GUEST EDITORIAL
Repairing (with) Algorithmic Systems

Tuukka Lehtiniemi
University of Helsinki, Finland/tuukka.lehtiniemi@helsinki.fi

Heta Tarkkala
University of Helsinki, Finland

The constant process of breakdown and repair is an inherent feature of the digital environment. Digital objects, software, and services tend to be in what is sometimes called permanent beta (Neff and Stark, 2004): they are released into the wild in a half-baked state, and developed in an iterative cycle involving failures, malfunctions, and breakdowns, learning from them, and their follow-up fixes or repairs. Testing (Marres and Stark, 2020) and gradual experimentation seem to be an important mode of operation for companies developing them. Algorithmic systems – dynamic arrangements of people and code (Seaver, 2019), including artificial intelligence (AI) applications, tools, and services – are no exception. In a sense, malfunction is even built into various AI tools and services, such as agents or chatbots. It is common knowledge that they routinely produce errors such as random falsehoods presented as facts ('hallucinations' as the industry jargon goes), and users simply need to be wary of this. While these services often improve through iterations, a pattern remains: algorithmic systems seem to perform almost miraculous feats when they work as expected, yet they often fail expectations.

This Special Issue builds on literature employing the notions of breakdown and repair (e.g., Henke and Sims, 2020; Jackson, 2014; Star, 1999) to investigate repair efforts related to algorithmic systems. The repair literature emphasizes the power of breakdown and repair as conceptual tools to focus attention: they allow probing things and reveal aspects that would otherwise remain hidden. Breakdown brings invisible things to attention, showing where things go wrong, how expectations are not met, or when progress stops. Repair, in turn, helps point out acts of restoration, but also the development, transformation, or renewal that can take place as a result of breakdown. As algorithmic systems never seem to be quite finished, they appear to be a prime example of objects of a broken world that is always-almost-falling-apart and under a constant process of fixing and reinvention (Jackson, 2014).

The Special Issue brings together a series of empirical articles that, together, allow us to examine how the notions of breakdown and repair fit in with an examination of algorithmic systems. These articles share an empirical focus on algorithmic systems in the public sector. As an empirical context, the public sector allows teasing out aspects that might otherwise be difficult to pin down. Here, the stakes of breakdown and repair can be serious. Public sector actors, their services, and their decision-making processes often operate with a distinct ethos and a basis

of core values, involving a focus on rights and entitlements of citizens and a commitment to democratic processes. When public sector algorithmic systems break down, the results can at worst involve dire social and societal consequences: rehashing of old biases and creating new ones, unequal treatment of citizens, and novel forms of discrimination (e.g., Allhutter et al., 2020; Broussard, 2023; Eubanks, 2018; Marjanovic et al., 2021; Rachovitsa and Johann, 2022). This can cause further domino-like breakdowns: of public trust, of social care processes, or of the lives of citizens or families. Development through breakdown and repair, typical as it may be in the digital domain, sits uncomfortably in the public sector context, where they might threaten something fundamental, such as the value basis of a service or process.

While algorithmic systems regularly break down, they are often also framed as a means to repair something in the public sector. Strategies and policy documents paving the way for algorithmic systems in the public sector tend to involve techno-optimism, with AI proffered as a source of positive social change, efficiency, and other public sector improvements (e.g., Bareis and Katzenbach, 2022). Techno-optimism related to AI, digitalisation services and automated decision-making is well acknowledged in research literature (e.g., Kvacik et al., 2023; De Togni et al., 2024; Ratner and Schrøder, 2024). New technologies become repairs to things that are considered broken, such as dysfunctional public services. The promises driving the recent influx of generative AI tools has only strengthened this trend, and it is unlikely that it will be reversed anytime soon. Our lives are likely to increasingly involve algorithmic systems and AI services, which are both repairing the public sector, and under constant repair themselves (see also, Galis and Vlassis, 2025).

With a focus on breakdown, repair, and public sector algorithmic systems, this Special Issue joins a stream of research marrying the notion of repair with algorithmic systems (e.g., Kaun and Liminga, 2023; Schwennesen, 2019; Velkova and Kaun, 2019). It also joins several recent thematic collections that have brought together algorithmic systems, public sector institutions, welfare states, automated decision-making, and artificial intelligence. These have focused on datafication (Dencik and Kaun, 2020), implementation challenges for artificial intelligence (Mergel et al., 2023), power relations and agency (van Toorn et al., 2024), digitalisation in the context of welfare states (Huby et al., 2024) and social and ecological sustainability (Saikkonen and Choroszewicz, 2025). How digital services, automated decision-making, and algorithmic systems change the work of civil servants has also been widely discussed elsewhere, for example through concepts such as street-level algorithms and system-level bureaucracy (Alkhatib and Bernstein, 2019; Bovens and Zouridis, 2002).

Besides the focus on breakdown and repair, what distinguishes this issue from previous thematic collections is attention to how public sector organisations themselves are implicated by algorithmic systems. Rather than examining citizen experiences or service provision, the contributions to this Special Issue focus on the ways in which public sector organisations, ranging from public service media to health and care organizations, deal with, or are expected to deal with, breakdowns and repair efforts. The contributions approach algorithmic systems, including AI tools and services, both as things needing repair, and as repairs to other forms of breakdown.

Collectively, the articles of this issue encourage us to ask: What do breakdowns related to algorithmic systems make visible? What is being maintained or transformed with acts to repair algorithmic systems, or to repair things with algorithmic systems? What gets pushed into the background with acts of repair? Where lies the power to define what is broken and how? On whose expense is repair done, and who bears the burden of it? Who, instead, benefits from it? What constitutes a desirable repair? To what extent can the availability of repairs determine brokenness? By attending to these questions, the articles allow thinking through the use and effects of algorithmic systems and AI in the public sector in a critical yet productive manner. While critical scholars have raised awareness of what can go wrong with datafication, algorithmic systems or AI, what might eventually work satisfactorily or even be desirable is often left for others, often technology developers, to experiment on

(e.g., Susser, 2022). Examining the breakdown-repair process is productive in this sense: after all, if things consistently break down in a similar manner, there is something to be learned about their social and societal desirability.

Thinking in terms of breakdown and repair

Following Christopher Henke and Benjamin Sims (2020: 3), we consider repair to be the process of "restoring both social and material order". Understood in this sense, repairing can involve the hands-on work of returning material things to working order. Yet not only machines, structures, and other material things can be the object of repair, but also social formations: organisations, relationships, processes, health, or healthcare. Indeed, in scholarship employing the notion of repair, repair has targeted various systems and objects from bicycles (Dant, 2019) to digital data (Pink et al., 2019), from workplace social order (Henke, 1999) to biased search results (Velkova and Kaun, 2021), and from AI-powered sorting robots in a recycling facility (Montiel Valle and Shorey, 2024) to the digital infrastructure of welfare provision (Kaun and Liminga, 2023). Material and social aspects of repair often go hand in hand (Henke and Sims, 2020): repairing a material object, such as a bridge, might not involve just a feat of engineering, but also the restoration of diminished trust in public infrastructure. Similarly, repairing data in a cancer registry can involve not just technical fixes, such as imputing missing details, but also the upkeep of ad-hoc arrangements between actors involved in producing cancer data (Lambotte and Martin-Scholz, this issue). Repair is thus a socio-technical phenomenon, including interventions to material structures, meaning, organisation, or social interactions, all of which are parts of keeping socio-technical systems in working order (Henke and Sims, 2020).

Repair is, of course, the flipside of things breaking down, being damaged or worn out, or for any reason not working as expected. If repair takes both material and more abstract forms, so do breakdowns. Things might fall apart literally: an undersea cable might be damaged, a server rack might overheat, a database might fail to connect, or a recommender system might suddenly spout unintended output. Even such literal breakdowns might provoke varying diagnoses of what went wrong and how it should be fixed. But breakdowns are sometimes more intangible to begin with. Things might, for example, break down even as their own state remains stable. This might happen as the surrounding circumstances change in ways that make a system cease to fulfil its desired function. Such situations can give rise to various appraisals of reasons for breakdown and the need and form of consequent reparatory actions. Repairing a welfare service with AI is a good example (Neves et al., this issue): it gives rise to questions on what constitutes a breakdown or a repair, and who determines these. These questions direct attention to the social and discursive, rather than the material, aspects of both breakdown and repair.

Focusing on breakdown is a well-known STS strategy. Susan Leigh Star (1999) famously discusses its merits as a conceptual probe. Infrastructures and other obscure things, which normally remain hidden and are largely taken for granted, may gain unprecedented visibility when they stop working. Breakdown foregrounds things that otherwise escape attention and brings to light relations with and through technologies. Repair, in this sense, is called for when things cease being invisible and the objective is to merge them into the background once again.

In *Autonomous Technology*, Langdon Winner (1978) goes one step further and discusses refusal to repair. For Winner, refusal can be an epistemological strategy. Breakdown, and the visibility things gain as a result of it, enables a mode of inquiry into our relationship to a particular connection, device, or technique in a way that is not possible before breakdown. This offers a possibility to observe how a technology occupying the physical or social space affects our world, and to consider whether this is what we desire. Repairing something, for Winner, contains at least an implicit acknowledgement that it has a desirable place in our world, and thus should be restored to working order.

Another strength of repair and breakdown as conceptual tools is how they highlight that socio-technical artifacts and systems develop not only with initial innovations. There is also – and perhaps

especially, at least in the case of digital systems – an opportunity for development when things require repair (Jackson, 2014). Breakdown and repair call attention to productive involvement: examining the breakdown–repair process can reveal, for example, how human and non-human actors make up sociotechnical systems in a process of creative problem solving (Tanweer et al., 2016; Pink et al., 2016), or how human experts step in to smoothen automation processes that do not quite collapse, yet are also not completely functioning (Alastalo and Lehto, this issue). All of this points to breakdown and repair as analytically productive concepts, as they focus attention on and foreground the elusive.

All acts of repair are not equal in terms of their relationship to social and material change. This Special Issue joins a stream of repair scholarship that has begun to attend to modalities of repair that help with making distinctions between repair acts. Henke and Sims (2020), for example, have presented two alternatives: repair as maintenance and repair as transformation, which have different implications in terms of social or material change. Maintenance is about attending to the status quo, keeping things running, or returning them to normal. Understood in the maintenance sense, acts of repair might involve either routine upkeep that ensures things are running, or reactions to potentially serious and large-scale falling-apart. The key here is how repair protects an existing social and material order. Acts of repair might even purposefully avoid transformative effects by ensuring that any adjustments do not compromise the object's relationship with its surroundings (Carillon, this issue). Repair, in the maintenance sense, is a conservative force, sometimes invisible, aimed at preserving the existing social and material order.

In transformative repair, in contrast, broken-down things are not restored back to their earlier state. Instead, existing structures or practices are purposefully and sometimes radically rearranged, putting forth a new social and material order. The key here is that repair is a force of change rather than preservation. Transformative acts of repair can present emancipatory opportunities for those not currently in power, or they can equally well serve the interests of the powerful; there is no guarantee that the transformation will be progressive in any positive sense of the word, or lead to growth or development (Ruckenstein, this issue). Nevertheless, repair in the transformative sense, as Steven Jackson (2014: 227) contends, can be "a site of some of the most interesting and consequential operations".

Another possibility to distinguish reparatory acts is to consider the mark they leave on the world, as Denis and Pontille (2025) suggest. Breakdown, in this sense, is an interruption, an event worthy of notice. Repair can cause something noticeable again: it is a means to resolve the interruption and to ensure that things start moving along again. Maintenance, in this way of thinking, is something that escapes notice: it aims to prevent problems from occurring, and to ensure that things are always kept in the background where they belong. When pre-emptive and continuous maintenance work is appropriately and successfully carried out, there is no breakdown to focus on: it appears as if nothing interesting has happened.

A third option is the viewpoint of broken world thinking (Jackson, 2014). Here, breakdown is considered to be the normal and continuous state of the world, in which things are always falling apart (Graham and Thrift, 2007; Jackson, 2014). This approach focuses attention on how the world moves forward not so much with initial innovations, but with constant productive acts of repair. In terms of the mark left in the world, breakdown ceases to be an event, as there is nothing unusual when things do not work as expected. Yet repair is not simply maintenance that keeps things in the background, it can be a transformative force. Broken world thinking thus collapses a clear distinction between maintenance and transformation, as constant and business-as-usual repair is taken to be exactly where the transformative potential lies.

As we will discuss below, the contributions to this Special Issue take different stances in terms of qualities and modalities of repair, based on the empirical aspects of the cases they examine.

The contributions to the Special Issue

This Special Issue presents five empirical studies examining brokenness, breakdown, and repair in the context of algorithmic systems for public sector organisations and processes. These contributions span different empirical contexts: AI development for long-term care (Neves et al.), an algorithmic recommender system in public service media (Carillon), a software robot automating data work in healthcare (Alastalo and Lehto), human repair efforts in cancer registries (Lambotte and Martin-Scholtz), and the aftermath of a healthcare data platform reform (Ruckenstein). Together, these contributions address both aspects of repair outlined above: repairing something broken in algorithmic systems, and repairing something in the public sector with algorithmic systems.

In the first article of the Special Issue, "Breaking or Repairing Long-Term Care for Older People? AI Delegation and the Carefication of Later Life", Barbara Barbosa Neves, Geoffrey Mead, Alexandra Sanders, Alex Broom, Naseem Ahmadpour and Kal Gulson examine socio-technical discourses of commercial developers of AI for long-term care in later life. The authors address the discursive aspects of breakdown and repair by examining how age- and care-related ideas are constructed by the AI industry. They do this with a visual, semiotic and textual analysis of AI companies' websites. As the authors discuss, the AI industry paints both caregivers and those in need of care not just as lacking, but lacking specifically in ways that AI solutions promise to fix. The authors thus connect breakdown and repair with techno-solutionism, and provide an in-depth analysis of how techno-solutionism in the care sector context turns particular ideas about technology into particular ideas of what is broken and how it can be restored. Those technologies that are in the industry discourses presented as possible and available at the same time affect which problems are constructed as worthy of repair: namely, the problems that prioritise efficiency and privilege technological fixes. This happens at the expense of other, already well-recognised systemic issues in public health and care.

In the second article, "Closing the Algorithmic Black Box: Breakdowns and Patching Strategies in a Public Service Media", Kevin Carillon examines breakdowns and repairs occurring in the implementation of an algorithmic recommender system in a public service media organisation. Carillon draws from participant observation in the organisation and focuses attention on episodes of breakdown and repair of the recommender system. Mobilising the notion of the (algorithmic) black box in the analysis, the article shows that while breakdowns make the recommender system visible and could thus 'open' the black box, repairs purposefully 'close' it again. Carillon proposes to call this process 'patching': a modality of repair that keeps the system running but preserves its opaque status, purposefully avoiding addressing the root issue that caused a breakdown in the first place. This opens up a way of conceiving algorithmic black boxes not as a stable state resulting from the properties of technologies, but as the outcome of black-boxing practices that emerge and re-emerge as the system breaks down and is consequently repaired.

The third article, "Frictions in Automating Routine Data Work – A Human-Assisted Robot in Datafied Healthcare in Finland" by Marja Alastalo and Iiris Lehto, examines breakdown and repair of robotic process automation of data validation in primary healthcare. The authors' analysis is based on ethnographic fieldwork with a data work team, where they focused attention on the constant not-quite-working but not-quite-broken state of the software robot. Motivated by this empirical observation, the authors examine how frictions, both technical and social in nature, complicate the software robot's smooth functioning. Due to friction, automation requires constant repair work, or what the authors call human assistance, to function properly, or at all. This constant need for human input contradicts the exaggerated expectations and promises associated with public sector automation. The authors maintain that the notion of friction, when employed side-by-side with breakdown and repair, redirects attention from episodes of repair to a more structural need for human aid and attention. This turns attention from autonomously functioning to human-assisted technologies, potentially a feature of automation projects more broadly.

In the fourth article, "Maintaining and Repairing the Cancer Registries' Regime of Knowing in the Turbulent Context of the French National AI Strategy", François Lambotte and Anja Martin-Scholz examine the work required to repair data in cancer registries. The need for this repair work, the authors show, is exacerbated by changes in health data governance resulting from a national AI strategy. Drawing from ethnographic fieldwork, the article contrasts the context-agnostic policy view on AI-driven transformation with the highly context-specific, manual, and labour-intensive repair practices carried out by human experts in the cancer registries. Theoretically, Lambotte and Martin-Scholz combine the notion of 'regime of knowing' with the notion of 'broken data', producing an in-depth analysis of intertwined elements of care, know-how and power relations that play out in repair work carried out to create data and maintain its quality. As the article shows, this repair work involves both manual technical fixes in the registers, as well as the maintenance of political, economic, social, or normative elements of cancer registries themselves, notably including the (often ad hoc) arrangements between different institutions. All these elements get increasingly disrupted by AI-related developments, leading to an increasing need for repair work.

In the fifth and final article of the Special Issue, "The Darker Qualities of Repair", Minna Ruckenstein examines the aftermath of the introduction of a healthcare data management platform. This algorithmic system was a repair attempt to begin with, aimed at improving healthcare by reorganising workflows and generating new data resources. Based on a series of workshops with physicians using the system, Ruckenstein examines the consequences this had on physicians and their work. The analysis reveals that repairing healthcare with an algorithmic system was a disruptive act that derailed physicians' existing workflows and led to repetitive downstream repair tasks. Ruckenstein characterises different aspects of this repair work as a 'darker' form of repair: it is a burden for physicians, who end up performing tasks that not only feel pointless and frustrating, but also distract them from the goal of helping patients. Further, the repetitive reparatory tasks fail to repair anything or lead to meaningful improvements. The article puts forth the darker qualities of repair as a lens to examine whose aims and interests are served by data-driven reforms, and to evaluate and anticipate breakdowns that accompany them.

Repairing (with) algorithmic systems

To round up this Special Issue's discussions on repairing (with) algorithmic systems, we highlight five fronts of repair debates that the contributions participate in.

Qualities and modalities of repair. The articles in this Special Issue address different stages of development related to algorithmic systems and AI in the public sector: the promissory stage prior to system implementation when algorithmic systems are proffered as solutions to broken aspects of services provided in the public sector (Neves et al.), the aftermath of an algorithmic system's introduction (Ruckenstein), different breakdowns that occur with an existing and operating system (Carillon; Alastalo and Lehto), and the data repair work that takes place at the backstage of health and care, but that is increasingly required by expected AI transformations (Lambotte and Martin-Scholtz). In these analyses of breakdown-repair processes, the authors encounter various forms of breakdown, and various modalities or qualities of repair.

Neves and colleagues analyse breakdown and repair as attempts to create agreement that the existing order in long-term care is compromised in a specific way, and that commercial AI developers provide the desirable means to re-establish order. This does not mean simply the return of the old order: the breakdown constructed here requires a transformation – one that advances the AI industry's interests. In both Carillon's and Ruckenstein's articles, identifying the modality or quality of repair is at the heart of the analysis. For Carillon, repair appears in the form of 'patching' that is not targeted at the root cause of the breakdown. Instead, repairs are carefully constructed so that the algorithmic system's legitimacy is not threatened or, in other words, unwanted transformations do not occur. Ruckenstein's analysis suggests that many qualitatively different repair processes

can be simultaneously at play when algorithmic systems are brought in to rearrange organizational practices. These different qualities of repair may be far from productive and renewing: it can rather be a burden. Alastalo and Lehto deal with a constant cycle of breakdown and repair. In their case, the robot's breakdowns are its well-known feature, and what they discuss exhibits qualities of broken world thinking. Their analytical solution is to focus on the friction that creates the broken world. Lambotte and Martin-Scholtz analyse broken data and its repair, and discover laborious acts of data maintenance, but also maintenance of a more social kind, such as relations of power between institutions. Transformations, in their case, are not contained within repair work which remains a conservative force, but rather enter from the outside, as national AI strategies and policies bring with them new data-related requirements.

All of this points to the value and importance of breakdown and repair as analytical approaches, and different modalities and qualities of repair as an 'analytical toolkit' as Ruckenstein suggests. It also points to the need to carefully consider and distinguish what breaks down, the qualities of repair that enter as a response, and the limits of these concepts. What externally appears as repair, for example, may not inherently conform to positive or empowering qualities often suggested by the notion. The 'permanent beta' status of many algorithmic systems also poses a risk of flattening their falling-apartness. While these systems are always under repair, attention to various qualities of repair can do more than just describe that state and sustain and conform to it.

Repair vis-à-vis solutionism. The notion of technological solutionism is often invoked simply as the technological fix to a more complex problem. More potently, as Lotje Siffels and Tamar Sharon have recently discussed (2024), solutionism can be considered a mode of problem construction, where available technologies begin to constitute problems. As Neves and colleagues highlight in their contribution to this Special Issue, the notion of technological solutionism can be usefully paired with the conceptual tools of breakdown and repair. Armed with these concepts, we can begin to see how generally available forms of AI applications, and particularly rigid expectations for their value and performance (Lehtiniemi, 2024), come to define what is a problem, what is considered a breakdown, and what does not work according to expectations. Available means to solve problems therefore begin to define both what is considered to be broken and how to repair it. The relationship between solutionism and repair might be considered in terms of the 'slippage' that Henke and Sims (2020: 19) discuss: a contrast is drawn between a system now and its desired state and then repair with algorithmic systems is posed as a means to bridge between the two. To be clear, the issue here is not that the existing order begins to look undesirable when conditions change along with new technologies. Rather, the issue is that breakdowns thus constructed are not necessarily the ones that most pressingly call for repair. As Siffels and Sharon (2024: 125) point out, attention to solutionism "allows one to focus on how the problem definition for which a technosolution is proposed came to be and to question if this was done well". Breakdown and repair as a form of techno-solutionism remains a theme with broader applicability in the kinds of 'AI transformations' that emerge across fields of application. This approach takes some of the shine away from the largely positive and forward-looking associations with the notion or repair, a theme we will return to later.

Methodologies to study breakdown and repair. Three out of the five articles included in the Special Issue employ ethnographic methods, broadly understood. This, in our view, speaks of the contexts in which the processes of breakdown and repair can be observed. As Alastalo and Lehto describe in their contribution to this issue, their focus on the constantly-breaking-down robot was not initially planned. Rather, this breakdown, or 'friction' as they call it, caught their attention during observations. Breakdown and repair, in other words, left a mark (Denis and Pontille, 2025), and this served as an invitation to investigate the issue further. In their contributions, Carillon as well as Lambotte and Martin-Scholz similarly encountered breakdown and repair work during their empirical investigations. Even though breakdown makes things visible, smaller and constantly ongoing breakdown–repair processes are probably more likely to escape analytical attention unless

they are observed in this way. More spectacular breakdowns can attract attention from afar – the potentially publicly highly visible breakdowns of the recommended system investigated by Carillon being an example – but details about them can also be most likely captured in the course of ongoing observation.

Repair and optimism. At its heart, repair appears as an optimistic and forward-looking concept: something noble or empowering is involved in attempts to return things to order, or to fix, renew, restore, or care for things. When something is framed to be *in need of repair,* the feeling of progress might be difficult to contest, and those involved in repair can experience involvement in making things better. Great expectations are placed, for example, on the opportunity to fix or improve public services as more data becomes available. This is clearly visible in healthcare, where data, and already existing data practices, are expected to feed innovation powered by AI. However, as Ruckenstein extensively discusses, attempts to repair things involve also darker aspects: repair might fail in its intentions and shape physician's daily work in ways that do not give them much reason for optimism. As also Lambotte and Martin-Scholz as well as Alastalo and Lehto show, repair related to algorithmic systems in practice means various forms of practical, grassroots-level human work and recontextualization. Often this might happen without the possibility to consider, let alone affect, how repair is done and what is its purpose.

The veneer of optimism might also hide other important questions, such as those of power and possibility: Who gets to maintain the existing order with repair, and what consequently gets hidden or contained (Carillon, this issue)? Hopes placed in repairs with algorithmic systems may postpone other urgently needed repairs if resources get diverted from other already well-known solutions (Neves, this issue), or because accumulation of 'more data' is argued to be needed before any action can be taken (Hoeyer, 2019). Thus, promissory repairs might distract from the kind of repair the world needs right now, and repairing with algorithmic systems can involve the avoidance of repairing by other means.

Repair and the human side of algorithmic systems. Finally, the contributions to this issue underline that repair related to algorithmic systems can implicate the humans and the human work involved in those systems in different ways. Attention to repair can make visible how the construction of breakdowns and their repair might cast humans as lacking as Neves and colleagues describe in their contribution, framing human deficiencies as the reason for repair. Alternatively, attention to breakdown and repair can help recognise necessary and unavoidable acts of care, maintenance, or assistance that keep algorithmic systems and processes up-and-running, as Alastalo and Lehto, as well as Lambotte and Martin-Scholtz, discuss in their contributions. Attention to breakdown and repair can show how repairing apparently technical breakdowns can also, or even primarily, target human and organisational relations, as Carillon's analysis shows. And more reflexive approaches to repair might help recognize how attempts to repair with algorithmic systems can derail humans from focusing on what matters to them, ethically and professionally, as Ruckenstein's contribution to this issue helps us see. Repair is a socio-technical phenomenon involving interventions in all the social and technical aspects of keeping systems in working order. But we would argue it can also be something more: in all of the above senses, repair can turn attention to how humans are affected, implicated, required by, or are constitutive parts of, algorithmic systems.

Acknowledgements

The Guest Editors would like to thank all authors for their excellent contributions to this Special Issue, the reviewers for their constructive input, as well as the journal's Coordinating Editor Antti Silvast for his support throughout the publication process. Lehtiniemi's work was supported by the REPAIR project, grant no. 372397, and Tarkkala's work by the Trust-M project, grant no. 372403, both funded by the Strategic Research Council (SRC) established within the Research Council of Finland.

References

Alastalo M and Lehto I (2025) Frictions in Automating Routine Data Work: A Human-Assisted Robot in Datafied Healthcare in Finland. *Science & Technology Studies* 38(4): 57-63.

Alkhatib A and Bernstein M (2019) Street-level algorithms: A theory at the gaps between policy and decisions. In: *Proceedings of the 2019 CHI conference on human factors in computing systems*. Association for Computing Machinery, pp. 1-13.

Allhutter D, Cech F, Fischer F, Grill G and Mager A (2020) Algorithmic profiling of job seekers in Austria: How austerity politics are made effective. *Frontiers in Big Data* 5.

Bareis J and Katzenbach C (2022) Talking AI into Being: The narratives and imaginaries of national AI strategies and their performative politics. *Science, Technology & Human Values*, 47(5): 855-881. https://doi.org/10.1177/01622439211030007.

Bovens M and Zouridis S (2002) From street-level to system-level bureaucracies: How information and communication technology is transforming administrative discretion and constitutional control. *Public Administration Review* 62(2): 174-184.

Broussard M (2023) *More than a Glitch: Confronting Race, Gender, and Ability Bias in Tech*. Cambridge: The MIT Press.

Carillon K (2025) Closing the Algorithmic Black Box: Breakdowns and Patching Strategies in a Public Service Media. *Science & Technology Studies* 38(4): 35-56.

Dant T (2019) Inside the bicycle: Repair knowledge for all. In: Strebel I, Bovet A and Sormani P (eds) *Repair Work Ethnographies: Revisiting Breakdown, Relocating Materiality*. Singapore: Springer Nature Singapore, pp. 283-312.

Dencik L and Kaun A (2020) Datafication and the welfare state. *Global Perspectives 1*(1): 12912.

Denis and Pontille (2025) *The Care of Things: Ethics and Politics of Maintenance*. Cambridge: Polity Press.

De Togni G, Erikainen S, Chan S and Cunningham-Burley S (2024) Beyond the hype: 'Acceptable futures' for AI and robotic technologies in healthcare. *AI & Society* 39: 2009-2018. https://doi.org/10.1007/s00146-023-01659-4.

Eubanks V (2018) *Automating inequality: How high-tech tools profile, police, and punish the poor.* New York: St. Martin's Press.

Galis V and Vlassis V S (eds) (2025) *Digitalization, Data and Welfare: Sociotechnical Approaches to Service Delivery*. Cheltenham: Edward Elgar Publishing.

Graham S and Thrift N (2007) Out of order: Understanding repair and maintenance. *Theory, Culture & Society* 24(3): 1-25.

Henke C R and Sims B (2020) *Repairing infrastructures: The maintenance of materiality and power*. Cambridge: Mit Press.

Hoeyer K (2019) Data as promise: Reconfiguring Danish public health through personalized medicine. *Social Studies of Science* 49(4): 531-555. https://doi.org/10.1177/0306312719858697.

Huby G, Røste R and Reutter L M (2024) Digitalization – Saving or Undermining the Nordic Welfare State? *Nordisk välfärdsforskning* (2): 120-126.

Jackson S J (2014) Rethinking Repair. In: Gillespie T, Boczkowski P J and Foot K A (eds) *Media Technologies: Essays on Communication, Materiality, and Society*. Cambridge: MIT Press, pp. 221-239.

Kaun A and Liminga A (2023) Welfare service centers: Maintenance, repair, and care at the analog interfaces of the digital welfare state. *New Media & Society* 27(5): 3039-3054. https://doi.org/10.1177/14614448231220362.

Kaun A and Männiste M (2025) Public sector chatbots: AI frictions and data infrastructures at the interface of the digital welfare state. *New Media & Society* 27(4): 1962-1985.

Kvakic M, Hansen H A and Fineide M J (2023) If digitalization is the answer – what is the problem? An analysis of policy documents related to the digitalization of Norwegian child welfare services. *Nordic Social Work Research* 15(3): 381-393. https://doi.org/10.1080/2156857X.2023.2277255.

Lambotte F and Martin-Scholz A-M (2025) Maintaining and Repairing the Cancer Registries' Regime of Knowing in the Turbulent Context of the French National AI Strategy. *Science & Technology Studies* 38(4): 64-96.

Lehtiniemi T (2024) Contextual social valences for artificial intelligence: Anticipation that matters in social work. *Information, Communication & Society* 27(6): 1110-1125. https://doi.org/10.1080/1369118x.2023.2234987.

Marjanovic O, Cecez-Kecmanovic D and Vidgen R (2021) Algorithmic pollution: Making the invisible visible. *Journal of Information Technology* 36(4): 391-408. https://doi.org/10.1177/02683962211010356.

Marres N and Stark D (2020) Put to the test: For a new sociology of testing. *British Journal of Sociology* 71(3): 423-443. https://doi.org/10.1111/1468-4446.12746.

Mergel I, Dickinson H, Stenvall J and Gasco M (2023) Implementing AI in the public sector. *Public Management Review*: 1–14. https://doi.org/10.1080/14719037.2023.2231950

Montiel Valle D A and Shorey S (2024) Dis//assemblages of AI: Repair labor and resistance in the automated workplace. *Information, Communication & Society* 27(10): 2022–2037. https://doi.org/10.1080/1369118x.2024.2371794.

Neff G and Stark D (2004) Permanently beta. *Society online: The Internet in context 173*: 188.

Neves B B, Mead G, Sanders A, Broom A, Ahmadpour N and Gulson K (2025) Breaking or Repairing Long-Term Care for Older People? AI Delegation and the Carefication of Later Life. *Science & Technology Studies* 38(4): 13-34.

Pink S, Ruckenstein M, Willim R and Duque M (2018) Broken data: Conceptualising data in an emerging world. *Big Data & Society* 5: 1-13. https://doi.org/10.1177/2053951717753228.

Rachovitsa A and Johann N (2022) The human rights implications of the use of AI in the digital welfare state: Lessons learned from the Dutch SyRI case. *Human Rights Law Review* 22(2).

Ratner H F and Schrøder I (2024) Ethical plateaus in Danish child protection services: The rise and demise of algorithmic models. *Science & Technology Studies* 37(3): 44-61. https://doi.org/10.23987/sts.126011.

Ruckenstein M (2025) The Darker Qualities of Repair. *Science & Technology Studies* 38(4): 97-113.

Saikkonen P and Choroszewicz M (2025) Fostering Socially and Ecologically Sustainable Digitalisation of Welfare States. *Social Inclusion 13*.

Schwennesen N (2019) Algorithmic assemblages of care: Imaginaries, epistemologies and repair work. *Sociology of Health & Illness* 41: 176–192. https://doi.org/10.1111/1467-9566.12900.

Seaver N (2019) Knowing Algorithms. In: Vertesi J and Ribes D (eds) *Digital STS. A Field Guide for Science & Technology Studies*. Princeton: Princeton University Press, pp. 412-422.

Siffels L E and Sharon T (2024) Where Technology Leads, the Problems Follow. Technosolutionism and the Dutch Contact Tracing App. *Philosophy & Technology* 37(125): 1-33. https://doi.org/10.1007/s13347-024-00807-y.

Star S L (1999) The ethnography of infrastructure. *American Behavioral Scientist* 43: 377-391.

Susser D (2022) Data and the Good. *Surveillance & Society* 20(3): 297-301. https://doi.org/10.24908/ss.v20i3.15764.

Tanweer A, Fiore-Gartland B and Aragon C (2016) Impediment to insight to innovation: Understanding data assemblages through the breakdown–repair process. *Information, Communication & Society* 19(6): 736-752. https://doi.org/10.1080/1369118x.2016.1153125.

van Toorn G, Henman P and Soldatić K (2024) Introduction to the digital welfare state: Contestations, considerations and entanglements. *Journal of Sociology 60*(3): 507-522. https://doi.org/10.1177/14407833241260890.

Velkova J and Kaun A (2021) Algorithmic resistance: Media practices and the politics of repair. *Information, Communication & Society* 24(4): 523-540. https://doi.org/10.1080/1369118X.2019.1657162 .

Winner L (1978) *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought.* Cambridge: MIT Press.