

Beyond breakdown: Exploring Regimes of Maintenance

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Mending, repairing, fixing, restoring, preserving, cleaning, recycling, up-keeping... an immense variety of more or less noticeable practices take part in the maintenance of objects, technologies and infrastructures. In this article we would like to make a first step into questioning such diversity. How can we understand the differences in the ways things are taken care of? What can we learn from the variety of justifications for objects to be mended, fixed, patched up, or patiently restored? In which conditions are these operations considered as important or negligible? To address these questions, we propose to examine three dimensions that we think can help in identifying regimes of maintenance: the distribution of maintenance practices, the kinds of objects that are enacted through them, and the ecology of the visible and invisible at play in the various ways maintenance work is accomplished and organized. Using several examples, we will outline two distinct regimes in which these dimensions are configured in radically different manners.

Who cares?

The way maintenance is experienced every day in rich countries can be useful to identify a first regime of maintenance. We use things that work, we live in houses and apartments that do not collapse, and we lean on reliable technical systems. This mundane aspect of our lives is characterized by a significant amount of maintenance work, of which we are mostly unaware. Here, maintenance is the exclusive domain of dedicated occupations that are in charge of the supervision and the repair of things. This is the case for instance of buildings which come with their army of workers who take care of them: plumbers, carpenters, electricians, roofers^[1]. In most Northern countries, large infrastructures such as roads, bridges, electrical grids, sewage and water systems are objects of such specialized maintenance. So are the "bright and shiny tools" that the innovation economy is obsessed with,^[2] the repair of which is intensely controlled by manufacturers.

When things are organized in this way, a neat boundary stands between occupational communities and users. Through their daily operations, dedicated workers perform flawless objects and services that users are supposed to enjoy without even thinking about maintenance and repair. In this regime, concerns for vulnerability are set apart from "normal" use. Material fragility and the messy side of things are meant to remain at the maintenance work perimeter, whilst

maintenance itself performs stability in users' life.

But maintenance can be organized in a very different manner. There are situations, indeed, where maintenance practices are largely distributed. This is for instance a crucial aspect in the trajectory of the Zimbabwe Bush Pump studied by de Laet and Mol^[3]. These authors foreground the role of certain users in the pump's longevity and the role of the pump itself that was designed to support continuous adjustments operated by almost everyone. Distributed maintenance is also a crucial aspect in the life of WiFi community infrastructures, which cannot work properly without the commitment of "lay home users" and "technical volunteers" who daily supervise them and provide them constant care – verifying nodes and connections, fixing bugs, rebooting frozen systems, and so on^[4].

In comparison to our first case, under such a regime the fragility and vulnerability of things are a shared concern. Everybody is supposed to deal with, and partly accept, disorder and decay as features of "normal" life. And everybody is allowed, and sometimes explicitly invited, to take part in repair and maintenance interventions.

Following Edgerton^[5], we can use the case of the automobile to understand the differences in the ways maintenance can be distributed. In countries of the global North, cars are more and more crammed with electronics, which imply that their maintenance is a highly technical matter that can only be handled by specialized and well-equipped workers, leaving aside most of their mundane users (figure 1). In many Southern countries in contrast, second hand cars are known to live a long and rich life, sustained by continuous repair operations carried out by people way beyond the walls and benches of approved workshops.



Figure 1: Professional repair. Photo by Jérôme Denis and David Pontille

Enacted objects

Obviously, objects themselves and their properties play an important part in maintenance regimes. One of the crucial issues they raise concerns their openness and capacity to be taken care of. Some objects can be easily opened and disassembled, while others resist. This is of course what planned obsolescence is all about: the design of things that instead of being easily maintainable have to be replaced. And even where failures are not exactly planned, a lot of objects are designed to impede certain kinds of maintenance, not only with material restrictions, but also legal and commercial ones^[6]. Conversely, some objects can be designed as open, accepting – even favoring – maintenance interventions, accomplishable by specialized workers or mundane users alike.

Furthermore, maintenance participates in enacting objects in very different manners. When interventions are exclusively accomplished by dedicated workers, they usually perform stabilized, clearly identifiable objects for users. The process of maintenance here consists of taking into consideration the very fragility and mutations of objects, though keeping these features unnoticed by users. This is for instance what we saw following the maintenance workers of the Paris subway wayfinding system, who monitor the signboards' mutations (such as mold, rust, discoloration and even disappearance) daily, to be sure they can be taken care of before becoming a visible breach in the standardized set of signs^[7]. This is also what Yurchak^[8] showed about the body of Lenin, which is preserved as an unchanged object through the

surveillance of manifold transformations that are kept invisible for visitors. In this regime, maintenance enacts what we might think of as two-sided objects, fragile in the eyes and hands of maintainers, reliable in the eyes of users.

In the opposite regime, where everybody is allowed or supposed to take care of things, stability is not considered as a normal or automatic condition in the mode of object existence. Mutations and transformations are commonplace. Here, the criteria that define the continuity of an object, its capacity to remain “the same”, are looser and broader. This is precisely what de Laet and Mol emphasize with the notion of “fluid object”^[9]: the longevity of Zimbabwe Bush Pump does not depend on its immutability, but on its ability to support multiple changes.

Let’s go back to the car example. What is a car exactly? Various repair and maintenance settings offer very different answers to this question. For instance, in old car collector communities, the automobile is mainly considered as a whole (shape, materials, paint...), each component of which should remain in its original state. But for others, a car is nothing more than a transportation means. No matter how many modifications and additions repair and maintenance bring to the initial object (figure 2), if it continues to run, it remains a car. Two ontologies are enacted in these radical alternatives. While the maintenance of the pristine antique car is aimed at preserving *authenticity*, the maintenance of the changing car sustains its *functionality*. Of course, these normativities are not a matter of taste or preference only. Objects are also enacted by policies and regulations that frame how maintenance should work, and vary dramatically from one geographic area to another.



Figure 2: A “functional” car. Photo by Garitzko, Wikimedia Commons.

In/visibilities of work

Besides the distribution of practices and the variety of enacted objects, maintenance regimes also differ regarding the question of the visibility of work. As already mentioned, when maintenance is a specialized matter that continuously performs stabilized objects meant to remain unchanged in the hands of users, work and workers are mostly erased from the picture. Maintenance traces are rendered invisible for the sake of the object’s visible integrity and immutability. On the contrary, in a distributed setting where objects encounter constant transformations, visible traces of maintenance operations are not considered an issue. Here, workers are not only visible to everyone, but are part of the crowd of people potentially participating in maintenance.

The visibility and invisibility of maintenance work raises more generally the question of the “costs” of the two regimes described here. A world entirely focused on consumption and innovation, on things that are supposed to stay stainless and flawless, draws on the erasure of central features in the mundane life of objects, from their day-to-day existence (and the place maintenance takes in it) to their “death” and transformation into waste^[10]. Situations where material vulnerability is taken for granted and maintenance practices are distributed, by contrast, build a much more open world that brings maintenance work and workers to the surface, and refuses to participate in the reproduction of the “myth of order”^[11]. Such a world “reframe[s] how we approach material vulnerability, not as something to be avoided, dismissed or

'repaired', but as something to think more responsibly"^[12]. If this may help to free us from the economy of shiny innovations, it is not without cost. In this world, we may no longer blindly rely on sturdy, always available, functioning technologies. Instead, everybody is invited to adopt both a modest and empowered position, based on daily participation in the care of people and things.

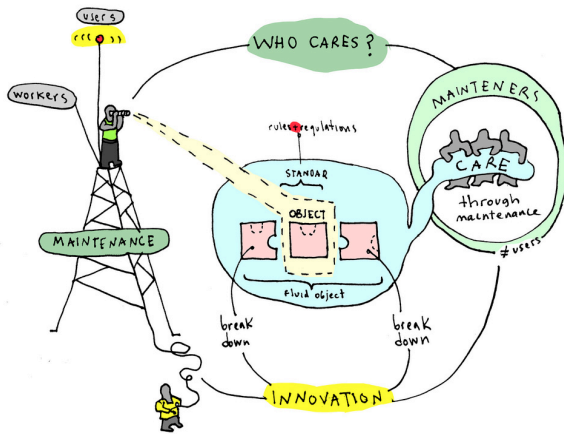


Figure 3: Two maintenance regimes - graphic work by Carla Boserman (CCO 1.0 Universal)

Beyond breakdown

Maintenance regimes can thus be characterized by more or less distributed practices, specific object enactments and a particular ecology of visible and invisible work (figure 3). Our attempt to identify such regimes is an invitation to go further, and what we described here should not be considered as evidence for an exhaustive, sufficient and stable account of what maintenance is or can be. Beyond the opposite configurations noted above, other regimes may exist and are worthy of further exploration. Preservation practices in art for instance are almost entirely dedicated to the slowing down of decay, and may be a good example of a maintenance regime in which practices are distributed among different professions and occupations, objects are enacted as aging entities, and maintenance work is mostly kept invisible^[13]. Still other dimensions could also be taken into account in identifying maintenance regimes, including not least the role of standards and regulations^[14].

Finally, beyond the mere specification of differences between local and practical configurations, identifying regimes of maintenance

can offer an occasion to raise more general issues. An important question it helps to tackle is the way breakdown is apprehended in and across the social sciences. Traditionally, breakdown is considered as a univocal event that both changes radically how users deal with things and offers to the researcher the conditions needed to bring hitherto unnoticed aspects of the world to light. The diversity of maintenance regimes may help to decenter such a view, and see breakdown as a relational phenomenon enacted in distinct manners across the various sites and circumstances in which it operates.

In the first regime we identified, we saw that maintenance consists in restricting the number of people who are able to perceive or recognize breakdowns. Maintenance is a success as long as objects remain at their place and in decent condition (that is, mainly unnoticed) in the eyes of their users, even when considered flawed and soon-to-be repaired by maintenance workers. In this regime, breakdowns are frequent and non-dramatic events for maintenance workers, while representing rare and critical situations when emerging as shared reality with those relegated to the position of users, who may experience a much clearer distinction between broken and non-broken objects.

In the second regime, where material fragility is a shared concern and maintenance is a distributed practice, such a binary opposition does not occur. In the hand of "maintainers-users" objects are always changing, living entities that traverse a number of intermediate states before being considered as inoperative. This is what de Laet and Mol showed about the Zimbabwe Bush Pump, the breakdown of which is generally not a final condition, but an "intermediate stage" that rarely lasts^[15]. In fact, the struggle against too narrow and systematic a definition of breakdown can be seen as a crucial feature of such a regime of maintenance, in which the endurance of objects is socially, economically and materially negotiated^[16].

Hence, exploring maintenance regimes does more than allow us to tackle the multiplicity of ways that objects, technologies and infrastructures are taken care of. It also invites us to reconsider stability, order, crisis and breakdown themselves as relational phenomena that draw on and are grounded in specific maintenance practices.

REFERENCES

- [1]. Stewart Brand, *How buildings learn: What happens after they're built* (New York: Viking Penguin, 1994).
- [2]. Steve J. Jackson, "Rethinking Repair," in *Media Technologies - Essays on Communication, Materiality, and Society*, ed. Tarleton Gillespie, Pablo J. Boczkowski and Kirsten A. Foot (Cambridge: MIT Press, 2014), 221-240.
- [3]. Marianne de Laet and Annemarie Mol, "The Zimbabwe Bush Pump: Mechanics of a Fluid Technology," *Social Studies of Science* 30, no. 2 (2000): 225-263.
- [4]. Stefan Verhaegh and Ellen van Oost, "Who Cares? The Maintenance of a Wi-Fi Community Infrastructure," in *Inverse Infrastructures Disrupting Networks from Below*, ed. Tineke M. Egyedi and Donna C. Mehos (Cheltenham: Edward Elgar, 2012), 141-160.
- [5]. David Edgerton, *The Shock of the Old. Technology and global history since 1900* (London: Profile books, 2006).
- [6]. Stephen Graham and Nigel Thrift, "Out of Order: Understanding Repair and Maintenance," *Theory, Culture & Society* 24, no. 3 (2007): 1-25.
- [7]. Jérôme Denis and David Pontille, "Material Ordering and the Care of Things," *Science, Technology, & Human Values* 40, no. 3 (2015): 338-367.
- [8]. Yurchak, Alexei, "Bodies of Lenin: The Hidden Science of Communist Sovereignty." *Representations* 129, no. 1 (2015): 116-157.
- [9]. Marianne de Laet and Annemarie Mol, "The Zimbabwe Bush Pump: Mechanics of a Fluid Technology," *Social Studies of Science* 30, no. 2 (2000): 225-263.
- [10]. Nicky Gregson and Mike Crang, "Materiality and waste: inorganic vitality in a networked world," *Environment and Planning A* 42, no.5 (2010): 1026-1032.
- [11]. Stephen Graham and Nigel Thrift, "Out of Order: Understanding Repair and Maintenance," *Theory, Culture & Society* 24, no. 3 (2007): 1-25.
- [12]. Blanca Cállen and Tomás Sánchez Criado, "Vulnerability tests. Matter of 'care for matte' in e-waste practices," *Tecnoscienza* 6, no. 2 (2016): 34.
- [13]. Fernando Domínguez Rubio, "On the discrepancy between objects and things," *Journal of Material Culture* 21, no. 1 (2016): 59-86.
- [14]. For instance, the conservation of heritage sites goes with numerous charters, conventions, national and international policies. For an exploration of such complex nexus of standards and their its practical consequences, see : Siân Jones and Thomas Yarrow, "Crafting authenticity: An ethnography of conservation practice," *Journal of Material Culture* 18, no. 1 (2013): 3-26.
- [15]. Marianne de Laet and Annemarie Mol, "The Zimbabwe Bush Pump: Mechanics of a Fluid Technology," *Social Studies of Science* 30, no. 2 (2000): 240.
- [16]. Daniela K. Rosner and Morgan Ames, "Designing for repair?: infrastructures and materialities of breakdown," *CSCW'14 Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing* (2014): 319-331.