Telemedicine: A practice-based approach to technology

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Abstract
Telecardiological consultancy, enabling distant consultation between cardiologist and the general practitioner in the presence of the patient and relying on a technological infrastructure, is a new medical working practice. This article proposes a practice-based approach in order to study it as an object emerging from a local ecology of human and non-human. An analytical framework proposes three interpretative lines: a reading of practice ‘from outside’ (as a patterned set of activities), a reading ‘from inside’ (as knowing-in-practice) and a reading as a social practice (as a ‘doing’ of society). The article analyses the discursive practices involved in a month of telecardiological consultancies in order to understand the effects of this new practice in a Western health care context. One of these meanings is that, as telecardiology comes into use, it is inscribed more in the social practice of reassurance than in the medical one of preventing and dealing with emergencies.

Keywords
discursive practices, knowing in practice, practice-based approach, reassurance, technology in practice

Introduction
The label ‘telemedicine’ covers numerous activities that rely on the use of information technologies to support the delivery of health care from a distance, and that are studied from different theoretical and empirical standpoints. This article proposes a framework for analysing telemedicine as a social-semiotic practice. It therefore considers the uses of ICT as emerging from a field of sociotechnical relations situated within local contexts of use but simultaneously related to the broader institutional environment.
It is not easy to define what telemedicine ‘is’. Many definitions have been put forward, and many ways of understanding and studying are available, according to the theoretical and disciplinary perspective that one wishes to adopt. The majority of authors (Cartwright, 2000; Lehoux et al., 2002; May & Ellis, 2001; Nicolini, 2007; Roine et al., 2001) identify its distinctive features as the use of Information and Communication Technologies (ICT) and clinical care at a distance. Studies that endeavour to furnish a definition of what telemedicine ‘is’ usually concentrate on the type of (more or less experimental) technologies employed and on modes of consultation (synchronous/asynchronous) (Craig, 1999; Rajani & Perry, 1999). On the basis of the various possible ‘combinations’ between technologies and modes of consultation, Mort et al. (2003) also envisage the existence of a ‘strong programme’ and a ‘weak programme’ in studies on telemedicine. The former regards telemedicine as a development in medical science to be scientifically tested and falsified like any new theory; the latter simply considers telemedicine to be a vehicle for the delivery of a service.

An analysis of the specialist literature conducted by examining various years’ issues of the most prestigious specialist journal in the sector – the Journal of Telemedicine and Telecare (Nicolini et al., 2004) – has shown the prevalence of two types of studies on telemedicine: summary studies that either report or systematize the results of various pilot cases, and studies that evaluate the implemented projects. The former, that describe pilot schemes, testify to the still largely experimental state of large part of telemedicine. This consideration is borne out by the almost total absence of studies that dwell on the organizational difficulties involved in implementing telemedicine; difficulties that emerge only when the piloting stage has been completed. The latter testify to the ongoing endeavour to legitimate telemedicine, an endeavour founded on the gathering and systematization of data presented cumulatively. This tendency, as noted by May et al. (2003), restricts the meaning of the term ‘telemedicine’ and corresponds to its ‘medicalization’, a necessary step before the new technological tools can be incorporated into the everyday practices of health care personnel.

The present article has been prompted by dissatisfaction with both the strong programme (which adopts a traditional scientism approach) and the weak one (which adopts a short-term instrumental approach), as well as with the notion of technology as ‘technology in itself’ (exclusive focus on ICT) and of telemedicine as consisting largely of medical expertise at a distance. It is based on the empirical study of a private telecardiology centre and examines, as a specific working practice, the collaborative activities carried on by the centre, the GP and the cardiologist within the workspace established by their connections in action. I call this practice ‘telecardiological consultation’ (to distinguish it from teleconsultation whose end users are medical specialists), and I shall analyse what this type of telemedicine ‘does’ in order to understand what it ‘is’ once it becomes a social practice.

My study therefore takes an epistemological approach that draws on ethnomethodology on the one hand, and on social studies of technology on the other. From a conceptual and methodological point of view, moving from the study of technology in itself (focus on ICT) to study of technology-in-practice (focus on a technologically mediated working practice) makes it possible to shed light on all the ‘invisible work’ (Star & Strauss, 1999) required of users so that a technology can become ‘usable’ in a given context of use.
Technologies are not born ‘usable’ and ‘reliable’ regardless of their users; on the contrary, they become such when use institutionalizes them as one ‘practice’ among others working practices (Suchman et al., 1999). The concept of technology-in-practice (Orlikowski, 2000) reflects the way with which its users have learned the interaction between humans and non-humans.

I shall describe how the patient, cardiologist, general practitioner, and the technological infrastructure constitute a context of local use that sustains the practice of ‘doing telecardiological consultation’ to the extent that all actively collaborate to ensure that the actions of each are aligned with those of the others, and that possible deviations are absorbed into the same organizational field. But the practice of ‘doing telecardiological consultation’ does not conclude with the single consultation; it also becomes embedded in the work practices of the hospital, the medical specialist and the general practitioner, and also of the patient (and his/her family) as an autonomous decision-maker who relates to an expert system organizing health care in a particular historical-cultural setting. Telecardiological consultation as a social practice is therefore anchored in other practices ranging from the medical practice of a certain hospital ward to the medical practices of wards connected with the latter. It involves nursing and administrative work practices; it extends to the management of social-health services on the ground; it concerns the legal validity of practices; it is incorporated into health care policies; and it is expressed as a cultural given.

In a very broad sense we may say that what ICTs do in systems of traditional work practices is to introduce distance, and that by doing so they create a system of knowledge fragmented and distributed among various actors (Bruni et al., 2007). Consider a telecardiological consultation and the plurality of human and non-human actors that interact to produce a diagnosis. The patient possesses the knowledge about his/her body and symptoms, the specialist physician has clinical knowledge that in this case is mediated by the new technological practice, and the GP has historical knowledge about the patient as well as that developed from familiarity with the new tools of mediation. Also involved is a technical infrastructure that is invisible when it works, but requires technical knowledge for its repair when it breaks down. The list could continue with the numerous bodies of knowledge that are activated in the interaction considered. However, for a simple telecardiological consultation to be a-problematic, all the human and non-human elements must have learned how to interact with each other, and all the bodies of knowledge must be aligned within a ‘new’ practice.

We may accordingly say that studying telecardiological consultation as a social practice requires the adoption of an interpretative model in which technology-in-practice is studied as an object emerging from a local medical ecology (Cicourel, 1999). My intention is to direct attention to the field of situated actions in which the new practices encounter and conflict with already-consolidated practices in which new actors and traditional actors negotiate their power relations, consumers make their choices, and the aggregate of constituted interests exert their influence. We may therefore turn our attention to the ecology of human and non-human actors (like technologies, laws, policies, institutionalized myths) that, if they are brought together, form a context of use, and if they fail in their alliances, give rise to a context of non-use or abandonment (Heath & Luff, 2000; Latour, 1996).
In the following sections, I shall introduce the methodological frame that goes by the name of the ‘practice-based approach’ and the research setting, then I shall describe telecardiological consultation as a social practice by analysing the emergent ‘object’ of the practice (practice from outside), how the practice springs from knowledgeable collective action (practice from inside), and the effects that the practice generates and supports in society (what the practice ‘does’). In the discussion I shall put forward an answer to the initial question – what telecardiological consultancy ‘does’ – to defend my main thesis that it is a sociotechnical practice that mainly performs a social function of reassurance.

A practice-based approach to technology

While theories of action assume a linear model of explanation that privilege the intentionality of actors, from which derives meaningful action, theories of praxis (Cohen, 1996) assume an ecological model in which agency is distributed among humans and non-humans and in which the relationality between the social world and materiality reconfigure agency (Latour, 2005) as a capacity realized through the associations of humans and materiality. Theories of practice are inscribed within conceptions that can be called ‘post-humanist’ in that they seek to decentre the human subject (Knorr-Cetina, 1997) and focus on relationships. A focus on social practice emphasizes the relational thinking based on interdependencies between subject and object, person and world, networks and society. They develop their properties only in relation to other subjects, social groups, or networks (Østerlund & Carlile, 2005).

Indeed, the sociological roots of the concept of ‘practice’ can be traced back to the work of Bourdieu (1990), Garfinkel (1967) and Giddens (1984) while its philosophical roots go back to phenomenology, Marxism, pragmatism, and the later Wittgenstein. In organization studies we witness a return to the study of practice that, according to Schatzki (2001) has common goals that can be summarized as follows: i) to go beyond problematic dualisms (action/structure, human/non-human), ii) to see reason not as an innate mental faculty, but as a practice phenomenon, iii) to question individual actions and their status as building blocks of the social.

A practice-oriented approach to technology, based on structuration theory (Giddens, 1984) has been introduced by Orlikowski (1992, 2000, 2002, 2007), whilst workplace studies (Heath & Button, 2002; Heath & Luff, 2000; Luff et al., 2000) are anchored in an ethnographic and ethnomethodological framework and seek to determine how the verbal, the visual and the material take shape through practice (especially discursive practices) during the production and coordination of interaction in technologically dense environments. Alongside these two strands of inquiry, the practice-based approach on which I rely has developed within studies on organizational learning that privilege a process conception of practising as knowing-in-practice in order to study knowledge not as an object but as a situated material and semiotic activity mediated by a plurality of artefacts and institutions (Gherardi, 2001).

It is important to employ a clearly circumscribed conception of practice when setting out to build a methodological framework able to guide empirical research. To this end I define practice as ‘a mode, relatively stable in time and socially recognized, of ordering heterogeneous items into a coherent set’ (Gherardi, 2006: 34). Within a workspace, a
stabilized way of doing things becomes a practice when it is institutionalized and made normatively accountable both for its practitioners and for those who view it from outside. For the empirical analysis of a practice, I propose three levels of analysis, the first two based on the distinction between objectivism and subjectivism (Bourdieu, 1990), or in Evered and Louis’s terms (1981) between ‘inquiry from outside’ and ‘inquiry from inside’, and the third one based on the distinction between production and reproduction.

When practices are read ‘from outside’, the inquiry concentrates on their regularity, on the pattern that organizes activities, and on the more or less shared understanding that allows their repetition. The recursiveness of practices is the element that enables both practitioners and researchers to recognize a practice as practice, that is, a way of doing sustained by canons of good practice (a normative accountability) and beautiful practice (an aesthetic accountability). Therefore a practice is such when it is socially recognized as an institutionalized doing (Gherardi, 2008). When a cardiologist tells a colleague that from 10 to 12 o’clock he will be ‘doing telecardiological consultancy’, the expression is intersubjectively meaningful as a specific work practice that is different from others not only because of the use of an IC technology but also because of the set of relations activated to produce that practice and to sustain its legitimacy and value. Hence knowledge about the practice is anterior to the practitioner who will put it into practice, that is, perform it as situated activity complying with the logic of the situation. In the section where I read teleconsultancy practice ‘from outside’, my knowledge interest will be driven by the following question: how does the object of the ‘telecardiological consultation’ practice emerge from the recursiveness of the activity? I shall assume that the goal, or the object, of a practice is not a telos that exists prior to that practice. It is not an end that directs the practice to itself. Rather, the object of the work, of every working practice, is emergent, and it is constantly defined and redefined during the activity.1

To do this I shall draw on and analyse a number of ‘repetitions’ of the same practice, my purpose being to construct a typology of uses and, on this empirical basis, deduce what are the objects of the practice and the organizational logic that governs the enactment of organizing networks. In fact, a reading of a practice from outside will enable me to compare the rhetoric of its use (associated with rapid intervention in emergency situations) with the situated uses that emerge from its being practised.

A second reading can be conducted ‘from inside’, that is, from the point of view of the activity that is being performed, with its temporality and processuality, as well as the emergent and negotiated order of the action being done. Seen from the inside, practice is a knowledgeable collective action that forges relations and connections among all the resources available and all the constraints present. Doing telecardiological consultation therefore requires knowing how to align two kinds of medical knowledge, an artefact (the ECG) representing the body of an absent patient, a technological system that receives and transmits communications, a gap that is filled, and therefore an action-net (Czarniawska, 2004) that is interwoven and deployed so that every element has a place and a sense in the interaction. From this definition it follows that knowing is a situated activity and knowing-in-practice is always a practical accomplishment.

Knowing is something people do together, and it is done in every mundane activity, in organizations when people work together and in academic fields as well. To know is to
be able to participate with the requisite competence in the complex web of relationships among people, material artefacts, and activities (Gherardi, 2001). Acting as a competent practitioner is synonymous with knowing how to connect successfully with the field of practices thus activated. In fact decontextualized knowledge – medicine in the present case – is a resource for action and practical reasoning; it is not the stock of knowledge that must be applied.

An empirical study that analyses practice from inside consists in the study of the practical organization of knowledge in the form of methods of seeing, listening, reasoning, and acting in association with human and non-human elements. In fact, objects and their material world can be construed as materialized knowledge and matter that interrogate humans and interact with them. To this end, I shall analyse the discursive practices that organize interactions in situation, my purpose being to show how practical reasoning is a mode of ordering and deploying the interweaving between knowledge and power (Foucault, 1980).

A third reading of practice relates to the reproduction of society and considers the social effects of a single practice in relation to its being practised within society. Ethnomethodologists talk of the inevitable reflexivity of practices to show that every practice creates its context. Bourdieu (1972) speaks of ‘circuits of reproduction’, that is, the reciprocal, cyclical relationships through which practice creates and recreates the objectified social structures and the conditions in which it occurs.

The relevance of this reading of technology as social practice is well exemplified by Schultze and Boland (2000: 195), who write that a careful study of ‘what people actually do’ (practice from outside in my terms) provides important inputs for system design, ‘but is inadequate for anticipating the long-term impacts of technology, i.e. its intended and unintended consequences’. These authors draw on Barbara Townley, who in turn paraphrases Foucault: ‘People know what they are doing, they know why they are doing it, but they don’t know what doing it does’. It is necessary therefore to analyse the circuits of reproduction of practices and I shall do it in order to examine the expected and unexpected consequences of technological practices, but above all to consider practices in their ‘doing’ of society. At this level I shall ask: what is the social effect of telecardiological consultation? And I shall integrate the two previous readings of practices viewed objectively and subjectively with reflection on the circuits of reproduction of the social (Table 1).

**Research setting and methodology**

The setting of the analysis is one of the most advanced private telecardiology centres in northern Italy, created in 1998. The centre uses the services of around 60 cardiologists (scattered around northern Italy) who examine electrocardiograms sent (online) by general practitioners (around 800). The general practitioner records the patient’s ECG using a portable apparatus (electrocardiograph), and the recordings may be made in the doctor’s surgery, or at the patient’s home, because the apparatus is not much bigger than a mobile phone and its memory is able to store around 10 traces, which can therefore be transmitted at a later time. The apparatus therefore allows both synchronous and a-synchronous communication. The patient’s ECG is transmitted via phone or mobile phone to the telecardiology centre, which sends it to the cardiologist and, on the same
telephone line, enables direct communication between the two doctors (in the case of synchronous communication). Once the call is over, the cardiologist signs the report and sends it by fax to the GP or dictates the report to the call-centre operator who sends it to the GP.

The patient may or may not be with the GP while his or her disembodied representation is floating through the air and arriving on the screen of the cardiologist’s computer. The absent patient is replaced by a non-human intermediary (the ECG) and by a human intermediary, the GP, which communicate the clinical information on the past history of the patient. Sometimes also the patient feeds his/her personal knowledge of his/her health or illness into the communicative network. The patient therefore may be non visible but not passive, and similarly the operators of the coordination centre are non-visible most of the time, especially when the technology works, but are active in orchestrating the interactions among clinicians and in staging the scene for the unfolding of the telecardiological practice. Clinicians, patients, operators, images and connecting technologies meet in the course of a virtual encounter that constitutes the space where knowing and collaborating take shape.

While administrative coordination is ensured by means of the coordination centre, which sustains a socio-technical infrastructure to carry on remote consultation, the daily coordination linking know-how and interrelated actions in a volatile environment is achieved by means of discursive practices. The virtual encounters in which clinicians, patients and operators of the coordination centre work together represent an organizational context in which coordination is less dependent on structural arrangements and more contingent on knowledge integration (Argote, 1999; Faraj & Xiao, 2006) and knowing-in-practice. Coordination in virtual encounters is mainly constituted by talk at work that manages the consequences of the distributed nature of work. In these volatile environments expertise coordination is achieved in discursive practices, and for this reason the methodology for the three-year-long research project was articulated in the following way:

- an ethnography of the telecardiological call centre was conducted in order to gain familiarity with the context, the technological infrastructure, and the work done at that workplace;

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<th>Table 1. A practice-based theoretical framework</th>
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ethnographic interviews were conducted with cardiologists working from home;
• a couple of focus groups were conducted with GPs to evaluate their satisfaction with the system;
• the phone calls made to the centre in the course of a year were recorded and became the focus of analysis for the present article, while previous moments were considered as background knowledge.

An ‘average’ month from a year of recordings was selected, and the analysis that follows is based on the results of listening to and analysing the transcripts of all the telephone calls (recorded by the centre for reasons of legal accountability) made in one month for a total number of 1052 calls.

If we consider telecardiological consultation as ‘one’ practice within medical practice with an opening and a closure, we may say that the researcher is able heuristically to isolate this practice from its interconnections with the other medical practices and therefore to analyse the activities within a practice from its beginning to its end, and see how the object of the practice takes shape. Considering that the average duration of a conversation was around two and a half minutes, it was possible to analyse a considerable number of reiterations of the same practice in its natural setting. To my knowledge, no previous research in the area of practice-based studies has drawn on such an extensive base of empirical observations.

Practice ‘from outside’

Out of 1052 telephone calls, which represented the average amount in one month, we analysed the 638 that we deemed ‘valid’: those, that is, in which the interaction was complete and comprised the entire sequence of the telecardiological consultation. It is interesting to note, however, that the residual figure consists of the calls that were not completed, for which the main reason was technological failure – that is, the absence of a good reception/transmission connection. This event revealed the presence and the fragility of the infrastructure. As Star (1999) argues, the main feature of infrastructures is that they are invisible as long as they work, but they constitute a problem for specific organizational practices. In our case, we can quantify interference by the infrastructure in the ‘normal’ performance of the practice at around 36.2 percent of cases. In other words, around one telephone call in every three had to do with a problem concerning the infrastructure supporting the practice, not the practice itself. This is not only a good measure of the ‘invisible work’ necessary to make new technologies function effectively in their support of work practices; it also conceptually directs attention to the ‘work needed to be able to work’ (i.e. articulation work).

When we consider the reason for initiating the telecardiological consultation, some 55.2 percent of the 638 telephone calls were classified as ‘routine’ (for certificates of good health or the monitoring of chronic patients), and 44.8 percent as ‘problematic’ (the patient had manifested or reported symptoms indicative of serious cardiological problems, or symptoms different from those normal in patients being treated pharmacologically for those same problems). This is a first significant finding in answer to the question ‘What does telecardiological consultation “do” when it becomes part of
medical practice?’ We may deduce from this first finding that its prime purpose is not to deal with problematic cases or urgent cases as the rhetoric portrays it. Moreover, routine situations are certifications that, in the absence of telecardiological consultation, are done on the basis of the doctor’s direct knowledge of the patient. When chronic patients are monitored, telecardiological consultation acts as a second opinion that requalifies the GP’s work. In both cases telecardiological consultation somehow change medical practice.

If the outcomes of the telecardiological consultations are examined in detail, they can be divided into four different categories (Parolin, 2006):

- 51.6 percent of the conversations concluded without clinical action being taken. Belonging to this category were both assessment of the patient (sometimes, but not but not always based on the artefact representing him/her, the ECG) that did not suggest cardiological problems, and conversations that led to a slight adjustment (if this was not accompanied by further tests) of the ongoing therapy;
- 30.3 percent concluded with the prescription of further tests;
- 9.6 percent of consultancies concluded with dispatch of the patient to an Accident and Emergency ward;
- 8.5 percent of telephone calls concluded without technical consultancy because the trace could not be assessed or was deemed not important.

We may therefore ask how the object of practice emerges, and whether it corresponds to the rhetoric depicting its advantages. First, we can see that its use is not primarily tied up with problematic situations, but rather with routine ones. In fewer than 10 percent of cases did it furnish evidence of a ‘serious’ situation that required the patient’s hospitalization (we shall see this in detail below). Moreover, evident here is one of the main functions of telecardiological consultation, that of acting as an organizational filter for A&E wards: the patient is reassured about his/her state of health by the GP, who also has the legitimation of the specialist, and is directed towards particular examinations or dissuaded from presenting him/herself to the hospital as an ‘urgent’ case. The object of the practice is therefore threefold: it has to do with the clinic (monitoring), with the organization of the health care service (filter), and with regulative accountability (certification).

All together, these data on telecardiology-in-use tell us that that it furnishes ‘objective support’ for the GP’s judgment, which is now based on instrumental evidence and which goes along with the rhetoric of evidence-based medicine (i.e. it also brings legitimacy). The good health certificate issued on the basis of knowledge of the patient is now backed by objective evidence. Likewise the prescription of the pharmacological therapy, or its alteration, is anchored in the cardiological report. We may accordingly say that the telecardiological consultation reassures both the patient and the GP, who can thus be considered on a par with a user of the service. And we can also say that it functions as a mechanism that keeps patients out of hospital while trying to extend medical practice outside the hospital (Nicolini, 2007).

These data confirm the finding of previous research conducted in other countries (Constantinides & Barrett, 2006; Molinari et al., 2002; Scalvini et al., 2001; Shanit et al., 1996), namely that the main effect of telemedicine is organizational in
nature – eliminating unnecessary hospitalization and the needless overcrowding of emergency wards – whilst its secondary function is clinical in that it improves prevention and treatment.

Apparent in the demand for telecardiological consultation is the convergence of three logics of action. From the hospital’s point of view, it is a notable ‘labour-saving device’ because it reduces the number of so-called ‘improper referrals’. From the patients’ point of view, it is a simple and rapid solution to preoccupations about their health and the correctness of their therapy. From the GPs’ point of view, it provides an opportunity to offer (and charge for) an innovative service to their patients, and therefore to upgrade their professionalism by means of direct interaction with specialists, and to draw on a larger body of evidence in their decision-making.

We shall gain better understanding of how these three organizing logics work together, and get all the objects, technologies and health service departments to function, when we have analysed the practice from inside as a knowledgeable collective action.

**Practice ‘from inside’: Unhampered situations**

Practice ‘from inside’ is defined as a recursive knowledgeable collective action, and in teleconsultancy it is a collective action performed through discursive practices within a virtual encounter. I now analyse the sequence of speech acts in a non-problematic telephone call, a situation that accounted for almost half of the situations.

The form of the interaction was highly standardized, owing to the protocols used in cardiology (and that, therefore, standardized the data and the criteria to which the two doctors referred), and to the ICT mediation that requires the cardiologists to compile a patient-file for each ECG examined, and therefore to ask the GP standard questions in a largely standard sequence.

Telecardiological consultation is much used to certify good health. This situation configures very brief telephone calls, whose outcomes are almost always taken for granted (there was not even one problematic call in our sample). The interaction is confined to the context of practice, and all opening and closing moves dictated by courtesy (i.e. by a general social practice) are removed and contextualized in the ‘colleagueship’ relationship between doctors (e.g. the use of informal ‘tu’ even between people who do not know each other). An example follows:

GP: Hi, it’s me.
C: [gives his surname]
GP: How, how are you? Hi . . .
C: Fine.
GP: Good, listen, I don’t known if the ECG arrived properly because it’s a seven-year-old boy.
C: Yes, everything’s fine.
GP: It’s only . . . he . . . he wants to join a football club.
C: Everything’s okay, physiological sinusal arrhythmia, everything’s okay.
GP: Good.
C: I’ll send it to you.
GP: Yes, thanks, ’bye.
C: ’Bye.

Telephone call 1 (0:43)

The duration of this call is 43 seconds, and the exchanges are reduced to the minimum. Also the forms of knowledge mobilized are simple: the GP brings to the interaction his/her knowledge of the ‘patient-as-child’ and of the technology, which may not produce a good-quality trace when the electrodes are attached to a small thorax. The cardiologist contributes his/her expert knowledge by reading the trace. The outcome of the interaction takes material form as a certificate signed by the cardiologist and therefore materializes professional competence in segnic form by assuming responsibility for statements concerning a third party. And now we can imagine how the certificate, as a material-semiotic artefact, enters a wider field of practices and what it ‘does’ as an affiliative object (Suchman, 2005) that associates humans and non-humans.

The certificate activates the relation between family and GP, and between the former and the football club, which requires a medical certificate before it will accept a new member. We can consider that the football club is more reassured about the admission of its new healthy member, and more accountable in case of an incident, if it can prove its thoroughness. Further relations are established with institutions: for example the local health authority, or the body that supervises the administrative practices of sports clubs (that may take the certificate as an accountability standard) and that may also provide them with funding. The availability of telecardiological consultation changes not only clinical practices but administrative ones as well. This example shows that a practice is always inserted into a ‘texture of practices’ (Gherardi, 2006) by a system of referrals and connections in action that also activate network learning.

When situations are not problematic, the interactions follow a pattern in which the GP’s first turns construct the scene, almost simultaneously introducing, and in an interwoven way, both the patient and the reason for the telephone call. What the GP does through his talk-in-situation is perform a narrative that represents to the expert the absent patient and the context of the interaction. This story becomes the affiliative object (the intermediary) between the two clinicians and associates with the graphic representation of the patient, which thus becomes disembodied and also invisible.

If we analyse telephone call 1 in terms of discursive practice we can distinguish among what is said, what is meant, what is done, and what the doing does (Table 2).

In the following turns, what the cardiologist does in the interaction is to read the ECG aloud so that the artefact representing the absent patient is made present in the interaction. The invisibility of the ECG to the GP is replaced by a vocal intermediary. When the cardiologists were asked why they thought aloud while reading ECGs, it was discovered that the reason concerned the social sustainability of the relation in the distance interaction: whilst physical co-presence makes what is being done reciprocally visible, in the absence of visibility the co-presence must be maintained through the voice. Even if the verbal exchange may have an informative purpose, the GP is unable fully to understand the sense of the fragmented reading made by the cardiologist.
Finally, there is a further element of invisibility in this virtual encounter, because when the GP leaves the conversation, it continues between the cardiologist and the operator at the coordination centre to whom he is dictating the report, which will then be faxed to the GP. This type of backstage phone call will be analysed below, but here it is well to have a complete picture of the various forms that invisibility assumes in these three settings where the virtual encounter takes place: the patient is not visible to the cardiologist and is represented by an intermediary; the ECG is not visible to the GP and is represented by the thinking aloud of the cardiologist; doctors and patients are invisible to the coordination centre operator, and they are represented, besides the ECG, by another affiliative object, a form on which the cardiologist and operator collaboratively inscribe the reason for the call and the actions undertaken following the consultation. A final kind of invisibility is given by the technological system that materially anchors the interactions, both making them possible and restricting their expressive forms, but that is transparent when it works and conceals the collective and cooperative work necessary to make it function. This is the articulation work (Corbin & Strauss, 1999) necessary both to understand ‘work that gets things back “on track” in the face of the unexpected’ and to understand when information systems work or not (Schmidt & Simone, 1996).

Practice ‘from inside’: Articulation work in hampered situations

In discussing the situations defined as ‘hampered’ I shall analyse the subsample of consultations whose outcome was the patient’s dispatch to the A&E and illustrate the articulative process by which the interorganizational network extended to include the hospital. It

| Table 2. The analytic framework applied to phone call 1 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| What is said | What is meant | What is done | What the doing does |
| GP: (...) I don’t know if the ECG arrived properly because it’s a seven-year-old boy | The transmission of the data may be unclear when the patient’s thorax is narrow | Re-presenting the absent patient in a clinical narrative | Objectifying the patient. Makes the infrastructure supporting the interaction visible |
| GP: (...) it’s only ... he ... he wants to join a football club | The patient is a healthy seven-year-old boy. The reason for the GP’s call is to obtain a certificate | Activating a relationship between institutions | Legitimise professional authority and its accountability |
| C: Everything’s okay, physiological sinusal arrhythmia, everything’s okay | I do not see anything suspicious | This is a ‘thinking aloud’ performance in which C reads the inscription of the patient into the artefact representing him | Produce a professional judgement and assert jurisdiction over the knowledge thus produced |
should be borne in mind that the percentage of dispatches to hospital was very low. This datum has a twofold meaning. On the one hand, it represents a further aspect of invisibility. In fact, the hospital was ever-present though invisible in these virtual encounters; it was an indirect actor in that the patient was not sent and the telemedicine service performed its task as the hospital’s filter, freeing it from cases that did not require its services. The meaning that it assumed in the remaining cases, those in which the filter allowed the patient to pass, is highly varied, and it is illustrated by the typical phone calls below.

In one month of telephone calls, we encountered only one case in which an emergency arose (telephone call 2):

[Greetings]
GP: I sent that trace, right? It’s one of my patients, last night I mean two nights ago, he had an... he suddenly started vomiting profusely, right? [presumably the patient is present]... intense vomiting, and the reason I’m calling is that he also had pains in the chest which were probably only due to the strain of vomiting... he’s hypertensive.
CC: Doctor Gallo, the trace has had a heart attack!
GP: I see.
CC: You’ve got to send him immediately [to A&E].
GP: I see, I’ll call...
CC: He’s had a minor heart attack, but you should send him to Accident and Emergency immediately.
GP: OK, right, I’ll do that.
CC: I’ll send the reply straight away to them [to A&E] so that we don’t lose any time.
GP: Alright, I’ll call the ambulance now.
[Salutations]

Telephone call 2 (2.13)

This interaction is a particular case of organizing set in train by a rare case of real emergency. The cardiologist sends the ECG trace directly to the hospital in order to accelerate the patient’s admission, accompanying it with a clinical report that certifies the urgency of the admission. In this case, the cardiologist assumes direct responsibility for the decision. It should be noted that, in order to mobilize his authority, he abandons the colloquial register between colleagues with which the conversation began and addresses the GP by surname, using his professional title, and mobilizing his authority. In conversation analysis this change in prosody is called ‘key’ and signals a re-framing of the interaction (Gumperz, 1989). Moreover, he does not conclude the telephone call until the GP expressly states that he will call an ambulance. A curious feature is the personalization of the artefact, which ‘has had a heart attack’: the object thus takes the place of the patient.

This phone call is also particular because it represents a rare case of asymmetry in the negotiation of authority between the two clinicians. Given that this is a consultation, the authority (and the responsibility) to decide what to do falls within the GP’s jurisdiction,
but the cardiologist’s status is superior. Moreover, his judgement is a professional judgment certified by one of the non-human intermediaries of the virtual encounter: the report signed by the cardiologist. The telephone call that follows simultaneously illustrates the dynamics of authority negotiation, dialogue coordination, and the most frequent reason for sending a patient to A&E, namely management of the legal responsibility for care:

[Greetings]
GP: Patient with evening precordialgia which spreads through the arms. In 1999 two heart bypasses, therapy with [...] , what do you say?
[Loss of connection]
[Again, loss of connection]
C: The ECG is normal, except that, because it’s a patient with two bypasses, in my clinical experience I’d send him for an examination anyway . . . I usually send them to A&E . . . but tell him to try taking trinitrine if the pain persists, and if it goes, it’s angina.
GP: Why only in the evening?
C: I can’t say . . . how long does it last?
GP: [acting as intermediary between patient and specialist] About an hour, and he sweats a bit; the pain is like when he had the bypass fitted, and it mostly affects the arms.
C: I’d say that a normal ECG in a case of angina doesn’t protect you at all . . . I’d send him to A&E . . . send him to A&E . . .
[Salutations]

Telephone call 3 (3:25)

I shall focus on the last sentence, in which the ECG ‘does not protect’ the GP. This reminds us that one component of medical competence is knowing how to deploy the authority, authoritativeness and legal responsibility deriving from exercise of a profession. This apparently simple telephone call illustrates how clinical knowledge is activated, and how the decision to send the patient to Accident and Emergency is taken in order to give legal protection to the profession. This is a case of what is now called ‘defensive medicine’.

One notes a trajectory in activation of what we may call a ‘diagnostic community’, a process facilitated by the following: the knowledge of the patient, who not only experiences and reports the symptoms but also sets them in relation to past experience; the GP’s clinically based knowledge; the cardiologist’s instrumentally based knowledge, and his knowledge grounded on experience, although he cannot explain it; and the absent actor – Accident and Emergency – which is virtually present and is assigned responsibility for the actual medical diagnosis. The network of practices in which the patient is hospitalized is activated within these few minutes, and it is in this space-time that the organizing takes place.

This case also illustrates a method widely used to manage the asymmetry between cardiologist and GP. The decision to send the patient to the emergency ward, or not to
send him, or to change his therapy, pertains to the GP, so that the GP formally uses the cardiologist’s specialist knowledge as a resource in the diagnostic and decision-making processes. The interaction between the two doctors evinces the cardiologist’s awareness of the asymmetry between those who possess the authoritativeness of expert knowledge and those who possess professional authority and responsibility. One notices that the cardiologist initially assumes a consultative role, in which he suggests a line of action legitimated on the basis of experience and what he habitually does in such situations. There ensues a moment of doubt between the two doctors as they look for an alternative course of action and obtain further knowledge from the patient. But then the cardiologist introduces an item of non-medical information into the interaction, in order to remind the GP of his legal responsibilities and to provide a defensive rationale for the medical profession. At this point the cardiologist abandons his consultancy role and explicitly tells the GP to send the patient to Accident and Emergency.

In the network of practices thus activated, Accident and Emergency is mobilized as a resource or a potential ally both in the care trajectory and in the management of social and legal responsibility for the doctors. The patient’s dispatch to hospital marks the conclusion of a dual line of reasoning: on the one hand, it is preferred to delegate a situation that may produce legal responsibilities for the hospital; on the other, a clinical and instrumental picture raises suspicions and therefore requires further checks. And we can see the complexity of defining the situation in relation to the negotiation of professional authority and power as highlighted in the following telephone call (Telephone call 4).

We should note that one of the main decisional criteria – and one of the items of information most frequently asked for and given during the conversations – concerns so-called ‘typical’ pain. Apparently, all GPs and cardiologists know very well what such pain is, and also the man in the street has a pretty good idea. But we now instead see a ‘situated’ definition of typical pain:

Line 1, GP: I’ve sent this gentleman’s ECG, this morning he felt, he complained of a stenocardia, a stenocardic pain of brief duration, it could be also typical because the patient has numerous risk factors.
[The cardiologist verifies the risk factors, diabetes, smoking, etc.]
Line 5, CC: Yeah, hell, he’s sitting on a time bomb!
Line 7, GP: Now the pain has subsided somewhat.
CC: Somewhat or completely?
GP: No, no, the pain’s gone [repeats it twice more].
CC: Was it a typical pain in the centre of the chest or?
GP: Yes, yes, no, no, maybe a major stenocardia, but let’s say . . .
CC: Now, if the pain lasted only a few minutes I wouldn’t worry, if instead it persisted for some time I think enzymes are due.
GP: Yes, yes, but as I said, it lasted only a few few minutes, so . . .
CC: And how long did it last altogether?
GP: It lasted more or less 10 minutes or a quarter of an hour, yes, yes.
[The next four speech turns centre on the ‘major’ pain and whether it was in the centre of the chest]
Line 20, CC: Now look, the decision is a difficult one in the sense that the clinical history couldn’t be worse.
Line 29, CC: . . . the enzymes . . . I said so before, because if the pain lasts more than 20 minutes, you’ve got to be very careful. If we’re sure it lasted 10 minutes, the enzymes won’t tell us anything, so, so what would I advise? . . . Good sense says that because the trace is anomalous, something must be done . . . because a patient with a pain he’s never had before, with a pathological ECG, I’d recommend at least a period of observation.

GP:  Let’s see . . . maybe we could wait and see if it happens again?
CC:  Because unfortunately this gentleman is at absolutely high risk.
GP:  Ah, that’s for sure.
CC:  If he were . . . a patient of mine I’d recommend clinical observation in hospital because of these previous episodes.
GP:  Yes, let see for a while, consider things . . . he’s not very . . . keen . . .
CC:  Keen (interrogative tone) . . . ah, I understand.

Telephone call 4 (9.14)

This telephone call is significant because it is the only one in which the two clinicians do not reach agreement, and the call terminates when the cardiologist stops insisting because he realizes that the patient is not ‘keen’ to go to hospital. Generally (consider telephone call 2), the cardiologist does not terminate a call until he has the GP’s confirmation (explicit, but also tacit) of the action that he will take, especially if his advice is to send the patient to A&E. Likewise, the GP habitually heeds the ‘authoritative’ advice given, largely in indirect form (‘In your place I’d do’; ‘here we do it like this’; ‘it suits you to do’), but one understands from this telephone call that also patients participate in the decision-making and may disagree with both cardiologist and GP. When one then reads (and mainly listens to) the transcript of the telephone call between the cardiologist and the call centre operator, one grasps – from the hesitation and the tone of voice of the cardiologist’s – his annoyance at the beginning of the conversation and later his choice to close the situation as ‘a normal’ case without any further comment (telephone call 5, dictation of the report):

Operator T: Yes?
CC:  What great traces guys! So . . . dammit . . . dammit! Sinusal rhythm . . . (the dictation begins, and then stops).
T:  Yes?
CC:  . . . (long hesitation) ECG performed for typical pain, A&E recommended.

Telephone call 5, report dictation (0.33)

This report dictation shows how in the third setting considered, the one in which the invisible work making distance consultation possible is performed, the communicative circuit is closed through an a posteriori rationalization that ‘pigeon-holes’ the situation within the categories anticipated by the accounting software.
Telecardiological consultation as a social practice

What kind of social practice is telecardiological consultation? What can we see when we look at the circuit of its reproduction? What does ‘doing’ it do? In the previous sections I have already illustrated what telecardiological consultation ‘does’ as a working practice: it mobilizes intermediaries in order to fill the distance and the invisibilities between the Centre, clinicians and patients, and it associates a diagnostic community. I shall now reflect on the social effects of the telecardiological consultation and read this practice in its ‘doing society’. I shall start from the encounter between two logics of practice in the patient/doctor relationship.

When someone goes to a doctor they usually have a simple expectation: they hope that the doctor will tell them that they have nothing to worry about, that their symptoms are not alarming; or if they have some form of chronic disease, that it is manageable. The expectation of being reassured about their health not only affects the state of mind with which patients contact the health professionals, but it is also a macro-social factor in the growing demand for health care in the Western countries. A health professional, on the other hand, has been trained to formulate diagnoses according to the principle that it is worse to declare a sick person healthy than the other way round (Berg, 1995; Rosenhan, 1973). Although they have an interest in common, the logic of practice of the patients is informed by a need for reassurance, while that of the doctors is more concerned with a search for proof; and if instruments or tests are available to bear out the initial hypotheses, they will presumably be used in the search for confirmation/non-confirmation of the disease. Against this background, I start by considering how the medical code of ethics and the logic of medical practice treat reassurance, and how the clinicians involved in my case study reacted to my interpretation of telecardiological consultation as a reassurance device.

When reassurance struck me as an important interpretative category, I decided to ask health professionals for their views on this commonsense construct. I was surprised by the similarity in their opinions on reassurance, of which they had a negative image based on an opposition between reassurance and professionalism. The latter they described using verbs like verify, exclude, inform, and similar, which expressed a search for certainty. Reassurance they saw as involving a minimization of the problem, a distortion of information, a ‘mother/child’ maternal relation, so that it pertained to the private rather than the professional sphere. They preferred the concept of information to reassurance because unlike reassuring, the action of informing establishes an adult/adult relation and inserts distance – and therefore professionalism – into the relationship with the patient. The negative image is also extended to the patient ‘who needs to be reassured’. In this case, s/he is defined as either a hypochondriac or as a troublesome person.

I found that ‘reassurance’ was not a word current in the medical vocabulary of the people that I interviewed. Their denial or minimization of this dimension can be understood also in relation to their professional vision. In fact, the scientific literature on medical practice and reassurance also treats reassurance in negative terms. In the mainstream medical framework, medical reassurance (Coia & Morley, 1998) aims at reducing patients’ illnesses rather than curing sufferers’ diseases. Patients’ illnesses correspond to a set of cognitions about disease and how patients feel in response to their disease cognitions constitutes the emotional component of illness. Consequently, changes in the
cognitive and emotional components of illness representations are both the targets of medical reassurance and the content of patients’ responses. Reassurance is commonly put in relation with cognition and emotion, and the authors conclude that, as currently practised, medical reassurance does not take into account the demonstrable psychological complexities of patients’ illnesses and the persuasion process. These authors conclude that medical reassurance, as currently practised, is both empirically ineffective and theoretically contraindicated.

Other telemedicine schemes can be read in similar terms. In England, for example, a rhetoric accompanying NHS Direct (a 24-hour telephone helpline established to provide health advice) has been that it empowers citizens to gain control over their own lives (Greatbatch et al., 2005; Hanlon et al., 2005, 2006). However, the evidence suggests that the effects have been a reduction in general practitioner workload out-of-hours, but with no effect on attendances at A&E services, and a shift of responsibility to the population rather than enhancement of their control (Munro et al., 2000). Whilst empowerment is socially considered ‘a good thing’, reassurance is not. O’Cathain et al. (2005: 1769) who studied the effect of NHS Direct found that ‘the act or state of being dependent is part of what it is to belong to a community, marking out and defining humanity, callers felt reassured that NHS Direct was there for them, when they could not get hold of a doctor or when they needed support in a distressing situation’. They concluded that NHS Direct contributed to a shift of responsibility to the population in some respects, as well as enhancement of their control, although not always in ways intended by the service. In fact, the sense of being cared for is not synonymous with being empowered. Quoting Sennett (2003), who takes issue with the assumptions in Western societies that to be dependent is to occupy a negative state, the authors assert the importance of being cared for – an aspect that the rhetoric of empowerment cannot face.

Owing to their professional education it is not easy for clinicians to see reassurance as a social practice in its material and organizational manifestations, and not as a feeling or a pathology. On the contrary, I conceptualize reassurance as a social practice performed through situated interaction, involving not only persons but also a technological infrastructure. Therefore a sociological and organizational definition of reassurance sees it as the effect of a situated activity, a collective accomplishment achieved within a network of personal, organizational and institutional relations that mobilize people, technologies and knowledge in response to a demand – individual and collective – for the exclusion or amelioration of a justified fear. Reassurance can therefore be seen as something that is ‘done’ within a socio-technical ensemble and the availability of a new technology redefines the previous socio-technical network. When I analysed practices ‘from within’ I was able to illustrate the knowledgeable actions through which reassurance is performed.

In the phone calls previously analysed, reassurance does not consist solely in a logic of action that induces the patient to ask for an ECG, or the GP for a specialist’s opinion on the monitoring. Also the football club (telephone call 1), by asking for a certificate with an ECG attached, wants to be reassured. We have also seen how the doctors (GP and cardiologist) seek reassurance when they use the telecardiological consultation to send the patient to A&E (telephone call 3) and to offload possible liabilities. The demand for reassurance allies with the ease of obtaining the artefact; the health care system discovers the advantage of lightening the workload of the A&Es, the cardiologists increase their
working hours and fees by working for the telecentre; and the network of socio-material relations expands. Paradoxically, as Illich (1982) noted, the availability of diagnostic instruments increases demand, with predictable increases in health service costs. The new technologies in health care, among them telecardiological consultation, may feed into this simple dynamic between the doctor’s and the patient’s expectations and give rise to unexpected consequences. One of these is that, as the telecardiological consultation enters into use, it is inscribed more in the socio-technical practice of reassurance than in the medical practice of preventing and coping with emergencies.

Conclusions

My intention in this article has been both methodological and substantive. I have sought to contribute on the one hand to the development of a practice-based framework for the study of ICT-mediated working practice, and on the other, to the understanding of telecardiological consultation as a material-semiotic practice that mobilizes practical knowledge within an action net.

By describing a practice from three perspectives (from outside, from within, and as a social practice) the theoretical framework has enabled me to argue that telecardiological consultation, when it is read ‘from outside’, has three main situated uses: it has to do with the clinic (monitoring), with the organization of the health care service (filter), and with regulative accountability (certification). It is a practice performed at the convergence of three logics of action: from the hospital’s point of view, it is a notable ‘labour-saving device’ because it reduces the number of ‘improper referrals’ and their costs; from the patients’ point of view, it is a simple and rapid solution to preoccupations about their health and the correctness of their therapy; from the GPs’ point of view, it provides an opportunity to offer (and charge for) an innovative service to their patients, and therefore to upgrade their professionalism. Telecardiological consultation produces a reassurance effect for the patients, who can now request a new service, for the GPs, who receive a second opinion, and for other organizations as well.

In fact, when the same practice was read ‘from inside’, one saw how organizing is discursively achieved by the mobilization of intermediaries that overcome the various sources of invisibility within the virtual encounter among the centre, the patient, the GP and the cardiologist. Intermediaries like the ECG, the voice, the partial communications, the forms and the technological infrastructure, acted as affiliative objects that activated interconnections with other practices within other organizations. This kind of practical knowledge had been learned during interactions and negotiations with professional authorities. It was a kind of articulation work that acted at a distance in wider action nets. These action nets were more or less ‘visible’ when the discursive practices in the telephone calls were analysed. Two main kinds of action nets were described. There were those activated by a certificate of good health supported by an ECG that associated sport organizations (or similar demands) and families within a sort of public reassurance of responsible organizational conduct. This kind of affiliative object links together a non-problematic network for reasons of accountability. The activation of the other kind of action net was more problematic because it was prompted by the need to solve ambiguous situations. Generally, the decision-making process concerned whether to send the
patient to the A&E, and the virtual encounter became open to a new and important actor. Reading the practice from inside showed how the practical knowledge of those involved switched between clinical considerations on the state of the patient and the meaning associated with the ECG to considerations concerning the practice’s legal accountability (defensive medicine). The possibility of calling the hospital ‘inside the practice’ and giving it final responsibility worked as a reassurance mechanism for all the actors involved in the virtual encounter.

When the same working practice was read in terms of its contribution to the reproduction of society (‘what the doing does’), we could see how, by changing pre-existing medical routines, it was more a social practice of reassurance than a medical intervention intended to prevent or to deal with emergencies.

More generally, this article contributes to the study of social interaction in distance work, and to the study of practical knowledge as a collective activity within an ecology of humans and non-humans through the proposal of an analytic framework.

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Notes

1 Activity theory has made a major contribution to the conception of the object of activity as an emergent object (Engeström, 1999). As conceptualized in cultural-historical activity theory objects of activity are simultaneously: given, socially constructed, contested, and emergent (Blackler et al., 2003).

2 Our research group – Rucola [www.soc.unitn.it/rucola] – contributed to development of the recording software so that it could serve as a useful research tool as well. The recordings were transcribed by a young doctor specializing in general medicine, Irene Toller (who wrote her dissertation on the role of the GP in telemedicine), and a sociologist – Laura Lucia Parolin – a doctoral student in Information Systems and Organizations, who wrote her dissertation on this topic. I am indebted to both of them for their valuable assistance. And I am also indebted to Attila Bruni, who spent time at the coordination centre making the ethnographic observations that provided the background knowledge for the analysis of the phone calls.

3 ‘Interference’ consisted of technical testing of the system or calls that failed because cell phones were used, or various events that we may label ‘technological failures’.

4 Moreover, in a large number of cases teleconsultancy performs the function of ‘reallocating’ patients to the medical service that they actually need.

5 The examples provided have been translated from Italian, and unfortunately the prosody is lost in translated texts. For this reason, the transcripts do not comply with the conventions of conversational analysis. There are numerous methodological problems relative to translation from one language to another when discourse analysis is to be conducted. I do not discuss these problems here, merely pointing out that I am aware of them and that I analyse conversations mainly for the purpose of analysing discursive interactions.

6 The length of the phone call is reported in brackets when the call is analysed in its entirety. It is not reported when only excerpts are used.
A field of practices arises in the interwoven texture that connects practices to each other. This texture is held together by a certain number of practices that provide anchorage for others. Texture is a strongly evocative concept that recalls the intricacies of networking but at the same time allows for an analytical, qualitative, framework (Strati, 2000). The key to understanding texture is the idea of ‘connectedness in action’, an endless series of relationships that continually merge into each other.

I am grateful to an anonymous reviewer for directing me to this literature, so relevant to my topic here and that strengthens my claim that one of the main effects of telemedicine in the developed countries concerns the theme of care, not of cure.

Bijker (1995: 274) states that whenever we consider a ‘socio technical ensemble’ we should be able to spell out the technical relations that go into stabilizing that institution, that is, the construction processes of artefacts, facts and relevant social groups.

References


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