The work to make telemedicine work:
A social and articulative view

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Abstract

This article contends that the take up of telemedicine results inevitably in the reconfiguration of the existing work practices and socio-material relationships. This new way of working triggers a variety of shifts in coordination mechanisms, work processes and power relationships in the health care sector. The paper, which is based on the findings of a research project conducted in Northern Italy, addresses three critical issues of telemedicine: the conflict between the scripts embodied in telemedicine technologies and the daily work practices of health care professionals; the tendency of telemedicine to produce a delegation of medical tasks to non-medical personnel (and to artifacts); and the tendency of telemedicine to modify the existing geography within the health care environment. The paper contends that telemedicine presupposes and entails some significant changes in work processes which affect both the material conditions of the expertise which is supposed to be distributed, and the relationships between health care professionals and their practices.

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Introduction

The great majority of existing research and practitioners’ literature on telemedicine adopts a clinical, technical, and economic approach. Social and organizational issues, albeit often mentioned, have been scarcely addressed (Chiasson & Davidson, 2004). In this article I shall argue that in order to understand some critical aspects of this new way of practicing medicine, we need to attend closely to the relationship between technology, work context and the structuration of organizational activities from a social and organizational perspective.

Using this perspective, and building on the result of a three years research, I will particularly contend that the take up of telemedicine results inevitably in the reconfiguration of the existing work practices, triggering a variety of shifts in coordination mechanisms and socio-material relationships.

The article is organized in the following way. I will start by introducing some of the fundamental tenets and potential benefits of a social and articulative view of telemedicine. I will then introduce the setting of a research conducted at four telemedicine sites in Northern Italy upon which the present discussion is based (Gherardi & Strati, 2004). The main characteristic of these sites was that operations had been in place for at least two years, that is, projects had progressed beyond (and successfully passed) the experimental and piloting stage. It takes in fact time organizational practices to start shifting and for social issues to emerge.

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I shall then proceed to discuss three of these issues, namely the consequences of the conflict between the scripts embodied in telemedicine technologies and the daily work practices of health care professionals; the tendency of telemedicine to produce a delegation of medical tasks to non-medical personnel (and to artifacts); and the tendency of telemedicine to modify the existing geography within the health care environment. I will conclude the article by observing that the research dispels the widespread idea that telemedicine simply constitutes a way of distributing at a distance existing services. On the contrary, the data support the idea that telemedicine presupposes and entails some significant changes in work processes which affect both the material condition of the expertise which is supposed to be distributed, and the relationships between health care professionals and their practices.

A social and articulative view of telemedicine

Technological innovations in general, telemedicine being no exception, have always triggered contrasting reactions both in the general public and among members of the scientific community. When a significant technological breakthrough appears in the public sphere, opinions tend to polarize between optimists, who emphasize the potentialities of the new technology, and pessimists, who tend on the contrary to stress the difficulties and the potential barriers to the adoption of the new instrumentality.

We are so accustomed to framing our conversation along this continuum that we seldom pause to observe that these two positions, in spite of their apparent diversity, share in fact some very basic assumptions. For example, they both assume that technology constitutes a fundamental, if not the most fundamental, cause of social and organizational change. They also share the implicit idea that technologies are a given, a sort of “black box” that moves on a linear trajectory from invention to diffusion and adoption. For both these positions, then, we can study the impact and effects of technology on work, organization, and society in a way that is not too different from how we would go about studying the impact of a meteorite on the planet’s surface.

In the last two decades these notions have been strongly questioned by a variety of scholars, who have argued that such a view ignores the reciprocal influence between technology and its social and historical context of emergence (see Jasanoff, Markle, Peterson, & Pinch, 1995; Sismondo, 2003 for a review).

According to this view, it is always possible to demonstrate that specific historical and social processes are implicated in both the design and use of any technology. Technology, actors, and society need hence to be thought together as part of heterogeneous network or ecology, instead of separate worlds (Bijker & Hughes, 1987; Gibson, 1979; Law, 1986, 1992; Bijker & Law, 1992; Star, 1995). This shift towards a social and historical way of studying the relationship between technology and society (and, by extension, technology and organization) has three important consequences.

First, this social perspective contends that technologies are never “neutral”. Technologies, in fact, carry with (and within) them the traces of their history. Accordingly, all technologies embody the intentions, desires, and views of those who created them; by the same token, they reflect a particular way of understanding the world and formulating and solving problems.

Second, technologies should not be thought of as a given; what we call technologies are in fact a (more or less) stable assemblage of a variety of material and human elements. The stability of technologies, and especially of complex technologies like telemedicine, is in effect the result of some kind of effort or work. All technologies are hence, at least partially, subject to (practical) interpretation.

Third, technologies only assume a defined practical meaning when they are put to use in a specific social and material, i.e., situated, context. We cannot think of a “technology” without making some reference to some users and a historical and material context of use populated by other technologies, actions, discourses, and interests. Technology is, by definition, always technology-in-use and should be studied as such (Timmermans & Berg, 2003).

The adoption of such a social, constructive, and processual view of technology (and telemedicine) generates in turn some new and very promising research questions. Studying technology as technology-in-use means in fact shifting the attention from the supposed effects of technology to the relationships and actions that attach meaning to the new technology and that stabilize its use within the extant work and organizational practices. This requires, in turn, that we adopt an articulative stance (Gubrium, 1988) which focuses on “how
members of situations assemble a reasonable understanding of the things and events that concern them and, thereby, realize them as objects of everyday life” (p. 27). The overall result is a perspective on technology which augments our appreciation of the phenomenon by giving prominence to some aspects that other approaches leave largely unexplored. Three of them are worth mentioning here.

First, a social and articulative perspective on technology brings to the fore the (often hidden) work necessary to make the innovation usable. To focus on technology-in-use means, in fact, to observe both the work carried out by users to make the technology work, as well as the (often hidden) work performed by the technology in order to respond to the users’ needs and to align with other existing elements (Berg, 1997; Heath & Luft, 2000).

Second, this approach studies technology as an object emerging within a densely interconnected assemblage of actors, actions, and relationships. This directs our attention to whether such “ecology”, which comprises users, other technologies, rules and regulations, institutions, and a variety of other heterogeneous elements, constitutes a context of use or whether the necessary mutual negotiations and alignment between elements fail, and the context becomes in fact a context of non-use or rejection (Hanseth, Aanestad, & Berg, 2004; Law, 2002).

Finally and yet importantly, observing technology in this way means focusing on how the local condition of use participates with, and contributes to, larger institutional processes. Even when studied locally, telemedicine appears in fact to be anchored to a variety of other practices and broader organizational, legal, and economic conditions. By observing telemedicine from this perspective, we can investigate to what extent this (new) way of doing medicine is aligned with the existing professional and institutional arrangements, and to what extent it deviates from them generating new possibilities of change (Aas, 2001; May & Ellis, 2001; May et al., 2001; Mort, May, & Williams, 2003; Webster, 2002).

In the rest of the paper I shall apply this perspective to the study of some major telemedicine initiatives conducted in northern Italy. As it will emerge, the perspective adopted here is substantially different from the medical and technology-oriented way in which the topic is usually addressed in the extant literature (see Roine, Ohinmaa, & Hailey, 2001; Taylor, 1998a, b for an extensive review). The adoption of a social and articulative perspective on telemedicine brings to the fore a number of critical phenomena, some of which are likely to influence the future take up of telemedicine. Three aspects will be addressed in detail: (1) the consequences of the conflict between the scripts embodied in telemedicine technologies and the daily work practices of health care professionals; (2) the tendency of telemedicine to produce a delegation of medical tasks to non medical personnel (and to artifacts); and (3) the tendency of telemedicine to modify the existing geography within the health care environment in the direction of strengthening existing centers of power, both professional and economical.

Research setting and methods

The data discussed derive from a three years research project conducted in Northern Italy. The overall aim of the research was to deepen understanding of the nature of the organizational innovation introduced under the generic label of “telemedicine”, the characteristics of the technologies employed, and the effects on the existing medical practices.

The study focused in particular on four telemedicine initiatives: the evaluation of a teleradiology project; the observation and analysis of a telecardiology consultation service; and the investigation of two major services of telemonitoring and telecaring (“teletriage”) for serious heart failure patients; the introduction of an electronic patient record (EPR) in a hospital ward.

These sites were chosen for a number of theoretical and practical reasons. First, I wanted to cover the most relevant tele medicalized specialties. My previous research illustrated that telecardiology and teleradiology are among the most common initiatives of telemedicine (Nicolini, Bruni, & Fasol, 2003). The study of the EPR was included because the system was supposed to support the virtual interaction between family doctors and the central hospital.1 Second, all these sites were recognized as national and international centers of excellence. Third, the cases covered different Italian regions (which have different organizational and funding set ups) and included both private and public sector organizations. Last but not least, these telemedicine initiatives had been in place for at least

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1The EPR study was carried out by Attila Bruni. The data discussed here are examined in detail in Gherardi and Strati (2004) and Bruni (2005).
2 years, that is, projects had progressed beyond (and successfully passed) the experimental and piloting stage. This allowed me to observe the emergence of organizational and professional issues that usually do not emerge when a project is in the experimentation or piloting phase. All the case studies were of a qualitative nature. The data on the teleradiology project were mainly collected through seven focus group interviews with about 65 users of the service. The focus groups were taped and subsequently transcribed. The transcriptions were analyzed using the coding process and category building practices of grounded theory (Bryman & Bell, 2003; Strauss & Corbin, 1990). The empirical evidence on the telecardiology initiative was gathered through a number of semi-structured interviews and short periods of participant observation over a period of 24 months. Finally, data about the two telemonitoring services and the EPR projects derived from extended periods of participant observation (three non-consecutive months over a 2 years period and three consecutive months, respectively), supplemented by a number of ethnographic and semi-structured interviews. The four case studies were analyzed combining the theoretical process of analytic induction (Bloor, 1978; Miles & Huberman, 1984) with some of the operational suggestions put forward by Eisenhardt (1989). Accordingly, the case studies were written-up separately and then compared using reiterate cycles of cross-site search for shared features and differences, field data review, and saturation of the categories.

While an extensive summary of the findings of the individual case studies is available in Gherardi and Strati (2004), I focus here on four organizational and social aspects emerging from the research: the counter-intuitive effects produced by the encounter between the scripts embodied in the new technologies and the existing work practices; the redistribution of tasks and responsibilities implicit in many of the prevailing telemedicine discourses and the related risk of marginalizing certain roles; and the tendency of telemedical practices to redesign the relationship between center and periphery in the organization and delivery of health care processes.

**When technological scripts and daily practices do not match**

One of the central ideas of the social and articulative study of technology is that all technical artifacts used in daily activity embody patterns of use and interactional scripts which reflect (to some extent) the views and intentions of their designers. According to Akrich (1992; see also Hanseth & Monteiro, 1997), when designers conceive technical artifacts, they tend to define actors with specific duties, tastes, competencies, motives, aspirations, and preferences. A large part of the designers’ work is that of inscribing a vision of (or prediction about) the world in the technical content of the new objects. During the design process, the designers work out a scenario for how the system will be used. This scenario is inscribed into the system. The inscription includes programs of action for the users, and defines roles to be played by users and the system. In doing this, the designers also make implicit or explicit assumptions about what competencies are required by the users as well as the system. However, the patterns of use inscribed in the artifact by the designers only come to life in the context of the daily activity of the users. When put to work, the concrete anticipations and restrictions of future patterns of use embodied in the technological artifact interact in complex ways with the existing work practices of the users. The result is a process of negotiation between the innovation and the work activity. The outcome of such negotiation determines, on the one hand, how the innovation is used “in practice”; at the same time, it produces some kind of change in the work practice, usually along lines which reflect (to some extent) the desires and intentions of the designers and their sponsor. Most important, the outcome of this encounter process is paramount for the successful take up of the innovation. It is not unusual, in fact, that such negotiations fail, so to speak, and the technology is rejected, ostracized, or, more often, silently ignored.

*Some counterintuitive effects of recording data electronically*

A first interesting instance was provided by some unexpected and counterintuitive effects that the use of EPRs brought to bear in the delivery of the service it was supposed to support. One of the expectations of the introduction of EPRs (and more generally of IT based systems for accessing medical and diagnostic information) is that they will improve the quality of the relationship between health care professionals and patients by affording the former fast and efficient access to a vast amount of data and expertise (Lau et al., 1999; Webster,
This, however, is not always the case and things are more complex and uncertain.

In one instance, several sessions in which doctors were to formulate and communicate a diagnosis based on the data retrieved through the EPR (tests results, previous reports, etc.) were observed. The doctors were usually sitting across the desk from the patients facing the screen, so that the patients could only see the back of it and did not have access to what the doctors were seeing and doing. Most of the doctors made much effort to conduct seamless, patient oriented interviews. However, they had to stop often to type in the EPR fields the information gathered from the patients. These interruptions and the period of silence that followed tended to raise the level of patients’ anxiety. Patients who were left “on hold”, exhibited a variety of anxiety revealing behaviors like biting their fingernails and whistling. In one of the doctor’s words: “[the problem] is the silence…during the silence patients start to think all sort of things…” To some extent, then, the practice of sympathetic interviewing put in place by the doctor, who tried to use a soft tone, an inviting posture, and a conversational approach in order to put the patient at ease, ran against the script embodied in the EPR that required a more standard (and more detached) question and answer interactional order. The two conflicted to the detriment of the interaction quality.

I observed a similar effect in the case of telemonitoring distant patients in one of the telecardiology centers. In this case, I was able to observe how monitoring calls were conducted before and after the introduction of an EPR.

Prior to the introduction of the tool, nurses ran their calls by consulting a variety of documents, which they laid on the desk in front of them. They would then let their phone conversations with the patients take a very informal course, collecting the information they needed as the patient would offer them. By utilizing this conversational discursive genre, they could thus establish warmer and more amicable relationships with patients who they contacted on a regular basis.

Even though the way in which the patient provided the required information depended on the individual conversations, the nurses were always ready to register the necessary information about patients’ health, symptoms, and the therapy, simply by writing on one of the documents in front of them. All that was required was moving a paper or a note book to the side of the desk and pulling another one closer. All this changed, however, with the introduction of the EPR. The EPR, in fact, had been structured in a traditional hierarchical way and screens were organized in a “logical” way according to an established sequential order. Such order reflected the “ideal pattern” of a “well done” call which was, however, very formal and interview-like and hence seldom followed by the nurses. The latter, on the contrary, preferred using a more loosely structured pattern that helped them in establishing more informal and warm interactions. This meant, however, that once they started to use the EPR to keep track of patient’s information while on the phone, nurses had to start “searching” for the appropriate screens in order to input data. This would take some time and required that nurses draw their attention from the patient to attend to such tasks. These very short interruptions of rhythm were however soon picked up by patients, who started to ask whether anything was wrong. They had learned that pauses in the rhythm of the conversation often meant that the nurses had found something wrong and that they were double checking or thinking about it.

In response to these emerging difficulties, some nurses reverted back to paper and pencil, and decided to input data after the call. In other cases, they introduced new practical ways of keeping the patients on hold without worrying them. For example, they started telling them aloud what they were doing or, alternatively, they started using interjections like “excuse me a moment”. Some of them used jokes to fill up time, e.g., by saying to the patients “I am so slow with this computer”, signaling thus the reason for the interruption and apologizing for it in the same sentence.

In both cases, using the EPR implied a shift in the practices and required a certain amount of repair work by the professionals and the patients (who had to learn to wait). In the case of the nurses who opted for reverting to pen and paper, this meant a significant workload increase. It must be added that in the first case one of the doctors stated that he had learned to capitalize on the silences, observing how patients reacted to it, and using the data to conduct later parts of the conversation (e.g., he would ask patients who bit their fingernails information about their hygiene). This latter comment suggests that, from a social perspective, the mismatch of scripts and practices is not necessarily conducive to negative consequences; the encounter between technology and practices may harbor unexpected
positive outcomes as well. What is important to note is that such effects are partially unpredictable and emerge only when the scripts embodied in the artifacts are translated into practice.

Misalignments between technological scripts and practices

Misalignments between technological scripts and daily practices were observed not only at the micro-interactional level but also at the level of the overall organization of the service.

In the case of teleradiology (an emergency service providing radiology services to peripheral hospitals at night and during holidays), I observed the clash between the script embodied in the new technology and the program sanctioned by the existing legal framework. The latter required, in fact, that all medical reports were signed off by a doctor “on duty” in order to obtain legal value. Accordingly, a disclaimer was added to all the medical reports produced by the distance radiologists. The disclaimer stated that the report had, in fact, no legal value. Given that the system was intended as a tool for helping the periphery medical centers to decide whether to send the patients to the regional hospital, this element neutralized a large part of its perceived value, drastically reducing its level of use. At the same time, for similar legal reasons, the report produced by the distant radiologists had to be systematically reviewed the following morning by the in-house radiologist who had to sign it off. The result was, in this case too, the production of a substantial amount of extra work which, according to my informants, significantly reduced the level of use of the system.

A final clear instance of the potentially negative effects of the clash between scripts and practices emerged in my study of one of the telecardiology centers. On the basis of the success of its operations, which were run on a 24/7 basis, the center started to offer to the existing family doctor clientele the possibility of accessing a variety of second opinion consultations (from teledermatology to telepsychology). Because of budget constraints, however, the service was initially designed to operate a-synchronously: doctors had to submit a request via email or phone and the expert in charge would contact them with an answer during specific office hours. Such a “script”, however, conflicted with the family doctor practice, which requires giving patients instant answers in order to deal with their anxiety. Although in theory (i.e., in a marketing survey carried out prior to the launch of the service) doctors were extremely interested in the support the second opinion service could provide them with, in practice the way in which this technology was set up conflicted with other relevant aspects of their practice. The result was the failure of the project, which was soon cancelled for lack of customers. In this case, the amount of work necessary to accommodate the innovation and the daily practices exceeded its perceived benefits; hence its failure.

As the previous examples illustrate, seen from a social and articulative perspective, telemedicine (in all its forms) embodies a script which has been inscribed within it by its designers. The utilization of telemedicine should therefore be thought of as a process of negotiation between script and extant practice. This process has three main characteristics: it is mainly unpredictable in theory, and it only materializes in practice; it is never a foregone result; and it requires a certain amount of remedial work which affects the balance between the costs and the benefits of the innovation. When the work necessary to make telemedicine work (Berg, 1997) exceeds its benefits, the technology fails to find its place in the existing social and material technology. I suggest therefore that this neglected aspect needs to be taken into consideration for it constitutes one of the critical factors towards the success of any technological innovation, and it may be at the root of even the best planned or well intentioned telemedicine project.

Redistributing and delegating tasks

The ecological view of technology (and telemedicine) introduced above supports the notion that what we customarily call “work roles” are not fixed social positions determined by rules and prescriptions, so much as the result of the interaction and negotiation of a variety of dimensions and aspects which all concur to determine how the task at hand will be interpreted in the particular situated workplace. From this perspective, negotiating boundaries and positioning oneself vis-à-vis other professional knowledges and technologies, allocating responsibilities, and redefining mutual accountability all constitute ordinary aspects of being at work.

The introduction of telemedicine should hence be considered an instance of the reshuffling of all these elements, or, seen from a “power” perspective, an opportunity for different parties to re-negotiate
their respective boundaries and to extend their influence. My study has found a recurrent pattern in the way labor is re-distributed following the introduction of telemedicine. Such redistribution assumes quite often the form of the delegation of clinical tasks to non-medical personnel and artifacts. According to my data, this pattern is strictly related to the nature of the technology itself. This has of course some far reaching implications.

The work of delegating

The first and most obvious place where I observed a process of task re-distribution was the study of the “tele triage” service, which was aimed at monitoring at a distance serious chronic heart failure patients. In this case, the redistribution was one of the main aims of the initiative. The very notion of “triage” is, in fact, an emerging form of division of labor which legitimizes some tasks that nurses have carried out for years on an informal basis. The practice of triaging (legally) delegates to nurses tasks and prerogatives that were previously reserved only to medical doctors. Triage, whether at the emergency department or on the phone, constitutes a form of redistribution of work that delegates some clinical tasks to non-clinical personnel. In the case I observed, “telenurses” were expected to handle autonomously the majority of cases and to refer to doctors only in exceptional cases. In fact, they did this extremely well: according to their data, nurses handled autonomously more than 90% of contacts, interacted with doctors in about 5% of cases and only in 2–3% of the cases they handed the case management over to doctors (Scalvini et al., 2005).

The process was not, however, as seamless as the data would suggest. This is because telemedicine introduces a dimension of distance and remoteness not only between health professionals and patients (an expectation which has received a lot of attention), but also between health professionals. The latter is an aspect seldom considered in the literature. In fact, modern specialized medicine, especially in hospitals and clinics, assumes the co-presence, proximity and mutual visibility not only between staff and patients, but also between health care professionals.

Hospital wards, and especially intensive or sub-intensive units such as those dealing with the pathologies discussed here, thrive on forms of distributed cognition such as the one discussed by Hutchins (1995a, b). Knowing is distributed between a complex array of people, artifacts and representations—including the patient, in which “there is a substantial sharing of knowledge between individuals with the task knowledge of more expert performers completely subsuming the knowledge of those who are less experienced (Hutchins, 1995a, p. 49). The knowledge “possessed” by members of the medical team is both highly variable and redundant. Individuals working together on a collaborative task engage in interactions that will allow them to pool the various resources to accomplish their tasks. These interactions are only in part planned and ordered. Programmed and legitimized forms of interaction and coordination such as formal meetings and informal gathering (taking a coffee together) coexist with a further layer of important random encounters (or failed encounters). In the wards people run and bump into each other all the time, interfere with each other, or miss each other when they should meet. The result of this (well known) planned chaos is not only effective team performance, but also high reliability. All medical (and non-medical) personnel have “war stories” to tell about how they were just “passing by” and noted some mistake made by another colleague, and how their intervention saved the day and prevented a catastrophic consequence.

This arrangement, however, also produces another notable effect, that is, it supports a sort of “circulating accountability”. Although in (most) western cultures accountability is strictly individual, in many team-work situations informal and tacit arrangements apply so that the distribution of tasks follow the contours of experience and competence instead of the rigid profiles of bureaucratic accountability. For example, in a ward, because of the intense regime of interaction, it is not unusual for non-medical personnel to carry out medical duties. This, however, presupposes a regime of proximity in which there is always “a doctor” nearby so that accountability trails can, in case of necessity, be brought back to the person in charge. All this changes, however, when distance is introduced in the equation. The distance between health care professionals interferes, in fact, with both these processes and thus requires some remedial strategies to be put in place. Several were observed in my case studies.

For what concerns the distribution of knowing, nurses were “trained” so that some of the knowledge and skills previously available within the team could be handled individually. The effort was thus
directed towards enabling the nurses to reproduce at an individual level as much as possible the redundancy collectively sustained in the ward. The redistribution of work was therefore more than a simple task-decomposition and delegation exercise; the redistribution followed, in fact, a sophisticated hologrammatic logic aimed at mimicking within the microcosm of the individual work the resources used in the collective process of distributed knowing and remembering. In order to facilitate this process, the world of the nurse was populated by a variety of new artifacts (protocols, forms) that carried out some of the knowing and remembering work previously distributed among several people. This, however, meant that the nurses had then to become proficient in handling their work through the mediation of a variety of symbolic artifacts which had been previously (or at least formally) the exclusive concern of medical doctors. The distance created between colleagues led to the “up-skilling” of the telenurses.

A variety of strategies were put in place to try to compensate for the effects of distance on accountability, given that the legal framework was designed to sustain the traditional collocated division of labor. Most of these strategies can be understood as ways of performing in the new conditions the effect according to which “a doctor is always in charge”.

As critical observers of medical work have noted, practical regimes in western medical establishments are set up to support the institutionalized myth that “it is the doctor who decides”, although each decision depends upon prior substantive work and the alignment of long and complex chains of people, information, tests, and machines to produce questions such as “is this medicine the right one for this patient in this very moment?” (see Berg, 1997 for an in depth discussion).

The first way of sustaining such a myth was through the use of a variety of discursive practices which have tended to downplay what nurses did. Even when they were clearly interpreting clinical data (such as electrocardiograms), nurses refrained from using terms such as “diagnosis”, which were reserved to doctors, even when physicians simply endorsed what the nurses had told them, as in the majority of cases.

A second way of supporting this myth required nurses to maintain, both symbolically and materially, accountability trails which would link their acts to some previous, recognizable, and legitimate medical decision. One of the skills of the nurses was therefore figuring out at what point it was necessary to report to the doctor (which often meant working hard to obtain his or her attention) so that the trail would not become too thin. At that point, the nurse would fill the doctor in with just enough details to allow him or her to make a decision which would act as a sort of “recovery” point should something happened (“remember, I talked to you about it that day…”).

Third, the effect of “the doctor is always in charge” was achieved by enlisting a variety of symbolic artifacts such as flow charts and protocols, which, although very seldom used by the nurses, were often mentioned and visibly posted in their room. Protocols and flowcharts allowed nurses to follow a particular course of action without having to making formal decisions. To the extent that they could attribute the decision to the protocol, they established an accountability trail which leads directly to the professional institution that had issued it, i.e., a sort of institutional “super doctor” with whom few would dare argue. In this case, one of the new skills developed by nurses entailed knowing how much they could “push” the protocol. As one of them put it: “if we use the protocol and something happens, it is easier to get away with it...however, this can be done within a limit: one has to show being able to carry out her duties, otherwise you’re in trouble, with or without the protocol”.

Last but not least, a material strategy put in place for safeguarding the institutional arrangement according to which “doctors are always in charge”, was avoiding putting too much (physical) distance between telepersonnel and physicians. Accordingly, the service was initially located within a room in the hospital ward. While the reason for this arrangement was initially attributed to cost and space, this set up was maintained even after a major relocation. At closer inspection, then, the reason for this proximity was mainly organizational: as long as nurses worked in or near the ward, it was easy for them to demonstrably remain under the control of a doctor who, in turn, could then be made accountable for the decision taken (although, as we have seen, this only happened in a minority of cases). The issues introduced by distance were hence case mitigated by reducing it.

Telemedicine and the necessity of knowledgeable intermediation

While a delegation of tasks was to be expected when observing the teletriage project, similar
phenomena to those just described were observed also in all my other case studies, albeit on a smaller scale.

The most relevant to our considerations was a second telemonitoring center. In this case, an explicit decision had been made to establish a telemonitoring service that was not based of an explicit triage model. In fact, in this case, the contact between patients and the center was mediated by an electronic device that collected vital signals (weight, blood pressure, etc.) and lab test results sent by patients. Patients were asked to carry out lab tests and send the results to the center by keying in the data using their telephone handsets following recorded voice instructions. These data were then compared by the program with a predetermined patient profile, and a warning was issued in case of significant deviation implying the risk of destabilization.

Although the nurse was supposed to perform a plain secretarial role (printing out results and delivering them to the doctor), observation revealed that her task was much more complex and implied a variety of highly skilled, interpretive roles. For example, on more than one occasion I observed that the nurse, after being notified by the machine that some of the data were significantly outside the set interval, did not communicate this information to the doctor and did not call the patients to inquire any further, as one would have expected (something she did at other times). When I investigated what was going on, I was explained that the data keyed in by the patient was “incompatible with life”—that is, the data were greatly beyond not only the normal threshold, but also a pathological variation. Moreover, all other data were ok, therefore suggesting that this was simply an inputting mistake. On the other hand, because the general agreement was that nurses would call only if something was wrong, she would limit contacts with patients as much as possible in order not to alarm them. This very concerned attitude, however, presupposed a level of professional skill and substantial medical knowledge that prefigured her work as a form of active intermediation more than a simple transfer of information. The active intermediary role required of the nurse by the technology became even more evident in the case in which the nurse called back patients to inquire about significant variations reported by the software. What should have been (in theory) a straightforward question and answer session, turned out instead to be a subtle exercise through which the nurse would use previous contacts with the patients, relational and conversational skills, and knowledge of the pathology and its main symptoms, to collect the necessary data. In other words, she was operating in a way not very different from what her colleagues were doing at the other center. Only then, therefore, would she translate this information in the format required by the doctor (written numerical indexes), eliminating the contextual information she had to gather in order to provide meaningful data. It was not unusual, however, for this contextual information to be communicated informally to the doctor when the papers were handed to him so that he could “follow up”. In sum, far from performing a passive data transfer task, the nurse acted as a very proactive and knowledgeable operator who worked in order to fill the gaps produced by the remoteness of the patients. By skillfully anticipating the interpretive needs of the doctor, she was in fact actively, albeit silently, mediating between herself and the distant patient, therefore performing a vicarious role. If we compare the findings of this study with those of other qualitative studies of distant medical work (e.g., Mort et al., 2003), it emerges that these elements are a constant aspect of distant medical work. I suggest that the reason for this recurrent finding is that translating lay speech, (like that of a patient), into medical discourse, is a highly skilled task that constitutes an already significant interpretive (if not outright diagnostic) activity. Accordingly, whenever it introduces intermediaries between the distant patients’ medical decision-makers, telemedicine produces a delegation of significant professional aspects of work. It is my contention that this happens because of the nature of the task at hand; therefore, the redistribution of work brought to bear by telemedicine constitutes a form of delegation even when it is not openly conceived as a form of triage.

In summary, the introduction of distant ways of working in medicine engenders the re-distribution of labor in terms of a delegation of professional work. This process requires that telehealthcare practitioners carry out duties usually more complex and more professionally connoted than they would have done before. In this sense, the redistribution amounts to a form of delegation which is, however, still seldom acknowledged either legally or economically (none of the personnel I encountered in my study received any form of compensation for the new level of work they were asked to carry out).
This tendency is somewhat inherent not only in the economical rationale of many telemedicine initiatives, which are predicated on providing the same level of services at lower costs, but also in the very nature of the task and technology.

**Redesigning the relationships between center and periphery**

For many years the adoption of IT technologies in healthcare has been purported as a way of introducing a more even distribution of services, therefore improving the access of remote communities and patients (Brauer, 1992). This optimistic vision, however, is matched by a contrary view which claims that telemedicine might in fact deepen the existing inequalities. Cartwright (2000), for example, argues that telemedicine can be used as an excuse to reduce investments in local services, dividing the world into those who have access to “real doctors” and face-to-face care, and others who will have to be contented with electronically mediated and sensorially anesthetized relationships. As this author puts it: “will physicians exhibit the same degree of ‘care’ for those patients who receive distant treatment?” (p. 257).

Both positions rightly underscore the fact that the introduction of telemedicine is bound to trigger a shift in the geography of health care provision. Cartwright (2000), moreover, aptly emphasizes that this results in the increased centrality and power of some, and the corresponding marginalization of others. I argue, however, that the transformation of the health care geography brought to bear by telemedicine is more complex and contradictory than it is depicted in some polarized debates, and that it involves not only patients but also health care professionals. Overall, my findings indicate that, contrary to the idea that IT systems propel the transformation of post industrial society into a flat networked society (Castells, 1996), telemedicine produces a centralizing tendency which goes exactly in the opposite direction, reinforcing the role and influence of existing centers of power, be it professional or economic.

**Sealing the relationship between the center and the periphery**

One of the frequently mentioned benefits of telemedicine is the possibility for a variety of users in remote areas to access highly specialized knowledge. Users can be either health professionals (as in the case of remote clinics or second opinion services) or patients. As illustrated by previous research, such access is not always unproblematic. For example, Lehoux, Sicotte, Denis, Berg, and Lacroix (2002) and Mort et al. (2003) documented the multifaceted nature of the relationship between distant health care professionals and the so called “tele-expert”. According to my study, the same can be said for the relationship between specialized centers and patients. One phenomenon that seems particularly interesting is the tendency to establish direct and preferential relationships between patients and specialized centers. In time, such relationships seal out other actors, therefore potentially altering the existing geography of relationships within the health care environment. Most notably, this happened in spite of the fact that telemonitoring initiatives had been designed with the intention of actively involving the community care services and the family doctors.

In Italy, since the late 1970s family doctors (general practitioners) have been considered the cornerstone of the national health care system. The logic is that of making family doctors the obligatory entry points to the public system, to promote a patient-centered system and prevent improper use of second level healthcare services. To date, a family doctor prescription is necessary for accessing public hospitals and specialized services (apart from emergency services), as well as for carrying out tests and obtaining free or subsidized medicines through the public systems.

As in many other Western countries, however, the Italian healthcare system is under constant pressure due to a rapidly ageing population and a progressive reduction of resources. At the same time, as in other places, the relationships between community, general, and hospital healthcare professionals are fraught with difficulties; these are rooted not only in a variety of practical constraints, but also in diverging worldviews and logics of action. Such difficulties become even more serious in the case of particular conditions such as chronic heart failure, a disease which requires highly specialized and continually updated skills and knowledge, and in which patients quite often become highly knowledgeable about their own condition.

When in such conditions specialized centers use new telemedical instrumentality to extend in time and space their new and sophisticated strategy of disease management, there is a real risk that the relationship between patients and centers becomes a
“closed environment”, as one of the teledoctors in my study put it. The center and the patient establish a fiduciary relationship that leads to a progressive bypass of other actors. This in turn leads to a reconfiguration of the patterns of communication, decision making, and influence among health professionals, with the (often distant) specialized center taking a central role in managing the patient (with all the ensuing legal, professional and economic implications).

My observations indicate that at least three factors combine to determine this state of affairs. First, chronic patients, whose well being and survival depend on rapid access to medical attention, quickly elect to rely on the center’s support instead of other health agencies. After all, the centers I observed are highly specialized, nationally known and highly reputable, and their service is highly reliable. Moreover, these centers, unlike family doctors, are readily accessible (in this case, access was guaranteed 24/7). They subsequently provide quick and competent responses, two basic ingredients which greatly reassure patients. Once patients start relying on the support of distant centers, they reduce their contacts with their general practitioners. They tend to go to their family doctors only to obtain the prescriptions and the tests “required by the center”, and progressively rely for everything else on the distance relationship established with the center.

Second, unless family doctors have a special interest in deepening the understanding of this specific pathology, they are usually happy to delegate the management of these patients to a trustworthy specialized center. After all, these are often very complicated patients, both clinically and emotionally. These patients (and/or their partners) are also often very competent, and hence very demanding. In my research I heard stories of patients who proved to be more informed about their own conditions than their doctors, thanks to both the formal training and informal learning derived from their extended contact with specialists.

Finally, even though in theory it would fall to the specialized center to involve the family doctor actively, preventing his/her exclusion from the relationship, practice is different. Involving a multiplicity of actors in the process of care requires a significant investment of time and human resources, two commodities most health care establishments rarely have an abundance of. Keeping the family doctor (and other community care services) in the loop would in fact demand overcoming both practical and entrenched cultural and professional difficulties. For example, when family doctors call the hospital at all, they prefer to speak to other doctors. This would run contrary to the intermediation and “triage” logic that justifies telemonitoring in the first place, as discussed above. In our cases, while nurses were always readily available, establishing relationships with hospital cardiologists was much more difficult, a factor that tended to discourage general doctors to persevere.

At the same time, in my research I collected a variety of “war stories” that testify to the reluctance of hospital personnel to contact family doctors whom they sometimes fail to regard as their peers. Consider for example the following extract quoted verbatim from a conversation with a senior nurse:

...I recall one time when a very serious CHF patient went home and was taken in charge by his family doctor. The doctor prescribed him a variety of useless tests, but failed to check the level of anticoagulant...luckily we asked the patient about it just hours before she was supposed to undergo a minor dentist surgery. We found that the level was in fact extremely low...had she gone to the dentist it would have been big trouble.

Besides illustrating (and celebrating) the difference in status of specialists vs. generalist doctors, the fragment also suggests that specialized centers’ personnel consider the active involvement of family doctors a burden or a sort of accessory effort that is easily disregarded when the pressure of daily tasks begins to bite.

The resulting “cutting out of community care”, as the phenomenon was described by another of my informants, constitutes one of the still largely unexplored hidden aspects of telemedicine. This phenomenon is worth considering because it paradoxically occurs only when the service is of a very high quality and generates a high level of trust. Its consequences are, however, difficult to foresee. The redesign of the relationships between center and periphery may in fact have far reaching consequences of an organizational (what is the role of family doctors in a system in which a patient can directly access high level expertise?), financial (who will pay for the service and how?), and legal nature (who is accountable if something goes wrong?) But there are other, more complex issues related to the establishment of “closed environments” with
patients who are prone to extreme dependency, as in the case of a patient who, claiming to trust only the specialist at the center, decided to embark on a 600 mile trip from his house to reach the specialized center, only to die on the way.

A telemedical capitalism?

There is another way in which telemedicine can alter the existing geography of the health care environment. In this case also the phenomenon is linked to some typical characteristics of this way of delivering care.

One of the recurrent findings in the case studies is that ease of access is considered a critical requirement of an effective telemedicine service. This was well illustrated, for example, by the case of the second opinion initiative discussed above, which failed for its inability to fulfil the access expectations. Issues of immediacy of time emerged, however, in all my case studies, as for instance in the teleradiology service. In this case, time emerged as a critical factor, because a slow or delayed response would have defeated the very purpose of the service, which was aimed at preventing improper hospitalization.

The proviso of fast, high level, and reliable responses on a 24/7 basis constitutes however a considerable organizational challenge that requires, among others, some very substantial initial investments (e.g., purchasing the technological infrastructure), a sufficient and constant volume of “traffic” to make viable the operation of an efficient call center, and access to enough health care expertise to respond in the necessary short time to all the queries. Although there are several ways to fulfill these and other requirements, it is clear that under such constraints telemedicine becomes a business for the limited number of players who have access to this level of commitment. These players are likely to be large public institutions or private companies who have already the necessary financial, professional and social capital to venture into an endeavor of such magnitude. It is not difficult to predict that in the future there will be a limited number of telemedicine centers that may, or may not, coincide with the existing leading large health care establishments. Be that as it may, the result is that telemedicine, far from materializing the vision, or the ideology, of the flat network, is likely to strengthen the existing power positions within the health care field on the basis of this unprecedented form of digital divide.

Concluding remarks

In this paper I have used a social and articulative approach for interrogating telemedicine as an ecology of human and non-human elements and exploring how it interacts, modifies, and interferes with the existing work practices, organizing processes, and larger institutional arrangements.

The use of such perspective permitted us to enrich and integrate previous studies on the organizational implications of telemedicine. These observations corroborate Aas’ (2001, 2004) findings according to which telemedicine produces changes in work processes, determines shifts in coordination mechanisms, and gives rise to learning phenomena. This study found out, not unlike previous ones, that such shifts follow a recurrent pattern (Lehoux et al., 2002; Mort et al., 2003; Nifte, 2003). In particular, changes in work processes can often be understood in terms of the encounter between the scripts embodied in the new technologies and the existing work practices. The data discussed here suggest that when the resulting amount of (hidden) remediatory work exceeds the perceived benefits of the technology, the latter is often abandoned or used only for cosmetic purposes. The study also indicates that the redistribution of tasks and responsibilities implicit in many of the prevailing telemedicine discourses often takes the form of a delegation of clinical tasks to non-medical personnel. This results in an increase of the knowledge content of the work required of these non-medical personnel, albeit a seldom recognized (and compensated) one. It also means that a variety of remedial strategies must be put in place to align this new division of labor with the existing legal and organizational framework. Finally, we see from the above discussion that the nature of telemedicine produces a shift and a redesign in the relational geography between actors involved in the health care process. As we have seen, there is a risk that this shift results in the exclusion, or bypass, of community level health care services, and the establishment of direct relationships between center and periphery. At the same time, there is a real possibility that the economical and organizational constraints of telemedicine redefine the institutional geography of the players within the health care sector in the direction of a strong centralization and emphasize on the power differential in the field.

On a more general methodological and conceptual level, the discussion in the preceding sections
demonstrates that the prevailing discourse on telemedicine, which is conceived as a unitary consumable object, suppresses the organizational process and the sheer amount of work needed to carry it out. This, in turn, reduces the possibility of understanding, and intervening to support the take up of this new form of medical instrumentality. Although a detailed discussion of the practical implication of my findings is beyond the scope of the present paper, it can be argued that the issues evidenced here should inform both the design and the evaluation of any telemedicine initiative. For example, the approach adopted here suggests that successful telemedicine systems should be designed in close collaboration with their actual users according to a logic of “bricolage” and “cultivation” of the technology (Dahlbom & Mathiassen, 1993). In this sense, this approach to the study of technology is useful in three ways: the approach offers the possibility of observing telemedicine from a novel perspective which considers it scarcely fruitful to discuss the inherent benefits or risks of telemedicine without focusing on its practical use. It also suggests that we look at benefits and risks in different contexts and circumstances. Finally, the approach taken here has the merit of bringing to the fore, and thus making susceptible to preventive the capacity of telemedicine of interfering and conflicting with the set of existing work practices, with all the consequential dynamics which this implies.

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