

Communication is maintenance: turning the agenda of media and communication studies upside down

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This paper proposes that communication and media studies should refocus on maintenance. Indeed, maintenance theory can help underestimated aspects of communication infrastructures emerge. First, maintenance shows the similarity of communication and transportation infrastructures, which overlap to the extent that the two fields of study can no longer be separated. Second, maintenance shows the persistence of communication infrastructures over time. Infrastructures are seldom replaced, and even more rarely closed down, new communication networks do not replace old ones, but they overlap with them. Consequently, this focus makes clear the need to study communication in longue durée or at least in long-term perspectives. Thirdly, the decision to maintain a communication network or infrastructure is a political one. Communication studies have often focused on political decisions on innovation, while maintenance offers a new way to look at centralization, delegation, sabotage to infrastructures, and the political responsibilities of making communications function. Finally, thanks to maintenance, the material dimension of communication can be more visible. This allows the integration of the new agendas of STS and of media archaeology, with the emergence of topics such as malfunctions or technical jobs, which are often considered out of the scope of communication studies.

Keywords: Communication studies, media studies, maintenance, communication infrastructures, transportation, persistence, power, materiality.

1. Maintenance theory: from the history of technology to communication and media studies

Over past decades, communication and media studies have often focused on innovation and new technologies. Innovation and innovativeness are mantras for Silicon Valley's corporations, digital startups have to innovate if they want to survive in the markets, and new digital media are often considered breakthroughs, every one of which has the potential to revolutionize users' habits. Innovation looks like the "dominant ideology of our era" (Russell and Vinsel, 2016). Similarly, communication studies have the tendency to focus on the latest (and, by their very nature, innovative) technologies of communication. The newest media are studied and researched; while old ones are often neglected after a few years, becoming dinosaurs of the technological past.

This paper proposes turning the agenda of communication and media studies upside down and refocusing it toward maintenance. This path has recently

emerged in the history of technology. David Edgerton (2007) called the “shock of the old” the fact that we tend to underestimate the relevance of technologies already in use for decades. According to Edgerton, newly emerged technologies are scarcely used by or really relevant to society while, at the same time, old technologies, which are no longer under the spotlight, are at the peak of their popularity. Maintenance is a theoretical corner under which old but still crucial technologies can emerge in the research agenda.

Steven Jackson (2014) claimed how maintenance is decisive even to understand contemporary technological systems and contemporary societies. Indeed, our societies are characterized by what he called the *broken world thinking*, “a world of risk and uncertainty, growth and decay, and fragmentation, dissolution and breakdown” (p. 221). Maintenance is embedded in risk societies because it fights against the ‘natural’ entropy, ageing, and degradation of technologies.

Andrew L. Russell and Lee Vinsel (2018) are considered two of the pioneers of maintenance theory and have claimed that maintenance is often underestimated, whereas innovation is overestimated:

At the turn of the millennium, in the world of business and technology, innovation had transformed into an erotic fetish. Armies of young tech wizards aspired to become disrupters. The ambition to disrupt in pursuit of innovation transcended politics, enlisting liberals and conservatives alike. Conservative politicians could gut government and cut taxes in the name of spurring entrepreneurship, while liberals could create new programs aimed at fostering research. The idea was vague enough to do nearly anything in its name without feeling the slightest conflict, just as long as you repeated the mantra: INNOVATION!! ENTREPRENEURSHIP!! (Russell and Vinsel, 2016)

Media innovators, such as Thomas Edison, Guglielmo Marconi, Steve Jobs, Elon Musk, and several other media heroes, businesspeople, and investors in non-Western cultures are often considered (and narrate themselves as) the main characters of communication. In reality, again according to Russell (2015), they count for only 1.6% of the tech stories, while the remaining 98.4% are stories of maintenance.

Christopher Henke and Benjamin Sims (2020) have chosen the word *repair* to underline how technological infrastructures need to be continuously maintained and restored through a broad range of activities, which can be both material and immaterial, social and technical, small and large scale. These activities are often invisible, but they are performed on daily basis and they are crucial to preserve technical and social orders.

According to Heike Weber and Stefan Krebs (2021), the traditional agenda of the history of technology is “innovation-centric”, but maintenance and repair are forms of incremental innovations themselves; consequently, distinguishing between innovation and maintenance does not make sense. Furthermore, maintenance and repair should be historicized or, better, we should look at them though “manifold temporalities” which can last for decades or centuries.

Following in the footsteps of these scholars, this paper aims to advance the theoretical reflection by introducing the lesson of maintenance and repair into media and communication studies. The main aim is to show the extent to which a turn towards maintenance can help refocusing the agenda of media and communication studies and can “force” communication scholars to look at new aspects of their discipline.

Specifically:

1. Maintenance shows the similarity of communication and transportation infrastructures, which overlap to the extent that the two fields of study can no longer be separated.
2. Maintenance shows the persistence of communication infrastructures over time. Infrastructures are seldom replaced, and even more rarely closed down, new communication networks do not replace old ones, but they overlap with them. Consequently, focusing on maintenance makes clear the need to study communication in *longue durée* or at least in long-term perspectives.
3. The decision to maintain a communication network or infrastructure is a political one. Communication studies have often focused on political decisions on innovation, while maintenance offers a new way to look at centralization, delegation, sabotage to infrastructures, and the political responsibilities of making communications function.

4. Thanks to maintenance, the material dimension of communication can be more visible. This allows the integration of the new agendas of science and technology studies (STS) and of media archaeology, with the emergence of topics such as malfunctions or technical jobs, which are often considered out of the scope of communication studies.

In the next sections, we discuss each of these four dimensions in more depth.

2. Turning the agenda of media and communication studies upside down: four examples

For three reasons, this theoretical paper uses primary and secondary historical sources, such as newspapers, magazines, and contemporary historical monographs. First, conceptualizations are always rooted in the historical reality in which the actors and processes move. Secondly, maintenance and communication infrastructures have long lifespans, often extending over centuries, and so historical sources from different periods can help toward a better understanding of their theoretical bases. Finally, direct relationships exist between politics, infrastructures, and maintenance practices, and even these aspects are determined by long and complex historical events. In this paper, these historical events or case studies are mainly used as *exempla* (i.e., narratives that can explain a concept), without claiming to be exhaustive. This paper therefore remains theoretical, but we hope that the historical case studies anchor the presented concepts in historical reality and thus make them easier to understand.

2.1 Communication infrastructures: on transportation and communication

Several scholars in the field of communication and transportation studies have proposed that the two fields should be integrated as their theoretical and methodological distinctions are becoming blurred (Balbi and Moraglio 2016; Miller 2018). These scholars have focused on common key concepts and ideas, such as *mobility*. Transportation and communication studies are converging towards the idea of being mobile, of flows of people and information, and of communication while in motion and physical motion allowed by means of communication.

In the past, infrastructures of transportation and communication were mostly indistinguishable. They performed the function of connecting a territory from point to point, allowing one to carry messages or *to be* messages in the sense that the Roman imperial or the Napoleonic roads (not to mention the Nazi Autobahn) sent an explicit ideological message of order and effectiveness. However, it is clear that if transport and communication infrastructures are closely linked, maintenance practices allow for better clarifying their links and differences. For instance, in the 16th century, the maintenance of a road could be entrusted to mail riders, producing the double effect of empowering the postal services and facilitating transportation.

Wolfgang Behringer (2003) is often quoted as one of the first to understand the links and dynamics of the early modern postal network and how it was connected to roads and political power in Europe. A less scrutinized example is the mail service of the Duchy of Savoy, which extended between France and Italy and was already efficient in the first half of the 16th century: “By putting on a map the locations chosen as the location of the post houses, one could graphically represent the progress of this innovation, destined to permanently change the communications system and the way of traveling, impressing if not on the territory, at least on the road network, a transformation that can rightly be considered emblematic of the transition from the Middle Ages to the Old regime” (Barbero 2002, p. 225). Clearly, the mail’s primary purpose was for the communication needs of Duke Charles II (1504-1553). It is quite interesting to note that the postal service was considered an extension or dependency of the Duke’s stable. In fact, the officers in charge of carrying communications (*cavalcatores*, i.e., riders) depended on the Duke’s stable manager, the Grand Squire. This was not only because they traveled on horseback but also because of the rules of the complex system of resting places and changing horses that was organized along the most important routes. The *cavalcatores* themselves often ran these post stations, either alone or in association with local hosts. Therefore, because of the links between the riders and the Grand Squire, the Duke directly controlled the entire net. In addition, temporary post stations were prepared and managed on the routes, which for some political, diplomatic, or military reasons

suddenly became important for the Duke. The mail service as a whole was extremely complex and expensive to maintain.

Postal couriers were people trusted by the Duke and were used for many different tasks, including supervising the maintenance of the roads. To one of them, Charles II granted *carte blanche* to repair the road between Rivoli and Susa¹ (Barbero 2002, p. 224). Clearly, the political power was protecting and maintaining routes that were important to him above all, but he was willing to strengthen those that suddenly proved useful. At the same time, the “Ducal Roads” was more efficient not only for the ducal mail services but for all the voyagers.

All these elements indicate the centrality of maintenance and therefore of economic resources for the management of the infrastructure network (communication and transportation routes). They also highlight the strong relationship between politics and maintenance. The road network was in itself an impressive sign of wealth, strength, and organization requiring complex and continuous works to maintain efficiency, and even the urban routes needed some officials (Viari, *Fango Officials*) to accomplish this task (Geltner 2019).

As claimed by James Carey (1989), the invention of telegraphy “permitted for the first time the effective separation of communication from transportation” (p. 203) and, according to many scholars, infrastructures of communication and of transportation began to diverge from this point in time. This is only partially true, and focusing on maintenance could lead to reconsidering this divergence. Train and telegraph networks, for example, were often maintained at the same time. Similarly, today when constructors dig to maintain and renovate roads, they also profit from renovating telephone and internet cables and replacing copper with fiber optics.

In sum, focusing on maintenance can help media and communication scholars rethink the links between transportation and communication infrastructures. Maintenance is a new lens whereby communication and transportation can be viewed as a privileged and unique field of study for communication scholars.

¹ Two important villages west of Turin.

2.2 Persistence and *longue durée*

As mentioned in the introduction, communication and media studies have often focused on short-term case studies and on the newest forms of communication. Due to maintenance activities and theory, new temporalities of communications can emerge. Specifically, the persistence of communication infrastructures over time allows researchers to adopt a *longue durée* perspective. This means that to understand the evolution of communications properly, long time spans, decades, or even better, centuries, should be examined.

There are many examples of communication infrastructures that can be understood simply by studying the long-term activities of maintenance. The Unter Tower Bridge in Bern (*Untertorbrücke*) represents a significant example. The first wooden bridge on the river Aare was built in 1255: “In this epoch, the bridge was not only of importance for the city of Bern (...) but also for the whole region, because no other bridge over the River Aare existed nearby” (Camenisch 2019, p. 95). The two nearest bridges were in Thun and Aarber, 30 kilometers south and 15 kilometers west; however, in the 15th century, about two centuries after its construction, the bridge was damaged by a flood, and the City Council decided to replace it with a stone bridge. The construction began in 1461 and ended in 1468 (Camenisch 2019, pp. 95-96). Considering the fact that this new bridge is still in place, it can be claimed that over the centuries the most important means of communication and transportation between the two banks of the Aare and for the entire Bern region have been the road network of which the bridge was the keystone². Maintaining the network implies maintaining its efficiency, safety, and users’ security – the broken world thinking, Jackson would say. All these tasks require a net of powers, authority, officers, and skilled and unskilled workers who share the road network maintenance responsibilities.

Structures and practices of communication persist over time. As Christian Franke (2019) has shown, Internet networks are often based on previous networks, such as the telegraph, the telephone, and even pneumatic tubes.

² It must also be mentioned the river Aare itself as a means of communication and transportation was linked to the road network. Obviously, the river and all the infrastructures on it, such as ports and fords, required constant maintenance as well.

Telephone networks in copper have been the backbone of the Internet, and from them, millions of people have accessed the net. Telephone networks, like other communication infrastructures, are indeed highly difficult to be completely replaced: once built, they are *quasi-irreversible* to use a concept of path dependency theory. For example, workers must dig in streets and change cables in houses.

Another interesting case involves pneumatic tubes. A pneumatic post was one of the most popular new media of the 19th century, and several large cities in Europe decided to dig and to place these networks of tubes under their roads³. It was the fulfillment of an old dream: the instantaneous transportation of goods from one point to another in the city. After some decades, the tubes were abandoned, and for example, today in Rome, one of the most relevant operators of the Internet bought tubes and filled them with internet cables (Balbi, 2017). Like telephone cables, the persistent tubes changed their usage and shifted from carrying telephone calls and transferring goods to supporting the Internet. These forms of technological persistence emerge from forms of remediation of communication infrastructures, of technical resistance over time, and of maintenance done on “old” infrastructures, which keep them in operation, or at least prepared to be copied to use them again. Communication and media studies often underestimate the relevance and persistence of communication, not only in terms of infrastructures but also in terms of political, economic, and cultural habits and mentalities.

Persistence is strictly linked to maintenance and *longue durée*. Maintenance is a way, or better, the most effective way, to make communication infrastructures work for long time spans to stretch their *durée*. It is not only a matter of technological repair or restoration but also of the users who can join this process. Thus, focusing on maintenance means adopting a new *time*-frame in communication and media studies: communication infrastructures must be evaluated from a long-term perspective, their changes require decades or centuries, and their uses can be changed due to new infrastructures, but it is rare that they are abandoned or dismissed. Even when an old communication

³ The pneumatic post is not simply an oddity of the past as it continues to be used in large shopping centers or banks as a means to transport cash from the points of sale to protected offices.

infrastructure is replaced by a new one, it tends to stand, playing a subordinate or a substitute role. Under this perspective, the case of road networks is interesting for three reasons: they are generally long-lasting structures, they undergo a change of meaning when they begin to be conceived almost exclusively as “transport” infrastructures and no longer as “communication” ones, often forgetting that goods are also vehicles of meanings that go beyond the goods themselves, and they need to be supported by maintenance processes.

When infrastructures are abandoned, they still pose maintenance problems and Weber and Krebs (2021) claims that the “afterlife” of a technology has been rarely conceptualized in the history of technology. So it is in media and communication studies, with few exceptions. As Paolo Bory (2020) claims on the origins of the high-speed networks in Italy, there was, and partially still is, a huge discussion on what to do with the 1990s Internet cabinets left on the streets no longer in use. This is not only a material or waste issue but also an economic one. Some resources must be allocated to demolish the past infrastructures (a sort of reverse maintenance), but this is quite expensive and unproductive in political terms. It is simpler to leave things as they are, hoping it will be possible to use them in a different way like in Rome with pneumatic mail tubes.

Maintenance can clearly show how communications should be addressed with a *longue durée* approach. Communication infrastructures are indeed persistent. They change their functions and uses over time, but they rarely disappear. They also must be maintained to be in operation or even when they are not in use anymore. Therefore, studying maintenance leads to reconsidering the temporalities of communications.

2.3 The politics of maintenance

The persistence of the road networks that for centuries have structured and allowed for communications can be considered a consequence of the presence of the political power that held them. By “political power,” we do not mean that only States maintain communication networks but also that the act of maintaining is always a political decision and is an act structured by (and at the same time shaping) the social and power relations. Henke and Sims (2020) claims that

“Discourses and materiality are inherently tied up in relationships of power; when one or another group of actors controls discourses of repair, for example, they can set the agenda for a sociotechnical system” (p. 19).

However, if immaterial artifacts (such as laws) and material artifacts (such as roads or bridges) were increasingly dependent on the monopoly of the political power over them, the maintenance processes entrusted to local communities would partially subtract the maintained object from its “real owner.” Maintaining something means – at least in part – owning it, or exercising a form of dominion over it. Despite a centripetal conception of dominance, the Romans assigned road maintenance to local communities, especially in the mountain regions, where the knowledge of the terrain and the local competencies were more important. In the Early Middle Ages, for example, bundles of alternative routes (*aree di strada*, Sergi 1981) were created. They served both to connect more or less isolated locations and to overcome the difficult problem of maintenance by multiplying the paths. These networks of pathways were created in response to the needs of local communities by local authorities. These two short examples illustrate that maintenance is a form of power, and owners can decide (or be forced) to give up this power to other centers of political controls, such as local communities.

Acts against the maintenance of communication networks can be viewed as crimes against the established authorities. A typical form of obstructing, often attributed to local populations, was the brigandage. By interrupting the normal road network, the bandits (not surprisingly also known as *highwaymen*) took control of the routes, reconfiguring the local power structure.

Another example is the sabotage of telegraph poles, the telephone switchboard, the Internet servers, and several other parts of communication infrastructures. This not only interrupts communications but also reconfigures the relationships of power over the territory. The Italian journal *Telegraphic Bulletin* in 1882 reported news that

[...] the Khan of Belouchistan, who is, as it is known, more or less vassal of Great Britain, has sympathy for European inventions, and he has had telegraphic lines built in his country. His subjects, more shrewd, suspecting that from such innovations could reach the total loss of their independence, have recently pulled down the telegraph poles. But the Khan has had them

replaced and by his order, the heads of the fifty most ardent agitators of the movement hostile to the civilization of the West have been stuck into the new poles. (Pali telegrafici singolari 1882, p. 220).

Beyond the historical value of the news and the clear contradiction of the “civilization of the West” through the practice of the impalement, this source clearly identified in the demolition of the telegraph poles a *subversive act* with a strong political connotation. The political reaction was strong as well, and it aimed both to ensure maintenance or the restoration of the network and to achieve the desired propaganda (and terrorist) effect.

While rebellion or brigandage are clear forms of violations of the law, escaping or procrastinating maintenance obligations (in general) is not. The long history of disputes and tensions in relation to (escaping) the maintenance of communication routes between urban and rural settlements and with higher authorities is more complex than it initially appears and deserves and requires being studied in terms of *longue durée*. Thus, it can be said that roads, infrastructures, and communication networks tell a story, which is that of the power that holds them. This story is intertwined with the issue related to the responsibility for ensuring the operation of infrastructure networks and therefore with maintenance.

In 1875, a Commission of the Italian Parliament was charged to study the problem of laying and upkeeping a submarine telegraph cable connecting Sardinia with the rest of the country. The connections had been ensured since 1854 through a cable from Liguria that reached Corsica and then Sardinia. It was “a mixed line (and for more through wooded and no railway region, as the Corsica island) (...) more subject to interruptions, and above all to failures compared to a completely underwater telegraph line⁴.” (Progetto di legge 1875, p. 6, authors’ translation). In such cases, the responsibilities of politics to allow for communication (or failing to do so) through maintenance is *per se* a message to the people who use the infrastructure.

⁴ As discussed in the paragraph 2.1, the importance attributed to the railway in the maintenance of the telegraphic lines can be noted here. When the two infrastructures could not be run together, the maintenance was much more difficult and slower.

The Commission proposed two solutions: the State could “purchase and maintain” by itself or “entrust a private company” the realization and the maintenance of the submarine cable (Progetto di legge 1875, p. 6, authors’ translation). The public management solution was abandoned for two reasons: the expenses to lay such a cable and the lack of specifically equipped ships, specialized sailors, and technical staff. Consequently, it was decided to turn to private companies “to obtain not only the supply and laying of the cable, but also the subsequent maintenance without any responsibility for the administration.” (Progetto di legge 1875, p. 7, authors’ translation). This case is particularly interesting because it highlights several problems in building and maintaining a communication network: the financing of the installation and maintenance of the line, the links with transportation means, the need for specialized tools and employees, and above all, the fact that public administrations could make political decisions based on maintenance as well.

Currently, maintenance seems no longer visible in the political agenda. It is an aspect of the relationship with an infrastructure that is generally little considered. First, this is because maintenance is currently a matter for specialists and of little interest to users. Second, politicians have lost interest in maintenance because political storytelling is focused on other aspects, and in relation to infrastructure, on the foundation stone, the ribbon-cutting ceremony, or in other words, in innovation. From the political, economic, and industrial points of view, the processes of replacing the old with the new seem more interesting and probably media and communication studies are the field where this innovation-centric perspective is mostly evident.

However, it is clear that maintenance deficits have costly consequences for infrastructure users, politicians, and the business world, as evidenced by countless cases, including the 2018 collapse of the Morandi Bridge, Genoa (Italy). The Genoese affair is particularly interesting because it involves maintenance: indeed, in addition to some design and construction peculiarities, poor inspections and maintenance activities were recognized as the causes of the collapse (Commissione Ispettiva Ministeriale 2018, pp. 50-62).

Moreover, the lack of maintenance activities would have been prolonged over time despite the fact that all the inspection phases had highlighted the material degradation of the bridge. The example of the Morandi Bridge in Genoa shows how long the chains of maintenance responsibility can be and how political power has to provide justifications because of the lack of maintenance.

All these reflections on maintenance and power imply that the maintenance of communication infrastructures is a communicative act. Through it, the political power communicates “taking care” or “not taking care” of the community. It is clear that if maintenance is not carried out, the message that is issued in the case of a catastrophic collapse – like the one in Genoa – is even more significant than the absence of maintenance *per se*. The price to pay for political powers is always higher than expected.

In conclusion, by examining maintenance, new practices of power in communication and media studies can emerge: centralization or delegation, sabotage to infrastructures and exemplar reactions, and responsibilities of making communications function. All these aspects, which are often underestimated when dealing with communication and power, emerge quite clearly when adopting a maintenance perspective.

2.4 Materiality

Communication studies have rediscovered⁵ the relevance of materiality since the end of the 2000s. Communication infrastructures are made of tarmac, steel, copper, silicon, and several other materials. Communication infrastructures are comprised of cables and wireless technologies, such as antennas, radar, transponders, servers, switchboards, and other physical tools, which “objectify” the apparent immateriality of communications.

This rediscovery of the material dimension of communication has occurred in two main fields, which have been integrated with communication and media

⁵ We claim it can be considered a rediscovery because one of the classic traditions of communication and media studies, the Toronto School, focused on materiality in the mid-1900s: consider the attention of Harold Innis on roads and train networks, but especially consider the work of Marshall McLuhan and the fact that he was often accused of “technological determinism.”

studies in recent years: science and technology studies (STS) and media archaeology.

STS scholars have always studied communication infrastructures, primarily large technical systems, such as railways or electric networks, and they have focused on the scientific work in laboratories and on artifacts, such as keys or bicycles – a good that despite its age and the existence of faster means of transportation is always actual and in renewal. However, in recent years, they have turned attention directly to media, particularly digital media (Boczkowski and Lievrouw 2007; Balbi, Delfanti, and Magaudda 2016). Media materiality is currently a central theme in studies on digital media manufacturing, conservation, distribution, and consumption, from servers hosting cloud data in well-defined centers and locations (Hu 2015), to undersea cables through which 90% of international Internet traffic passes (Parks and Starosielski 2015), and from the obsolescence of digital items that rapidly go out of fashion and are replaced or recycled (Tischleder and Wasserman 2015), to the pollution generated by the apparently eco-friendly digital technologies in contemporary cultures (Cubitt 2017).

Media archaeology is another “new” branch of media and communication studies. First, it must not be forgotten that “traditional” archaeology has always taken into account means of communications, such as roads and many other artifacts, and it has always paid attention to temples and monasteries that can also be considered both transmitters of powerful messages and mobility infrastructures. However, the recent success of media archaeology led to the emergence of a heterogeneous framework embracing a range of methods and theories and focusing on past media through an attention to media’s alternative roots, forgotten trajectories, and neglected ideas (Huhtamo and Parikka 2011, Parikka 2012). Rediscovering the material dimension of alternative pasts is thus one of the goals of this new field of study.

Maintenance intersects within STS and media archaeology, and it is beneficial in examining media and communications in material terms. Russell and Vinsel define maintenance as:

[...] all of the *work* that goes into preserving technical and physical orders. [...] And physical orders including everything from machines, to the built environment, to farm fields, including maintaining the borders between fields and wilderness. [...] Put another way, maintenance is a war—maybe the war—with entropy (Russell and Vinsel 2018, pp. 1-25).

Consequently, turning the media and communication studies agenda upside down with materiality requires focusing on the *physical order* of communications, fighting a war against material entropy. It means giving more importance to the physical dimension of communication and therefore to cultural and maintenance practices.

In fact, maintenance is often a *physical* or material act that can be done on old or new communication technologies. Rewiring submarine cables to allow for telegrams or Internet data flows, repairing a road, a railroad, or a tube, and restoring WhatsApp after a “down” are all acts aiming to bring communications back to a “natural” mode of functioning – a kind of return symbolized by the prefix *re-*. There is nothing natural there because communications could simply not work, and malfunctions are constitutive parts of communications. With maintenance and its focus on the material dimension, this hidden and dark aspect of communication becomes center-stage: the fight against malfunction.

Furthermore, when performing maintenance, workers must access the networks of communication malfunctioning. Sometimes they can do it virtually and online, and sometimes they must repair streets and pieces of cable or replace transistors or integrated circuits in person. Focusing on maintenance is then focusing on jobs that are considered out of the realm of communication studies (the maintainers) but also that add a high degree of interdisciplinary to the field. In general, communication studies are considered a mix of humanities, social sciences, and economics, and adding a material dimension means also including hard sciences.

3. Conclusion: finding maintenance in communication

The main aim of this paper is to show how maintenance can change (or turn upside down) the agenda of media and communication studies and can “force” communication scholars to examine new aspects of their discipline.

First, focusing on maintenance, the convergence of communication and transportation infrastructures emerge. Second, at the level of maintenance, communication infrastructures persist over time, and thus they must be studied from the *longue durée* perspective. Third, maintenance has a political dimension and leads to the emergence of non-conventional political economies of communication. Finally, maintenance facilitates the emergence of the material dimensions of communication as well the emergence of malfunctions and technical jobs, which are often considered out of the scope of communication studies.

To go more in depth in this theoretical reflection, maintenance can be also observed in several *acts* of communication. Users, listeners, and stakeholders are often “maintained” by communications. As clearly observed during the current pandemic, communication preserves and maintains personal relations, mutual understanding, misunderstandings, and even silence are all forms of maintenance of (good or bad) relationships. Consider the maintenance of large audiences as well. The mobile warnings on highways alert travelers to the inconveniences they may encounter. Informing drivers of the presence of obstacles on the roadway or dangerous road conditions is an act through which drivers are informed that someone is maintaining the infrastructure. Using the same example, this act of communication can be done because it is easier to place tags than to solve the problem. A tag “no swimming” in a polluted ocean beach means that whoever is responsible cares about people, but at the same time, all the possible efforts to solve the problem have not been undertaken.

A second set of examples of maintenance practices in communication deals with technologies. Saying “Hello!” when starting a telephone call, “Can you hear me?” when launching a Zoom meeting, or checking the WiFi connection if WhatsApp does not work are all acts of care in themselves. When examined carefully, all technologies of communication have specific ways to test whether

they are working properly or whether there is too much “noise,” as the famous mathematical theory of communication states (Shannon and Weaver 1949). Thus, maintenance can be simply viewed as a constitutive element of communication practices.

A third and final example of maintenance in communication deals with the role the mass media have always had in contemporary societies. Newspapers, broadcasting, websites, or even social media can exert a form of maintenance over democracy by informing citizens. They can similarly misinform, thus maintaining a state of confusion and inability to understand the limits between truth and lies and fake news and fact checking.

This paper is just an initial contribution towards the redefinition of media and communication studies when focusing on maintenance. It represents a first inquiry into new ideas, paths, concepts, agendas, and temporalities that can emerge thanks to maintenance theory. Media infrastructures get old and need to be repaired, communications persist for decades or even for centuries, fighting malfunction and sabotage is part of communications’ ‘normal’ life, or again political accountability should include maintenance over the old media. Those are some of the new dimensions that a focus on maintenance can add to the agenda of media and communication studies. Even if further theoretical and empirical research is required, new generations of media and communication scholars will have to consider those new insights, which will be probably crucial in societies that are getting old, like the media and communications they are using, and start not to believe in the ideology of continuous technological innovation anymore. Maintenance theory, in conclusion, can be a paradigmatic theory for approaching communication and media studies in the new spirit of the times.

References

- Balbi, G., 2017, *Ancora tu! L'emersione e la rilevanza della storia dei media nella vita quotidiana*, «Mediascapes Journal», 8, pp. 11-23, available: <https://ojs.uniroma1.it/index.php/mediascapes/article/view/13947>, retrieved December 6, 2020.
- Balbi, G., Moraglio, M., 2016, *A Proposal to Hybridise Communication and Mobility Research Agendas*, in S. Fari, M. Moraglio (Eds.), *Peripheral*

- flows: A Historical Perspective on Mobilities between Cores and Fringes*, Newcastle-Upon-Tyne, Cambridge Scholars Publishing, pp. 10-27.
- Balbi, G., Delfanti, A., Magaudo, P., 2016, *Digital Circulation: Media, Materiality, Infrastructures. An Introduction*, «Tecnoscienza: Italian Journal of Science & Technology Studies», 7, 1, pp. 7-16.
- Barbero, A., 2002, *Il ducato di Savoia. Amministrazione e corte di uno stato franco-italiano*, Roma-Bari, Laterza.
- Behringer, W., 2003, *Im Zeichen des Merkur: Reichspost und Kommunikationsrevolution in der Frühen Neuzeit*, Göttingen, Vandenhoeck & Ruprecht.
- Boczkowski, P., Lievrouw, L., 2007, *Bridging STS and communication studies: Scholarship on media and information technologies*, in O. Amsterdamska, E. Hackett, M. Lynch, J. Wajcman (Eds.), *The Handbook of Science and Technology Studies*, Cambridge, The MIT Press, pp. 949-977.
- Bory, P., 2020, *The Internet Myth: From The Internet Imaginary to Network Ideologies*. London, University of Westminster Press, available <https://www.uwestminsterpress.co.uk/site/books/m/10.16997/book48/>, retrieved December 6, 2020.
- Camenisch, C., 2019, *From the Alpine Mountain Height to the Swiss Lake District Climate and Society in the City and Republic of Bern from the 14th to the 16th centuries*, in A. Kiss, K. Pribyl (Eds.), *The Dance of Death in Late Medieval and Renaissance Europe Environmental Stress, Mortality and Social Response*, London, Routledge, pp. 95-96.
- Carey, J. W., 1989, *Communication as Culture. Essays on Media and Society*, New York, Routledge.
- Cubitt, S., 2017, *Finite Media Environmental Implications of Digital Technologies*, Durham and London: Duke University Press.
- Edgerton, D., 2007, *The Shock of the Old: Technology and Global History since 1900*, London, Profile-books.
- Franke, C., 2019, *Computer Networks on Copper Cables. From 'Promises to the Public' to 'Profits for Providers'*, in P. Bory, G. Negro, G. Balbi (Eds.), *Computer Network Histories. Hidden Streams from the Internet Past*, Zurich, Chronos Verlag, pp. 65-78.
- Geltner, G., 2019, *Infrastructure and Urban Wellbeing in Later Medieval Italy*, Philadelphia, University of Pennsylvania Press.
- Giorcelli Bersani, S., 2019, *L'impero in quota. I Romani e le Alpi*, Torino, Einaudi.
- Henke, C. R., Sims, B. 2020, *Repairing Infrastructures. The Maintenance of Materiality and Power*, Cambridge, MA, The MIT Press.
- Hu, T.-H., 2015, *A Prehistory of the Cloud*, Cambridge, The MIT Press.
- Huhtamo, E., Parikka, J., (Eds.) 2011, *Media Archaeology: Approaches, Applications, and Implications*, Berkeley, CA, University of California Press.
- Jackson, S.J. 2014, *Rethinking Repair*, in T. Gillespie, P. Boczkowski, and K. Foot (Eds.), *Media Technologies: Essays on Communication, Materiality and Society*, Cambridge, MA: MIT Press, pp. 221-239.
- Miller, J., 2018, *Media and mobility: Two fields, one subject*, «The Journal of Transport History», 39, 3, pp. 381-397.

- Commissione Ispettiva Ministeriale, 2018, *Comune di Genova. Autostrada A10 – crollo del Viadotto Polcevera*, Ministero delle Infrastrutture e dei trasporti, Roma, available www.mit.gov.it/comunicazione/news/ponte-crollo-ponte-morandi-commissione-ispettiva-genova/ponte-morandi-online-la, retrieved December 6, 2020.
- Pali telegrafici singolari, 1882, «Buletto telegrafico», III, 7, p. 220.
- Progetto di legge per l'approvazione della Convenzione stipulata con la Compagnia Erlanger per la collocazione e la manutenzione di un cordone sottomarino fra il continente italiano e la Sardegna, 1875, «Buletto telegrafico», XI, 1, pp. 4-14.
- Parikka, J., 2012, *What is media archaeology?*, Cambridge UK, Polity Press.
- Parks, L., Starosielski, N., 2015, *Signal Traffic: Critical Studies of Media Infrastructures*, Indiana, IL, University of Illinois Press.
- Russell, A., Vinsel, L., 2016, *Hail the maintainers*, «Aeon», available <https://aeon.co/essays/innovation-is-overvalued-maintenance-often-matters-more>, retrieved December 6, 2020.
- Russell, A., Vinsel, L., 2018, *After Innovation, Turn to Maintenance*, «Technology and Culture», 59, 1, pp. 1-25.
- Russell, A., 2015, *Nothing Special: Standards, Infrastructure, and Maintenance in the Great Age of American Innovation*, Platypus, «The Castac Blog», available <http://blog.castac.org/2015/04/nothing-special/>, retrieved December 6, 2020.
- Sergi G., 1981, *Potere e territorio lungo la strada di Francia. Da Chambéry a Torino fra X e XIII secolo*, Napoli, Liguori.
- Shannon, C.E., Weaver, W. 1949, *The Mathematical Theory of Communication*, Urbana, University of Illinois Press.
- Tischleder, B.B., Wasserman, S., 2015, *Cultures of Obsolescence. History, Materiality, and the Digital Age*, London, Palgrave.
- Weber, H., Krebs, S., 2021, *The Persistence of Technology: From Maintenance and Repair to Reuse and Disposal*, in S. Krebs and H. Weber (Eds.), *The Persistence of Technology. Histories of Repair, Reuse and Disposal*, Bielefeld, Transcript.

