

Beyond Innovation-Speak: Swiss Telephone Workers and the Making of Technical Identity

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ABSTRACT: This article examines how maintenance workers in Switzerland's Post, Telephone and Telegraph company (PTT) understood and represented their own labor between 1921 and 1959. Drawing on union magazines and previously unpublished sources, it argues that maintenance was not inherently invisible or undervalued but became the object of ongoing struggles over status, expertise, and technological identity. As Switzerland's telephone network expanded, automated, and aged, workers moved from identifying themselves as builders of infrastructure to presenting maintenance as a specialized and indispensable form of technical labor. These shifting representations emerged through debates about outsourcing, training, mechanization, and professional recognition, including disputes over the very name of the job. By tracing how workers alternately reproduced and challenged the "innovation-speak" that marginalized repair labor, the article reframes maintenance as a political and discursive category rather than merely a technical activity. In doing so, it contributes to the historiography of infrastructure, labor, and maintenance in modern communications systems.

KEYWORDS: telephone; maintenance; workers; Switzerland

Introduction

In the 1920s, the Swiss national Post, Telephone and Telegraph company (PTT) employed linemen who became mainly maintainers and fixers. Having previously constructed telephone lines, they were gradually assigned to maintaining and repairing cables and wires, mostly on lines, and rarely in central exchanges. For a long time, these workers complained that the more valuable construction work was assigned to others. Over time, however, influenced by

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material, economic, and political changes, they began to recognize the value of maintenance work, articulating and deploying it in their union demands.

In recent decades, historians of technology have welcomed more research on maintenance and repair, following trends also established in STS.¹ Historian Philip Scranton has stressed that “technological uncertainty is the perennial companion of technological innovation,” and maintenance faces precisely this uncertainty.² Many scholars have suggested that the history of technology, as well as STS and related disciplines, must contend with technological fragility in “a world of risk and uncertainty, growth and decay, and fragmentation, dissolution and breakdown.”³ Well-known historian of technology David Edgerton underlines how maintenance and repair—understood as the collective effort to keep technologies functioning—are “almost as widely distributed as use” and that “things cannot exist without maintenance.”⁴

Nevertheless, despite their growing relevance, maintenance and repair remain a marginal topic in the history of technology.⁵ Their historical understatement, according to Andrew L. Russell and Lee Vinsel, is mainly due to the dominant “innovation mindset” or “innovation-speak.”⁶ Edgerton also points out the “enormous rhetorical emphasis on the need for increased innovation.”⁷ This focus on novelty, innovation, and changes tends to obscure what is preserved, what lasts, and consequently the work needed to keep things functioning, such as maintenance, repair, and related activities.⁸

The invisibility of maintenance is a widely discussed topic, but what happens within this unseen realm is pivotal: The political, economic, and social power related to technology is retained, reinforced, negotiated, or distributed, as our case study shows. Communication economist Nicholas

1. For major STS contributions: Henke, “The Mechanics of Workplace Order: Toward a Sociology of Repair”; Jackson, “Rethinking Repair”; Graham and Thrift, “Out of Order: Understanding Repair and Maintenance”; Dant, “The Work of Repair: Gesture, Emotion, and Sensual Knowledge”; Denis and Pontille, *Le soin des choses: Politiques de la maintenance*.

2. Scranton, “The Challenge of Technological Uncertainty.”

3. For works in the philosophy of technology: Young and Coeckelbergh, *Maintenance and Philosophy of Technology: Keeping Things Going*. For media studies: Ferrigato and Balbi, “Toward a Media Maintenance Approach (MEMA): Maintenance as a Theoretical Tool for Media Studies.” Quote from Jackson, “Rethinking Repair,” 221.

4. Edgerton, *The Shock of the Old: Technology and Global History since 1900*, 80, 100.

5. Notably, the 2024 ICOHTEC-SHOT joint annual meeting was entitled “Reparando/Repair in the History of Technology.”

6. Vinsel and Russel, *The Innovation Delusion: How Our Obsession with the New Has Disrupted the Work That Matters Most*, 8, 10. Also Vinsel and Russel, “After Innovation, Turn to Maintenance,” 6.

7. Edgerton, “What Is the Historiography of Technology About?,” 681.

8. For a discussion on the definition of maintenance: Ferrigato and Balbi, “Toward a Media Maintenance Approach (MEMA): Maintenance as a Theoretical Tool for Media Studies.”

Curien argues that state-owned telephone networks are called upon to ensure security, combat geographic exclusion, and determine adequate tariffs, tasks that are accomplished and made to last not only through construction and exploitation but also through maintenance.⁹

One crucial element that remains underestimated in discussions of maintenance is technology's dependency on "human labor."¹⁰ Innovation-speak makes "the people who maintain and repair infrastructures . . . often not very visible to outsiders."¹¹ It helps to "picture the job market as a kind of pyramid, with the very few innovators sitting at the top being supported by a broad base of maintainers."¹²

If maintenance is "a mundane action that doesn't see heroes," presumably maintenance workers would oppose the innovation-speak that considers them invisible and irrelevant.¹³ But this is not the case. As "the social prestige of individual repair professions has varied greatly over time and between different social and historical contexts," workers' representation of maintenance also varies.¹⁴ They can strengthen or reject innovation-speak.

Studying maintainers's discourses shows how this workforce framed its role in public and union claims, bringing to light the political, economic, and social struggles concealed in maintenance. This case study thus contributes to the historiography on maintenance, the history of telephony, and the historiography of labor in Switzerland's telephone system. The gap extends to media history, where a "redefinition of media and communication studies . . . focusing on maintenance" has been identified as necessary.¹⁵

This article focuses on technicians working for the Swiss national telephone company, from the founding of the PTT in 1921 to the milestone of the world's first fully direct-dialed national network in December 1959. These four decades saw a considerable expansion of the network and growth

9. Curien, *Économie des réseaux*.

10. Vogel, "Maintenance and the Humanness of Infrastructure," 42.

11. Henke and Sims, *Repairing Infrastructures: The Maintenance of Materiality and Power*, ch. 1.

12. Vinsel and Russel, *Innovation Delusion*, 118–19.

13. "Un geste banal qui ne reconnaît pas de héros" (Denis and Pontille, *Le soin des choses*, 4).

14. Krebs and Weber, "Rethinking the History of Repair: Repair Cultures and the 'Lifespan' of Things," 42.

15. On maintenance for communication: Houston, "Mobile Phone Repair Knowledge in Downtown Kampala: Local and Trans-Local Circulations"; Hadlaw, "Business as Usual: Telephone Repair and Maintenance at the Bell Telephone Company of Canada"; Starosielski, "Grounded Speed and the Soft Temporality of Network Infrastructure"; Rose, "The Telegraph from Below: Race, Labour and the Indo-European Telegraph Department 1862–1927"; Balbi and Leggero, "Communication Is Maintenance: Turning the Agenda of Media and Communication Studies Upside Down," 17; Krebs and Mossop, "The 'Technical Time' of the Luxembourgish Telephone System: Reflections on the Transformative Power of Maintenance"; Meneghello, "Sense Perception and the Maintenance of Pneumatic Mail Tubes in the Longue Durée: Feeling the Air, Preventing and Fixing Failures."

in its technological sophistication. PTT's history over this period marks the stages in the Swiss network's development and highlights the maintenance and repair challenges. Maintenance needs evolved, as illustrated by the maintenance workers's comments in their trade union weeklies. Maintenance workers gradually left behind innovation-speak and moved toward "specialization-" and then "maintenance-speak." This article traces that shift and asks what factors shaped these changing representations of maintenance work and technological identity.

Reconstructing Maintenance Through Workers's Discourses

The primary sources for this article are the French and Italian editions of PTT trade union weeklies from 1921 to 1959. In 1921, employees organized into the Swiss Federation of Telephone and Telegraph Workers published a trilingual magazine, *Telephon- und Telegraphen-Union/Union des Téléphones et Télégraphes/Unione dei Telefonici e Telegrafici*. It discussed the potential merger of unions and workers's associations in the emerging company PTT. Two different mergers were considered: one "vertical," with higher-ranking functionaries, and one "horizontal," with postal and telegraph employees, the latter of which was chosen.¹⁶ From 1925 to 1928, before the merger took effect, the federations had already published a joint weekly (their "official and mandatory organ") in German (*Post-, Telephon- und Telegraphen-Union*), French (*Union des Postes, Téléphones et Télégraphes*), and Italian (*Unione delle Poste, Telefoni e Telegrafi svizzeri*). These weeklies are stored in the PTT Archives in Köniz (Bern) and in the Swiss National Library.

From 1929, PTT workers and clerks merged in the new Swiss Federation of Postal, Telephone, and Telegraph Employees (FSIPT) and began publishing a new weekly in German (*PTT Union*) and French/Italian (*Union PTT*). The federation called employees of state companies "officers" and created twenty-five wage levels. While PTT's clerks and workers became officers, the federation labeled letter carriers, clerks, and maintainers as well as warehouse workers as "subordinate officials."¹⁷

The vertical merger with higher-ranking officials took place in 1950. The union, now the Swiss Union of Postal, Telephone and Telegraph Officials, was abbreviated to the PTT Union. Subsequent mergers reduced workers's status to a minority in their union. Articles by or about telephone workers in the magazines consequently declined over time. *Union PTT* (French/Italian edition) was not a translation of the Swiss German *PTT Union* but rather was edited independently, collecting contributions from various sources,

16. The Swiss Federation of Telephone and Telegraph Workers merged with the Swiss Federation of Postal and Telegraph Workers.

17. Franz Rohner, "Les 40 ans d'existence de la Fédération des employés des P.T.T.," *Revue syndicale suisse: Organe de l'Union syndicale suisse* 23 (1931): 222.

including transcripts of federation members's speeches (often translated from German), to which the Geneva editors added their comments. In addition, a network of contributors, workers mainly from French-speaking Switzerland and usually under pseudonyms, discussed diverse issues. The Italian section of the magazine produced comments and contributions, usually firsthand accounts by workers, from the late 1930s. Editorial control does not appear to have been strict, as the pages are full of critical debates about the federation. *Union PTT* was a stage for discourses about work and workers, in the context of union demands. The function of these texts, and the broader "production of discourse," was famously described by Michel Foucault as "at once controlled, selected, organized and redistributed by a certain number of procedures."¹⁸

The limited relevance usually accorded to maintenance means that available sources are scarce. As Jan Hadlaw confirmed in her article on maintainers at the telecommunications company Bell in Canada, "Information on what was repaired and how, as well as who was responsible for repairing, is difficult to ascertain from company records." Hadlaw also noted that, perhaps not coincidentally, repair practices have received less than their due attention by historians.¹⁹ Accordingly, the Swiss union magazines constitute the best source for reconstructing workers's activities and, crucially, their representations of maintenance.

A brief history of the Swiss telephone network situates the representation of maintenance. It relies on annual reports published by PTT between 1929 and 1956.²⁰ The data on breakdowns derive from PTT's technical magazine *Technische Mitteilungen/Bulletin technique/Bollettino tecnico*.²¹ Taken together, these sources make it possible not only to reconstruct maintenance practices but also to trace how workers themselves articulated, contested, and reshaped the meaning of maintenance over time.

18. Foucault, "The Order of Discourse," 53.

19. Hadlaw, "Business as Usual," 88.

20. Administration des télégraphes et des téléphones suisses, *Annuaire* 1929, 58; *Annuaire* 1933, 128; *Annuaire* 1939, 90; *Annuaire* 1945, 76; *Annuaire* 1949, 72; *Annuaire* 1956, 64.

21. On cable faults: R. Gertsch, "Les défauts des câbles et leurs causes," *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 1 (1934): 1–9; "Dix ans de statistique sur les défauts de câbles," *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 6 (1937): 201–16; R. Gertsch and H. Koelliker, "Vingt ans de statistique des défauts de câbles," *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 1 (1950): 8–33; E. Hadorn and R. Hainfeld, "Trente ans de statistique des défauts de câbles: Etude de la statistique de 1927 à 1956," *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 5 (1958): 177–204.

Infrastructural Change and Conditions of Maintenance, 1921–59

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The development of PTT's network formed the context in which the workers at the center of this article operated. In 1921, the gradual merger of Switzerland's federal offices responsible for various mandated services began, involving the postal service (federal monopoly since 1848), telegraphy (1852), and telephony (1878). The process was completed in 1928 with the creation of the federal company PTT. In that same year, the Swiss telephone network consisted of 28,060 km of overhead lines, 2,199 km of urban underground cables, and 306 km of suburban cables, totaling 30,567 km. By 1956, the last year PTT's annual report included this data, the network consisted of 32,920 km of overhead lines, 17,684 km of urban underground cables, and 6,647 km of suburban cables, for a total of 57,251 km. The network thus almost doubled in thirty-five years, and the key factor in this expansion was the laying of underground cables (see figure 1, top).

Another relevant aspect of this growth was the massive rise in conductors. In 1921, the telephone network included 103,642 km of overhead wires for intercity lines and 100,575 km for urban lines; adding 45,314 km of intercity underground conductors and 376,310 km of local conductors brought the total to 625,841 km. By 1956, overhead wires had almost disappeared from the interurban network (4,089 km) but had increased by about 50 percent in the local infrastructure (158,824 km); the network had 1,343,155 km of underground "interurban and rural" conductors and 4,669,093 km of "local" conductors. As the lower table in figure 1 shows, the Swiss telephone infrastructure surpassed 6 million km of underground conductors. In addition to these "low-frequency" cables, 57,506 km of high-frequency underground conductors were required.

In thirty-five years, the length of the network almost doubled, and conductors increased tenfold. The infrastructure developed through the creation of new lines, but above all by upgrading existing lines. Crucially, maintenance must be understood as a prerequisite for this development, shaping both the expansion and the long-term functioning of the network.

The development of the Swiss network can be divided into different phases. The first phase, between 1921 and 1928, was the establishment of PTT. It registered relatively little infrastructural growth, as by 1928 the network had just 899 additional kilometers. However, these years were crucial for replacing many interurban overhead lines with underground (and sometimes underlake) cables. Automatic exchanges introduced after 1922 used mainly ITT or Siemens switching equipment.²² From 1920, cables became more efficient thanks to electronic lamps, which improved long-distance transmission. From the following year, cables were better insulated, coated with tar; moreover, the electrification of railroads forced the substitution of

22. Bachmann, "Developments of Communication in Switzerland."

	Overhead Lines (km)		Underground Lines (km)		
	Urban and Interurban		Urban	Interurban	Total
1921	28,060		2,199	308	30,567
1926	26,977		2,821	1,186	30,984
1931	27,812		4,353	1,925	34,090
1936	26,423		6,566	3,416	36,405
1941	26,119		8,101	4,345	38,565
1946	28,927		9,208	4,883	43,018
1951	32,148		12,845	5,771	50,764
1956	32,920		17,684	6,647	57,251

	Overhead Conductors (km)		Underground Cables (km)		
	Urban	Interurban	Urban	Interurban	Total
1921	100,575	103,642	376,310	45,314	625,841
1926	105,854	87,041	578,128	197,324	968,347
1931	120,850	72,911	1,009,674	486,601	1,690,036
1936	124,791	41,174	1,454,972	803,628	2,424,565
1941	125,801	22,412	1,771,209	958,988	2,878,410
1946	145,337	17,169	2,075,171	1,022,631	3,260,308
1951	159,672	9,518	3,283,935	1,203,881	4,657,006
1956	158,824	4,089	4,669,093	1,343,155	6,175,161

FIG. 1. Growth through Underground Cables. Length of lines and conductors in the Swiss telephone network, 1921–56. Swiss telephone authorities extended the network by creating lines and branches, while PTT engineers increased conductor capacity tenfold by upgrading existing lines. The PTT drove much of this expansion by installing underground cables. Maintenance was a prerequisite for this development; it shaped both the expansion and the long-term functioning of the network. (Sources: Administration des postes, télégraphes et téléphones suisses, *Annuaire*, 1930, 1934, 1940, 1946, 1950, 1957, 1960.)

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overhead wires along the rails, which suffered massive interference. Newly built lines had cables laid in pipes or in concrete and iron culverts.²³ In addition, bundles of conductors replaced the suburban overhead networks; for every kilometer of underground track, there were 179.7 km of conductors. These transformations began to shift the balance of work from construction toward maintenance and monitoring.

During the second phase, from 1929 to 1940, progress was impressive despite economic crises and political uncertainty. The network was extended by 6,385 km, while the underground infrastructure totaled 231.7 km of conductors per kilometer. The introduction of thinner 0.6 mm wires allowed more conductors in the existing conduits.²⁴ In 1927, PTT started gathering, analyzing, and publishing statistics on cable breakdowns, possibly a sign that maintenance issues were gaining importance. In the first decade of PTT's surveys (until 1936), the network had on average one breakdown every two days; those breakdowns were categorized as damages due to external agents (the majority), factory, or assembly defects. Of the external causes of damage, nearly half (48 percent)—536 in a decade—were caused by human digging activities.²⁵ Pickaxes, deep soundings, or jackhammers sheared or ruined cables during the construction of roads, water and gas pipes, or the power grid. From 1932, galvanized steel and iron conduits were occasionally installed; however, in 1939, the company decided that such protection was too expensive.²⁶ Corrosion was the second "external" cause of failures, caused by lack of maintenance, defects, or degraded insulation. Corrosion could be chemical, electrolytic, or intercrystalline and generated 110 failures in ten years, slightly more than lightning (108, mostly in one canton, Ticino), while seventy-one damages were caused by rodents (mice and rats). In the final surveys, faults due to rodents, also connected with scarce insulation, grew to the point that PTT's technical magazine said they were obliged to prevent this "by every conceivable means."²⁷ Thus, conduits, cable insulation, and their maintenance were essential to protect cables against water, chemicals, and rodents, further reinforcing the centrality of maintenance work in everyday operations.

The third and shortest phase was from 1941 to 1945. Though Switzerland remained neutral in World War II, the network's development slowed down due to supply shortages. Although the data indicate expansion at even greater rates (3,899 km in five years), 63 percent of the new lines were actually overhead wires, largely new subscriber connections made between

23. Administration des télégraphes et des téléphones suisses, *Annuaire* 1929, 20.

24. Schiess, *Un siècle de télécommunications en Suisse, 1852–1952*, 921.

25. Gertsch, "Les défauts des câbles," 206.

26. Schiess, *Un siècle de télécommunications*, 893.

27. "On est obligé de le prévenir par tous les moyens imaginables" (Gertsch, "Les défauts des câbles," 214).

1944 and 1945. Progress with conductors was limited to 1,453 km underground, with the utilization rate dropping from 231.7 to 219 km per km of underground network.

The situation with breakdowns also worsened. Whereas in 1936 outages averaged one fault every two days, by 1945 they doubled to one every twenty-four hours. Furthermore, the major causes of damage changed. With the construction of new branches, the percentage of failures from construction and assembly defects dropped; the records show a substantial increase in breakdowns due to external agents. For example, in 1935 there were 18 corrosion faults; in 1945 there were 133, exceeding the total of the 1927–36 decade. In the same period, damage due to cable defects and assembly grew from forty-six to seventy-three. Long story short, the infrastructure was subject to aging and disintegration, increasing the importance and urgency of maintenance interventions.²⁸ PTT annual reports show stable maintenance expenses for 1940–43 and strongly rising costs for 1944 and especially 1945. Consequently, not only total expenses rose from 1.625 to 2.389 million francs between 1943 and 1945 but also average expenses per kilometer of underground conductor (from 0.22 to 0.27 francs) and overhead wire (from 6.54 to 10.06 francs).²⁹

The fourth and final phase started in 1946, when the Telegraph and Telephone Administration declared, “Swiss telephony is currently going through a stage of modernization whose pace is almost revolutionary. The automation of telephone traffic in particular . . . is progressing rapidly and will probably be completed within five years.”³⁰ In 1946, just 10 percent of the 950 centrals in the Swiss network were still manual.³¹ The number of subscribers grew rapidly, and the network underwent significant reorganization.³² The entire route increased by 15,501 km (including 10,796 km of underground cables, mainly urban), reaching 228.4 km of conductors per kilometer. This evolution of the network was possible thanks to the introduction, from 1948, of thinner and more efficient current-carrying cables.³³

28. “Les câbles sont sujets, comme toutes les choses créées par la main de l’homme, aux phénomènes de vieillissement et de désagrégation” (Gertsch and Koelliker, “Vingt ans de statistique,” 8–12).

29. Administration des postes, télégraphes et téléphones suisses, *Annuaire* 1945.

30. H. Dill, “Nouveaux progrès de la téléphonie automatique,” *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 3 (1946): 1.

31. G. Letellier, “Dispositions générales du telephone en Suisse,” *Annales des télécommunications*, 8-9 (1946): 153–175.

32. Subscribers went from 500,000 in 1948 to one million in July 1959 (Administration des postes, télégraphes et téléphones suisses, *Annuaire* 1949; Administration des postes, télégraphes et téléphones suisses, *Annuaire* 1959). For the reorganization: R. Frei, “Die Gestaltung des schweizerischen Telephon-Fernnetzes: La structure du réseau téléphonique interurbain Suisse,” *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 11 (1971): 623–35.

33. Schiess, *Un siècle de télécommunications*, 924.

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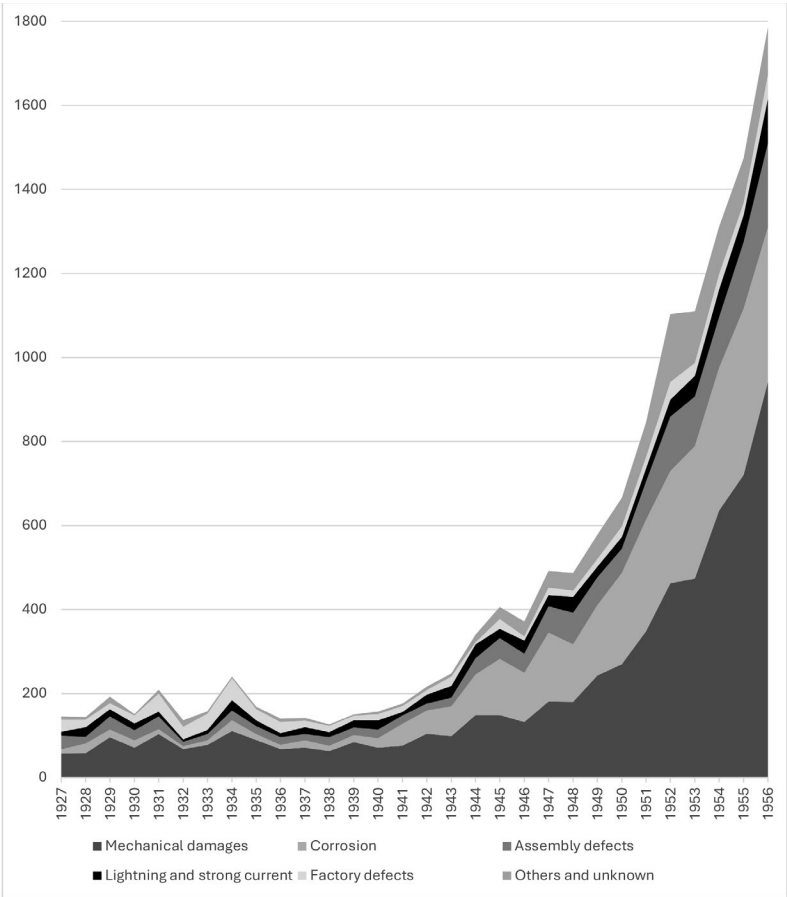


FIG. 2. Infrastructure under Strain. Showing the number and causes of failures in the Swiss telephone network, 1927–56, the graph shows a general increase in faults over the review period, especially from the 1940s onwards. Construction crews, utility workers, and road builders caused much of the damage to the network through accidental mechanical strikes, which often accounted for around half of all recorded failures. Corrosion-related damage also increased steadily during the same period, forcing PTT maintenance to confront the growing fragility of aging underground infrastructure. (Sources: E. Hadorn and R. Hainfeld, “Trente ans de statistique des défauts de câbles: Etude de la statistique de 1927 à 1956,” *Technische Mitteilungen/Bulletin technique/Bollettino tecnico* 5 [1958]: 180–81.)

After the war there were more installation faults, particularly due to poor soldering. Indeed, the rapid modernization involved many young and nonprofessional welders. Most breakdowns, however, concerned mechanical damage: In 1956, three cables were damaged every day by picks, jackhammers, and mechanical shovels. Corrosion damage continued to rise as some of the conduits built since the 1920s were already several decades old. In 1956, PTT's technical magazine made an assessment. Adding up the costs of repairing breakdowns due to corrosion (without the loss of conversion taxes and plant depreciation) and comparing these with the cost of maintaining the entire network ("maintenance of cable chambers, cleaning and repainting end-of-cable cabinets and protective irons, replacement of defective ascending cables and repair of mechanical damage, etc.") showed that the two expenditures were almost equal (see figure 2), highlighting the economic significance of maintenance within the system.³⁴

On December 3, 1959, the last manual central in Scuol/Schuls, canton of Graubünden, was closed, and Switzerland had the first fully direct-dialed national network. *Union PTT* celebrated by reporting a speech by Gustav Adolf Wettstein, director of the Telegraph and Telephone Administration. The magazine's editors concluded sharply, "If the Swiss telephone network is today entirely automatic, its installations, which are based on the most scientific technique, would be nothing but scrap without the approximately 8,000 agents who ensure their operation, without the high level of their professional training and . . . awareness of duty."³⁵ In other words, infrastructures have human as well as material and technological components. While this section has traced the material transformation of the network, the following sections turn to the discursive transformation through which workers finally made these human contributions visible and meaningful.³⁶

Construction, Status, and the Marginalization of Maintenance

Workers's weeklies reveal the diverse stages of maintainers's self-representation that closely mirror the phases of the network's evolution. They feature discourses concerning maintenance workers's relevance to the company and their role that were fully aligned with innovation-speak.

In the 1920s, while many lines were built from scratch or renewed, fewer PTT workers were employed in construction, repair workshops, and

34. Hadorn and Hainfeld, "Trente ans de statistique," 195.

35. *Union PTT*, December 18, 1959, 5.

36. Star and Ruhleder, "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces."

warehouses.³⁷ The construction service workers were mainly “fitters” (*monteur* in German and French, *montatore* in Italian, meaning literally “someone who builds or assembles something”), also identified as OTTs (meaning telegraph and telephone workers). A 1950s article provides a glimpse of these times: “The construction and maintenance of these lines, entrusted to the competent services, required considerable manpower. Apart from specialized executives, this heterogeneous workforce was made up of agents belonging to the most diverse professional backgrounds unrelated to employment.”³⁸ In theory, these workers’s main task was to install lines or centrals and connect subscribers, but the ongoing construction of the large interurban underground lines was usually entrusted to private companies, which from 1921 could also establish new connections. PTT’s “construction service” was not at the heart of the network expansion.

The Swiss Federation of Telephone and Telegraph Workers strongly opposed the policy of outsourcing construction.³⁹ Workers protested the decision to delegate an activity (for which they were qualified) to private companies, often insisting that the external workers’s technical preparation was poor. “It is in no way in the interest of the administration,” they wrote in June 1921, “to entrust private installations to people who do not have the necessary experience in this specific professional branch.” They warned that the undesirable and inevitable outcome would be an increase in disruptions, additional work and considerable costs: “Even if the installation is carried out by a private installer, all maintenance costs, repairs, etc., will be the responsibility of the administration.”⁴⁰

For decades, PTT workers pointed out the poor quality of private companies.⁴¹ PTT’s administration denied this, considering private companies both acceptable and economical. In the 1920s, many workers wanting to be part of the network’s development suffered layoffs. Another article in *Telephon- und Telegraphen-Union*, dated October 7, 1921, suggested that linemen’s duties

37. Subordinate officials, permanent workers, and auxiliary workers went from 1,624 in 1922 to 1,408 in 1929 (Administration des télégraphes et des téléphones suisses, *Annuaire* 1929, 55).

38. *Union PTT*, August 7, 1953, 1.

39. Entrusting construction and repair work to an external workforce was a well-established practice. Until 1908, there were no “ouvriers” listed among the employees. In 1909, following a reorganization of the administration, 349 “monteurs et ouvriers” were reported (Conseil Fédéral Suisse, “Rapport à la Haute Assemblée Fédérale sur la gestion du Conseil Fédéral Suisse,” 1909, 641) to which were added 519 “ouvriers à la journée” (daily workers). In 1920, the number of “monteurs et ouvriers des lignes,” both permanent and temporary, had risen to 1,943, to which must be added other workers who were counted separately, such as 100 people employed not by individual offices but by the central administration (Conseil Fédéral Suisse, “Rapport à la Haute Assemblée Fédérale sur la gestion du Conseil Fédéral Suisse,” 1920, 946).

40. *Telephon- und Telegraphen-Union*, June 24, 1921.

41. *Union des Postes, Téléphones et Télégraphes*, January 21, 1926.

were changing: “Even if an installation works well, disruptions can occur over time and often long after its construction.” The article admitted that it would be necessary to hire a larger workforce to repair the undoubtedly more numerous interruptions due to installation faults. This prediction was half true. The “construction service” ended up doing more and more repairs and maintenance, but without increasing the workforce, for three reasons: the private sector’s installations were not of poor quality; the ongoing replacement of overhead lines with underground cables made the network more resilient; and as the telephone network was being built or rebuilt, a new infrastructure typically (but not always) required less maintenance than old.⁴² This also explains why PTT workers asked to take part in construction work: They did not want to be relegated to what they considered a residual role as maintainer, which was also physically demanding and dangerous: Repairs were carried out in all weather and required climbing on roofs or high poles (see figure 3). As a 1923 article noted with bitter irony, being a maintainer was like gathering crumbs from private companies: “It’s obvious that contractors don’t want to deal with repairs or small installations; they want concessions allowing them large profits, and in this respect the General Directorate of Telegraphs has been helping them for a long time in a way which deserves the recognition of the bosses.”⁴³

The articles quoted here aimed to function as union demands. PTT workers’s discourse shows that they sought better working conditions. They claimed to be builders, not repairers, and usually avoided mentioning their maintenance-related duties. However, repair works were sometimes reported, especially when carried out under difficult conditions, and these accounts show that maintenance progressively became the main occupation for PTT’s linemen.⁴⁴ A 1926 letter to *Union des Postes, Téléphones et Télégraphes* stated that PTT “alone bears the costs of repairing defective installations.”⁴⁵ Then, in 1930: “The T.T. staff soon only took care of branching work or repairs to minor subscriber lines.”⁴⁶

Within a decade, however, the dominant discourse fluctuated. Despite refusing to be confined to repairs, workers sometimes demonstrated a long-term, typically “maintenance culture” vision.⁴⁷ For instance, in 1924, PTT’s administration emphasized the economic benefits of outsourcing construction, claiming that underground cables would “almost completely eliminate”

42. The maintenance costs declared by the company for each kilometer of conductor in 1924 amounted to 11.58 francs for overhead lines and 1.37 francs for underground ones (Administration des télégraphes et des téléphones suisses, *Annuaire* 1929, 60).

43. *Telephon- und Telegraphen-Union*, August 2, 1923, 4.

44. E.g., *Union des Postes, Téléphones et Télégraphes*, March 4, 1926, 4; *Union des Postes, Téléphones et Télégraphes*, January 2, 1931, 5.

45. *Union des Postes, Téléphones et Télégraphes*, January 19, 1926, 2.

46. *Union PTT*, September 26, 1930, 1.

47. Balbi and Leggero, “Communication Is Maintenance,” 7–26.

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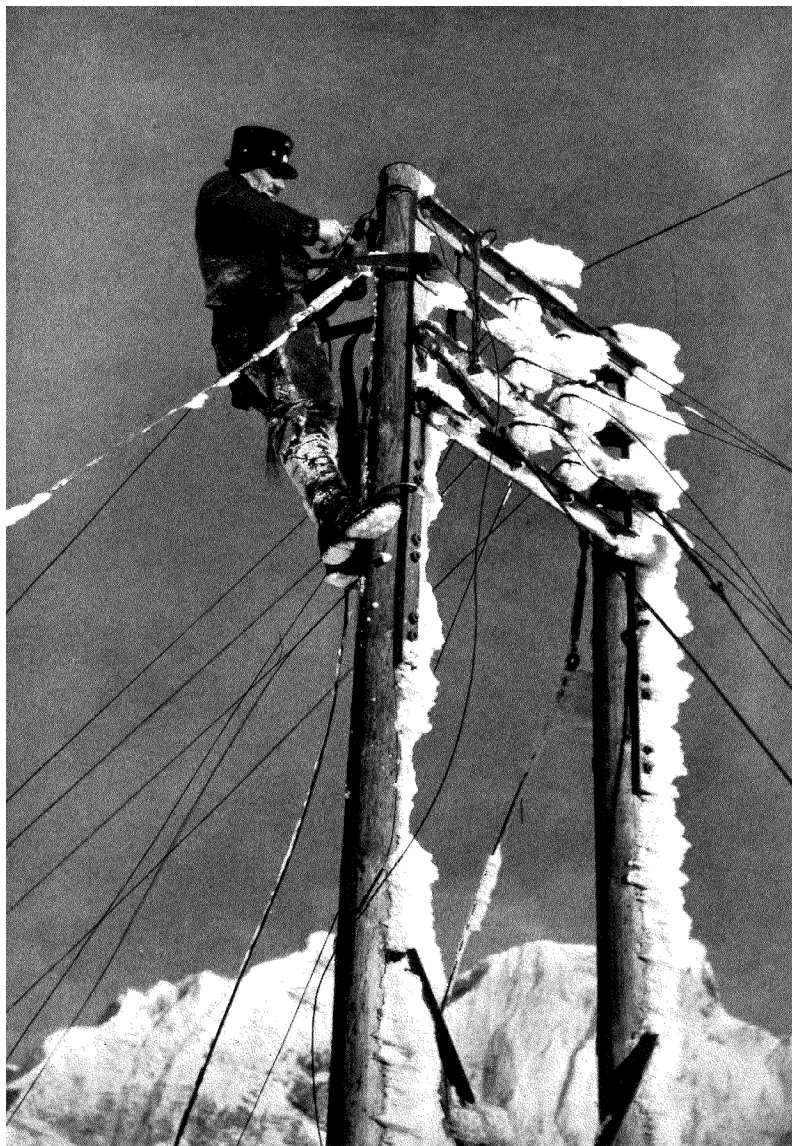


FIG. 3. Danger on the Lines. The photograph shows a PTT *monteur* working on a line during winter. Before the 1930s, workers's weeklies used photographs like this one to illustrate the dangers of repair work. Line faults forced repairmen to brave all weather conditions, travel to remote mountain locations, carry out repairs several meters above the ground while secured to telephone poles with only a simple strap around their waists. Through these images, maintenance workers represented themselves as skilled laborers confronting the physical risks of keeping the Swiss telephone network operational. (Source: Bratschi, *Fiers de servir*.)

the need for maintenance on some lines. Workers, however, disputed this view, focusing on the infrastructure's stability over time.⁴⁸

In general, workers's grievances did not have much effect. Redundancies continued throughout the 1920s, working conditions did not improve, and the impacts were long-lasting. After years of discussion, the law regulating federal officials came into force in 1928. It introduced twenty-five wage levels for Swiss officials employed by federal companies, and PTT linemen were relegated to the "bottom of the table."⁴⁹ An entry-level lineman was on the same wage level, the twenty-fourth, as a letter carrier; a first-class lineman was only two levels higher. Despite subsequent and insufficient adjustments, these wage levels demonstrated the low consideration for the "construction service." Other factors were decisive. According to linemen, the Swiss Federation of Post, Telephone, and Telegraph Employees was not sufficiently involved in protecting their group.⁵⁰ Moreover, in a decade, telephone technology had evolved, and many linemen simply were not keeping up, reinforcing their marginalization within the emerging technical order.

In short, these dynamics show that in the 1920s, maintenance was not only materially expanding but also discursively devalued, as workers aligned themselves with innovation-speak while simultaneously experiencing the growing centrality of maintenance in practice.

Skill, Training, and Reframing of Maintenance

The Great Depression affected Switzerland throughout the 1930s, with unemployment and rising prices. Nevertheless, telephone infrastructure was increasingly automated, the kilometers of conductors multiplied, and installations expanded steadily. At that time, wages in the construction service, repair shops, and warehouses were low, yet the workforce remained stable despite the widening infrastructure.⁵¹ OTTs still had to defend their jobs, including maintenance duties, from outsourcing to private contractors. Maintenance shifted from being an unwelcome and poorly tolerated task to represent a defensive bulwark. Because maintaining infrastructure required continuous attention—prevention, diligence, and medium- and long-term evaluation—workers argued that it should remain in-house. OTTs complained that the maintenance of central exchanges and equipment in general suffered greatly from being entrusted to private industry: "These installations,

48. *Union PTT*, March 28, 1924, 3–4.

49. Included under "monteur" were those who, upon the entry into force of the federal law on the organization of officials, were classified as telephone workers.

50. On the federation's inability to support OTTs regularly: *Union PTT*, June 14, 1929, 3; June 21, 1929, 3; May 9, 1941, 2; May 19, 1944, 1.

51. Subordinate officers, permanent workers, and auxiliary workers rose from 1,474 in 1931 to 1,532 in 1939.

which are always delicate, deteriorate as they become the testing ground for a constantly changing army of electricians, with little regard for the interests of the administration.” They argued that it was hardly surprising to see not only masses of “faulty” equipment being returned to the depots and subscribers dissatisfied with how the present regime dealt with disruptions but also that PTT’s linemen had to come to the rescue when breakdowns occurred due to private companies’s incompetence.⁵² Workers’s discourse changed, but so too did linemen themselves. In May 1929, a worker “from La Chaux-de-Fonds” wrote, “Let’s face it, not all our colleagues have been able to keep up with the dramatic changes in telephony technology in recent years. A host of new devices and systems were introduced, and it was easy to see that professional training was lacking at its very roots.”⁵³ The issue of technological progress for workers would not be resolved quickly. Nine years later, the annual assembly of OTTs in French-speaking Switzerland met at the Maison des syndicats (trade union house) in Neuchâtel. Victor Schmidt, spokesman for the federation’s steering committee, said frankly, “There’s no denying that our profession is undergoing major change, and that this trend is set to continue. This evolution stems from the automation of the telephone.” Schmidt argued that in the past, OTTs’s work was mainly physical: “Today, the transformation is such that the brain also comes into play.”⁵⁴ To quote Christopher R. Henke’s book on physically demanding work, “The interaction of body and setting [that] is the crucial relationship for understanding repair . . . [is about to change] because the body is the link between social and material forms of order.”⁵⁵ This marked a new phase in the relationship between workers, their bodies, the network, and their job. Consequently, workers began to represent maintenance differently, shifting to “specialization-speak,” whereby public discourse emphasized technical skills and competencies (or incompetence).

From the 1930s, OTTs had to compete for technical training with workers in private industries. They could not count on PTT: “Private industry is very active in training skilled workers, through courses, conferences and so on. Regrettably, the same cannot be said of the Confederation’s staff. The Administration demands qualities from its staff, but neglects to give them the opportunity to acquire them.”⁵⁶ Proof that the administration neglected professional education was the fact that it was often forced to hire private workers to carry out complicated jobs. Once again, workers and the company were on opposite sides, especially as employees considered training a fundamental tool for developing pride in their work. For years, the workers’s

52. *Union PTT*, September 4, 1931, 1.

53. *Union PTT*, May 5, 1929, 1.

54. *Union PTT*, July 1, 1938, 3.

55. Henke, “Mechanics of Workplace Order,” 64.

56. *Union PTT*, October 25, 1929, 1.

union unsuccessfully demanded that PTT provide training: “Are we going to continue to treat the telephone and, more specifically, the construction department, as a flock of sheep, obediently following the ram at the head of the flock?”⁵⁷ The union wondered why the administration trained apprentices for the operational part of the profession, yet not for the technical part.⁵⁸

PTT did not train internal workers. According to *Union PTT*, the company considered that some could be replaced by outsiders and others would gradually be replaced as they retired. From 1932, PTT introduced exams for subordinate officers seeking promotion to a higher grade (and a higher wage). In the past, these upgrades were due after some years of service; however, as PTT’s general management explained, “The purpose of examinations is, in principle, to eliminate from promotion those who are insufficiently qualified. . . . Anyone who does not possess the necessary professional knowledge and does not take the trouble to prepare for the examination does not deserve a better position.”⁵⁹ These exams were challenging and required good theoretical grounding. As older workers often failed, PTT thus succeeded in locking them in the lower grades and promoting younger, better-prepared people. Only in the 1950s did *Union PTT* recognize a change in the company’s approach to training, thanks to “managerial forces inspired by the new concepts of progress.” However, it also recalled the rules once in force at its Telephone Directorate, “the law that to govern well it was necessary to raise the worker in ignorance . . . [the] absolute prohibition to get into their calloused hands a scheme or other that could open dull minds to major knowledge,” highlighting the long-standing tension between expertise, control, and access to technical knowledge.⁶⁰ These developments show that the emergence of specialization-speak was not merely a response to technological change but a strategic rearticulation of workers’s identity, grounded in skill, training, and expertise, through which maintenance began to acquire new legitimacy within the technological order.

Pride, Recognition, and the Politics of Naming

In the first half of the 1940s, as war raged in neighboring countries, imports collapsed and supplies of the raw materials needed to develop the Swiss

57. The federation also tried to educate its members: technical contributions appeared occasionally in *Union PTT*; in 1935, the federation committee announced that it was preparing material for a technical course in telephony (*Union PTT*, March 15, 1935, 2); in 1936, it edited a simplified pocket telephony manual for workers, priced at only 1 franc (*Union PTT*, October 16, 1936, 2).

58. *Union PTT*, December 12, 1930, 1.

59. *Union PTT*, January 2, 1931, 1.

60. *Union PTT*, April 3, 1953, 4.

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FIG. 4. Maintaining Hidden Infrastructure. Although the photograph showing PTT Workers maintaining underground cables is undated, editors included it in a 1941 commemorative volume celebrating the telephone workers' contribution to the Swiss Confederation. The image illustrates a vital yet often unseen aspect of their maintenance work while emphasizing its technical difficulty, with two *monteurs* working through a tangled bundle of wires. Considered in a broader context, the photograph presented underground cable maintenance as specialized technical labor essential to the operation of modern communications infrastructure. (Source: Bratschi, *Fiers de servir*.)

telephone network ran low. Breakdowns increased because the infrastructure was aging and corrosion damage multiplied.

Consequently, for the first time in two decades, the workforce in PTT's construction services, repair shops, and warehouses grew significantly, from 1,509 employees in 1940 to 1,838 in 1945.⁶¹ As essential services, including telephony, were crucial to the Swiss Confederation, OTTs recognized and actively promoted their central function for both the company and the nation. This importance rested on their skills as maintainers—technically trained people who, in difficult times, sustained the existing infrastructure.

In peacetime, *Union PTT* sometimes published articles from generalist newspapers, such as a commentary from *Gazette de Lausanne* arguing that the modernization and especially the maintenance of telephone lines had positive impacts on tourism in the Alps.⁶² Yet in wartime, telephone infrastructure was considered even more relevant. In 1941, for the 650th anniversary of the Swiss Confederation, *Union fédérative du personnel de la Confédération* published a richly illustrated commemorative book, *Fiers de servir* (Proud to serve). It was advertised in *Union PTT* and praised confederation workers's activities in times of hardship. Alongside letter carriers, railroad workers, and drivers, telephone linemen could not be forgotten: "There are few agents of the Confederation who, over the last quarter century, have had to adapt to the rapid progress of technology as much as the telephone monteur [lineman]. But each and every one of them has done so with courage, aware and proud of working for the good of the country" (see figure 4).⁶³ The book describes different kinds of technicians, and many—unsurprisingly—are specialists in repair, supervision, and maintenance. This is especially true for those working on lines (monteurs).⁶⁴

PTT workers deserved recognition as they were also involved in defense against military attacks. Despite Switzerland's neutrality, its cities were bombed several times, always by mistake. In 1941, telephone technicians were involved in the Défense Aérienne Passive (Passive Air Defense; DAP), essential for alerting citizens in the event of bombing. The PTT workers's job was to fix faults in the warning siren system. Proudly, the union stated, "It is normal for our T.T. staff to be called upon to assist in the rapid resolution of any faults that may occur in these installations that use our circuits."⁶⁵

61. Administration des postes, télégraphes et téléphones suisses, *Annuaire 1945*, 74. We cannot determine whether this growth was due to the increased maintenance needs of the company. We can report that while the number of subordinate officers grew moderately, from 1,199 to 1,250, the number of permanent workers increased from 263 to 552. These were new hires who aspired to be hired later as officials.

62. *Union PTT*, July 12, 1935, 2.

63. Bratschi, ed., *Fiers de servir*, 122.

64. Bratschi, *Fiers de servir*, 122.

65. *Union PTT*, April 4, 1941, 2.

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Maintenance work was now represented in a new way: as a source of pride. Through articles and letters in *Union PTT*, linemen explicitly argued—often for the first time—how much their work had changed over time: “In the good old days . . . when the telephone was a magneto phone with a dry battery, the administration hired electrical monteurs to become team leaders. These pioneers of the wire almost always worked without schematics, on a routine basis, noting down their experiences. . . . We can be proud of them. What’s more, they came together to form the organization to which we now belong.” Thus, for the first time in *Union PTT*, workers openly rejected their “construction job,” freely and proudly stating that their main role was no longer that of builders or monteurs, nor did they carry out assembly work: “But we do troubleshooting, periodic checks, overhauls of researchers or automatic exchanges; we are also installation controllers, i.e., we closely monitor the work carried out by private monteurs, and when the time is right, we put complicated installations into service.”⁶⁶

The narrative shift from builders to maintainers, repairers, and supervisors was finally complete. If the role of maintenance workers had once been denied, almost hidden away, and only occasionally acknowledged, now the opposite was true: “It’s important to remember that a troubleshooter, a controller or a mechanic of automatic exchanges has to study constantly in order to keep up with the situation and the latest developments.”⁶⁷ Also, thanks to the crucial importance of maintaining infrastructure in difficult times, workers felt they were better positioned to demand better wages.

In the postwar period, *Union PTT* underwent profound changes: Fewer workers submitted articles and letters, and young workers did not recognize the magazine’s function and potential. The setback is obvious: Articles were mostly about national politics and general union issues, while workers’ stories and opinions were scarce despite the OTT workforce’s sharp rise, from 1,838 in 1945 to 3,098 in 1956.⁶⁸ For the OTTs, now preferably called “telephone craftsmen” and no longer “subordinate officials,” the 1950 merger with higher-ranking officials was problematic. If OTTs had once felt the rivalry with workers in private companies, now they wanted to be considered equal to the officials in the telephone administration; unfortunately, these officials formed their own union in even greater numbers.⁶⁹ Though linemen featured less frequently in the magazines, their voices were often heard challenging the

66. *Union PTT*, May 8, 1942, 2.

67. *Union PTT*, May 8, 1942, 2.

68. Administration des postes, télégraphes et téléphones suisses, *Annuaire* 1956, 24. From 1957, PTT stopped publishing the number of workers divided by function.

69. In 1949, there were 2,657 workers in the construction services, repair shops, and warehouses and 3,937 (mostly women telephone operators) in the administration and operations.

union.⁷⁰ Among the claims against PTT, one already identified resurfaced in the early 1950s: the “name” issue.

A 1942 article under the simple heading “Monteurs?” and signed with the pseudonym “Petit Louis” argued, “We aren’t monteurs anymore.”⁷¹ An enthusiastic letter in the next issue of *Union PTT* responded, “Of course you’re right, Petit Louis. . . . You said we’re no longer monteurs; without being dismissive, the fact is irrefutable and has been for many years. I also think it would be normal to change the name of our job, and to create new functions adapted to the requirements of our service.” The letter continues, “In this way, the monteur will disappear from the classification, to make way for new functions . . . it will be the just reward for delicate, assiduous work; for our trade is no longer the occupation of a mere practicing worker, but we are really taking on technical responsibilities.”⁷² There was no follow-up in the weekly to this second letter, but its author, “Jean Suis,” proved ahead of his time.

Union PTT reported an insistent discussion on changing the job title in 1952, ten years after “Petit Louis” and “Jean Suis.” An article discussing how to improve repairmen’s working conditions and wages argued that “if these responsibilities are to be valued first and foremost, the names must be revised because today the title ‘monteur’ no longer fits.”⁷³ While discussing wages and working conditions a few weeks later, the assembly of telephone linemen again brought up the “renaming” issue.⁷⁴ The name was considered pivotal for gaining recognition for repairmen. Again, the maintainers’s discourse was based on acknowledging the value of maintenance and the workers who provided it. The opposition to innovation-speak was explicit. In a discussion covered by the same 1952 article, someone argued that after automation, the infrastructure would work and look after itself. The article’s response: In Italy, we have the best example of how the most sophisticated installations are useless without quality personnel . . . many large new exchanges are silent, dead, so to speak; why? Because there are few, if any, personnel capable of maintaining and repairing such installations.”⁷⁵ The message is frank, and the job title is still a key issue: “The monteur (which is an inaccurate designation, we should rather say *contrôleur d’exploitation*) is directly responsible for this maintenance.”⁷⁶ Workers were well aware of the importance of names for representing things, giving them value, and changing perceptions. And the

70. *Union PTT*, June 22, 1951, 3. In 1953, the union responded to accusations that appeared “between the lines” in earlier articles in the paper, where they accused young linemen of “daring to raise criticism” of the union (*Union PTT*, October 17, 1952, 4).

71. “Nous ne sommes plus des monteurs,” *Union PTT*, May 8, 1942, 2.

72. *Union PTT*, May 15, 1942, 2.

73. *Union PTT*, October 17, 1952, 4.

74. *Union PTT*, November 7, 1952.

75. *Union PTT*, November 7, 1952.

76. *Union PTT*, November 7, 1952.

proposed name, *controleur d'exploitation* (exploitation controller), was useful for a discourse tailored to workers's new representation. They demanded the same amount of respect as the clerks and the administration, which employed a class of people whom the linemen considered privileged and by whom they felt treated as inferior.⁷⁷ The new name leveled the field: Maintainers wanted to be recognized as exploitation controllers because they, after all, enabled ue and allowed others (clerks and administrative officials) to work. Maintainers, more than anyone else, were valuable, and they now recognized, in Henke's words, that "the power embedded in infrastructures . . . is built on expertise developed through their construction and maintenance."⁷⁸

For over a year, the "name issue" was not discussed in *Union PTT*, until February 1954, when the magazine published information on a new classification of officials and newly introduced jobs. The article explained the "naming of functions" request, noting that the union had submitted written and verbal proposals to PTT, suggesting that "Central Maintainers I and II" become "Exploitation Controllers I and II", "a designation that could also have been applied to 17th and 15th class functions."⁷⁹ The union was therefore proposing the same name change as in 1952.

This wasn't just a name, but a new way to represent a job. It was therefore a substantive demand, a discourse representing a shift in how maintenance and repair workers sought recognition. PTT refused. Its response was definitive and negative: "After several discussions with the administration," wrote *Union PTT*, "we realized that they [the company] absolutely wanted to keep the term 'monteur.'"⁸⁰

In this sense, the consolidation of "maintenance-speak" reveals not only a revaluation of repair work but also a broader struggle over authority, expertise, and recognition, in which workers sought to redefine their place within a technological system that depended on them yet continued to marginalize their role.

Conclusion

This article contributes to the history of technology in several ways. It showcases maintenance and repair workers, who have rarely been the focus of sustained scholarly attention. In addition, it focuses on the texts these workers produced, which are themselves scarce due to the difficulty of locating consistent and coherent sources. The shifting ways in which maintenance workers represented their work—and the discourse through which these

77. *Union PTT*, May 25, 1956, 3.

78. Henke, "Negotiating Repair: The Infrastructural Contexts of Practice and Power," 267.

79. *Union PTT*, February 15, 1954, 2.

80. *Union PTT*, February 15, 1954, 2.

representations were articulated—show that the invisibility of maintenance and its practitioners cannot be attributed solely to the supposed mundane or routine nature of the activity. Through these representations of maintenance, these employees tried to gain value and recognition, alongside improving their roles and working conditions. Maintenance representation thus has a fundamentally political character: It is embedded in specific historical and social contexts and articulated through discourse that responds to, and contests, competing frameworks. The case of PTT workers demonstrates the complexity behind the widely discussed “invisibility of maintenance” and how it is produced or unveiled through ongoing struggles to conceal, preserve, manage, and challenge power relations surrounding technology.

The article traces how PTT maintenance workers gradually moved away from innovation-speak and finally opposed it. Their articles in trade union magazines demanded better working conditions and wages.⁸¹ At first, these employees wanted to be considered construction workers; later, they acknowledged pride in their work through progressive specialization and specialization-speak; finally, they articulated and defended the value of maintenance for both the company and society and, in doing so, demanded a new title. Taken together, these shifts reveal not a linear progression but a contested reconfiguration of technological identity, in which workers actively renegotiated their place within changing technical and institutional orders.

Weber and Krebs question the twentieth century’s “common narrative of a linear decline of repair,” stating that the “long history of repairing things saw multiple ups and downs.”⁸² By presenting an evolution in maintenance representation, this case study shows that the process of recognizing the value of maintenance was not determined solely by changes in jobs and duties. Moreover, technical training played a key role in reshaping both the representation and broader perceptions of maintainers, suggesting that high- and low-skilled maintenance workers should be studied through distinct analytical frameworks. The aging Swiss telephone network as well as the complex social, economic, and political situation in the early 1940s, made maintenance and repair more valuable.

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81. Henke and Sims wrote that “discourses and materiality are inherently tied up in relationships of power” (*Repairing Infrastructures*, ch. 1), and Foucault talked about a “semio-technique with which one tried to arm the power” (*Discipline and Punish: The Birth of the Prison*, 94).

82. Weber and Krebs, “The Persistence of Technology: From Maintenance and Repair to Reuse and Disposal,” 21.

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