New Configurations of Work Relations and Their Impacts on Work, Employment, and Collective Action

The Context of the Implementation of Speech Recognition Software

Summary

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Overview of the project and our research strategy

It is increasingly noticeable that contemporary work is no longer taking part inside the traditional employment relationship between an employer and employees, but within new organizational configurations like subcontracting, interim appointments (obtained through an employment agency) and self-employment. These organizational configurations place workers (employees or self-employed) in contact with various entities that influence their working and employment conditions without necessarily endorsing the legal status of an employer, and effectively upsets the employment relationship by making it more complex to control workers.

To understand contemporary work and employment relations, it seems necessary to shift the analysis from the firm level to that of the value chain, conceived as a "social system", in order to take into account the nature of relationships between firms, and also between the firms and the different types of workforce they put into contact. The general objective of this research project is to understand, from a historical and comparative perspective, how these new configurations operate, and their impacts on work, employment and the capacity of the various actors to take collective action.

The research strategy that was chosen is that of the multiple-case study (Yin, 1989; Eisenhardt, 1989). Four sectors distinguished by the nature and strategy of the pivot firm and by the degree of qualification of the workers concerned, are targeted for analysis, namely: ICT business services, childcare services, transportation and food processing.

For each of these sectors, a synchronic (current configurations) and diachronic (their development over the last ten years) case study of a pivotal company, its subcontractors, agency workers and independent workers was carried out. Due to the current context of globalization, subcontracting chains are spreading to multiple countries; the case studies on transportation equipment and food processing will thus focus on a multinational firm simultaneously present in Canada, France and Mexico (comparative case-study on these 3 countries).

Introduction

This case study is about the implementation of a voice recognition software—"Engin"—in a public organization active in the health and social services sector ("Client").

Engin was developed by a Quebec high-tech firm ("Developer"). Client has entrusted the implementation and support of Engin to a company ("Integrator") specialized in the sale, service and installation of professional recording solutions (dictation and transcription systems, digital communication recorders, etc.).

Client acquired Engin licenses (one for each user) from Integrator. The implementation of Engin requires the installation of the software on specific workstations and a training involving a co-construction between each of the users (physicians) and the software.

1 Configurations of inter-organizational relationships

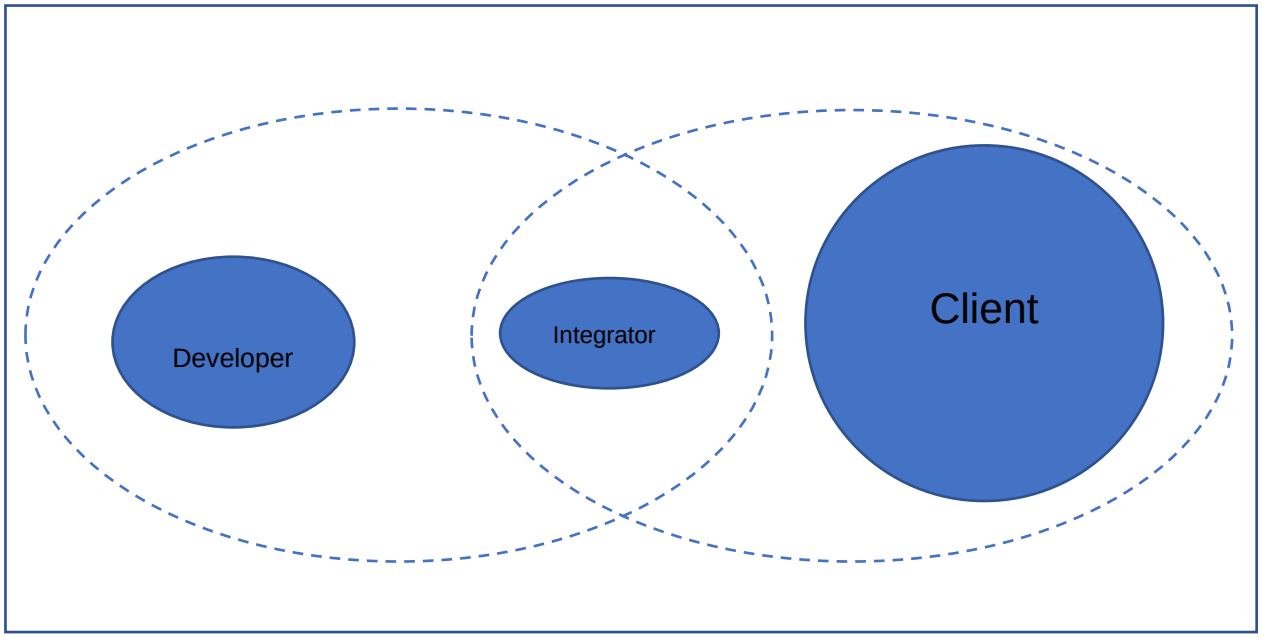
The Solution project: a dual externalization

The project emerged from two types of externalization. One is the externalization between Client and Integrator, with Client having chosen to entrust the implementation of Engin to Integrator.

It should be noted that the Ministry of Health and Social Services tends to opt for the subcontracting of information technology projects as a matter of course (IRIS, 2013. https://cdn.iris-recherche.qc.ca/uploads/publication/file/Sous-traitance-WEB-03.pdf).

The second externalization is the one that brings together Integrator and Developer, the latter having entrusted resellers, such as Integrator, with the task of supporting clients in the implementation of its software. In fact, Developer and Integrator have been partners since 2011, a partnership that has allowed Developer to expand its market beyond the administrative region in which its headquarters are located.

Diagram 1. Engin – dual externalization



Presentation of the Related Organizations

a) Client

Client was founded in 2015 following the implementation of the *Act to modify the organization and governance of the health and social services network, in particular by abolishing the regional agencies*. Thus, Client is the result of the integration of approximately 100 facilities, including seven hospitals, fourteen long-term care residential centres and several other institutions (local community service centres, rehabilitation centres, youth centres, etc.). Client is one of 22 integrated health and social services centres—Centres intégrés de santé et de services sociaux, CISSS—that were created in 2015 and that is deployed across a vast territory covering both urban and rural areas.

Client has approximately 10,000 salaried employees (equivalent to 9,500 full-time positions). In addition to the salaried staff, there are more than 650 physicians with practice privileges in Client facilities.

As is the case for all CISSS, Client branch is responsible for the capture and distribution of medical reports, their backup and all health records facilities throughout its territory.

b) Developer

Developer is a high-tech firm founded more than 25 years ago. It is composed of nine (9) persons specialized in the development of information software in the health sector.

Developer presents two complete software suites to produce medical reports compatible with Client's information and distribution systems: a radiological information system (RIS) and a picture archiving and communication system (PACS).

Developer softwares are also compatible with the interpretation and visualization stations for radiology tests. Together, these software suites constitute the Diagnostic Computer Imaging System (DCIS), which produces, records, transfers and communicates radiographic images and films. The DCIS also allows to generate reports (interpretation of examinations done by the radiologist) based on digital dictation or voice recognition.

Engin allows to produce medical reports, consult patient files and add information to them, from dictation to final report. As a tool for generating and managing reports and files for health professionals, it offers three main functions: voice recording and the production and distribution of written reports. Reporting through Engin is simplified. Most importantly, production is standardized due to the templates, standardized texts and specialized dictionaries contained in Engin. The distribution function allows reports to be sent to referring physicians within short delays.

c) Integrator

Integrator was founded in 1977. At the time of the study, Integrator consisted of a team of seven (7) analyzer technicians.

Integrator specializes in the sale, service and installation of dictation, transcription, multi-track digital communication recorders as well as recording and transcription systems for the health and judicial sectors. Integrator resells speech recognition solutions, including Engin, in the form of licenses.

The characteristics of Engin

The selection of the Engin software by Client was based primarily on its ability to recognize French language. While the English-speaking market for speech recognition software is flourishing, it is very underdeveloped for the French language.

Since the use of Engin is very personalized, licenses are sold individually and cannot be returned once used. Engin is a software that can distinguish the voice, speed, diction and other features of each user—but only one user for each license. It does so by means of “dictionaries” that are specific to each user and that allow customizing voice recognition and dictation. Users adapt their dictionaries by standardizing the way they dictate and by following the system’s procedures and using its templates; but it is the dictionaries that allow the system to learn and evolve.

Due to the customization that characterizes Engin, Integrator recommends that its Clients purchase one license at a time.

The contract concluded between Client and Integrator

The contract between Client and Integrator was concluded based on a call for tenders whose outlines were, for one, poorly defined and, secondly, without the then managers really knowing the technology and conditions for implementing voice recognition. One manager insisted on a modification of the terms of the contract so as to include the foreground functionality, whereas the initial terms included only the background functionality. The background functionality means that the software generates the transcription of the physician’s dictation and that a medical secretary validates the transcription by listening to the entire dictation. The foreground

functionality eliminates the need for a secretary since the software displays on the screen the words spoken by the physician, allowing him or her to correct his or her report as the dictation progresses. Limiting the software's function to the background would not have saved time or reduced reporting delays.

The contract between Client and Integrator covers the selling price of the software, support (configurations and interfaces, in particular) and updates.

The terms of the contract were well received by the representatives of Client's IT department, who affirm not having the resources (in terms of staff and expertise) required to develop or support voice recognition given the above-mentioned preference on the part of Quebec's Ministry of Health and Social Services to subcontract such services.

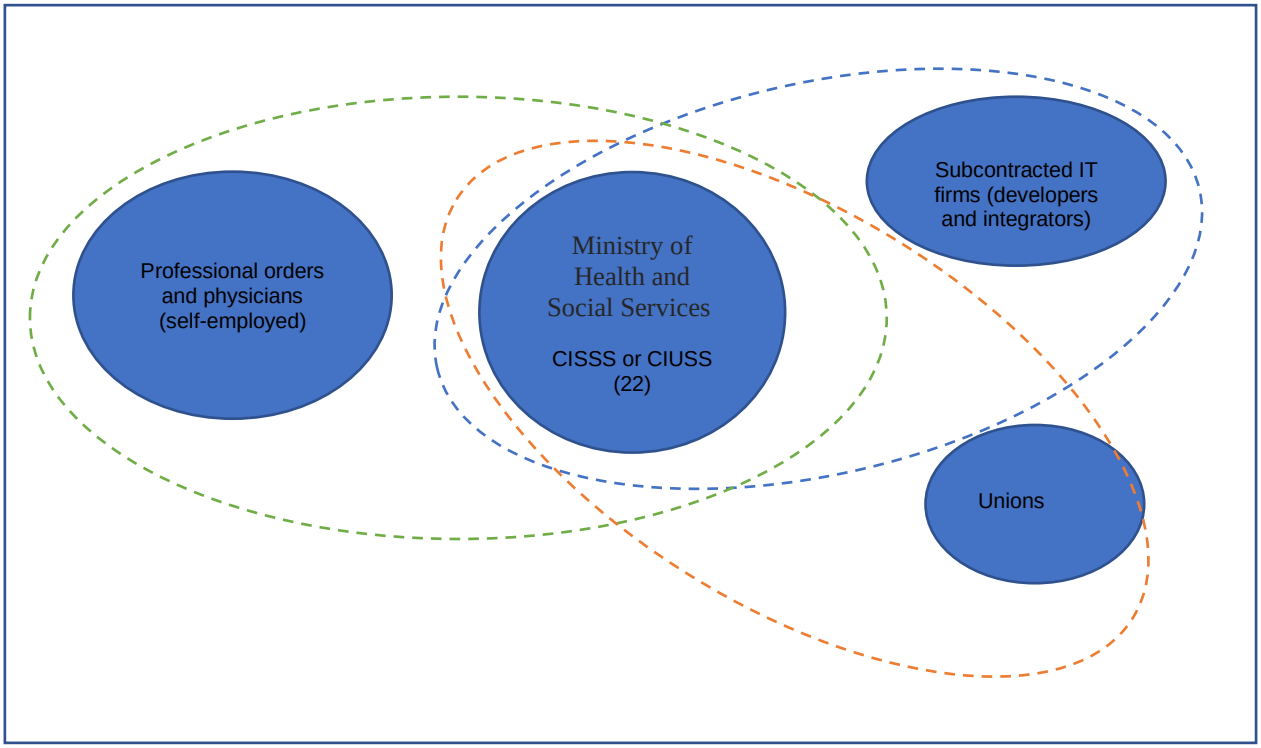
Support and updates are performed remotely from the users' workstations. Integrator team does not have to travel to perform updates. The support, for its part, is also carried out from a distance (email, telephone in particular) with the various people involved in the project.

The contract between Client and Integrator is the only agreement that exists. Client has no contractual relationship with Developer. Integrator insists that Client representatives deal only with them. Nevertheless, we have learned that the people assigned to the project by Client communicate daily with Developer for any question that directly affects the software code.

The ecosystem of the Engin project

The Engin project not only emerges from a dual externalization; it is also situated at the intersection of two distinct and complementary configurations: that of the health and social services network (ministry, CISSS) and that of the medical profession (professional orders and physicians), in an environment composed of union organizations and various suppliers, including IT service subcontractors (whether developers or integrators).

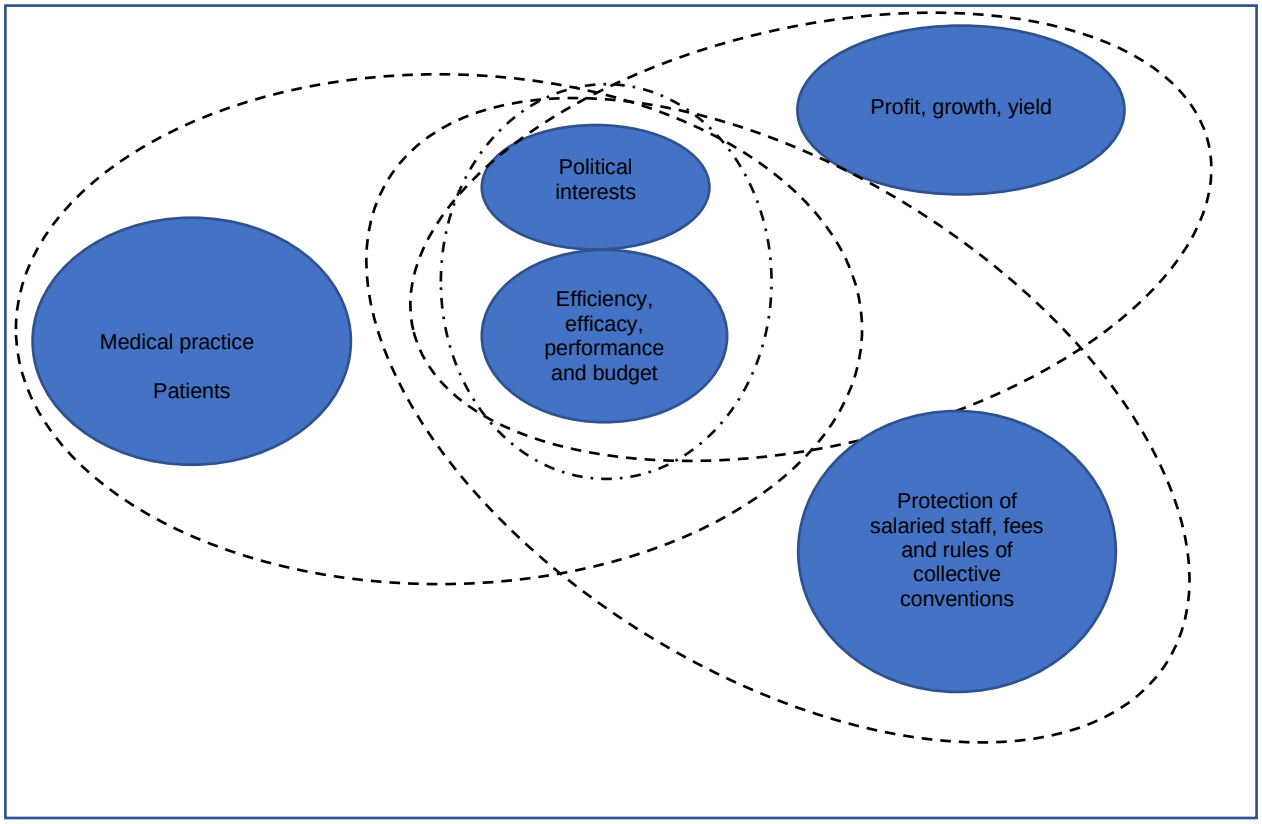
Diagram 2. Engin – a complex environment



Note: The dotted lines refer to the various relationships between the actors. Relationships are subject to laws and regulations both legislative (Civil Code, Bill 10, Charter of the French Language, labour laws, codes of ethics) and professional (project management practices; codified or uncodified administrative procedures, such as report templates developed by medical secretaries). Blue: contractual relations; Orange: labour relations; Green: service relationships.

According to one informant, the project environment can also be described in terms of the powers involved: political power, administrative power, professional power and union power. According to this informant, the system is fine if all four powers remain in balance. Seen from this angle, the above diagram can therefore be read in terms of interests that complement and oppose one another. We add to the four stated powers the power of suppliers and subcontractors to whom we assign interests of profit, growth and performance.

Diagram 3. An environment of interest



The pattern of interests and expected effects of any ministerial directive and mergers are certainly impressive. Nevertheless, it is important to take into account the imbalances between the powers involved and the relationships (antagonistic or collaborative) that have developed between them, since it is in particular in the consideration of the actors involved and their interactions that the complexity of social labour relations is revealed, as we will see in the section on working conditions.

The particularities of the implementation of Engin

Support as a method of implementation

Engin's implementation takes the form of personalized support (or training) for physicians (radiologists, in the case study) and the production of processes and templates (or report templates).

The physicians participate in the training on a voluntary basis and for various reasons. While it is strongly hoped that many physicians will become users of Engin, it is understood that this may not materialize since many of them have a diction that is difficult to decipher for a computer.

The support includes an initial training followed by three phases (evaluation, background and foreground) during which the physicians learns about Engin, the processes and templates while Engin adapts to the physician's diction.

The initial training and the phases constitute the implementation mode prescribed by Developer, whereas the support of physicians constitutes a procedure set up by Client following one failed attempt to implement the system with psychiatric physicians as well as two failed attempts to implement Engin in two other CISSS.

The failure of the implementation in a psychiatric system was, according to many, predictable (unstandardized practice, elaborate reports) and testified to the lack of knowledge of business processes as well as a sloppy call for tenders.

As for the experiences of other CISSS, in the first case, the physicians (radiologists, in this case) were unable to successfully complete the evaluation phase, probably due to an interface problem between Engin and the image management software.

In the second case, physicians were forced to move to the foreground phase, in the absence of standardized procedures and despite the fact that neither the physicians nor the software had achieved the required level of learning.

The implementation with support has therefore become an essential condition for successful implementation and for maintaining the quality of medical reports.

The support

Support is provided by three medical secretaries assigned to the project. They are the ones who help physicians (radiologists) go through the different stages of implementation once the initial training has been successfully completed.

a) The phases

The first phase is the evaluation phase. This phase consists of generating reports from dictations from the physician. These same dictations are also transcribed by the medical secretary. The two reports are then compared to identify any errors in the report generated by Engin.

The second phase—background—involves the software generating the transcription and a medical secretary reviewing it.

The evaluation and background phases require medical secretaries to distinguish errors that are attributable to physician dictation from those attributable to the software. The medical secretary informs the physician of the mistakes and proposes solutions in the way he or she dictates in order to avoid their recurrence. For errors that are attributable to the software, the secretaries communicate with the project team leaders and, depending on the circumstance, directly with Integrator or Developer analysts.

For Integrator, the work carried out by the secretaries is not only essential for the training of physicians but is also an important source of information for improving the software.

The third and final phase—foreground—no longer requires the intervention of a medical secretary, since the physician has perfected her or his dictation skills while

Engin has completed its learning of the physician's vocabulary and diction. In other words, physicians have learned to dictate and view the texts of their reports on the screen. They can then correct errors as they occur.

b) The production of templates

Engin offers two types of templates: working templates (consultation, operating protocol, etc.) and report templates (standardization of the form and content of the texts contained in the reports).

The templates were developed by an experienced medical secretary assigned to the project and integrated into the software by Developer.

For Developer and Integrator, the production of templates is also an essential condition for the successful implementation of Engin.

Moreover, in this case study, the production of work templates represents an opportunity to standardize medical reporting practices at Client level, which includes seven hospitals since the creation of the CISSS by the Ministry of Health and Social Services.

2. The employment conditions

In order to take into account the particular nature of Engin (a customized learning software) and to ensure its successful operation, the implementation is carried out by a project team made up primarily of two main groups with different statuses: employees (secretaries, professionals, managers), who make up the support group; and self-employed workers (physicians), who make up the physicians' group. A third group is comprised of the technicians and professionals of Integrator and Developer.

The Support group

The Support group is composed of a regional pilot, three medical secretaries and an IT project manager.

The regional pilot was hired specifically for the project and devotes all her time to it.

The medical secretaries joined the group on a voluntary basis. They are permanent, full-time, unionized employees. They were selected based on their personal skills: quality of work, previous experience with speech recognition and ability to interact with physicians. The duration and intensity (full-time vs. part-time) of the assignment of medical secretaries varies according to the number of physicians in the Physician group. At the time of the study, three radiologists were in the Physicians group.

The project manager comes from the IT department and manages the contract concluded with Integrator.

The work of the Support group is monitored on a daily basis through a daily meeting with the manager responsible for the group. The work is also supported by a

committee that meets monthly and that is composed of a functional manager, an IT professional, a transcript supervisor and the head of the radiology department.

Officially, the Support group is also supported by professionals from Integrator and Developer, but none of them is strictly speaking assigned to Client contract, nor present in the follow-up meetings.. That said, we were informed that the regional pilot and medical secretaries do maintain contact with the staff of these firms on a regular if not daily basis. Client manager, the regional pilot and the responsible IT professional also deal with Integrator representatives on aspects related to the contract, software patches and upgrades, and technical aspects (servers, interfaces). We did not conduct interviews with Integrator and Developer staff, but it appears that neither firm contracts freelancers or self-employed workers.

The remuneration of members of the Support group is governed by national collective agreements, supplemented by locally negotiated provisions.

The assignment of medical secretaries to the project does not affect the general conditions of their employment (salary, benefits, fringe benefits). However, since their transcription work is normally done from home (telework), their participation in the project has meant that they have had to give up working at home and the concomitant benefits of being able to manage their own work schedule, save on time and travel costs, and having more time for the family and working overtime.

It may seem paradoxical that secretaries would agree to take part in a project that could ultimately eliminate their job. However, the collective agreement provides job security for employees (retraining following technological changes and reassignment following the elimination of positions). Moreover, since Client is significantly behind in the transcription or medical reports, to the extent of forcing it to subcontract, there is no reason to fear the disappearance of the position “medical secretary.” Moreover, some medical practices do not lend themselves easily to speech recognition and technology still has limitations, including the difficulty of decoding the various accents of the human voice.

Interestingly, neither the human resources department nor the union was aware of the existence of the Engin project and the assignment of workers to it.

The Physicians’ group

The selection of the first radiologists was guided by the quality of the radiologists’ diction and their willingness to participate in the project.

However, considering that physicians are remunerated per medical procedure, their participation means that they choose to deprive themselves of a portion, sometimes substantial, of their income.

The success of Engin’s implementation is therefore based on the voluntary nature of the initial candidates and their ability to influence other physicians to follow in their footsteps.

Considering the importance of implementing Engin for Client, the members of the support team had to find ways to incentivize the physicians to become Engin users.

3. The working conditions

Technical difficulties

The support group must deal with the shortcomings of Engin—a software considered immature. In the manager's opinion, this software was released prematurely.

Let us recall that Engin is an intelligent software, designed to learn and improve. However, it appears that it is not stable and that it can understand the same thing differently from one day to the next. For Developer, the problem may lie in aspects such as the physician's speech, his or her degree of fatigue or the various environments in which the reports are dictated. In short, it is not necessarily the software itself that can be called into question.

In addition to the above, Developer, always from a distance, responds to requests for patches or improvements but never commits to production deadlines.

As a result, the support group is unable to bring physicians to the foreground phase quickly. Implementation difficulties result in work not progressing as quickly as expected despite the efforts of group members.

Relationship issues and performance maintenance

Support requires a sustained relationship between physicians and medical secretaries, namely, one in which secretaries encourage physicians to improve their dictation. The secretaries carry out this task with tact because the physicians are volunteers and also, perhaps even more importantly, "because they are physicians." In other words, the status of physician, combined with the importance which the project holds to Client, gives participating physicians the leverage to be inordinately accommodated.

Moreover, the case reveals a paradox: that of carrying out a project in an organization having a hierarchical structure. Despite their assignment to the project, the medical secretaries continue with digital transcription to help reduce the backlog that Client is experiencing. They are also subject to ongoing supervision by their supervisor and productivity standards (60 minutes of recording per day), even if their daily work hours are reduced by the number of hours they spend on the Engin project.

In short, medical secretaries are affected by the coexistence of the various employment statuses within the project (self-employed workers such as physicians and subcontractors) as well as supervision induced by the hierarchical organization. Their participation in the project is therefore a source of stress and frustration. Finally, they will eventually have to renounce their quality standards (reports that are free of spelling, grammatical or syntactical errors or that are perfectly formatted), since it will be up to the physicians they have trained in speech recognition to support these dimensions.

A virtual work environment

The representatives of Integrator and Developer work remotely from their respective headquarters.

The regional pilot provides most of the communication between the team members and the two suppliers on a daily basis: “Normally, we always go through her because she has gained experience and because she’s been trained to solve certain problems.” One of the medical secretaries is also in charge of improving the dictionaries, and must communicate with Developer, since the improvement involves entering the source code.

The relationship with subcontractors is generally virtual. Integrator or Developer contributors have access to the remote workstations of the project manager and the medical secretary responsible for improving the dictionaries.

While virtual exchanges have the benefit of saving time for those who take part in them, it appears that they can also be a problem for members of the Support group, who are often waiting for answers that are slow to come.

In addition, Engin has several version anomalies (bugs), requiring the project manager to test each of the new versions.

It seems that the small size of Integrator and Developer is a determining factor in the progress of the project and, consequently, the working context of the team members. “They may lack resources because XXX routinely calls [Developer], she is always referred to two people. When one person is on vacation, the other is overloaded. There are not just two of them, we know that. We know there are other people in the back. On the other hand, they have other clients so we're starting to feel that they may have a little less time for us.”.

Fortunately for the Support group, the efforts of its members have always been well received by senior management, who in turn has put pressure on Integrator’s management to ensure that the problems identified are resolved.

Conclusion

This case study presents a project in which work is carried out within complex organizational configurations involving the use of subcontracting and self-employment. The project brings together workers with different statuses (employees and self-employed).

The study shows that employment conditions continue to depend on an individual’s legal employer as well as on collective agreement negotiated by unions, in the case of Client. On the other hand, the study reveals that the working conditions of workers—those of medical secretaries in particular—are influenced by organizations and individuals who are not their legal employers.

The working conditions of the members of the project team—whether salaried or self-employed—can be considered as part of a complex system composed of organizations, subsystems of these organizations and regulatory mechanisms. A complex system that both structures and feeds into the overall project process. Consequently, we suggest that understanding social labour relations requires transcending the legal boundaries of companies in order to understand the relationships between entities, social labour relations and their mutual influences.