moore and Damian Tambini (eds), *Digital Dominance: The Power of Google, Amazon, Facebook, and Apple* (Oxford University Press 2018)

Evgeny Morozov, *To Save Everything, Click Here: Technology, Solutionism, and the Urge to Fix Problems that Don't Exist* (Allen Lane 2013)

Matt Novak, '50 Years of the Jetsons: Why The Show Still Matters' (2012) Smithsonian Magazine <https://www.smithsonianmag.com/history/50-years-of-the-jetsons-why-the-show-still-matters-43459669>

Rebekah Overdorf, Bogdan Kulynych, Ero Balsa, Carmela Troncoso, and Seda Gürses, 'POTs: Protective Optimization Technologies' (2018) *arXiv preprints*, arXiv:1806.02711v3 <https://arxiv.org/abs/1806.02711v3>

Christine Poggi, *Inventing Futurism: The Art and Politics of Artificial Optimism* (Princeton University Process 2009)

Karl Polanyi, *The Great Transformation: The Political and Economic Origins of our Times* (Farrar & Rheinhart 1944)

Howard Rheingold, *The Virtual Community: Homesteading on the Electronic Frontier* (1993) <https://www.rheingold.com/vc/book/intro.html>

Nikolas Rose and Peter Miller, 'Political Power Beyond the State: Problematics of Government' (1992) 43 *The British Journal of Sociology* 173 <https://www.jstor.org/stable/591464>

Jonathan Taplin, *Move Fast and Break Things: How Facebook, Google, and Amazon Cornered Culture and Undermined Democracy* (Little Brown 2017)

Peter-Paul Verbeek, *What Things Do: Philosophical Reflections on Technology, Agency, and Design* (Penn State Press 2005)

Harold Wilson, 'Labour's Plan for Science: Reprint of Speech by the Rt Hon Harold Wilson MP, Leader of the Labour Party, at the Annual Conference, Scarborough, Tuesday, October 1, 1963', 9 *Labour Party Pamphlets and leaflets 1963-1964* (Labour Party 1964)

Langdon Winner, 'Do Artifacts Have Politics?' (1980) 109 *Daedalus* 121 <https://www.jstor.org/stable/20024652>

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