Maintaining Technologies

Review of *Maintenance and Philosophy of Technology: Keeping Things Going*, edited by Mark Thomas Young and Mark Coeckelbergh. Routledge, 2024

by Tim Juvshik[1]

Maintenance and Philosophy of Technology: Keeping Things Going (hereafter "MPT"), edited by Mark Thomas Young and Mark Coeckelbergh, is an extensive anthology covering a wide array of topics on the relationship between technology and our maintenance practices, as well as cognate issues such as repair, recycling, and restoration. The editors have done an excellent job of curating a volume which highlights the philosophical importance of maintenance in different domains – the stated goal of MPT. Indeed, maintenance is a phenomenon of core importance to our technological practices, yet it has received little attention in philosophy. Thankfully, MPT helps rectify that lacuna. MPT includes a very useful introduction by the editors, which gives a historical overview of maintenance and repair studies explaining the dearth of literature on the topic, highlights key issues of philosophical relevance involving maintenance, and has a breakdown of the volume's structure. MPT is divided into two parts and includes twelve chapters written by authors from diverse academic and theoretical backgrounds. Part I covers the metaphysics and epistemology of maintenance (seven chapters) while Part II covers the ethics, politics, and aesthetics of maintenance (five chapters).

Part I covers the metaphysics and epistemology of maintenance. In "Maintenance and the Humanness of Infrastructure", Steven Vogel argues that infrastructure, such as sewage or electrical systems, is usually hidden from end users. Vogel appeals to Heidegger's distinction between being ready-to-hand and present-to-hand: infrastructure is ready-to-hand when it is functioning as intended, but it becomes present-to-hand only when it is in need of repair. But Vogel argues that Heidegger's account misses the diachronic nature of the maintenance needed to keep infrastructure hidden. Instead, Vogel appeals to Marx: infrastructure depends on *labour*, i.e. human activity, to keep it maintained and thus hidden. But this hiddenness means we lose sight of labourers because we only focus on infrastructure as object. Making and maintaining are thus not distinct activities. Maintenance is a necessary part of making, and indeed, maintenance of urban infrastructure is intended to minimize the required activities of end users. Vogel focuses on broader sociotechnical systems like sewage systems and transport infrastructure, using an extended discussion of the George Washington Bridge as a key example. One does wonder whether such considerations would apply to *tools* such as hammers or tennis rackets. Vogel ends with some socio-political commentary on the role of maintenance workers and how they are both hidden from view and their roles derided and looked down on. Infrastructure is not hidden to them, which leads Vogel to

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gesture towards the possibility of a standpoint epistemology of repair and maintenance – a recurring theme in MPT.

Mark Thomas Young's contribution, "Technology in Process: Maintenance and the Metaphysics of Artefacts", approaches maintenance from a more analytic perspective. Young argues that analytic metaphysics has a bias towards substance ontology, i.e. things over processes. On this view, change is seen as derivative of static entities. This bias crops up in the metaphysics of artifacts by overemphasizing the *products* of designer intentions, collapsing changes to the artifact as subsequent to and derivative of, the original designer intentions. Young has an extensive discussion of the ways that artifacts are changed via our routine maintenance practices and in this way he shows how maintenance isn't merely *preservative*, i.e. maintains the original designer intention, but can also be *transformative*, i.e. elicits changes in the artifact that go beyond the original designer intention. Young highlights how, parallel to views in biology, maintenance should be understood as the stabilization of processes over time, and that there is a close connection between the stability of processes, artifacts, and our normative expectations about how artifacts should function. This helps explain notions such as obsolescence, since it isn't the artifact that changes, but our normative expectations of what it should do. Young gives the example of the Golden Gate Bridge in San Francisco, which, in response to changing safety expectations, had higher safety barriers put in place to prevent suicides. This move away from static objects and towards dynamic processes is needed to account for our actual artifact and maintenance practices, though implicit in this view seems to be a descriptivist metaontological assumption which should perhaps be made explicit.

In "There, I Fixed It! On the Status and Meaning of Repair", Tiago Mesquita Carvalho discusses the epistemological features of our repair practices. Carvalho argues that repair is socially and culturally variable and both the users' and repairers' intentions are often relevant, citing the Japanese practice of *Kitsungi* (repairing objects with golden lacquer) and the creative repair solutions of Cubans given political restrictions on access to spare parts. Repair often requires particular *know-how*, not just *knowledge that* of the artifact, with repairers often unable to articulate why a particular repair solution works. In this sense, repair can be doubly creative: repair can change the proper function of an artifact, but particular repair solutions can be highly creative, rather than formulaic. To that extent, scientific and technical advances may complement our ability to repair technologies, but they can never formalize it in a step-by-step procedure, and thus there can't be fully automated mass repair because of the kinds of creative know-how required. Although we should wonder about the effects of AI on mass automated repair and whether AI could ever come up with the sorts of creative solutions Carvalho discusses. Cristina Bernabéu and Jésus Vega-Encabo continue the epistemic focus on repair in "A Standpoint Epistemology of Repair?". They survey the hugely diverse activities and roles that fall under the label of "repair practices". On its face, it seems like a standpoint epistemology of repair could be developed, as suggested by Jackson (2014), since our repair practices involve a highly stratified division of knowledge and labour. Standpoint epistemology involves three main tenets: (1) the situated knowledge thesis (knowers are shaped by their social and historical situations); (2) the epistemic privilege thesis (knowers can

occupy an epistemic standpoint which grants them privileged access and perspective on a particular domain); and (3) the inversion thesis (the standpoint of the oppressed is advantageous over the standpoints of the non-oppressed since their perspective is closer to reality). Bernabéu and Vega-Encabo argue that the situated knowledge thesis holds since social and historical factors have shaped our repair practices. However, the epistemic privilege thesis and the inversion thesis are far less plausible in the case of repair. Is there something subordinate about our social/technical division of repair labour and knowledge that would endow epistemic privilege? Not obviously, since the group is so diverse and highly intersectional. There are no common interests that would lead to group awareness of subordination – a prerequisite for epistemic privilege. But if there's no basis for epistemic privilege amongst the group of repairers, then *ipso facto* there can't be an advantageous epistemic standpoint, so the inversion thesis fails, too.

Two papers use Simondon's work to explore maintenance. In "Sustainability as Planetary Maintenance", Jochem Zwier argues that sustainability runs parallel to technical maintenance of artifacts, but that it fundamentally differs as technical maintenance always has an optimal form of the artifact to aim for, whereas sustainability only has a negative aim, what suboptimal form the planet should *not* have. The optimal form the earth should take is highly contextual and contested. Zwier uses Simondon's work to criticize technical maintenance and instead suggests that we should consider alternative possibilities for what sustaining the planet could involve, although without suggesting any concrete alternatives. A natural question is whether geoengineering proposals also fall prey to such a critique or if they can be understood as planetary maintenance, but they only receive a passing mention. Zwier relies heavily on Simondon's work without much exposition. To that end, readers may be better served reading Johannes F. M. Schick's contribution *first*, "Maintaining Perpetual Actuality in the Digital Age? Simondon's Conception of Maintenance and the Networked Era", which offers a more accessible discussion of Simondon's philosophy. Schick argues that maintenance can be understood using Simondon's conception of the concretization of technical objects through technicity, lending them a spatial and a temporal dimension. Schick argues that this can help us understand maintenance by analogy with story-telling, i.e. maintenance is the history of the technical object as its milieu changes via the need to maintain it. However, increasingly digital and technical objects are not designed to be maintained by the user, leading to alienation from technicity, since their 'story' isn't graspable by the user because they are primarily designed to be sold and rebought when degraded. For Schick, maintenance as story-telling is ultimately a critique of the alienation inherent in capitalism, which leads to the deskilling of users.

In "Towards a Realist Metaphysics of Software Maintenance", Keith Begley develops a Platonist account of software and software maintenance. Computational entities exhibit an ontological duality since they involve both hardware (physical) and software (non-physical), which seems to make them both concrete and abstract. Begley criticizes Irmak's (2012) account of software as an abstract artifact, arguing that it violates parsimony. Rather, Begley argues that we don't need to introduce new ontological categories because Jerrold Katz's Platonist account yields a solution, namely, computational entities are composite objects composed of both abstract

and concrete constituents. Katz distinguishes between homogenous (abstract, concrete) and heterogenous (composite) objects, as well as three kinds of the latter: simple (only composed of homogenous objects), complex (composed of both homogenous and heterogenous objects), and compound (only composed of heterogenous objects). Begley argues that computational entities are complex objects composed of multiple iterations of different types and tokens. This helps explain the distinct role of maintenance (i.e. change) in computer programming. Indeed, Begley points out that computer programmers spend most of their time maintaining existing programs in adaptive or enhancive ways, rather than writing new programs. In this way, software maintenance doesn't fall prey to the overemphasis on designer intentions and innovation, but Begley does interestingly note that software maintenance is nevertheless viewed as second-class to software development, despite its central role in computer programming.

Part II explores the ethics, politics, and aesthetics of maintenance. Steffen Steinert's contribution, "Maintenance of Value and the Value of Maintenance", argues that considering a maintenance perspective is critical to illuminating technological value change in three ways: why we need to move beyond a design focus, how maintenance can stabilize and destabilize values, and how maintenance isn't merely preservative, but also transformative. Steinert applies this to sociotechnical systems (hardware, agents, institutions), rather than more object-oriented analyses that focus on tools. Our maintenance practices of sociotechnical systems show how they can both stabilize and destabilize values since the maintenance practices can shift the values beyond those inherent in the initial design and production phases. This suggests new avenues of research insofar as we should focus on responsible maintenance, not just responsible design. Steinert gives a litany of examples including the Tokyo subway system, road infrastructure, and the broader institutions and agents that govern these systems. Steinert's chapter continues a trend in philosophy of technology which focuses on how technology shapes values and is shaped in turn, but with a novel discussion of the role of maintenance.

Simon Penny's contribution, "An Eco-Ethics for the End of the Anthropocene: Finding Ethical and Sustainable Paths Through Consumerism, Disposability, and Planned Obsolescence", is one part philosophical argument and one part personal reflection. Penny identifies the historical factors that led us to the climate crisis: technological progress, (fast) fashion, irreparability and disposability, planned obsolescence, disposable packaging, single use plastics, the failure of recycling programs, and economies premised on continuous growth through consumption. Penny explores maintenance, repair, salvage, bricolage, and repurposing of simple, domestic technologies, which often require specific know-how (echoing Carvalho) and develops a salvage eco-ethics at the *personal* level. Penny reflects on his own taxonomizing practices of leftover technologies (eschewing the term *junk*) and draws a three-way comparison between hoarders, collectors, and purgers (think Marie Kondo). The result is an interesting mish-mash of different ways people can avoid waste, but Penny concludes that while pursuing a salvage eco-ethics may be an individual responsibility, it isn't a substitute for socio-political action, which is needed to change larger structural barriers to sustainability. Questions of sustainability are further explored in Taylor Stone and Aimee van Wynsberghe's paper, "Repairing AI". The authors call for a

reconceptualization of AI via an understanding of maintenance, using Henke and Sims' (2020) distinction between repair as transformation and repair as conservation, as well as Young's view of maintenance as an on-going process that changes the artifact. Stone and van Wynsberghe distinguish between the sustainability *of* AI and AI *for* sustainability. The former regards how to make AI infrastructure and uses sustainable, while the latter is about using AI to help with sustainable goals (e.g. wilderness preservation, urban ecological management). The authors emphasize how AI relies on a vast system of material infrastructure (data centres, satellites, cables, computers, resource extraction), all of which needs to be maintained and repaired. However, these infrastructures have a huge environmental cost. Maintaining this infrastructure offers an opportunity to reconceive of AI and what we want it for – we can maintain its functions, but we can also change social values through our repair practices of AI. However, the authors don't offer much in terms of concrete alternative conceptions and thus the chapter is more of a promissory note than research program.

Both Sanna Lehtinen's "Aesthetic Values in the Maintenance of Urban Technologies" and Joost Alleblas and Benjamin Hofbauer's "Negotiating Visions of Waste: On the Ethics of Maintaining Waste Infrastructures" address the maintenance of urban technological systems. Lehtinen argues that we should apply aesthetic theory to urban technologies and their maintenance to bring in new perspectives on our maintenance practices in urban contexts. Lehtinen advances two arguments: first, that maintenance of urban technologies is an aesthetic issue, not just a functional or practical one, and second, that the maintenance of urban technologies is of crucial importance to showing care for future generations, by appeal to Yuriko Saito's (2007) work on care. The maintenance of urban technologies can evince a sort of creativity (favelas in Rio de Janeiro are an example), as well as illustrate cultural and aesthetic values by preserving the 'authentic' city (e.g. tram cars, rail stations). Maintenance decisions, even aesthetic ones, can show care, e.g. maintenance for sustainability goals becomes a moral and aesthetic duty. Thus, maintenance and care can be seen as improving material conditions over time in urban contexts. Similarly, Alleblas and Hofbauer argue that waste infrastructure is resilient and becomes more permanent over time through maintenance. This inhibits meaningful valuative and conceptual change regarding waste. The authors argue that the maintenance of urban waste infrastructure presents the possibility of reimagining what urban waste is. Changing behaviours has typically focused on city dwellers learning more about waste management, sustainability, and landfills, with some attendant institutional changes (regulations, fines), but it has ignored the material conditions afforded urban waste infrastructure, which restrict waste producers from changing their behaviour. Approaching maintenance of waste infrastructure as *transformative* can change the material conditions, allowing a reconceptualization of waste, especially by rendering it visible, thereby forcing urban dwellers to confront their waste practices.

MPT offers a bevy of perspectives on maintenance and its central role in our daily lives while highlighting its philosophical importance. There are a number of recurrent themes, including the invisibility of maintenance and infrastructure, special know-how of maintenance and repair, maintenance and its relation to sustainability, maintenance as both preservative and transformative

and its attendant importance for value and conceptual change, and maintenance and repair as processes. MPT is well balanced, with perhaps a bit of a lean towards continental approaches, and will be of great interest to anyone working in philosophy of technology, environmental philosophy, and epistemology and metaphysics of artifacts. While most of the chapters are probably too advanced for undergraduates, the volume is well suited for graduate students and researchers, and I suspect it will succeed in launching a number of new research directions in philosophy of technology.

References

Henke, C. and B. Sims. (2020). *Repairing Infrastructures: The Maintenance of Materiality and Power*. Cambridge, MA: MIT Press.

Irmak, Nurbay. (2021). "Software is an Abstract Artifact." *Grazer Philosopische Studien.* 86: 55-72.

Jackson, S. J. "Rethinking Repair." In *Media Technologies: Essays on Communication, Materiality, and Society*, ed. Taleton *et al*. Cambridge: The MIT Press, 2014,

Saito, Yuriko. *Everyday Aesthetics*. Oxford: OUP, 2007.